## H-4. Disbursement Schedule of Project Cost

The implementation schedule for the project is prepared on the basis of the major works and is shown in Figure H-4. The disbursement schedule of project cost based on the project implementation is estimated in Table H-2 and H-4 ~H-9.

## H-5. Cost of Operation and Maintenance

The equipment for operation and maintenance will be newly furnished. List of equipment to be procured for O & M use is shown in Table H-16, while annual O & M cost is estimated in Table H-20.

## TABLE H-1 : SUMMARY OF PROJECT COST

- Unit: ฿1,000 -

| Cost Item | Lam Se | Huai Khum Kham | Huai Kham Phak Wan | Huai Na Khai | Huai Soob | Total |
|---|---|---|---|---|---|---|
| Preparatory Work | 2,574 | 2,574 | 1,872 | 2,574 | 1,872 | 11,466 |
| Dam | 67,188 | 102,277 | 89,163 | 126,570 | 107,176 | 492,374 |
| Canal | 40,564 | 134,177 | 37,943 | 77,220 | 64,032 | 353,936 |
| Overhead, Profit and Taxes | 15,159 | 32,842 | 17,722 | 28,354 | 23,781 | 117,858 |
| Sub-total (1) | 125,485 | 271,870 | 146,700 | 234,718 | 196,861 | 975,634 |
| On-farm and Village Pond | 11,660 | 25,569 | 9,383 | 19,994 | 9,656 | 76,262 |
| O & M Equipment | 1,510 | 3,668 | 1,402 | 2,912 | 1,295 | 10,787 |
| Land Acquisition | 6,024 | 6,607 | 1,203 | 9,576 | 1,953 | 25,363 |
| Survey and Investigation | 3,156 | 3,506 | 2,812 | 4,217 | 3,068 | 16,759 |
| Administration | 3,310 | 7,171 | 3,869 | 6,191 | 5,192 | 25,733 |
| Consulting Services | 9,245 | 22,452 | 8,585 | 17,830 | 7,924 | 66,036 |
| Sub-total (2) | 34,905 | 68,973 | 27,254 | 60,720 | 29,088 | 220,940 |
| Base Cost (1 + 2) | 160,390 | 340,843 | 173,954 | 295,438 | 225,949 | 1,196,574 |
| Physical Contingencies | 16,039 | 34,084 | 17,395 | 29,544 | 22,595 | 119,657 |
| Price Contingencies | 25,813 | 55,639 | 27,185 | 53,661 | 38,849 | 201,147 |
| Project Cost | 202,242 | 430,566 | 218,534 | 378,643 | 287,393 | 1,517,378 |

## TABLE H-2 : SUMMARY OF DISBURSEMENT SCHEDULE

- Unit: ฿1,000 -

| Cost Item | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Preparatory Works | - | - | - | 11,466 | - | - | - | - | 11,466 |
| Dam | - | - | - | 49,191 | 229,182 | 172,667 | 41,334 | - | 492,374 |
| Canal | - | - | - | - | 42,536 | 155,859 | 127,290 | 28,251 | 353,936 |
| Overhead, Profit and Taxes | - | - | - | 8,334 | 37,335 | 45,139 | 23,169 | 3,881 | 117,858 |
| Sub-total (1) | - | - | - | 68,991 | 309,053 | 373,665 | 191,793 | 32,132 | 975,634 |
| On-farm and Village Pond | - | - | - | - | - | 34,959 | 33,891 | 7,412 | 76,262 |
| O & M Equipment | - | - | - | - | - | - | 5,394 | 5,393 | 10,787 |
| Land Acquisition | - | - | - | 9,549 | 10,031 | 5,783 | - | - | 25,363 |
| Survey and Investigation | 8,379 | 8,380 | - | - | - | - | - | - | 16,759 |
| Administration | 1,287 | 1,287 | 2,573 | 5,146 | 5,146 | 5,146 | 3,861 | 1,287 | 25,733 |
| Consulting Services | - | 10,995 | 13,178 | 4,173 | 10,838 | 11,431 | 10,691 | 4,730 | 66,036 |
| Sub-total (2) | 9,666 | 20,662 | 15,751 | 18,868 | 26,015 | 57,319 | 53,837 | 18,822 | 220,940 |
| Base Cost (1 + 2) | 9,666 | 20,662 | 15,751 | 87,859 | 335,068 | 430,984 | 245,630 | 50,954 | 1,196,574 |
| Physical Contingencies | 967 | 2,066 | 1,576 | 8,785 | 33,506 | 43,099 | 24,563 | 5,095 | 119,657 |
| Price Contingencies | 294 | 895 | 893 | 11,045 | 45,295 | 78,306 | 52,507 | 11,912 | 201,147 |
| Project Cost | 10,927 | 23,623 | 18,220 | 107,689 | 413,869 | 552,389 | 322,700 | 67,961 | 1,517,378 |

## TABLE H-3 : EACH PROJECT COST

Unit: ₿ 1,000

| Description | Lam Se | | | Huai Khum Khan | | | Huai Kham Phak Wan | | |
|---|---|---|---|---|---|---|---|---|---|
| | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total |
| 1. Preparatory Work | 629 | 1,945 | 2,574 | 629 | 1,945 | 2,574 | 458 | 1,414 | 1,872 |
| 2. Dam | 36,895 | 30,293 | 67,188 | 59,909 | 42,368 | 102,277 | 49,695 | 39,468 | 89,163 |
| 3. Canal | 20,222 | 20,342 | 40,564 | 66,610 | 67,567 | 134,177 | 19,124 | 18,819 | 37,943 |
| 4. Overhead, Profit, Taxes | 4,548 | 10,611 | 15,159 | 9,853 | 22,989 | 32,842 | 5,317 | 12,405 | 17,722 |
| Sub-total | 62,294 | 63,191 | 125,485 | 137,001 | 134,869 | 271,870 | 74,594 | 72,106 | 146,700 |
| 5. On-farm and Muban Pond | 7,260 | 4,400 | 11,660 | 15,667 | 9,902 | 25,569 | 5,736 | 3,647 | 9,383 |
| 6. O & M Equipment | 1,119 | 391 | 1,510 | 2,717 | 951 | 3,668 | 1,039 | 363 | 1,402 |
| 7. Right of Way | 0 | 6,024 | 6,024 | 0 | 6,607 | 6,607 | 0 | 1,203 | 1,203 |
| 8. Survey and Investigation | 1,543 | 1,613 | 3,156 | 1,494 | 2,012 | 3,506 | 1,285 | 1,527 | 2,812 |
| 9. Administration | 0 | 3,310 | 3,310 | 0 | 7,171 | 7,171 | 0 | 3,869 | 3,869 |
| 10. Consulting Services | 8,185 | 1,060 | 9,245 | 19,878 | 2,574 | 22,452 | 7,600 | 985 | 8,585 |
| Sub-total | 18,107 | 16,798 | 34,905 | 39,756 | 29,217 | 68,973 | 15,660 | 11,594 | 27,254 |
| Base Cost | 80,401 | 79,989 | 160,390 | 176,757 | 164,086 | 340,843 | 90,254 | 83,700 | 173,954 |
| 11. Physical Contingencies | 8,040 | 7,999 | 16,039 | 17,676 | 16,408 | 34,084 | 9,025 | 8,370 | 17,395 |
| Total | 88,441 | 87,988 | 176,429 | 194,433 | 180,494 | 374,927 | 99,279 | 92,070 | 191,349 |
| 12. Price Contingencies | 4,916 | 20,897 | 25,813 | 11,101 | 44,538 | 55,639 | 5,430 | 21,755 | 27,185 |
| Project Cost | 93,357 | 108,885 | 202,242 | 205,534 | 225,032 | 430,566 | 104,709 | 113,825 | 218,534 |

| Description | Huai Na Khai | | | Huai Soob | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total |
| 1. Preparatory Work | 629 | 1,945 | 2,574 | 458 | 1,414 | 1,872 | 2,803 | 8,663 | 11,466 |
| 2. Dam | 73,450 | 53,120 | 126,570 | 64,966 | 42,210 | 107,176 | 284,915 | 207,459 | 492,374 |
| 3. Canal | 38,362 | 38,858 | 77,220 | 31,903 | 32,129 | 64,032 | 176,221 | 177,715 | 353,936 |
| 4. Overhead, Profit, Taxes | 8,506 | 19,848 | 28,354 | 7,134 | 16,647 | 23,781 | 35,358 | 82,500 | 117,858 |
| Sub-total | 120,947 | 113,771 | 234,718 | 104,461 | 92,400 | 196,861 | 499,297 | 476,337 | 975,634 |
| 5. On-farm and Muban Pond | 12,164 | 7,830 | 19,994 | 5,961 | 3,695 | 9,656 | 46,788 | 29,474 | 76,262 |
| 6. O & M Equipment | 2,157 | 755 | 2,912 | 959 | 336 | 1,295 | 7,991 | 2,796 | 10,787 |
| 7. Right of Way | 0 | 9,576 | 9,576 | 0 | 1,953 | 1,953 | 0 | 25,363 | 25,363 |
| 8. Survey and Investigation | 2,091 | 2,126 | 4,217 | 1,491 | 1,577 | 3,068 | 7,904 | 8,855 | 16,759 |
| 9. Administration | 0 | 6,191 | 6,191 | 0 | 5,192 | 5,192 | 0 | 25,733 | 25,733 |
| 10. Consulting Services | 15,786 | 2,044 | 17,830 | 7,016 | 908 | 7,924 | 58,465 | 7,571 | 66,036 |
| Sub-total | 32,198 | 28,522 | 60,720 | 15,427 | 13,661 | 29,088 | 121,148 | 99,792 | 220,940 |
| Base Cost | 153,145 | 142,293 | 295,438 | 119,888 | 106,061 | 225,949 | 620,445 | 576,129 | 1,196,574 |
| 11. Physical Contingencies | 15,315 | 14,229 | 29,544 | 11,989 | 10,606 | 22,595 | 62,045 | 57,612 | 119,657 |
| Total | 168,460 | 156,522 | 324,982 | 131,877 | 116,667 | 248,544 | 682,490 | 633.741 | 1,316,231 |
| 12. Price Contingencies | 10,493 | 43,168 | 53,661 | 7,847 | 31,002 | 38,849 | 39,787 | 161,360 | 201,147 |
| Project Cost | 178,953 | 199,690 | 378,643 | 139,724 | 147,669 | 287,393 | 722,277 | 795,101 | 1,517,378 |

## TABLE H-4 : DISBURSEMENT SCHEDULE OF TOTAL PROJECT COST

Unit: ฿ 1,000

| Project | Total | | | 1990 | | | 1991 | | | 1992 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total |
| 1. Preparatory Work | 2,803 | 8,663 | 11,466 | | | | | | | | | |
| 2. Dam | 284,915 | 207,459 | 492,374 | | | | | | | | | |
| 3. Canal | 176,221 | 177,715 | 353,936 | | | | | | | | | |
| 4. Overhead, Profit, Taxes | 35,358 | 82,500 | 117,858 | | | | | | | | | |
| Sub-total | 499,297 | 476,337 | 975,634 | | | | | | | | | |
| 5. On-farm and Muban Pond | 46,788 | 29,474 | 76,262 | | | | | | | | | |
| 6. O & M Equipment | 7,991 | 2,796 | 10,787 | | | | | | | | | |
| 7. Right of Way | 0 | 25,363 | 25,363 | | | | | | | | | |
| 8. Survey and Investigation | 7,904 | 8,855 | 16,759 | 3,950 | 4,429 | 8,379 | 3,954 | 4,426 | 8,380 | | | |
| 9. Administration | 0 | 25,733 | 25,733 | 0 | 1,287 | 1,287 | 0 | 1,287 | 1,287 | 0 | 2,573 | 2,573 |
| 10. Consulting Services | 58,465 | 7,571 | 66,036 | | | | 10,250 | 745 | 10,995 | 12,179 | 999 | 13,178 |
| Sub-total | 121,148 | 99,792 | 220,940 | 3,950 | 5,716 | 9,666 | 14,204 | 6,458 | 20,662 | 12,179 | 3,572 | 15,751 |
| Base Cost | 620,445 | 576,129 | 1,196,574 | 3,950 | 5,716 | 9,666 | 14,204 | 6,458 | 20,662 | 12,179 | 3,572 | 15,751 |
| 11. Physical Contingencies | 62,045 | 57,612 | 119,657 | 396 | 571 | 967 | 1,421 | 645 | 2,066 | 1,218 | 358 | 1,576 |
| Total | 682,490 | 633,741 | 1,316,231 | 4,346 | 6,287 | 10,633 | 15,625 | 7,103 | 22,728 | 13,397 | 3,930 | 17,327 |
| 12. Price Contingencies | 39,787 | 161,360 | 201,147 | 43 | 251 | 294 | 312 | 583 | 895 | 402 | 491 | 893 |
| Project Cost | 722,277 | 795,101 | 1,517,378 | 4,387 | 6,538 | 10,927 | 15,937 | 7,686 | 23,623 | 13,799 | 4,421 | 18,220 |

| 1993 | | | 1994 | | | 1995 | | | 1996 | | | 1997 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total |
| 2,803 | 8,663 | 11,466 | | | | | | | | | | | | |
| 29,071 | 20,120 | 49,191 | 148,192 | 80,990 | 229,182 | 89,403 | 83,264 | 172,667 | 18,249 | 23,085 | 41,334 | | | |
| | | | 21,191 | 21,345 | 42,536 | 77,625 | 78,234 | 155,859 | 63,351 | 63,939 | 127,290 | 14,054 | 14,197 | 28,251 |
| 2,501 | 5,833 | 8,334 | 11,201 | 26,134 | 37,335 | 13,542 | 31,597 | 45,139 | 6,951 | 16,218 | 23,169 | 1,163 | 2,718 | 3,881 |
| 34,375 | 34,616 | 68,991 | 180,584 | 128,469 | 309,053 | 180,570 | 193,095 | 373,665 | 88,551 | 103,242 | 191,793 | 15,217 | 16,915 | 32,132 |
| | | | | | | 21,497 | 13,462 | 34,959 | 20,760 | 13,131 | 33,891 | 4,531 | 2,881 | 7,412 |
| | | | | | | | | | 3,994 | 1,400 | 5,394 | 3,997 | 1,396 | 5,393 |
| 0 | 9,549 | 9,549 | 0 | 10,031 | 10,031 | 0 | 5,783 | 5,783 | | | | | | |
| 0 | 5,146 | 5,146 | 0 | 5,146 | 5,146 | 0 | 5,146 | 5,146 | 0 | 3,861 | 3,861 | 0 | 1,287 | 1,287 |
| 3,571 | 602 | 4,173 | 9,375 | 1,463 | 10,838 | 9,875 | 1,556 | 11,431 | 9,179 | 1,512 | 10,691 | 4,036 | 694 | 4,730 |
| 3,571 | 15,297 | 18,868 | 9,375 | 16,640 | 26,015 | 31,372 | 25,947 | 57,319 | 33,933 | 19,904 | 53,837 | 12,564 | 6,258 | 18,822 |
| 37,946 | 49,913 | 87,859 | 189,959 | 145,109 | 335,068 | 211,942 | 219,042 | 430,984 | 122,484 | 123,146 | 245,630 | 27,781 | 23,173 | 50,954 |
| 3,794 | 4,991 | 8,785 | 18,996 | 14,510 | 33,506 | 21,194 | 21,905 | 43,099 | 12,249 | 12,314 | 24,563 | 2,777 | 2,318 | 5,095 |
| 41,740 | 54,904 | 96,644 | 208,955 | 159,619 | 368,574 | 233,136 | 240,947 | 474,083 | 134,733 | 135,460 | 270,193 | 30,558 | 25,491 | 56,049 |
| 1,711 | 9,334 | 11,045 | 10,658 | 34,637 | 45,295 | 14,455 | 63,851 | 78,306 | 9,701 | 42,806 | 52,507 | 2,505 | 9,407 | 11,912 |
| 43,451 | 64,238 | 107,689 | 219,613 | 194,256 | 413,869 | 247,591 | 304,798 | 552,389 | 144,434 | 178,266 | 322,700 | 33,063 | 34,898 | 67,961 |

## TABLE H-5 : DISBURSEMENT SCHEDULE OF LAM SE PROJECT

Unit: ฿ 1,000

| Project | Total | | | 1990 | | | 1991 | | | 1992 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total |
| 1. Preparatory Work | 629 | 1,945 | 2,574 | | | | | | | | | |
| 2. Dam | 36,895 | 30,293 | 67,188 | | | | | | | | | |
| 3. Canal | 20,222 | 20,342 | 40,564 | | | | | | | | | |
| 4. Overhead, Profit, Taxes | 4,548 | 10,611 | 15,159 | | | | | | | | | |
| Sub-total | 62,294 | 63,191 | 125,485 | | | | | | | | | |
| 5. On-farm and Muban Pond | 7,260 | 4,400 | 11,660 | | | | | | | | | |
| 6. O & M Equipment | 1,119 | 391 | 1,510 | | | | | | | | | |
| 7. Right of Way | 0 | 6,024 | 6,024 | | | | | | | | | |
| 8. Survey and Investigation | 1,543 | 1,613 | 3,156 | 771 | 807 | 1,578 | 772 | 806 | 1,578 | | | |
| 9. Administration | 0 | 3,310 | 3,310 | 0 | 165 | 165 | 0 | 165 | 165 | 0 | 331 | 331 |
| 10. Consulting Services | 8,185 | 1,060 | 9,245 | | | | 1,435 | 104 | 1,539 | 1,705 | 140 | 1,845 |
| Sub-total | 18,107 | 16,798 | 34,905 | 771 | 972 | 1,743 | 2,207 | 1,075 | 3,282 | 1,705 | 471 | 2,176 |
| Base Cost | 80,401 | 79,989 | 160,390 | 771 | 972 | 1,743 | 2,207 | 1,075 | 3,282 | 1,705 | 471 | 2,176 |
| 11. Physical Contingencies | 8,040 | 7,999 | 16,039 | 77 | 97 | 174 | 221 | 107 | 328 | 171 | 47 | 218 |
| Total | 88,441 | 87,988 | 176,429 | 848 | 1,069 | 1,917 | 2,428 | 1,182 | 3,610 | 1,876 | 518 | 2,394 |
| 12. Price Contingencies | 4,916 | 20,897 | 25,813 | 8 | 43 | 51 | 49 | 97 | 146 | 56 | 65 | 121 |
| Project Cost | 93,357 | 108,885 | 202,242 | 856 | 1,112 | 1,968 | 2,477 | 1,279 | 3,756 | 1,932 | 583 | 2,515 |

| 1993 | | | 1994 | | | 1995 | | | 1996 | | | 1997 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total |
| 629 | 1,945 | 2,574 | | | | | | | | | | | | |
| 4,280 | 3,117 | 7,397 | 21,003 | 12,767 | 33,770 | 11,612 | 14,409 | 26,021 | | | | | | |
| | | | 4,044 | 4,068 | 8,112 | 12,133 | 12,205 | 24,338 | 4,045 | 4,069 | 8,114 | | | |
| 411 | 959 | 1,370 | 1,727 | 4,028 | 5,755 | 2,076 | 4,843 | 6,919 | 334 | 781 | 1,115 | | | |
| 5,320 | 6,021 | 11,341 | 26,774 | 20,863 | 47,637 | 25,821 | 31,457 | 57,278 | 4,379 | 4,850 | 9,229 | | | |
| | | | | | | 5,445 | 3,300 | 8,745 | 1,815 | 1,100 | 2,915 | | | |
| | | | | | | | | | 559 | 196 | 755 | 560 | 195 | 755 |
| 0 | 3,012 | 3,012 | 0 | 3,012 | 3,012 | | | | | | | | | |
| 0 | 662 | 662 | 0 | 662 | 662 | 0 | 662 | 662 | 0 | 498 | 498 | 0 | 165 | 165 |
| 500 | 84 | 584 | 1,312 | 205 | 1,517 | 1,382 | 218 | 1,600 | 1,285 | 212 | 1,497 | 566 | 97 | 663 |
| 500 | 3,758 | 4,258 | 1,312 | 3,879 | 5,191 | 6,827 | 4,180 | 11,007 | 3,659 | 2,006 | 5,665 | 1,126 | 457 | 1,583 |
| 5,820 | 9,779 | 15,599 | 28,086 | 24,742 | 52,828 | 32,648 | 35,637 | 68,285 | 8,038 | 6,856 | 14,894 | 1,126 | 457 | 1,583 |
| 582 | 978 | 1,560 | 2,809 | 2,474 | 5,283 | 3,265 | 3,564 | 6,829 | 804 | 685 | 1,489 | 111 | 47 | 158 |
| 6,402 | 10,757 | 17,159 | 30,895 | 27,216 | 58,111 | 35,913 | 39,201 | 75,114 | 8,842 | 7,541 | 16,383 | 1,237 | 504 | 1,741 |
| 262 | 1,829 | 2,091 | 1,576 | 5,906 | 7,482 | 2,227 | 10,388 | 12,615 | 637 | 2,383 | 3,020 | 101 | 186 | 287 |
| 6,664 | 12,586 | 19,250 | 32,471 | 33,122 | 65,593 | 38,140 | 49,589 | 87,729 | 9,479 | 9,924 | 19,403 | 1,338 | 690 | 2,028 |

## TABLE H-6 : DISBURSEMENT SCHEDULE OF HUAI KHUM KHAM PROJECT

Unit: ฿ 1,000

| Project | Total | | | 1990 | | | 1991 | | | 1992 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total |
| 1. Preparatory Work | 629 | 1,945 | 2,574 | | | | | | | | | |
| 2. Dam | 59,909 | 42,368 | 102,277 | | | | | | | | | |
| 3. Canal | 66,610 | 67,567 | 134,177 | | | | | | | | | |
| 4. Overhead, Profit, Taxes | 9,853 | 22,989 | 32,842 | | | | | | | | | |
| Sub-total | 137,001 | 134,869 | 271,870 | | | | | | | | | |
| 5. On-farm and Muban Pond | 15,667 | 9,902 | 25,569 | | | | | | | | | |
| 6. O & M Equipment | 2,717 | 951 | 3,668 | | | | | | | | | |
| 7. Right of Way | 0 | 6,607 | 6,607 | | | | | | | | | |
| 8. Survey and Investigation | 1,494 | 2,012 | 3,506 | 747 | 1,006 | 1,753 | 747 | 1,006 | 1,753 | | | |
| 9. Administration | 0 | 7,171 | 7,171 | 0 | 359 | 359 | 0 | 359 | 359 | 0 | 717 | 717 |
| 10. Consulting Services | 19,878 | 2,574 | 22,452 | | | | 3,485 | 253 | 3,738 | 4,141 | 339 | 4,480 |
| Sub-total | 39,756 | 29,217 | 68,973 | 747 | 1,365 | 2,112 | 4,232 | 1,618 | 5,850 | 4,141 | 1,056 | 5,197 |
| Base Cost | 176,757 | 164,086 | 340,843 | 747 | 1,365 | 2,112 | 4,232 | 1,618 | 5,850 | 4,141 | 1,056 | 5,197 |
| 11. Physical Contingencies | 17,676 | 16,408 | 34,084 | 75 | 136 | 211 | 423 | 162 | 585 | 414 | 106 | 520 |
| Total | 194,433 | 180,494 | 374,927 | 822 | 1,501 | 2,323 | 4,655 | 1,780 | 6,435 | 4,555 | 1,162 | 5,717 |
| 12. Price Contingencies | 11,101 | 44,538 | 55,639 | 8 | 60 | 68 | 93 | 146 | 239 | 137 | 145 | 282 |
| Project Cost | 205,534 | 225,032 | 430,566 | 830 | 1,561 | 2,391 | 4,748 | 1,926 | 6,674 | 4,692 | 1,307 | 5,999 |

| 1993 | | | 1994 | | | 1995 | | | 1996 | | | 1997 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total |
| 629 | 1,945 | 2,574 | | | | | | | | | | | | |
| 5,903 | 4,031 | 9,934 | 37,133 | 20,167 | 57,300 | 16,873 | 18,170 | 35,043 | | | | | | |
| | | | 13,322 | 13,513 | 26,835 | 39,966 | 40,540 | 80,506 | 13,322 | 13,514 | 26,836 | | | |
| 516 | 1,203 | 1,719 | 3,468 | 8,092 | 11,560 | 4,763 | 11,113 | 15,876 | 1,106 | 2,581 | 3,687 | | | |
| 7,048 | 7,179 | 14,227 | 53,923 | 41,772 | 95,695 | 61,602 | 69,823 | 131,425 | 14,428 | 16,095 | 30,523 | | | |
| | | | | | | 11,750 | 7,427 | 19,177 | 3,917 | 2,475 | 6,392 | | | |
| | | | | | | | | | 1,358 | 476 | 1,834 | 1,359 | 475 | 1,834 |
| 0 | 3,303 | 3,303 | 0 | 3,304 | 3,304 | | | | | | | | | |
| 0 | 1,434 | 1,434 | 0 | 1,434 | 1,434 | 0 | 1,434 | 1,434 | 0 | 1,075 | 1,075 | 0 | 359 | 359 |
| 1,214 | 205 | 1,419 | 3,188 | 497 | 3,685 | 3,358 | 529 | 3,887 | 3,121 | 514 | 3,635 | 1,371 | 237 | 1,608 |
| 1,214 | 4,942 | 6,156 | 3,188 | 5,235 | 8,423 | 15,108 | 9,390 | 24,498 | 8,396 | 4,540 | 12,936 | 2,730 | 1,071 | 3,801 |
| 8,262 | 12,121 | 20,383 | 57,111 | 47,007 | 104,118 | 76,710 | 79,213 | 155,923 | 22,824 | 20,635 | 43,459 | 2,730 | 1,071 | 3,801 |
| 826 | 1,212 | 2,038 | 5,711 | 4,701 | 10,412 | 7,671 | 7,921 | 15,592 | 2,283 | 2,063 | 4,346 | 273 | 107 | 380 |
| 9,088 | 13,333 | 22,421 | 62,822 | 51,708 | 114,530 | 84,381 | 87,134 | 171,515 | 25,107 | 22,698 | 47,805 | 3,003 | 1,178 | 4,181 |
| 373 | 2,267 | 2,640 | 3,204 | 11,221 | 14,425 | 5,232 | 23,091 | 28,323 | 1,808 | 7,173 | 8,981 | 246 | 435 | 681 |
| 9,461 | 15,600 | 25,061 | 66,026 | 62,929 | 128,955 | 89,613 | 110,225 | 199,838 | 26,915 | 29,871 | 56,786 | 3,249 | 1,613 | 4,862 |

## TABLE H-7 : DISBURSEMENT SCHEDULE OF HUAI KHAM PHAK WAM PROJECT

Unit: ฿.1,000

| | Total | | | 1990 | | | 1991 | | | 1992 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total |
| 1. Preparatory Work | 458 | 1,414 | 1,872 | | | | | | | | | |
| 2. Dam | 49,695 | 39,468 | 89,163 | | | | | | | | | |
| 3. Canal | 19,124 | 18,819 | 37,943 | | | | | | | | | |
| 4. Overhead, Profit, Taxes | 5,317 | 12,405 | 17,722 | | | | | | | | | |
| Sub-total | 74,594 | 72,106 | 146,700 | | | | | | | | | |
| 5. On-farm and Muban Pond | 5,736 | 3,647 | 9,383 | | | | | | | | | |
| 6. O & M Equipment | 1,039 | 363 | 1,402 | | | | | | | | | |
| 7. Right of Way | 0 | 1,203 | 1,203 | | | | | | | | | |
| 8. Survey and Investigation | 1,285 | 1,527 | 2,812 | 642 | 764 | 1,406 | 643 | 763 | 1,406 | | | |
| 9. Administration | 0 | 3,869 | 3,869 | 0 | 193 | 193 | 0 | 193 | 193 | 0 | 387 | 387 |
| 10. Consulting Services | 7,600 | 985 | 8,585 | | | | 1,332 | 97 | 1,429 | 1,583 | 130 | 1,713 |
| Sub-total | 15,660 | 11,594 | 27,254 | 642 | 957 | 1,599 | 1,975 | 1,053 | 3,028 | 1,583 | 517 | 2,100 |
| Base Cost | 90,254 | 83,700 | 173,954 | 642 | 957 | 1,599 | 1,975 | 1,053 | 3,028 | 1,583 | 517 | 2,100 |
| 11. Physical Contingencies | 9,025 | 8,370 | 17,395 | 64 | 96 | 160 | 198 | 105 | 303 | 158 | 52 | 210 |
| Total | 99,279 | 92,070 | 191,349 | 706 | 1,053 | 1,759 | 2,173 | 1,158 | 3,331 | 1,741 | 569 | 2,310 |
| 12. Price Contingencies | 5,430 | 21,755 | 27,185 | 7 | 42 | 49 | 43 | 95 | 132 | 52 | 71 | 123 |
| Project Cost | 104,709 | 113,825 | 218,534 | 713 | 1,095 | 1,808 | 2,216 | 1,253 | 3,469 | 1,793 | 640 | 2,433 |

| 1993 | | | 1994 | | | 1995 | | | 1996 | | | 1997 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total |
| 458 | 1,414 | 1,872 | | | | | | | | | | | | |
| 5,377 | 3,921 | 9,298 | 32,766 | 21,247 | 54,013 | 11,552 | 14,300 | 25,852 | | | | | | |
| | | | 3,825 | 3,764 | 7,589 | 11,474 | 11,291 | 22,765 | 3,825 | 3,764 | 7,589 | | | |
| 461 | 1,074 | 1,535 | 2,539 | 5,925 | 8,464 | 2,004 | 4,676 | 6,680 | 313 | 730 | 1,043 | | | |
| 6,296 | 6,409 | 12,705 | 39,130 | 30,936 | 70,066 | 25,030 | 30,267 | 55,297 | 4,138 | 4,494 | 8,632 | | | |
| | | | | | | 4,302 | 2,735 | 7,037 | 1,434 | 912 | 2,346 | | | |
| | | | | | | | | | 519 | 182 | 701 | 520 | 181 | 701 |
| 0 | 361 | 361 | 0 | 842 | 842 | | | | | | | | | |
| 0 | 774 | 774 | 0 | 774 | 774 | 0 | 774 | 774 | 0 | 581 | 581 | 0 | 193 | 193 |
| 464 | 78 | 542 | 1,219 | 190 | 1,409 | 1,284 | 202 | 1,486 | 1,193 | 197 | 1,390 | 525 | 91 | 616 |
| 464 | 1,213 | 1,677 | 1,219 | 1,806 | 3,025 | 5,586 | 3,711 | 9,297 | 3,146 | 1,872 | 5,018 | 1,045 | 465 | 1,510 |
| 6,760 | 7,622 | 14,382 | 40,349 | 32,742 | 73,091 | 30,616 | 33,978 | 64,594 | 7,284 | 6,366 | 13,650 | 1,045 | 465 | 1,510 |
| 676 | 762 | 1,438 | 4,035 | 3,274 | 7,309 | 3,061 | 3,398 | 6,459 | 728 | 637 | 1,365 | 105 | 46 | 151 |
| 7,436 | 8,384 | 15,820 | 44,384 | 36,016 | 80,400 | 33,677 | 37,376 | 71,053 | 8,012 | 7,003 | 15,015 | 1,150 | 511 | 1,661 |
| 305 | 1,425 | 1,730 | 2,264 | 7,815 | 10,079 | 2,088 | 9,905 | 11,993 | 577 | 2,213 | 2,790 | 94 | 189 | 283 |
| 7,741 | 9,809 | 17,550 | 46,648 | 43,831 | 90,479 | 35,765 | 47,281 | 83,046 | 8,589 | 9,216 | 17,805 | 1,244 | 700 | 1,944 |

## TABLE H-8 : DISBURSEMENT SCHEDULE OF HUAI NA KHAI PROJECT

Unit: ฿ 1,000

| Project | Total | | | 1990 | | | 1991 | | | 1992 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total |
| 1. Preparatory Work | 629 | 1,945 | 2,574 | | | | | | | | | |
| 2. Dam | 73,450 | 53,120 | 126,570 | | | | | | | | | |
| 3. Canal | 38,362 | 38,858 | 77,220 | | | | | | | | | |
| 4. Overhead, Profit, Taxes | 8,506 | 19,848 | 28,354 | | | | | | | | | |
| Sub-total | 120,947 | 113,771 | 234,718 | | | | | | | | | |
| 5. On-farm and Muban Pond | 12,164 | 7,830 | 19,994 | | | | | | | | | |
| 6. O & M Equipment | 2,157 | 755 | 2,912 | | | | | | | | | |
| 7. Right of Way | 0 | 9,576 | 9,576 | | | | | | | | | |
| 8. Survey and Investigation | 2,091 | 2,126 | 4,217 | 1,045 | 1,063 | 2,108 | 1,046 | 1,063 | 2,109 | | | |
| 9. Administration | 0 | 6,191 | 6,191 | 0 | 310 | 310 | 0 | 310 | 310 | 0 | 619 | 619 |
| 10. Consulting Services | 15,786 | 2,044 | 17,830 | | | | 2,768 | 201 | 2,969 | 3,288 | 270 | 3,558 |
| Sub-total | 32,198 | 28,522 | 60,720 | 1,045 | 1,373 | 2,418 | 3,814 | 1,574 | 5,388 | 3,288 | 889 | 4,177 |
| Base Cost | 153,145 | 142,293 | 295,438 | 1,045 | 1,373 | 2,418 | 3,814 | 1,574 | 5,388 | 3,288 | 889 | 4,177 |
| 11. Physical Contingencies | 15,315 | 14,229 | 29,544 | 105 | 137 | 242 | 381 | 157 | 538 | 329 | 89 | 418 |
| Total | 168,460 | 156,522 | 324,982 | 1,150 | 1,510 | 2,660 | 4,195 | 1,731 | 5,926 | 3,617 | 978 | 4,595 |
| 12. Price Contingencies | 10,493 | 43,168 | 53,661 | 12 | 60 | 72 | 84 | 142 | 226 | 109 | 122 | 231 |
| Project Cost | 178,953 | 199,690 | 378,643 | 1,162 | 1,570 | 2,732 | 4,279 | 1,873 | 6,152 | 3,726 | 1,100 | 4,826 |

| 1993 | | | 1994 | | | 1995 | | | 1996 | | | 1997 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total |
| 629 | 1,945 | 2,574 | | | | | | | | | | | | |
| 6,953 | 4,967 | 11,920 | 19,519 | 9,343 | 28,862 | 32,006 | 18,807 | 50,813 | 14,972 | 20,003 | 34,975 | | | |
| | | | | | | 7,672 | 7,772 | 15,444 | 23,017 | 23,315 | 46,332 | 7,673 | 7,771 | 15,444 |
| 597 | 1,394 | 1,991 | 1,190 | 2,776 | 3,966 | 2,731 | 6,373 | 9,104 | 3,352 | 7,820 | 11,172 | 636 | 1,485 | 2,121 |
| 8,179 | 8,306 | 16,485 | 20,709 | 12,119 | 32,828 | 42,409 | 32,952 | 75,361 | 41,341 | 51,138 | 92,479 | 8,309 | 9,256 | 17,565 |
| | | | | | | | | | 9,123 | 5,873 | 14,996 | 3,041 | 1,957 | 4,998 |
| | | | | | | | | | 1,078 | 378 | 1,456 | 1,079 | 377 | 1,456 |
| 0 | 2,873 | 2,873 | 0 | 2,873 | 2,873 | 0 | 3,830 | 3,830 | | | | | | |
| 0 | 1,238 | 1,238 | 0 | 1,238 | 1,238 | 0 | 1,238 | 1,238 | 0 | 928 | 928 | 0 | 310 | 310 |
| 964 | 163 | 1,127 | 2,531 | 395 | 2,926 | 2,666 | 420 | 3,086 | 2,478 | 408 | 2,886 | 1,091 | 187 | 1,278 |
| 964 | 4,274 | 5,238 | 2,531 | 4,506 | 7,037 | 2,666 | 5,488 | 8,154 | 12,679 | 7,587 | 20,266 | 5,211 | 2,831 | 8,042 |
| 9,143 | 12,580 | 21,723 | 23,240 | 16,625 | 39,865 | 45,075 | 38,440 | 83,515 | 54,020 | 58,725 | 112,745 | 13,520 | 12,087 | 25,607 |
| 914 | 1,258 | 2,172 | 2,324 | 1,662 | 3,986 | 4,508 | 3,844 | 8,352 | 5,402 | 5,873 | 11,275 | 1,352 | 1,209 | 2,561 |
| 10,057 | 13,838 | 23,895 | 25,564 | 18,287 | 43,851 | 49,583 | 42,284 | 91,867 | 59,422 | 64,598 | 124,020 | 14,872 | 13,296 | 28,168 |
| 412 | 2,352 | 2,764 | 1,304 | 3,968 | 5,272 | 3,074 | 11,205 | 14,279 | 4,278 | 20,413 | 24,691 | 1,220 | 4,906 | 6,126 |
| 10,469 | 16,190 | 26,659 | 26,868 | 22,255 | 49,123 | 52,657 | 53,489 | 106,146 | 63,700 | 85,011 | 148,711 | 16,092 | 18,202 | 34,294 |

## TABLE H-9 : DISBURSEMENT SCHEDULE OF HUAI SOOB PROJECT

Unit: ₿ 1,000

| Project | Total | | | 1991I | | | 1991 | | | 1992 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total |
| 1. Preparatory Work | 458 | 1,414 | 1,872 | | | | | | | | | |
| 2. Dam | 64,966 | 42,210 | 107,176 | | | | | | | | | |
| 3. Canal | 31,903 | 32,129 | 64,032 | | | | | | | | | |
| 4. Overhead, Profit, Taxes | 7,134 | 16,647 | 23,781 | | | | | | | | | |
| Sub-total | 104,461 | 92,400 | 196,861 | | | | | | | | | |
| 5. On-farm and Muban Pond | 5,961 | 3,695 | 9,656 | | | | | | | | | |
| 6. O & M Equipment | 959 | 336 | 1,295 | | | | | | | | | |
| 7. Right of Way | 0 | 1,953 | 1,953 | | | | | | | | | |
| 8. Survey and Investigation | 1,491 | 1,577 | 3,068 | 745 | 789 | 1,534 | 746 | 788 | 1,534 | | | |
| 9. Administration | 0 | 5,192 | 5,192 | 0 | 260 | 260 | 0 | 260 | 260 | 0 | 519 | 519 |
| 10. Consulting Services | 7,016 | 908 | 7,924 | | | | 1,230 | 90 | 1,320 | 1,462 | 120 | 1,582 |
| Sub-total | 15,427 | 13,661 | 29,088 | 745 | 1,049 | 1,794 | 1,976 | 1,138 | 3,114 | 1,462 | 639 | 2,101 |
| Base Cost | 119,888 | 106,061 | 225,949 | 745 | 1,049 | 1,794 | 1,976 | 1,138 | 3,114 | 1,462 | 639 | 2,101 |
| 11. Physical Contingencies | 11,989 | 10,606 | 22,595 | 75 | 105 | 180 | 198 | 114 | 312 | 146 | 64 | 210 |
| Total | 131,877 | 116,667 | 248,544 | 820 | 1,154 | 1,974 | 2,174 | 1,252 | 3,426 | 1,608 | 703 | 2,311 |
| 12. Price Contingencies | 7,847 | 31,002 | 38,849 | 8 | 46 | 54 | 43 | 103 | 146 | 48 | 88 | 136 |
| Project Cost | 139,724 | 147,669 | 287,393 | 828 | 1,200 | 2,028 | 2,217 | 1,355 | 3,572 | 1,656 | 791 | 2,447 |

| 1993 | | | 1994 | | | 1995 | | | 1996 | | | 1997 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total | F/C | L/C | Total |
| 458 | 1,414 | 1,872 | | | | | | | | | | | | |
| 6,558 | 4,084 | 10,642 | 37,771 | 17,466 | 55,237 | 17,360 | 17,578 | 34,938 | 3,277 | 3,082 | 6,359 | | | |
| | | | | | | 6,380 | 6,426 | 12,806 | 19,142 | 19,277 | 38,419 | 6,381 | 6,426 | 12,807 |
| 516 | 1,203 | 1,719 | 2,277 | 5,313 | 7,590 | 1,968 | 4,592 | 6,560 | 1,846 | 4,306 | 6,152 | 527 | 1,233 | 1,760 |
| 7,532 | 6,701 | 14,233 | 40,048 | 22,779 | 62,827 | 25,708 | 28,596 | 54,304 | 24,265 | 26,665 | 50,930 | 6,908 | 7,659 | 14,567 |
| | | | | | | | | | 4,471 | 2,771 | 7,242 | 1,490 | 924 | 2,414 |
| | | | | | | | | | 480 | 168 | 648 | 479 | 168 | 647 |
| | | | | | | 0 | 1,953 | 1,953 | | | | | | |
| 0 | 1,038 | 1,038 | 0 | 1,038 | 1,038 | 0 | 1,038 | 1,038 | 0 | 779 | 779 | 0 | 260 | 260 |
| 429 | 72 | 501 | 1,125 | 176 | 1,301 | 1,185 | 187 | 1,372 | 1,102 | 181 | 1,283 | 483 | 82 | 565 |
| 429 | 1,110 | 1,539 | 1,125 | 1,214 | 2,339 | 1,185 | 3,178 | 4,363 | 6,053 | 3,899 | 9,952 | 2,452 | 1,434 | 3,886 |
| 7,961 | 7,811 | 15,772 | 41,173 | 23,993 | 65,166 | 26,893 | 31,774 | 58,667 | 30,318 | 30,564 | 60,882 | 9,360 | 9,093 | 18,453 |
| 796 | 781 | 1,577 | 4,117 | 2,399 | 6,516 | 2,689 | 3,178 | 5,867 | 3,032 | 3,056 | 6,088 | 936 | 909 | 1,845 |
| 8,757 | 8,592 | 17,349 | 45,290 | 26,392 | 71,682 | 29,582 | 34,952 | 64,534 | 33,350 | 33,620 | 66,970 | 10,296 | 10,002 | 20,298 |
| 359 | 1,461 | 1,820 | 2,310 | 5,727 | 8,037 | 1,834 | 9,262 | 11,096 | 2,401 | 10,624 | 13,025 | 844 | 3,691 | 4,535 |
| 9,116 | 10,053 | 19,169 | 47,600 | 32,119 | 79,719 | 31,416 | 44,214 | 75,630 | 35,751 | 44,244 | 79,995 | 11,140 | 13,693 | 24,833 |

# TABLE H-10 : CONSTRUCTION COST OF LAM SE PROJECT

| Description of Works | Unit | Quantity | Unit Rate (฿) F/C | Unit Rate (฿) L/C | Unit Rate (฿) Total | Amount (฿ '000) F/C | Amount (฿ '000) L/C | Amount (฿ '000) Total |
|---|---|---|---|---|---|---|---|---|
| A. Dam | | | | | | | | |
| 1. Temporary Work | L.S. | | | | | 3,354 | 2,754 | 6,108 |
| 2. Dam body | | | | | | | | |
| -Stripping | cu.m | 54,300 | 6.0 | 3.0 | 9.0 | 326 | 163 | 489 |
| -Excavation | | | | | | | | |
| (1) Common Soil | cu.m | 126,400 | 12.0 | 4.0 | 16.0 | 1,517 | 505 | 2,022 |
| -Embankment | | | | | | | | |
| (1) Zone I (Impervious) | cu.m | 167,700 | 31.0 | 12.0 | 43.0 | 5,199 | 2,012 | 7,211 |
| (2) Zone II (Impervious) | cu.m | 129,200 | 29.0 | 11.0 | 40.0 | 3,747 | 1,421 | 5,168 |
| (3) Filter/Drain | cu.m | 5,100 | 130.0 | 304.0 | 434.0 | 663 | 1,550 | 2,213 |
| (4) Riprap | cu.m | 23,600 | 146.0 | 339.0 | 485.0 | 3,446 | 8,000 | 11,446 |
| (5) Top Soil | cu.m | 5,700 | 40.0 | 40.0 | 80.0 | 228 | 228 | 456 |
| (6) Sodding | sq.m | 19,100 | 0 | 14.0 | 14.0 | 0 | 267 | 267 |
| (7) Pavement | cu.m | 4,800 | 65.0 | 152.0 | 217.0 | 312 | 730 | 1,042 |
| Sub-total | | | | | | 15,438 | 14,876 | 30,314 |
| 3. Spillway | | | | | | | | |
| -Excavation | | | | | | | | |
| (1) Common Soil | cu.m | 31,000 | 12.0 | 4.0 | 16.0 | 372 | 124 | 496 |
| (2) Rock W/O dynamite | cu.m | 700 | 91.0 | 33.0 | 124.0 | 64 | 23 | 87 |
| (3) Rock W/ dynamite | cu.m | 6,300 | 58.0 | 22.0 | 80.0 | 365 | 139 | 504 |
| -Backfill | cu.m | 1,400 | 40.0 | 40.0 | 80.0 | 56 | 56 | 112 |
| -Reinforced Concrete | cu.m | 1,270 | 2,025.0 | 2,475.0 | 4,500.0 | 2,572 | 3,143 | 5,715 |
| Sub-total | | | | | | 3,429 | 3,485 | 6,914 |
| 4. Outlet | | | | | | | | |
| -Excavation | | | | | | | | |
| (1) Common Soil | cu.m | 7,200 | 12.0 | 4.0 | 16.0 | 86 | 29 | 115 |
| (2) Rock W/O dynamite | cu.m | 600 | 91.0 | 33.0 | 124.0 | 55 | 19 | 74 |
| -Backfill | cu.m | 5,600 | 40.0 | 40.0 | 80.0 | 224 | 224 | 448 |
| -Riprap | cu.m | 250 | 146.0 | 339.0 | 485.0 | 37 | 84 | 121 |
| -Reinforced Concrete | cu.m | 400 | 2,025.0 | 2,475.0 | 4,500.0 | 810 | 990 | 1,800 |
| -Gate & Valve | | | | | | | | |
| (1) Jet flow gate ϕ800 | unit | 2 | 2,310,000 | 990,000 | 3,300,000 | 4,620 | 1,980 | 6,600 |
| (2) Sluice valve ϕ800 | unit | 2 | 1,330,000 | 570,000 | 1,900,000 | 2,660 | 1,140 | 3,800 |
| -Conduit Pipe | ton | 28.8 | 35,000 | 15,000 | 50,000 | 1,008 | 432 | 1,440 |
| -Gate house | sq.m | 50 | 250 | 610 | 860 | 13 | 30 | 43 |
| Sub-total | | | | | | 9,513 | 4,928 | 14,441 |
| 5. Road | m | 6,000 | 352 | 291 | 643 | 2,112 | 1,746 | 3,858 |
| 6. Miscellaneous Works | L.S. | | | | | 3,049 | 2,504 | 5,553 |
| Total | | | | | | 36,895 | 30,293 | 67,188 |
| B. Canal | | | | | | | | |
| 1. Main Canal | | | | | | | | |
| -Stripping | cu.m | 57,400 | 6 | 3 | 9 | 344 | 173 | 517 |
| -Excavation (Earth) | cu.m | 42,400 | 12 | 4 | 16 | 509 | 169 | 678 |
| -Embankment | cu.m | 215,300 | 29 | 11 | 40 | 6,244 | 2,368 | 8,612 |
| -Laterite | cu.m | 21,800 | 19 | 68 | 87 | 414 | 1,483 | 1,897 |
| -Sodding | sq.m | 158,300 | 0 | 11 | 11 | 0 | 1,741 | 1,741 |
| -Lining Concrete | cu.m | 4,220 | 740 | 1,112 | 1,852 | 3,123 | 4,692 | 7,815 |
| -Related Structure | L.S. | | | | | 1,785 | 1,785 | 3,570 |
| -Miscellaneous Works | L.S. | | | | | 1,242 | 1,241 | 2,483 |
| Sub-total | | | | | | 13,661 | 13,652 | 27,313 |
| 2. Lateral Canal | | | | | | | | |
| -Stripping | cu.m | 31,200 | 6 | 3 | 9 | 187 | 94 | 281 |
| -Excavation (Earth) | cu.m | 12,800 | 12 | 4 | 16 | 154 | 51 | 205 |
| -Embankment | cu.m | 108,700 | 29 | 11 | 40 | 3,152 | 1,196 | 4,348 |
| -Laterite | cu.m | 12,800 | 19 | 68 | 87 | 243 | 871 | 1,114 |
| -Sodding | sq.m | 83,100 | 0 | 11 | 11 | 0 | 914 | 914 |
| -Lining Concrete | cu.m | 1,880 | 740 | 1,112 | 1,852 | 1,391 | 2,091 | 3,482 |
| -Related Structure | L.S. | | | | | 865 | 865 | 1,730 |
| -Miscellaneous Works | L.S. | | | | | 599 | 608 | 1,207 |
| Sub-total | | | | | | 6,591 | 6,690 | 13,281 |
| Total | | | | | | 20,222 | 20,342 | 40,564 |
| C. On-farm and Muban Pond | | | | | | | | |
| 1. On-farm | ha | 1,100 | 4,875 | 3,250 | 8,125 | 5,363 | 3,574 | 8,937 |
| 2. Drainage Canal | | | | | | | | |
| -Excavation | cu.m | 12,055 | 12 | 4 | 16 | 145 | 48 | 193 |
| -Embankment | cu.m | 5,202 | 29 | 11 | 40 | 151 | 57 | 208 |
| -Miscellaneous Works | L.S. | | | | | 20 | 11 | 31 |
| Sub-total | | | | | | 316 | 116 | 432 |
| 3. Muban Pond | | | | | | | | |
| -Stripping | cu.m | 15,200 | 6 | 3 | 9 | 91 | 46 | 137 |
| -Excavation | cu.m | 70,600 | 12 | 4 | 16 | 847 | 283 | 1,130 |
| -Embankment | cu.m | 17,200 | 29 | 11 | 40 | 499 | 189 | 688 |
| -Sodding | sq.m | 11,540 | 0 | 11 | 11 | 0 | 127 | 127 |
| -Miscellaneous Works | L.S. | | | | | 144 | 65 | 209 |
| Sub-total | | | | | | 1,581 | 710 | 2,291 |
| Total | | | | | | 7,260 | 4,400 | 11,660 |

## TABLE H-11 : CONSTRUCTION COST OF HUAI KHUM KHAM PROJECT

| Description of Works | Unit | Quantity | Unit Rate (฿) F/C | Unit Rate (฿) L/C | Unit Rate (฿) Total | Amount (฿ '000) F/C | Amount (฿ '000) L/C | Amount (฿ '000) Total |
|---|---|---|---|---|---|---|---|---|
| A. Dam | | | | | | | | |
| 1. Temporary Work | L.S. | | | | | 5,446 | 3,852 | 9,298 |
| 2. Dam body | | | | | | | | |
| -Stripping | cu.m | 26,200 | 6.0 | 3.0 | 9.0 | 157 | 79 | 236 |
| -Excavation | | | | | | | | |
| (1) Common Soil | cu.m | 25,000 | 12.0 | 4.0 | 16.0 | 300 | 100 | 400 |
| (2) Rock W/O dynamite | cu.m | 10,700 | 91.0 | 33.0 | 124.0 | 974 | 353 | 1,327 |
| -Embankment | | | | | | | | |
| (1) Zone I (Impervious) | cu.m | 147,800 | 31.0 | 12.0 | 43.0 | 4,582 | 1,773 | 6,355 |
| (2) Zone II (Impervious) | cu.m | 93,200 | 29.0 | 11.0 | 40.0 | 2,703 | 1,025 | 3,728 |
| (3) Zone III (Random) | cu.m | 83,500 | 28.0 | 10.0 | 38.0 | 2,338 | 835 | 3,173 |
| (4) Filter/Drain | cu.m | 2,800 | 130.0 | 304.0 | 434.0 | 364 | 851 | 1,215 |
| (5) Riprap | cu.m | 21,000 | 146.0 | 339.0 | 485.0 | 3,066 | 7,119 | 10,185 |
| (6) Top Soil | cu.m | 6,700 | 40.0 | 40.0 | 80.0 | 268 | 268 | 536 |
| (7) Sodding | sq.m | 22,300 | 0 | 14.0 | 14.0 | 0 | 312 | 312 |
| (8) Pavement | cu.m | 3,400 | 65.0 | 152.0 | 217.0 | 221 | 517 | 738 |
| Sub-total | | | | | | 14,973 | 13,232 | 28,205 |
| 3. Foundation Treatment | | | | | | | | |
| -Grout-hole Drilling ϕ46 mm | m | 12,200 | 630.0 | 270.0 | 900.0 | 7,686 | 3,294 | 10,980 |
| -Grouting (Cement) | ton | 370 | 3,060.0 | 1,740.0 | 4,800.0 | 1,132 | 644 | 1,776 |
| -Test-hole NX | m | 1,200 | 1,430 | 610.0 | 2,040.0 | 1,716 | 732 | 2,448 |
| -Permeability Test | test | 230 | 490.0 | 210.0 | 700.0 | 113 | 48 | 161 |
| Sub-total | | | | | | 10,647 | 4,718 | 15,365 |
| 4. Spillway | | | | | | | | |
| -Excavation | | | | | | | | |
| (1) Common Soil | cu.m | 38,000 | 12.0 | 4.0 | 16.0 | 456 | 152 | 608 |
| (2) Rock W/O dynamite | cu.m | 4,000 | 91.0 | 33.0 | 124.0 | 364 | 132 | 496 |
| (3) Rock W/dynamite | cu.m | 41,000 | 58.0 | 22.0 | 80.0 | 2,378 | 902 | 3,280 |
| -Backfill | cu.m | 4,200 | 40.0 | 40.0 | 80.0 | 168 | 168 | 336 |
| -Reinforced Concrete | cu.m | 3,080 | 2,025.0 | 2,475.0 | 4,500.0 | 6,237 | 7,623 | 13,860 |
| Sub-total | | | | | | 9,603 | 8,977 | 18,580 |
| 5. Outlet | | | | | | | | |
| -Excavation | | | | | | | | |
| (1) Common Soil | cu.m | 9,200 | 12.0 | 4.0 | 16.0 | 110 | 37 | 147 |
| (2) Rock W/O dynamite | cu.m | 4,200 | 91.0 | 33.0 | 124.0 | 382 | 139 | 521 |
| -Backfill | cu.m | 8,200 | 40.0 | 40.0 | 80.0 | 328 | 328 | 656 |
| -Riprap | cu.m | 440 | 146.0 | 339.0 | 485.0 | 64 | 149 | 213 |
| -Reinforced Concrete | cu.m | 730 | 2,025.0 | 2,475.0 | 4,500.0 | 1,478 | 1,807 | 3,285 |
| -Gate & Valve | | | | | | | | |
| (1) Jet flow gate ϕ1,000 | unit | 1 | 2,870,000 | 1,230,000 | 4,100,000 | 2,870 | 1,230 | 4,100 |
| ϕ 900 | unit | 1 | 2,590,000 | 1,110,000 | 3,700,000 | 2,590 | 1,110 | 3,700 |
| (2) Sluice Valve ϕ1,000 | unit | 1 | 1,750,000 | 750,000 | 2,500,000 | 1,750 | 750 | 2,500 |
| ϕ 900 | unit | 1 | 1,540,000 | 660,000 | 2,200,000 | 1,540 | 660 | 2,200 |
| -Conduit Pipe | ton | 55.2 | 35,000 | 15,000 | 50,000 | 1,932 | 828 | 2,760 |
| -Gate house | sq.m | 50 | 250 | 610 | 860 | 13 | 30 | 43 |
| Sub-total | | | | | | 13,057 | 7,068 | 20,125 |
| 6. Road | m | 3,500 | 352 | 291 | 643 | 1,232 | 1,019 | 2,251 |
| 7. Miscellaneous Works | L.S. | | | | | 4,951 | 3,502 | 8,453 |
| Total | | | | | | 59,909 | 42,368 | 102,277 |
| B. Canal | | | | | | | | |
| 1. Main Canal | | | | | | | | |
| -Stripping | cu.m | 143,000 | 6 | 3 | 9 | 858 | 429 | 1,287 |
| -Excavation (Earth) | cu.m | 150,100 | 12 | 4 | 16 | 1,801 | 601 | 2,402 |
| -Embankment | cu.m | 542,500 | 29 | 11 | 40 | 15,733 | 5,967 | 21,700 |
| -Laterite | cu.m | 62,300 | 19 | 68 | 87 | 1,184 | 4,236 | 5,420 |
| -Sodding | sq.m | 354,900 | 0 | 11 | 11 | 0 | 3,904 | 3,904 |
| -Lining Concrete | cu.m | 13,680 | 740 | 1,112 | 1,852 | 10,123 | 15,212 | 25,335 |
| -Related Structure | L.S. | | | | | 12,880 | 12,880 | 25,760 |
| -Miscellaneous Works | L.S. | | | | | 4,258 | 4,323 | 8,581 |
| Sub-total | | | | | | 46,837 | 47,552 | 94,389 |
| 2. Lateral Canal | | | | | | | | |
| -Stripping | cu.m | 75,800 | 6 | 3 | 9 | 455 | 227 | 682 |
| -Excavation (Earth) | cu.m | 31,000 | 12 | 4 | 16 | 372 | 124 | 496 |
| -Embankment | cu.m | 263,900 | 29 | 11 | 40 | 7,653 | 2,903 | 10,556 |
| -Laterite | cu.m | 31,200 | 19 | 68 | 87 | 593 | 2,121 | 2,714 |
| -Sodding | sq.m | 201,700 | 0 | 11 | 11 | 0 | 2,219 | 2,219 |
| -Lining Concrete | cu.m | 4,570 | 740 | 1,112 | 1,852 | 3,382 | 5,082 | 8,464 |
| -Related Structure | L.S. | | | | | 5,520 | 5,520 | 11,040 |
| -Miscellaneous Works | L.S. | | | | | 1,798 | 1,819 | 3,617 |
| Sub-total | | | | | | 19,773 | 20,015 | 39,788 |
| C. On-farm and Muban Pond | | | | | | | | |
| 1. On-farm | ha | 2,600 | 4,875 | 3,250 | 8,125 | 12,675 | 8,450 | 21,125 |
| 2. Drainage Canal | | | | | | | | |
| -Excavation | cu.m | 19,000 | 12 | 4 | 16 | 228 | 76 | 304 |
| -Embankment | cu.m | 5,700 | 29 | 11 | 40 | 165 | 63 | 228 |
| -Miscellaneous Works | L.S. | | | | | 39 | 14 | 53 |
| Sub-total | | | | | | 432 | 153 | 585 |
| 3. Muban Pond | | | | | | | | |
| -Stripping | cu.m | 24,000 | 6 | 3 | 9 | 144 | 72 | 216 |
| -Excavation | cu.m | 104,300 | 12 | 4 | 16 | 1,252 | 417 | 1,669 |
| -Embankment | cu.m | 32,100 | 29 | 11 | 40 | 931 | 353 | 1,284 |
| -Sodding | sq.m | 30,800 | 0 | 11 | 11 | 0 | 339 | 339 |
| -Miscellaneous Works | L.S. | | | | | 233 | 118 | 351 |
| Sub-total | | | | | | 2,560 | 1,299 | 3,859 |
| Total | | | | | | 15,667 | 9,902 | 25,569 |

# TABLE H-12 : CONSTRUCTION COST OF HUAI KHAI PHAK WAM PROJECT

| Description of Works | Unit | Quantity | Unit Rate (฿) F/C | Unit Rate (฿) L/C | Unit Rate (฿) Total | Amount (฿ '000) F/C | Amount (฿ '000) L/C | Amount (฿ '000) Total |
|---|---|---|---|---|---|---|---|---|
| A. Dam | | | | | | | | |
| 1. Temporary Work | L.S. | | | | | 4,518 | 3,588 | 8,106 |
| 2. Dam body | | | | | | | | |
| -Stripping | cu.m | 31,400 | 6.0 | 3.0 | 9.0 | 188 | 95 | 283 |
| -Excavation | | | | | | | | |
| (1) Common Soil | cu.m | 29,100 | 12.0 | 4.0 | 16.0 | 349 | 117 | 466 |
| (2) Rock W/O dynamite | cu.m | 10,900 | 91.0 | 33.0 | 124.0 | 992 | 360 | 1,352 |
| -Embankment | | | | | | | | |
| (1) Zone I (Impervious) | cu.m | 132,900 | 31.0 | 12.0 | 43.0 | 4,120 | 1,595 | 5,715 |
| (2) Zone II (Impervious) | cu.m | 112,900 | 29.0 | 11.0 | 40.0 | 3,274 | 1,242 | 4,516 |
| (3) Zone III (Random) | cu.m | 99,000 | 28.0 | 10.0 | 38.0 | 2,772 | 990 | 3,762 |
| (4) Filter/Drain | cu.m | 18,600 | 130.0 | 304.0 | 434.0 | 2,418 | 5,654 | 8,072 |
| (5) Riprap | cu.m | 24,800 | 146.0 | 339.0 | 485.0 | 3,621 | 8,407 | 12,028 |
| (6) Top Soil | cu.m | 13,000 | 40.0 | 40.0 | 80.0 | 520 | 520 | 1,040 |
| (7) Sodding | sq.m | 26,400 | 0 | 14.0 | 14.0 | 0 | 370 | 370 |
| (8) Pavement | cu.m | 3,900 | 65.0 | 152.0 | 217.0 | 254 | 592 | 846 |
| Sub-total | | | | | | 18,508 | 19,942 | 38,450 |
| 3. Foundation Treatment | | | | | | | | |
| -Grout-hole Drilling ϕ46 mm | m | 14,000 | 630.0 | 270.0 | 900.0 | 8,820 | 3,780 | 12,600 |
| -Grouting (Cement) | ton | 700 | 3,060.0 | 1,740.0 | 4,800.0 | 2,142 | 1,218 | 3,360 |
| -Test-hole NX | m | 1,300 | 1,430.0 | 610.0 | 2,040.0 | 1,859 | 793 | 2,652 |
| -Permeability Test | test | 270 | 490.0 | 210.0 | 700.0 | 132 | 57 | 189 |
| Sub-total | | | | | | 12,953 | 5,848 | 18,801 |
| 4. Spillway | | | | | | | | |
| -Excavation | | | | | | | | |
| (1) Common Soil | cu.m | 16,000 | 12.0 | 4.0 | 16.0 | 192 | 64 | 256 |
| (2) Rock W/O dynamite | cu.m | 1,000 | 91.0 | 33.0 | 124.0 | 91 | 33 | 124 |
| (3) Rock W/dynamite | cu.m | 13,000 | 58.0 | 22.0 | 80.0 | 754 | 286 | 1,040 |
| -Backfill | cu.m | 900 | 40.0 | 40.0 | 80.0 | 36 | 36 | 72 |
| -Reinforced Concrete | cu.m | 1,320 | 2,025.0 | 2,475.0 | 4,500.0 | 2,673 | 3,267 | 5,940 |
| Sub-total | | | | | | 3,746 | 3,686 | 7,432 |
| 5. Outlet | | | | | | | | |
| -Excavation | | | | | | | | |
| (1) Common Soil | cu.m | 3,600 | 12.0 | 4.0 | 16.0 | 43 | 15 | 58 |
| (2) Rock W/O dynamite | cu.m | 1,700 | 91.0 | 33.0 | 124.0 | 155 | 56 | 211 |
| -Backfill | cu.m | 2,200 | 40.0 | 40.0 | 80.0 | 88 | 88 | 176 |
| -Riprap | cu.m | 470 | 146.0 | 339.0 | 485.0 | 69 | 159 | 228 |
| -Reinforced Concrete | cu.m | 280 | 2,025.0 | 2,475.0 | 4,500.0 | 567 | 693 | 1,260 |
| -Gate & Valve | | | | | | | | |
| (1) Jet flow gate ϕ900 | unit | 1 | 2,590,000 | 1,110,000 | 3,700,000 | 2,590 | 1,110 | 3,700 |
| (2) Sluice valve ϕ900 | unit | 1 | 1,540,000 | 660,000 | 2,200,000 | 1,540 | 660 | 2,200 |
| -Conduit Pipe | ton | 23.0 | 35,000 | 15,000 | 50,000 | 805 | 345 | 1,150 |
| -Gate House | | 25 | 250 | 610 | 860 | 6 | 16 | 22 |
| Sub-total | | | | | | 5,863 | 3,142 | 9,005 |
| 6. Miscellaneous Works | L.S. | | | | | 4,107 | 3,262 | 7,369 |
| Total | | | | | | 49,695 | 39,468 | 89,163 |
| B. Canal | | | | | | | | |
| 1. Main Canal | | | | | | | | |
| -Stripping | cu.m | 37,200 | 6 | 3 | 9 | 223 | 112 | 335 |
| -Excavation (Earth) | cu.m | 34,100 | 12 | 4 | 16 | 409 | 137 | 546 |
| -Embankment | cu.m | 142,100 | 29 | 11 | 40 | 4,121 | 1,563 | 5,684 |
| -Laterite | cu.m | 13,800 | 19 | 68 | 87 | 262 | 939 | 1,201 |
| -Sodding | sq.m | 70,640 | 0 | 11 | 11 | 0 | 777 | 777 |
| -Lining Concrete | cu.m | 2,980 | 740 | 1,112 | 1,852 | 2,205 | 3,314 | 5,519 |
| -Related Structure | L.S. | | | | | 2,370 | 2,370 | 4,740 |
| -Miscellaneous Works | L.S. | | | | | 959 | 921 | 1,880 |
| Sub-total | | | | | | 10,549 | 10,133 | 20,682 |
| 2. Lateral Canal | | | | | | | | |
| -Stripping | cu.m | 35,300 | 6 | 3 | 9 | 212 | 106 | 318 |
| -Excavation (Earth) | cu.m | 14,700 | 12 | 4 | 16 | 176 | 59 | 235 |
| -Embankment | cu.m | 123,000 | 29 | 11 | 40 | 3,567 | 1,353 | 4,920 |
| -Laterite | cu.m | 14,500 | 19 | 68 | 87 | 276 | 986 | 1,262 |
| -Sodding | sq.m | 94,000 | 0 | 11 | 11 | 0 | 1,034 | 1,034 |
| -Lining Concrete | cu.m | 2,140 | 740 | 1,112 | 1,852 | 1,584 | 2,379 | 3,963 |
| -Related Structure | L.S. | | | | | 1,980 | 1,980 | 3,960 |
| -Miscellaneous Works | L.S. | | | | | 780 | 789 | 1,569 |
| Sub-total | | | | | | 8,575 | 8,686 | 17,261 |
| C. On-farm and Muban Pond | | | | | | | | |
| 1. On-farm | ha | 950 | 4,875 | 3,250 | 8,125 | 4,631 | 3,088 | 7,719 |
| 2. Drainage Canal | | | | | | | | |
| -Excavation | cu.m | 4,000 | 12 | 4 | 16 | 48 | 16 | 64 |
| -Embankment | cu.m | 1,500 | 29 | 11 | 40 | 44 | 16 | 60 |
| -Miscellaneous Works | L.S. | | | | | 9 | 3 | 12 |
| Sub-total | | | | | | 101 | 35 | 136 |
| 3. Muban Pond | | | | | | | | |
| -Stripping | cu.m | 9,300 | 6 | 3 | 9 | 56 | 28 | 84 |
| -Excavation | cu.m | 38,600 | 12 | 4 | 16 | 463 | 155 | 618 |
| -Embankment | cu.m | 13,600 | 29 | 11 | 40 | 394 | 150 | 544 |
| -Sodding | sq.m | 13,000 | 0 | 11 | 11 | 0 | 143 | 143 |
| -Miscellaneous Works | L.S. | | | | | 91 | 48 | 139 |
| Sub-total | | | | | | 1,004 | 524 | 1,528 |
| Total | | | | | | 5,736 | 3,647 | 9,383 |

# TABLE H-13 : CONSTRUCTION COST OF HUAI NA KHAI PROJECT

| Description of Works | Unit | Quantity | Unit Rate (฿) F/C | Unit Rate (฿) L/C | Unit Rate (฿) Total | Amount (฿ '000) F/C | Amount (฿ '000) L/C | Amount (฿ '000) Total |
|---|---|---|---|---|---|---|---|---|
| A. Dam | | | | | | | | |
| 1. Temporary Work | L.S. | | | | | 6,677 | 4,829 | 11,506 |
| 2. Dam body | | | | | | | | |
| -Stripping | cu.m | 46,000 | 6.0 | 3.0 | 9.0 | 276 | 138 | 414 |
| -Excavation | | | | | | | | |
| (1) Common Soil | cu.m | 94,200 | 12.0 | 4.0 | 16.0 | 1,130 | 377 | 1,507 |
| (2) Rock W/O dynamite | cu.m | 24,600 | 91.0 | 33.0 | 124.0 | 2,239 | 811 | 3,050 |
| -Embankment | | | | | | | | |
| (1) Zone I (Impervious) | cu.m | 247,200 | 31.0 | 12.0 | 43.0 | 7,663 | 2,967 | 10,630 |
| (2) Zone II (Impervious) | cu.m | 152,300 | 29.0 | 11.0 | 40.0 | 4,417 | 1,675 | 6,092 |
| (3) Zone III (Random) | cu.m | 134,000 | 28.0 | 10.0 | 38.0 | 3,752 | 1,340 | 5,092 |
| (4) Filter/Drain | cu.m | 14,000 | 130.0 | 304.0 | 434.0 | 1,820 | 4,256 | 6,076 |
| (5) Riprap | cu.m | 34,200 | 146.0 | 339.0 | 485.0 | 4,993 | 11,594 | 16,587 |
| (6) Top Soil | cu.m | 18,200 | 40.0 | 40.0 | 80.0 | 728 | 728 | 1,456 |
| (7) Sodding | sq.m | 36,400 | 0 | 14.0 | 14.0 | 0 | 510 | 510 |
| (8) Pavement | cu.m | 8,200 | 65.0 | 152.0 | 217.0 | 533 | 1,246 | 1,779 |
| Sub-total | | | | | | 27,551 | 25,642 | 53,193 |
| 3. Foundation Treatment | | | | | | | | |
| -Grout-hole Drilling ϕ46 mm | m | 20,300 | 630.0 | 270.0 | 900.0 | 12,789 | 5,481 | 18,270 |
| -Grouting (Cement) | ton | 812 | 3,060.0 | 1,740.0 | 4,800.0 | 2,485 | 1,413 | 3,898 |
| -Test-hole NX | m | 1,800 | 1,430.0 | 610.0 | 2,040.0 | 2,574 | 1,098 | 3,672 |
| -Permeability Test | test | 370 | 490.0 | 210.0 | 700.0 | 181 | 78 | 259 |
| Sub-total | | | | | | 18,029 | 8,070 | 26,099 |
| 4. Spillway | | | | | | | | |
| -Excavation | | | | | | | | |
| (1) Common Soil | cu.m | 50,000 | 12.0 | 4.0 | 16.0 | 600 | 200 | 800 |
| (2) Rock W/O dynamite | cu.m | 3,000 | 91.0 | 33.0 | 124.0 | 273 | 99 | 372 |
| (3) Rock W/ dynamite | cu.m | 32,000 | 58.0 | 22.0 | 80.0 | 1,856 | 704 | 2,560 |
| -Backfill | cu.m | 1,400 | 40.0 | 40.0 | 80.0 | 56 | 56 | 112 |
| -Reinforced Concrete | cu.m | 1,730 | 2,025.0 | 2,475.0 | 4,500.0 | 3,503 | 4,282 | 7,785 |
| Sub-total | | | | | | 6,288 | 5,341 | 11,629 |
| 5. Outlet | | | | | | | | |
| -Excavation | | | | | | | | |
| (1) Common Soil | cu.m | 1,800 | 12.0 | 4.0 | 16.0 | 22 | 7 | 29 |
| (2) Rock W/O dynamite | cu.m | 1,700 | 91.0 | 33.0 | 124.0 | 155 | 56 | 211 |
| -Backfill | cu.m | 1,800 | 40.0 | 40.0 | 80.0 | 72 | 72 | 144 |
| -Riprap | cu.m | 200 | 146.0 | 339.0 | 485.0 | 29 | 68 | 97 |
| -Reinforced Concrete | cu.m | 590 | 2,025.0 | 2,475.0 | 4,500.0 | 1,195 | 1,460 | 2,655 |
| -Gate & Valve | | | | | | | | |
| (1) Jet flow gate ϕ1,600 | unit | 1 | 3,850,000 | 1,650,000 | 5,500,000 | 3,850 | 1,650 | 5,500 |
| (2) Sluice valve ϕ1,600 | unit | 1 | 2,450,000 | 1,050,000 | 3,500,000 | 2,450 | 1,050 | 3,500 |
| -Conduit pipe | ton | 29.9 | 35,000 | 15,000 | 50,000 | 1,047 | 448 | 1,495 |
| -Gate house | | 60 | 250 | 610 | 860 | 15 | 37 | 52 |
| Sub-total | | | | | | 8,835 | 4,848 | 13,683 |
| 6. Miscellaneous Works | L.S. | | | | | 6,070 | 4,390 | 10,460 |
| Total | | | | | | 73,450 | 53,120 | 126,570 |
| B. Canal | | | | | | | | |
| 1. Main Canal | | | | | | | | |
| -Stripping | cu.m | 85,000 | 6 | 3 | 9 | 510 | 255 | 765 |
| -Excavation (Earth) | cu.m | 105,200 | 12 | 4 | 16 | 1,262 | 421 | 1,683 |
| -Embankment | cu.m | 320,400 | 29 | 11 | 40 | 9,292 | 3,524 | 12,816 |
| -Laterite | cu.m | 37,200 | 19 | 68 | 87 | 707 | 2,529 | 3,236 |
| -Sodding | sq.m | 211,800 | 0 | 11 | 11 | 0 | 2,330 | 2,330 |
| -Lining Concrete | cu.m | 8,060 | 740 | 1,112 | 1,852 | 5,964 | 8,963 | 14,927 |
| -Related Structure | L.S. | | | | | 4,940 | 4,940 | 9,880 |
| -Miscellaneous Works | L.S. | | | | | 2,268 | 2,296 | 4,564 |
| Sub-total | | | | | | 24,943 | 25,258 | 50,201 |
| 2. Lateral Canal | | | | | | | | |
| -Stripping | cu.m | 57,800 | 6 | 3 | 9 | 347 | 173 | 520 |
| -Excavation (Earth) | cu.m | 24,400 | 12 | 4 | 16 | 293 | 97 | 390 |
| -Embankment | cu.m | 201,500 | 29 | 11 | 40 | 5,844 | 2,216 | 8,060 |
| -Laterite | cu.m | 23,700 | 19 | 68 | 87 | 450 | 1,612 | 2,062 |
| -Sodding | sq.m | 153,800 | 0 | 11 | 11 | 0 | 1,692 | 1,692 |
| -Lining Concrete | cu.m | 3,520 | 740 | 1,112 | 1,852 | 2,605 | 3,914 | 6,519 |
| -Related Structure | L.S. | | | | | 2,660 | 2,660 | 5,320 |
| -Miscellaneous Works | L.S. | | | | | 1,220 | 1,236 | 2,456 |
| Sub-total | | | | | | 13,419 | 13,600 | 27,019 |
| Total | | | | | | 38,362 | 38,858 | 77,220 |
| C. On-farm and Muban Pond | | | | | | | | |
| 1. On-farm | ha | 2,100 | 4,875 | 3,250 | 8,125 | 10,238 | 6,825 | 17,063 |
| 2. Muban Pond | | | | | | | | |
| -Stripping | cu.m | 17,800 | 6 | 3 | 9 | 107 | 53 | 160 |
| -Excavation | cu.m | 72,900 | 12 | 4 | 16 | 875 | 291 | 1,166 |
| -Embankment | cu.m | 26,500 | 29 | 11 | 40 | 769 | 291 | 1,060 |
| -Sodding | sq.m | 25,400 | 0 | 11 | 11 | 0 | 279 | 279 |
| -Miscellaneous Works | L.S. | | | | | 175 | 91 | 266 |
| Sub-total | | | | | | 1,926 | 1,005 | 2,931 |
| Total | | | | | | 12,164 | 7,830 | 19,994 |

# TABLE H-14 : CONSTRUCTION COST OF SOOB PROJECT

| Description of Works | Unit | Quantity | Unit Rate (฿) F/C | Unit Rate (฿) L/C | Unit Rate (฿) Total | Amount (฿ '000) F/C | Amount (฿ '000) L/C | Amount (฿ '000) Total |
|---|---|---|---|---|---|---|---|---|
| A. Dam | | | | | | | | |
| 1. Temporary Work | L.S. | | | | | 5,906 | 3,837 | 9,743 |
| 2. Dam Body | | | | | | | | |
| -Stripping | cu.m | 29,000 | 6.0 | 3.0 | 9.0 | 174 | 87 | 261 |
| -Excavation | | | | | | | | |
| (1) Common Soil | cu.m | 79,700 | 12.0 | 4.0 | 16.0 | 956 | 319 | 1,275 |
| (2) Rock W/O dynamite | cu.m | 14,700 | 91.0 | 33.0 | 124.0 | 1,338 | 485 | 1,823 |
| -Embankment | | | | | | | | |
| (1) Zone I (Impervious) | cu.m | 201,200 | 31.0 | 12.0 | 43.0 | 6,237 | 2,415 | 8,652 |
| (2) Zone II (Impervious) | cu.m | 82,100 | 29.0 | 11.0 | 40.0 | 2,381 | 903 | 3,284 |
| (3) Zone III (Random) | cu.m | 75,600 | 28.0 | 10.0 | 38.0 | 2,117 | 756 | 2,873 |
| (4) Filter/Drain | cu.m | 2,800 | 130.0 | 304.0 | 434.0 | 364 | 851 | 1,215 |
| (5) Riprap | cu.m | 21,900 | 146.0 | 339.0 | 485.0 | 3,197 | 7,425 | 10,622 |
| (6) Top Soil | cu.m | 7,000 | 40.0 | 40.0 | 80.0 | 280 | 280 | 560 |
| (7) Sodding | sq.m | 23,400 | 0 | 14.0 | 14.0 | 0 | 328 | 328 |
| (8) Pavement | cu.m | 4,800 | 65.0 | 152.0 | 217.0 | 312 | 730 | 1,042 |
| Sub-total | | | | | | 17,356 | 14,579 | 31,935 |
| 3. Foundation Treatment | | | | | | | | |
| -Grout-hole Drilling ϕ46mm | m | 19,500 | 630.0 | 270.0 | 900.0 | 12,285 | 5,265 | 17,550 |
| -Grounting (Cement) | ton | 975 | 3,060.0 | 1,740.0 | 4,800.0 | 2,984 | 1,696 | 4,680 |
| -Test-hole NX | m | 1,600 | 1,430.0 | 610.0 | 2,040.0 | 2,288 | 976 | 3,264 |
| -Permeability Test | test | 320 | 490.0 | 210.0 | 700.0 | 157 | 67 | 224 |
| Sub-total | | | | | | 17,714 | 8,004 | 25,718 |
| 4. Spillway | | | | | | | | |
| -Excavation | | | | | | | | |
| (1) Common Soil | cu.m | 79,000 | 12.0 | 4.0 | 16.0 | 948 | 316 | 1,264 |
| (2) Rock W/O dynamite | cu.m | 6,000 | 91.0 | 33.0 | 124.0 | 546 | 198 | 744 |
| (3) Rock W/ dynamite | cu.m | 57,000 | 58.0 | 22.0 | 80.0 | 3,306 | 1,254 | 4,560 |
| -Backfill | cu.m | 1,200 | 40.0 | 40.0 | 80.0 | 48 | 48 | 96 |
| -Reinforced Concrete | cu.m | 2,070 | 2,025.0 | 2,475.0 | 4,500.0 | 4,192 | 5,123 | 9,315 |
| Sub-total | | | | | | 9,040 | 6,939 | 15,979 |
| 5. Outlet | | | | | | | | |
| -Excavation | | | | | | | | |
| (1) Common Soil | cu.m | 14,200 | 12.0 | 4.0 | 16.0 | 170 | 57 | 227 |
| (2) Rock W/O dynamite | cu.m | 3,000 | 91.0 | 33.0 | 124.0 | 273 | 99 | 372 |
| -Backfill | cu.m | 7,700 | 40.0 | 40.0 | 80.0 | 308 | 308 | 616 |
| -Riprap | cu.m | 1,230 | 146.0 | 339.0 | 485.0 | 180 | 417 | 597 |
| -Reinforced Concrete | cu.m | 380 | 2,025.0 | 2,475.0 | 4,500.0 | 770 | 940 | 1,710 |
| -Gate & Valve | | | | | | | | |
| (1) Jet flow gate ϕ700 | unit | 1 | 1,960,000 | 840,000 | 2,800,000 | 1,960 | 840 | 2,800 |
| ϕ800 | unit | 1 | 2,310,000 | 990,000 | 3,300,000 | 2,310 | 990 | 3,300 |
| (2) Sluice valve ϕ700 | unit | 1 | 980,000 | 420,000 | 1,400,000 | 980 | 420 | 1,400 |
| ϕ800 | unit | 1 | 1,330,000 | 570,000 | 1,900,000 | 1,330 | 570 | 1,900 |
| -Conduit Pipe | ton | 26.7 | 35,000 | 15,000 | 50,000 | 935 | 400 | 1,335 |
| -Gate house | | 50 | 250 | 610 | 860 | 13 | 30 | 43 |
| Sub-total | | | | | | 9,229 | 5,071 | 14,300 |
| 6. Road | m | 1,000 | 352 | 291 | 643 | 352 | 291 | 643 |
| 7. Miscellaneous Works | L.S. | | | | | 5,369 | 3,489 | 8,858 |
| Total | | | | | | 64,966 | 42,210 | 107,176 |
| B. Canal | | | | | | | | |
| 1. Main Canal | | | | | | | | |
| -Stripping | cu.m | 81,500 | 6 | 3 | 9 | 489 | 245 | 734 |
| -Excavation (Earth) | cu.m | 53,000 | 12 | 4 | 16 | 636 | 212 | 848 |
| -Embankment | cu.m | 295,900 | 29 | 11 | 40 | 8,581 | 3,255 | 11,836 |
| -Laterite | cu.m | 31,800 | 19 | 68 | 87 | 604 | 2,163 | 2,767 |
| -Sodding | sq.m | 219,700 | 0 | 11 | 11 | 0 | 2,417 | 2,417 |
| -Lining Concrete | cu.m | 5,720 | 740 | 1,112 | 1,852 | 4,233 | 6,360 | 10,593 |
| -Related Structure | L.S. | | | | | 6,430 | 6,430 | 12,860 |
| -Miscellaneous Works | L.S. | | | | | 2,097 | 2,109 | 4,206 |
| Sub-total | | | | | | 23,070 | 23,191 | 46,261 |
| 2. Lateral Canal | | | | | | | | |
| -Stripping | cu.m | 33,800 | 6 | 3 | 9 | 203 | 101 | 304 |
| -Excavation (Earth) | cu.m | 13,900 | 12 | 4 | 16 | 167 | 55 | 222 |
| -Embankment | cu.m | 117,800 | 29 | 11 | 40 | 3,416 | 1,296 | 4,712 |
| -Laterite | cu.m | 13,900 | 19 | 68 | 87 | 264 | 945 | 1,209 |
| -Sodding | sq.m | 90,000 | 0 | 11 | 11 | 0 | 990 | 990 |
| -Lining Concrete | cu.m | 2,040 | 740 | 1,112 | 1,852 | 1,510 | 2,268 | 3,778 |
| -Related Structure | L.S. | | | | | 2,470 | 2,470 | 4,940 |
| -Miscellaneous Works | L.S. | | | | | 803 | 813 | 1,616 |
| Sub-total | | | | | | 8,833 | 8,938 | 17,771 |
| Total | | | | | | 31,903 | 32,129 | 64,032 |
| C. On-farm and Muban Pond | | | | | | | | |
| 1. On-farm | ha | 920 | 4,875 | 3,250 | 8,125 | 4,485 | 2,990 | 7,475 |
| 2. Drainage Canal | | | | | | | | |
| -Excavation | cu.m | 10,900 | 12 | 4 | 16 | 131 | 43 | 174 |
| -Embankment | cu.m | 3,800 | 29 | 11 | 40 | 110 | 42 | 152 |
| -Miscellaneous Works | L.S. | | | | | 24 | 9 | 33 |
| Sub-total | | | | | | 265 | 94 | 359 |
| 3. Muban Pond | | | | | | | | |
| -Stripping | cu.m | 11,400 | 6 | 3 | 9 | 68 | 35 | 103 |
| -Excavation | cu.m | 50,300 | 12 | 4 | 16 | 604 | 201 | 805 |
| -Embankment | cu.m | 14,800 | 29 | 11 | 40 | 429 | 163 | 592 |
| -Sodding | sq.m | 14,200 | 0 | 11 | 11 | 0 | 156 | 156 |
| -Miscellaneous Works | L.S. | | | | | 110 | 56 | 166 |
| Sub-total | | | | | | 1,211 | 611 | 1,822 |
| Total | | | | | | 5,961 | 3,695 | 9,656 |

## TABLE H-15 : COST OF PREPARATORY WORKS

| Description of Works | Unit | Quantity | Unit Rate (฿) | | | Amount (฿ '000) | | |
|---|---|---|---|---|---|---|---|---|
| | | | F/C | L/C | Total | F/C | L/C | Total |
| 1. O/M Branch Office | | | | | | | | |
| -Office | sq.m | 400 | 1,100 | 3,400 | 4,500 | 440 | 1,360 | 1,800 |
| -Garage and Warehouse | sq.m | 200 | 220 | 680 | 900 | 44 | 136 | 180 |
| -Miscellaneous Works | L.S | | | | | 145 | 449 | 594 |
| Total | | | | | | 629 | 1,945 | 2,574 |
| 2. Dam | | | | | | | | |
| -Office Operation Room | sq.m | 300 | 1,100 | 3,400 | 4,500 | 330 | 1,020 | 1,350 |
| -Garage and Warehouse | sq.m | 100 | 220 | 680 | 900 | 22 | 68 | 90 |
| -Miscellaneous Works | L.S | | | | | 106 | 326 | 432 |
| Total | | | | | | 458 | 1,414 | 1,872 |

## TABLE H-16 : O/M EQUIPMENT

- Unit: ฿1,000 -

| Description | Q'ty | Unit Cost | Total Cost | Fuel | Repair |
|---|---|---|---|---|---|
| 1. Moter Grader, 125 HP | 2 | 1,303 | 2,606 | 286 | 182 |
| 2. Loader Backhoe Combination | 2 | 771 | 1,542 | 265 | 108 |
| 3. Flat Bed Truck, 4 ton | 2 | 228 | 456 | 168 | 31 |
| 4. Pick-up Truck, 4 ton | 3 | 217 | 651 | 86 | 45 |
| 5. Station Wagon, 4 x 4 | 1 | 489 | 489 | 37 | 34 |
| 6. Motor Bicycle, 125 cc | 22 | 23 | 506 | 135 | 35 |
| 7. Diesel Generating Set, 15 KVA | 1 | 109 | 109 | 45 | 7 |
| 8. Diesel Generating Set, 5 KVA | 1 | 65 | 65 | 15 | 4 |
| 9. 04" Centrifugal Pump | 3 | 92 | 276 | 17 | 20 |
| 10. Concrete Mixer, 7 cu.ft. | 1 | 130 | 130 | 4 | 9 |
| 11. Air Compressor, 15 cfm | 1 | 27 | 27 | 3 | 2 |
| 12. Back-fill Vibrating Tamper | 1 | 21 | 21 | 1 | 1 |
| 13. Concrete Vibrator, 1/2" | 1 | 23 | 23 | 1 | 1 |
| 14. Gas Welding & Cutting Outfit | 1 | 17 | 17 | 4 | 1 |
| 15. Electric Hand Drill, 1/2" | 1 | 77 | 77 | - | 4 |
| 16. Electric Bench Drill, 1/2" | 1 | 153 | 153 | - | 11 |
| 17. Electric Portable Grinder | 1 | 100 | 100 | - | 7 |
| 18. Electric Bench Grinder w/brush | 1 | 282 | 282 | - | 20 |
| 19. Hydraulic Jack, 10 ton | 1 | 77 | 77 | - | 5 |
| 20. Hydraulic Jack, 5 ton | 1 | 51 | 51 | - | 3 |
| 21. Chain Hoist, 5 ton | 1 | 51 | 51 | - | 3 |
| 22. Hand Tool Set for Field Workshop | 1 | 282 | 282 | - | 20 |
| Total | | | 7,991 | 1,067 | 553 |

## TABLE H-17 : COST OF RIGHT OF WAY

| Description of Works | Unit | Quantity | Unit Rate (฿) | | | Amount (฿ '000) | | |
|---|---|---|---|---|---|---|---|---|
| | | | F/C | L/C | Total | F/C | L/C | Total |
| Lam Se | | | | | | | | |
| 1. Dam | ha | 74.9 | 0 | 43,750 | 43,750 | 0 | 3,277 | 3,277 |
| 2. Irrigation Canal | ha | 56.6 | 0 | 43,750 | 43,750 | 0 | 2,476 | 2,476 |
| 3. Drainage Canal | ha | 6.2 | 0 | 43,750 | 43,750 | 0 | 271 | 271 |
| Total | | | | | | 0 | 6,024 | 6,024 |
| Huai Khum Kham | | | | | | | | |
| 1. Dam | ha | 67.0 | 0 | 31,250 | 31,250 | 0 | 2,094 | 2,094 |
| 2. Irrigation Canal | ha | 138.0 | 0 | 31,250 | 31,250 | 0 | 4,313 | 4,313 |
| 3. Drainage Canal | ha | 6.4 | 0 | 31,250 | 31,250 | 0 | 200 | 200 |
| Total | | | | | | 0 | 6,607 | 6,607 |
| Huai Kham Phak Wan | | | | | | | | |
| 1. Irrigation Canal | ha | 46.3 | 0 | 25,000 | 25,000 | 0 | 1,158 | 1,158 |
| 2. Drainage Canal | ha | 1.8 | 0 | 25,000 | 25,000 | 0 | 45 | 45 |
| Total | | | | | | 0 | 1,203 | 1,203 |
| Huai N Khai | | | | | | | | |
| 1. Dam | ha | 292.5 | 0 | 25,000 | 25,000 | 0 | 7,313 | 7,313 |
| 2. Irrigation Canal | ha | 90.5 | 0 | 25,000 | 25,000 | 0 | 2,263 | 2,263 |
| Total | | | | | | 0 | 9,576 | 9,576 |
| Huai Soob | | | | | | | | |
| 1. Dam | ha | 0 | 0 | 25,000 | 25,000 | 0 | 0 | 0 |
| 2. Irrigation Canal | ha | 73.9 | 0 | 25,000 | 25,000 | 0 | 1,848 | 1,848 |
| 3. Drainage Canal | ha | 4.2 | 0 | 25,000 | 25,000 | 0 | 105 | 105 |
| Total | | | | | | 0 | 1,953 | 1,953 |

## TABLE H-18 : COST OF SURVEY AND INVESTIGATION (1/2)

| Description of Works | Unit | Quantity | Unit Rate (฿) | | | Amount (฿ '000) | | |
|---|---|---|---|---|---|---|---|---|
| | | | F/C | L/C | Total | F/C | L/C | Total |
| Lam Se | | | | | | | | |
| 1. Dam and Quarry Site | | | | | | | | |
| -Plan map survey, scale 1:1,000 | ha | 60 | 300 | 1,200 | 1,500 | 18 | 72 | 90 |
| -Strip topography Survey | km | 4.1 | 2,800 | 11,200 | 14,000 | 11 | 46 | 57 |
| -Strip topography Survey for Road | km | 6.0 | 2,000 | 8,000 | 10,000 | 12 | 48 | 60 |
| -Seismic Prospecting | km | 2.1 | 240,000 | 60,000 | 300,000 | 504 | 126 | 630 |
| -Core Drilling | m | 360 | 1,680 | 720 | 2,400 | 605 | 259 | 864 |
| -Permeability Test | Test | 50 | 560 | 240 | 800 | 28 | 12 | 40 |
| -Standard Penetration Test | Time | 50 | 40 | 160 | 200 | 2 | 8 | 10 |
| -Test pit at borrow area | no. | 20 | 300 | 2,700 | 3,000 | 6 | 54 | 60 |
| -Auger Drilling | m | 740 | 30 | 270 | 300 | 22 | 200 | 222 |
| -Laboratory Test | | | | | | | | |
| Physical Test | sample | 20 | 1,300 | 5,200 | 6,500 | 26 | 104 | 130 |
| Dynamic Test | sample | 10 | 8,250 | 19,250 | 27,500 | 83 | 192 | 275 |
| 2. Canal | | | | | | | | |
| -Strip topography Survey | km | 30.8 | 2,800 | 11,200 | 14,000 | 86 | 345 | 431 |
| 3. Miscellaneous Works | L.S. | | | | | 140 | 147 | 287 |
| Total | | | | | | 1,543 | 1,613 | 3,156 |
| Huai Khum Khom | | | | | | | | |
| 1. Dam and Quarry Site | | | | | | | | |
| -Plan mapsurvey, scale 1:1,000 | ha | 120 | 300 | 1,200 | 1,500 | 36 | 144 | 180 |
| -Strip topography Survey | km | 3.9 | 2,800 | 11,200 | 14,000 | 11 | 44 | 55 |
| -Strip topography Survey for Road | km | 3.5 | 2,000 | 8,000 | 10,000 | 7 | 28 | 35 |
| -Seismic Prospecting | km | 2.0 | 240,000 | 60,000 | 300,000 | 480 | 120 | 600 |
| -Core Drilling | m | 280 | 1,680 | 720 | 2,400 | 470 | 202 | 672 |
| -Permeability Test | Test | 40 | 560 | 240 | 800 | 22 | 10 | 32 |
| -Standard Penetration Test | Time | 40 | 40 | 160 | 200 | 2 | 6 | 8 |
| -Test pit at borrow area | no. | 20 | 300 | 2,700 | 3,000 | 6 | 54 | 60 |
| -Auger Drilling | m | 440 | 30 | 270 | 300 | 13 | 119 | 132 |
| -Laboratory Test | | | | | | | | |
| Physical Test | sample | 20 | 1,300 | 5,200 | 6,500 | 26 | 104 | 130 |
| Dynamic Test | sample | 10 | 8,250 | 19,250 | 27,500 | 83 | 192 | 275 |
| 2. Canal | | | | | | | | |
| -Strip topography Survey | km | 72.0 | 2,800 | 11,200 | 14,000 | 202 | 806 | 1,008 |
| 3. Miscellaneous Works | L.S. | | | | | 136 | 183 | 319 |
| Total | | | | | | 1,494 | 2,012 | 3,506 |
| Huai Kham Phak Wan | | | | | | | | |
| 1. Dam and Quarry Site | | | | | | | | |
| -Plan mapsurvey, scale 1:1,000 | ha | 200 | 300 | 1,200 | 1,500 | 60 | 240 | 300 |
| -Strip topography Survey | km | 2.9 | 2,800 | 11,200 | 14,000 | 8 | 33 | 41 |
| -Seismic Prospecting | km | 1.9 | 240,000 | 60,000 | 300,000 | 456 | 114 | 570 |
| -Core Drilling | m | 220 | 1,680 | 720 | 2,400 | 370 | 158 | 528 |
| -Permeability Test | Test | 50 | 560 | 240 | 800 | 28 | 12 | 40 |
| -Standard Penetration Test | Time | 50 | 40 | 160 | 200 | 2 | 8 | 10 |
| -Test pit at borrow area | no. | 30 | 300 | 2,700 | 3,000 | 9 | 81 | 90 |
| -Auger Drilling | m | 60 | 30 | 270 | 300 | 2 | 16 | 18 |
| -Laboratory Test | | | | | | | | |
| Physical Test | sample | 30 | 1,300 | 5,200 | 6,500 | 39 | 156 | 195 |
| Dynamic Test | sample | 15 | 8,250 | 19,250 | 27,500 | 124 | 289 | 413 |
| 2. Canal | | | | | | | | |
| -Strip topography Survey | km | 25.1 | 2,800 | 11,200 | 14,000 | 70 | 281 | 351 |
| 3. Miscellaneous Works | L.S. | | | | | 117 | 139 | 256 |
| Total | | | | | | 1,285 | 1,527 | 2,812 |

## TABLE H-18 : COST OF SURVEY AND INVESTIGATION (2/2)

| Description of Works | Unit | Quantity | Unit Rate (฿) | | | Amount (฿ '000) | | |
|---|---|---|---|---|---|---|---|---|
| | | | F/C | L/C | Total | F/C | L/C | Total |
| Huai Na Khai | | | | | | | | |
| 1. Dam and Quarry Site | | | | | | | | |
| -Plane mapsurvey, scale 1:1,000 | ha | 230 | 300 | 1,200 | 1,500 | 69 | 276 | 345 |
| -Strip topography Survey | km | 6.6 | 2,800 | 11,200 | 14,000 | 18 | 74 | 92 |
| -Seismic Prospecting | km | 3.6 | 240,000 | 60,000 | 300,000 | 864 | 216 | 1,080 |
| -Core Drilling | m | 350 | 1,680 | 720 | 2,400 | 588 | 252 | 840 |
| -Permeability Test | Test | 90 | 560 | 240 | 800 | 50 | 22 | 72 |
| -Standard Penetration Test | Time | 90 | 40 | 160 | 200 | 4 | 14 | 18 |
| -Test pit at borrow area | no. | 30 | 300 | 2,700 | 3,000 | 9 | 81 | 90 |
| -Auger Drilling | m | 60 | 30 | 270 | 300 | 2 | 16 | 18 |
| -Laboratory Test | | | | | | | | |
| Physical Test | sample | 30 | 1,300 | 5,200 | 6,500 | 39 | 156 | 195 |
| Dynamic Test | sample | 15 | 8,250 | 19,250 | 27,500 | 124 | 289 | 413 |
| 2. Canal | | | | | | | | |
| -Strip topography Survey | km | 47.9 | 2,800 | 11,200 | 14,000 | 134 | 537 | 671 |
| 3. Miscellaneous Works | L.S. | | | | | 190 | 193 | 383 |
| Total | | | | | | 2,091 | 2,126 | 4,217 |
| Huai Soob | | | | | | | | |
| 1. Dam and Quarry Site | | | | | | | | |
| -Plane mapsurvey, scale 1:1,000 | ha | 130 | 300 | 1,200 | 1,500 | 39 | 156 | 195 |
| -Strip topography Survey | km | 4.7 | 2,800 | 11,200 | 14,000 | 13 | 53 | 66 |
| -Strip topography Survey for Road | km | 1.0 | 2,000 | 8,000 | 10,000 | 2 | 8 | 10 |
| -Seismic Prospecting | km | 2.4 | 240,000 | 60,000 | 300,000 | 576 | 144 | 720 |
| -Core Drilling | m | 270 | 1,680 | 720 | 2,400 | 454 | 194 | 648 |
| -Permeability Test | Test | 60 | 560 | 240 | 800 | 34 | 14 | 48 |
| -Standard Penetration Test | Time | 60 | 40 | 160 | 200 | 2 | 10 | 12 |
| -Test pit at borrow area | no. | 20 | 300 | 2,700 | 3,000 | 6 | 54 | 60 |
| -Auger Drilling | m | 190 | 30 | 270 | 300 | 6 | 51 | 57 |
| -Laboratory Test | | | | | | | | |
| Physical Test | sample | 20 | 1,300 | 5,200 | 6,400 | 26 | 104 | 130 |
| Dynamic Test | sample | 10 | 8,250 | 19,250 | 27,500 | 83 | 192 | 275 |
| 2. Canal | | | | | | | | |
| -Strip topography Survey | km | 40.6 | 2,800 | 11,200 | 14,000 | 114 | 454 | 568 |
| 3. Miscellaneous Works | L.S. | | | | | 136 | 143 | 279 |
| Total | | | | | | 1,491 | 1,577 | 3,068 |

## TABLE H-19 : COST OF CONSULTING SERVICES

A. Detailed Design

unit: Yen

| | |
|---|---|
| 1. Foreign Currency Portion | |
| (1) Remuneration | (Yen) |
| - Foreign Consultants - 35 M/M | 77,000,000 |
| - Local Consultants - 50 M/M | 33,600,000 |
| (2) Allowance for Foreign Personnel | 5,880,000 |
| (3) Out-of-Pocket Expense | 3,180,000 |
| (4) Unallocated Contingencies | 5,940,000 |
| Total (1) | 125,600,000 |
| (Baht Equivalent: | 22,429,000) |
| 2. Local Currency Portion | (Baht) |
| (1) Allowance for Local Personnel | 105,000 |
| (2) Local Communication | 300,000 |
| (3) Local Transportation | 628,000 |
| (4) Salaries for Supporting Staff | 330,000 |
| (5) Costs for Printing | 300,000 |
| (6) Unallocated Contingencies | 81,000 |
| Total (2) | 1,744,000 |
| Total (1)+(2) | ฿24,173,000 |

B. Supervision

| | |
|---|---|
| 1. Foreign Currency Portion | |
| (1) Remuneration | (Yen) |
| - Foreign Consultants - 50 M/M | 110,000,000 |
| - Local Consultants - 100 M/M | 67,200,000 |
| (2) Allowance for Foreign Personnel | 8,400,000 |
| (3) Out-of-Pocket Expenses | 6,760,000 |
| (4) Unallocated Contingencies | 9,440,000 |
| Total (1) | 201,800,000 |
| (Baht Equivalent: | 36,036,000) |
| 2. Local Currency Portion | (Baht) |
| (1) Allowance for Local Personnel | 2,100,000 |
| (2) Local Communication | 960,000 |
| (3) Local Transportation | 476,000 |
| (4) Salaries for Supporting Staff | 1,056,000 |
| (5) Costs for Printing | 960,000 |
| (6) Unallocated Contingencies | 275,000 |
| Total (2) | 5,827,000 |
| Total (1)+(2) | ฿41,863,000 |

Note: Exchange rate of ฿1.00 = ¥5.6

## TABLE H-20 : OPERATION AND MAINTENANCE COST

- Unit: ฿1,000 -

| Description | Cost |
|---|---|
| 1. Equipment purchasing Cost | 7,991 |
| 2. Annual Operation and Maintenance Cost | |
| 1) Salaries and Wages | 2,448 |
| 2) Fuel and Repair for Equipment | 1,620 |
| 3) Material Supplies 1/ | 5,331 |
| 4) General Expenditure 2/ | 282 |
| Total | 9,681 |

Notes : 1/ Civil Cost x 0.007 (0.7%)
761,590 x 0.007 = 5,331

2/ {1) + 2) + 3} x 0.03 (3.0%)

## TABLE H-21 : SALARY AND WAGE FOR O/M

- Unit: ฿1,000 -

| Description | No. of Personnel | Salary Per Annum | Total Salary Per Annum |
|---|---|---|---|
| 1. Water Master | 1 | 120 | 120 |
| 2. Zoneman | 13 | 72 | 936 |
| 3. Gate Tender | 22 | 36 | 792 |
| 4. Foreman | 2 | 48 | 96 |
| 5. Carpenter | 3 | 36 | 108 |
| 6. Plasterer | 1 | 36 | 36 |
| 7. Steel Setter | 1 | 36 | 36 |
| 8. Common Labor | 15 | 21.6 | 324 |
| Total | | | 2,448 |

## TABLE H-22 : UNIT COST OF VARIOUS WORKS

- Unit: Baht -

| Description of Works | Unit | F/C | L/C | Total |
|---|---|---|---|---|
| A. Dam | | | | |
| - Stripping | cu.m | 6.0 | 3.0 | 9.0 |
| - Excavation (Earth) | cu.m | 12.0 | 4.0 | 16.0 |
| - Excavation (Rock) | cu.m | 91.0 | 33.0 | 124.0 |
| - Excavation with Dynamite | cu.m | 58.0 | 22.0 | 80.0 |
| - Embankment (Impervious Zone-I) | cu.m | 31.0 | 12.0 | 43.0 |
| - Embankment (Impervious Zone-II) | cu.m | 29.0 | 11.0 | 40.0 |
| - Embankment (Random Zone) | cu.m | 28.0 | 10.0 | 38.0 |
| - Backfill | cu.m | 40.0 | 40.0 | 80.0 |
| - Filter/Drain | cu.m | 130.0 | 304.0 | 434.0 |
| - Riprap | cu.m | 146.0 | 339.0 | 485.0 |
| - Top Soil | cu.m | 35.0 | 35.0 | 70.0 |
| - Sodding | sq.m | 0 | 14.0 | 14.0 |
| - Gravel Pavement | cu.m | 65.0 | 152.0 | 217.0 |
| - Drilling ($\phi$46 m/m) | m | 630.0 | 270.0 | 900.0 |
| - Cement for Grout | ton | 3,060.0 | 1,740.0 | 4,800.0 |
| - Test Hole NX | m | 1,430.0 | 610.0 | 2,040.0 |
| - Permeability Test | test | 490.0 | 210.0 | 700.0 |
| - Reinforced Concrete | cu.m | 2,025.0 | 2,475.0 | 4,500.0 |
| B. Canal | | | | |
| - Stripping | cu.m | 6.0 | 3.0 | 9.0 |
| - Excavation | cu.m | 12.0 | 4.0 | 16.0 |
| - Embankment | cu.m | 29.0 | 11.0 | 40.0 |
| - Laterite | cu.m | 19.0 | 68.0 | 87.0 |
| - Lining Concrete | cu.m | 740.0 | 1,112.0 | 1,852.0 |
| - Sodding | sq.m | 0 | 11.0 | 11.0 |

## FIGURE H-1 : PROJECT ORGANIZATION CHART FOR IMPLEMENTATION

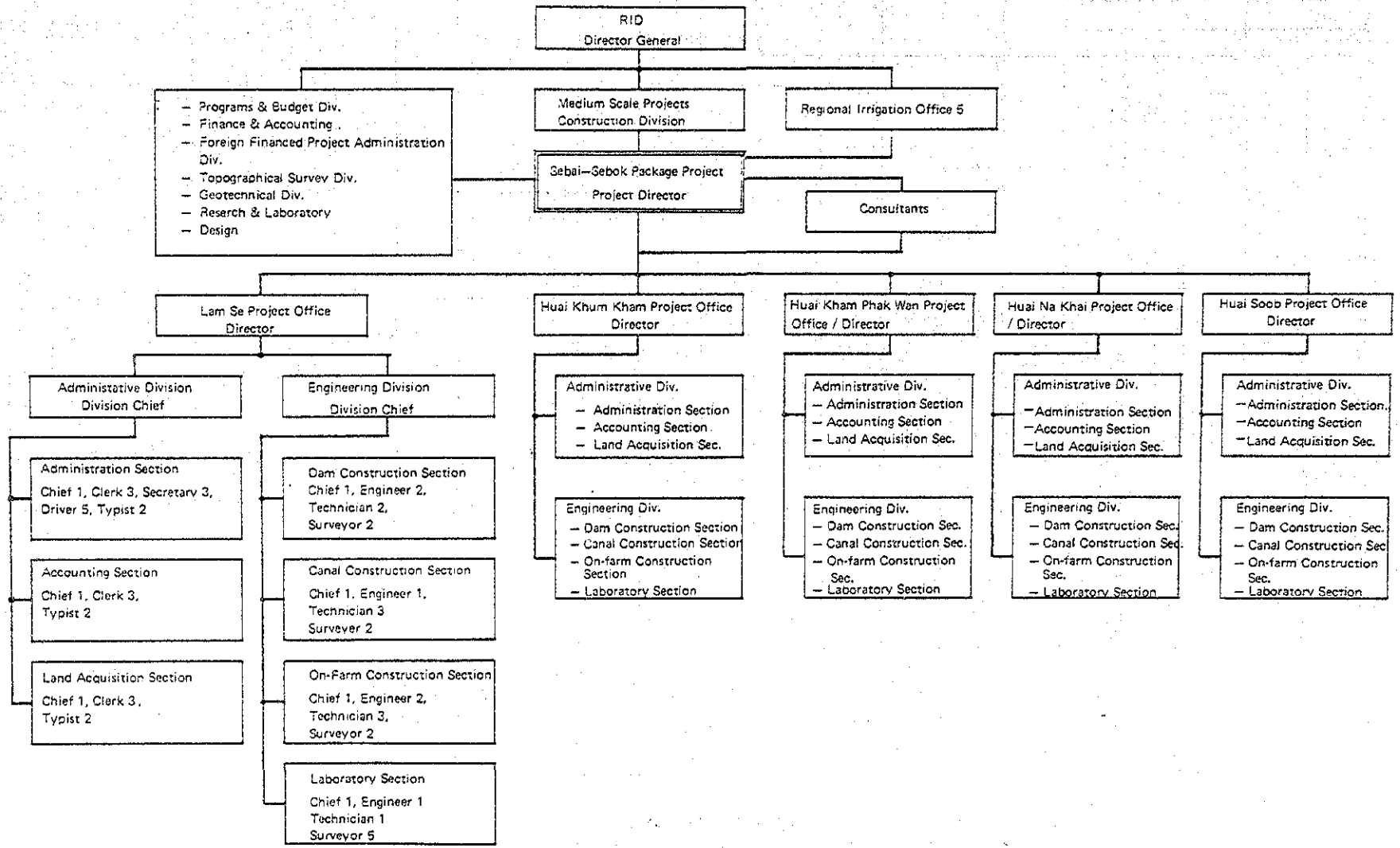


FIGURE H-2 : CONSTRUCTION SCHEDULE OF EACH PROJECT (1/5)
LAM SE PROJECT

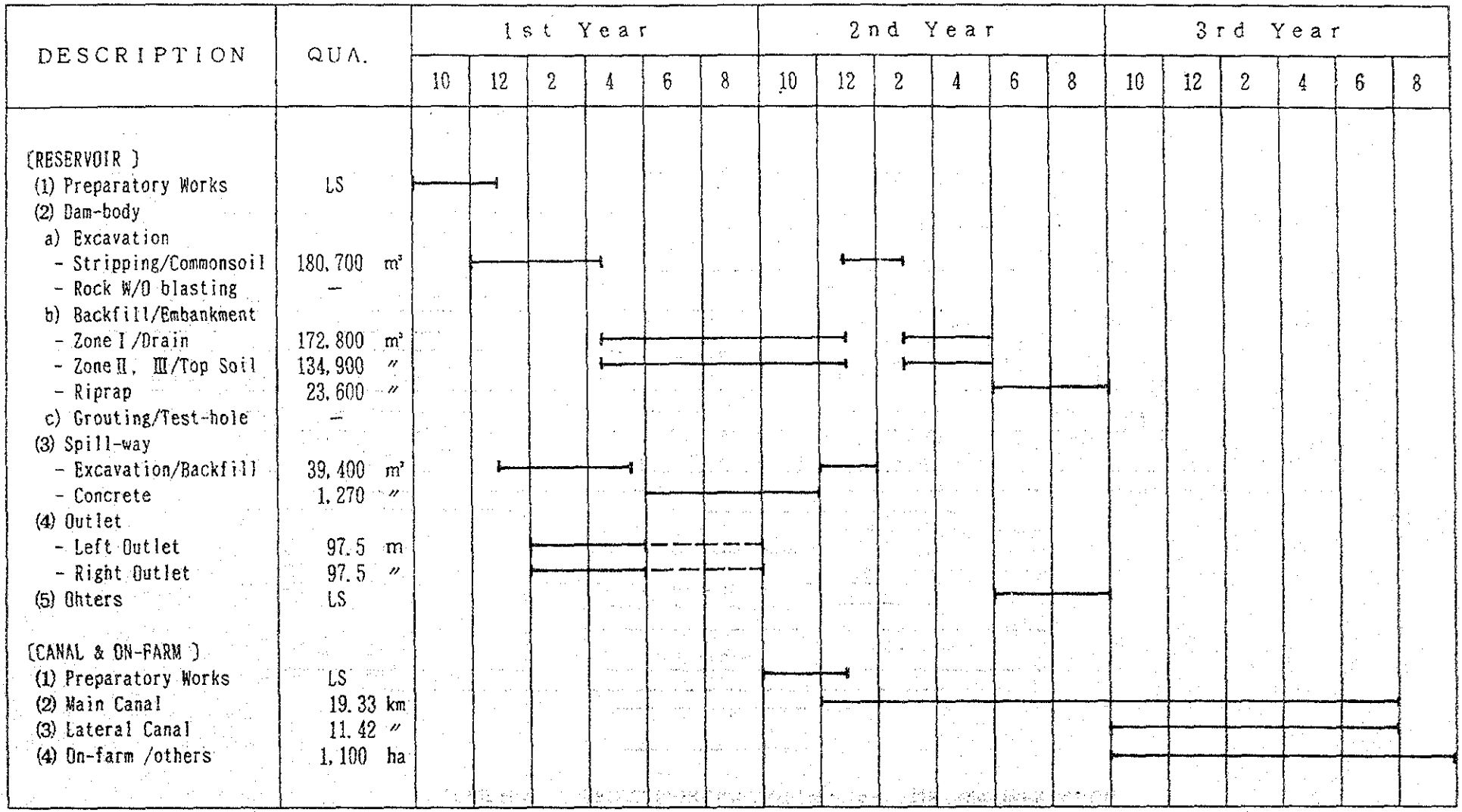


**FIGURE H-2 : CONSTRUCTION SCHEDULE OF EACH PROJECT (2/5)**
**HUAI KHUM KHAM PROJECT**

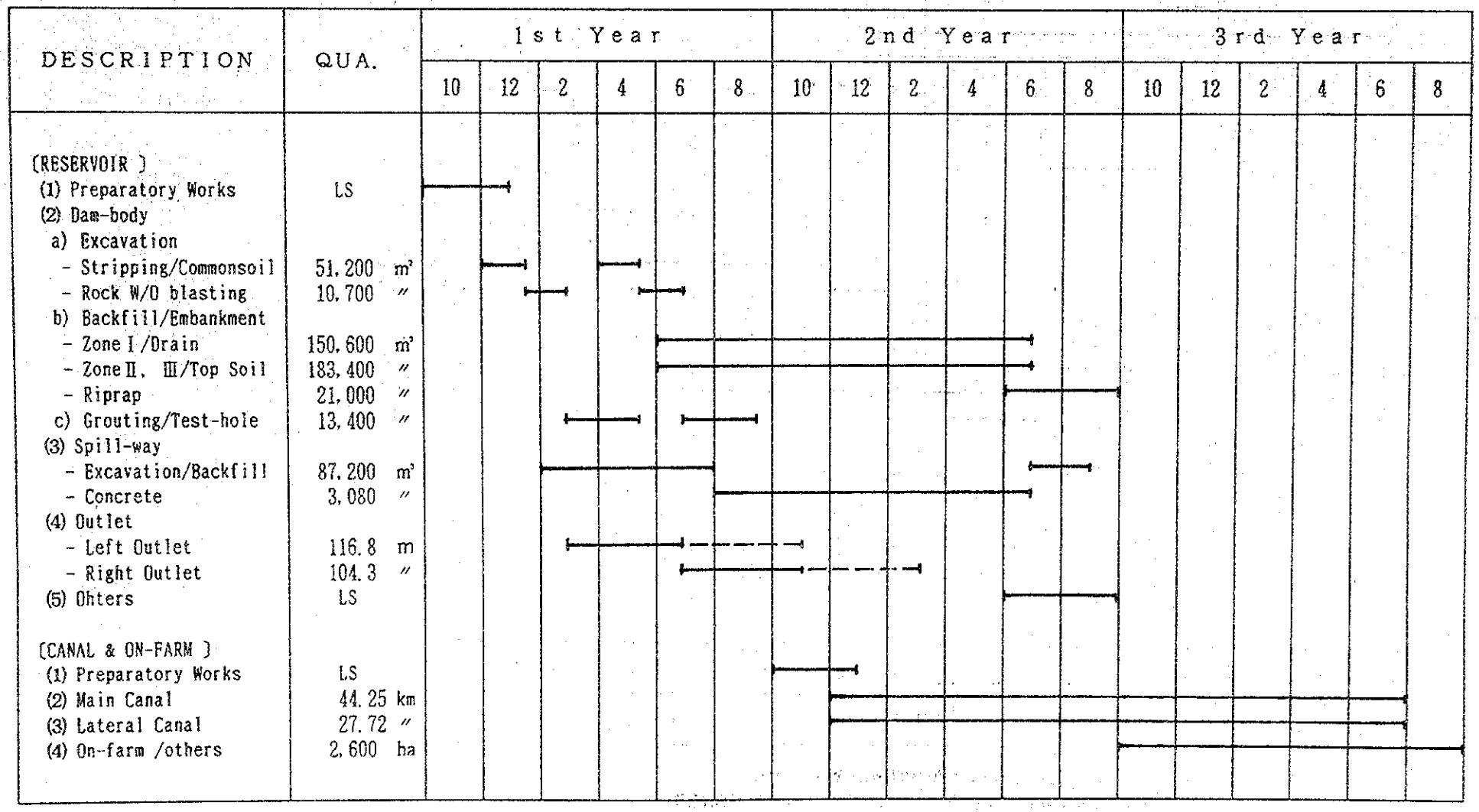


FIGURE H-2 : CONSTRUCTION SCHEDULE OF EACH PROJECT (3/5)
HUAI KHAM PHAK WAN PROJECT

| DESCRIPTION | QUA. |
|---|---|
| 〔RESERVOIR〕 | |
| (1) Preparatory Works | LS |
| (2) Dam-body | |
| a) Excavation | |
| - Stripping/Commonsoil | 60,500 m³ |
| - Rock W/O blasting | 10,900 〃 |
| b) Backfill/Embankment | |
| - Zone Ⅰ/Drain | 151,500 m³ |
| - Zone Ⅱ, Ⅲ/Top Soil | 224,900 〃 |
| - Riprap | 24,800 〃 |
| c) Grouting/Test-hole | 15,300 〃 |
| (3) Spill-way | |
| - Excavation/Backfill | 30,900 m³ |
| - Concrete | 1,320 〃 |
| (4) Outlet | |
| - Left Outlet | 97.8 m |
| - Right Outlet | — |
| (5) Ohters | LS |
| 〔CANAL & ON-FARM〕 | |
| (1) Preparatory Works | LS |
| (2) Main Canal | 12.20 km |
| (3) Lateral Canal | 12.91 〃 |
| (4) On-farm /others | 950 ha |

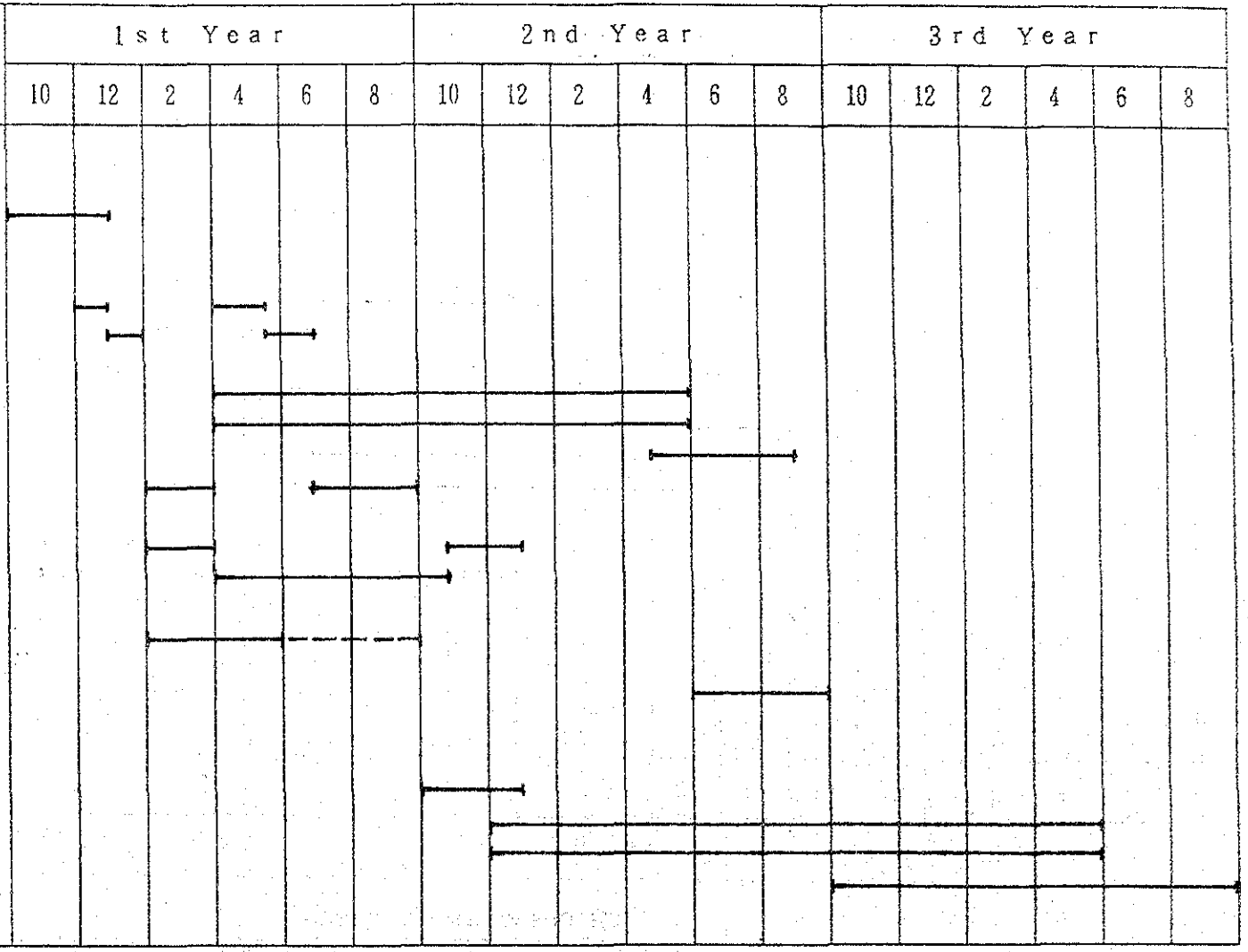


**FIGURE H-2 : CONSTRUCTION SCHEDULE OF EACH PROJECT (4/5)**
**HUAI NA KHAI PROJECT**

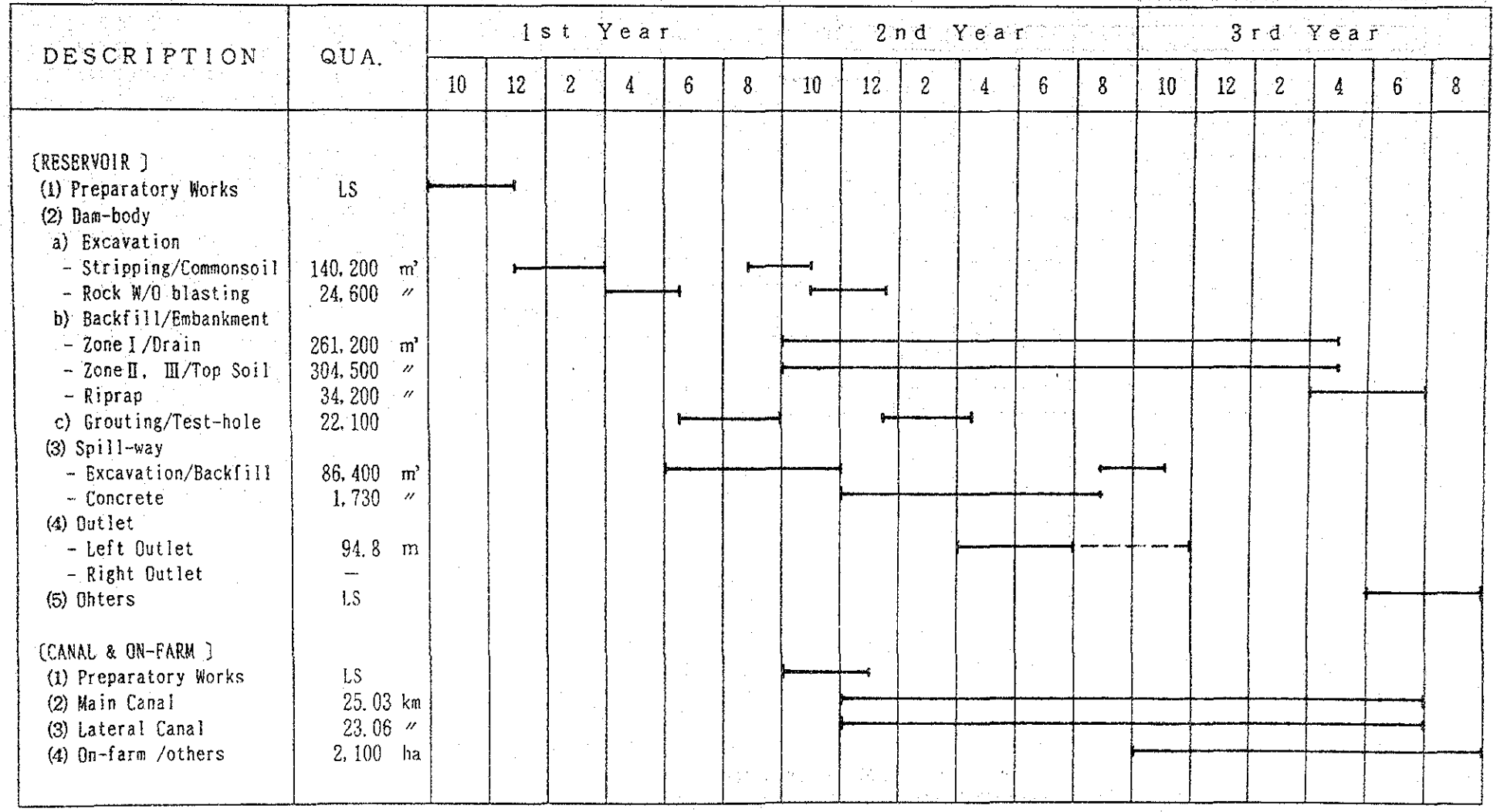


FIGURE H-2 : CONSTRUCTION SCHEDULE OF EACH PROJECT (5/5)
HUAI SOOB PROJECT

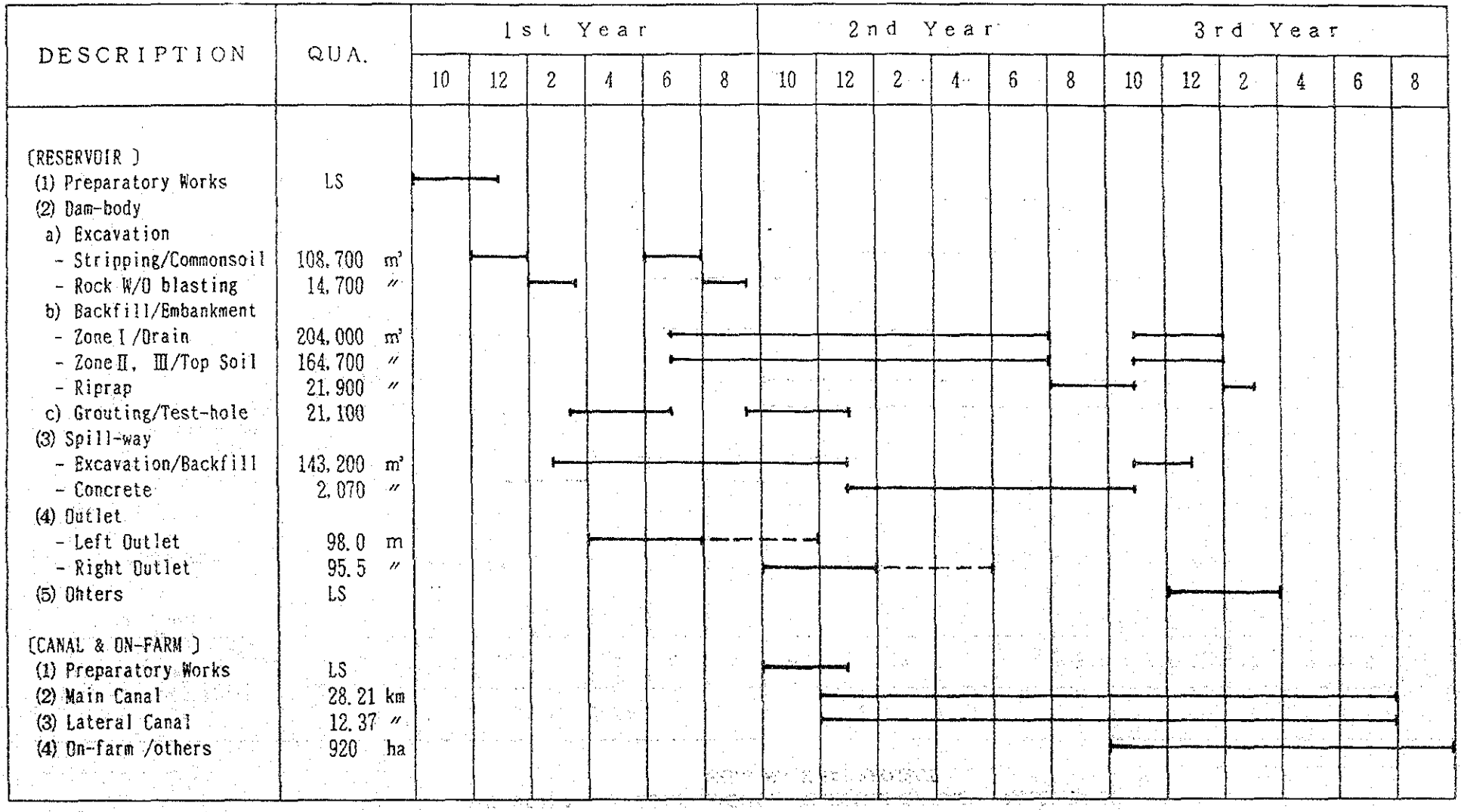
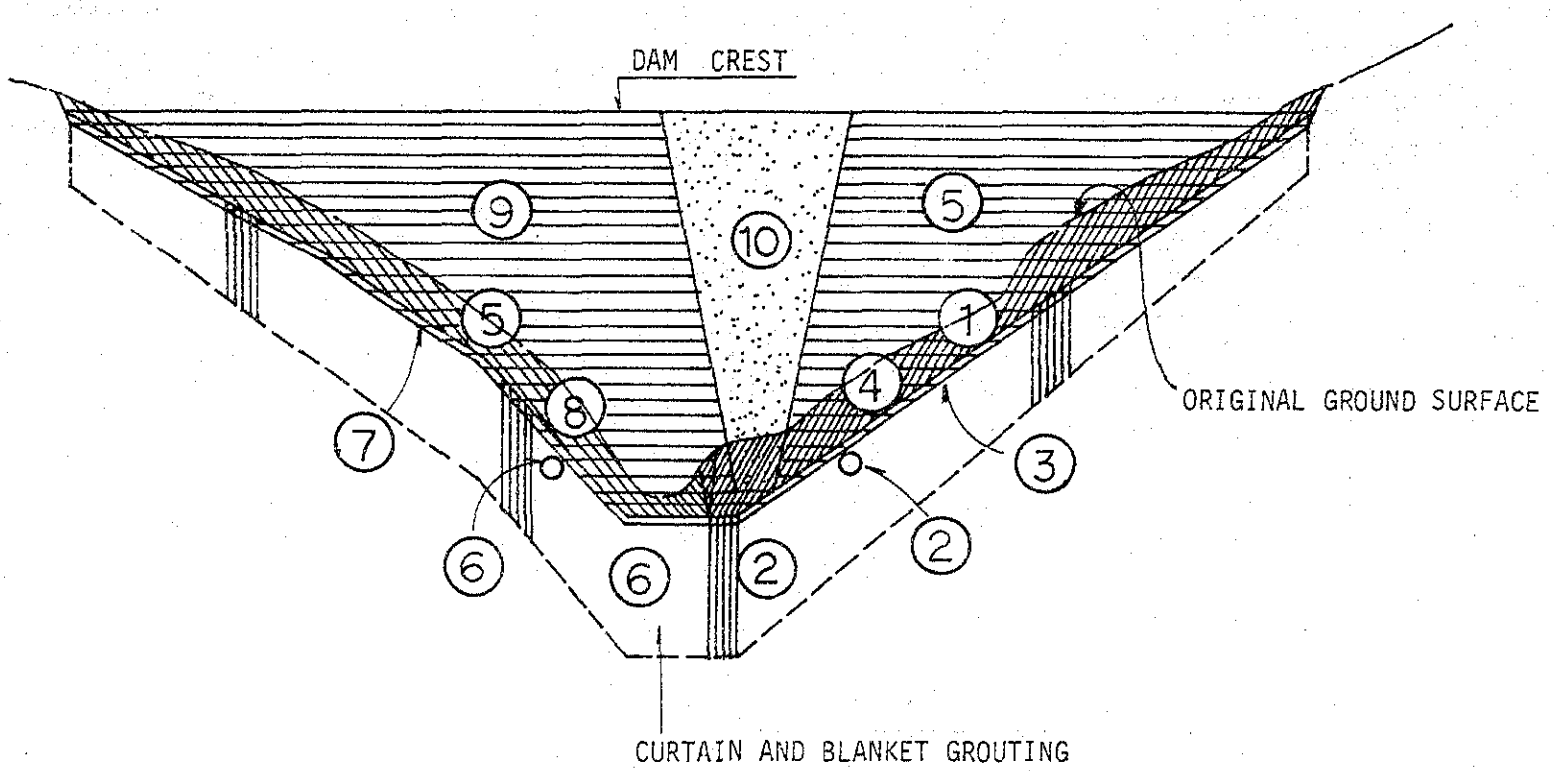
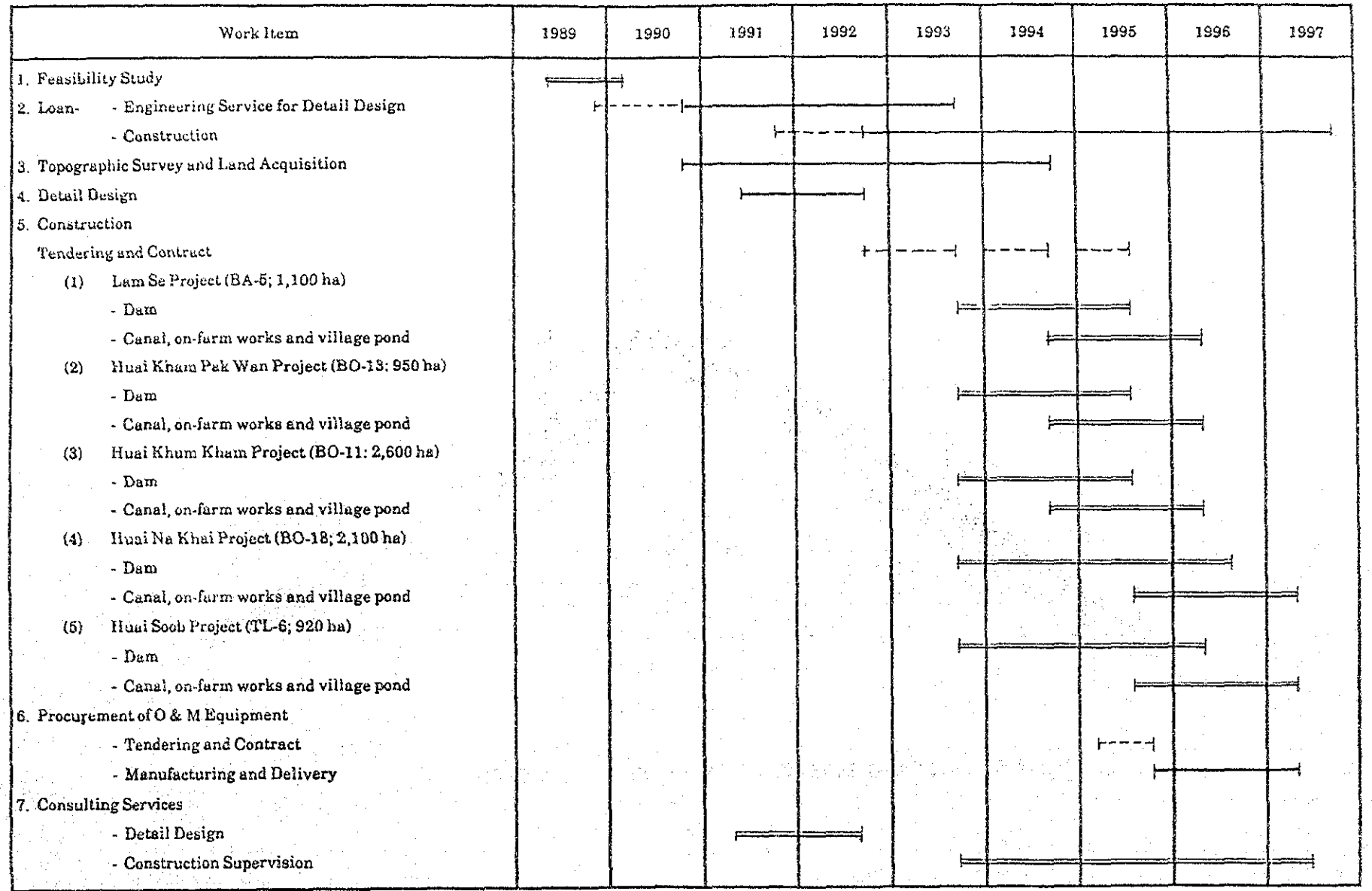


FIGURE H-3 : EXAMPLE FO SEQUENCE OF DAM CONSTRUCTION




PROFILE SECTION OF DAM

FIGURE H-4 : IMPLEMENTATION SCHEDULE OF SEBAI-SEBOK IRRIGATION PROJECT



# APPENDIX J. PROJECT EVALUATION

# APPENDIX J. PROJECT EVALUATION

## J-1. Economic Evaluation

### J-1-1. Evaluation Method

#### (1) Evaluation of Economic Values

Added to the explanations described in the Main Report, Chapter 9-1, some comments as well as basic data will be hereby presented. As for computation of economic costs, the actual tax ratio for each item was examined. While, economic values of benefits are adjusted and explained in each corresponding subject in the Appendix, mainly in two categories as economic price of benefit and production cost component in the benefit.

#### (2) Social Evaluation

There has been introduced the way of thinking to evaluate the subject project from a social point of view by adopting the "social price"; for example, as seen in a project financed by IBRD. In fact, for the subject project, many kinds of social benefits or impact could be expected as repercussion of economic development.

Level-up of farmer's living standard, stimulation in the related industries and improvement of socio-economic infrastructure are some of them. The method of social evaluation, however, has not yet completely been established nor popular in Thailand ; therefore in the Report, they will not be estimated by quantitative method but be described by qualitative way in the column of other benefits and also in the section of farm household survey analysis.

#### (3) Project Life

Project life will be fixed by the physical project life as well as the related conditions such as O & M system, administrative level and the beneficiarie's management ability. The economic life of a dam and other associated civil structures can be considered to be 100 years and 75 years respectively. At the same time, the project life for the economic evaluation shall be limited to the period where the return converted to the net present value is meaningful.

Considering the above mentioned factors, the project economic life is fixed at 50 years.

J-1-2. Value of Economic Cost and Benefit

(1) Opportunity Cost

a) Capital Cost

According to the recent estimate made by the World Bank, the opportunity cost of capital in Thailand averages ten percent per year. The marginal productivity of capital in the agriculture sector is considered to be below this average, and particularly in the Northeast Region where the return of investment is expected to be low, due to the handicap of related conditions.

Considering the above assumption, lower discount rate of seven percent is assumed taking into account limited investment opportunities in the region and of characteristic of this sub-sector.

b) Resources

Taking into account opportunity cost of resources, the method of transaction of resources in the economic analysis is settled as follows;

- Local duties and taxes are excluded from the cost since they simply represent transfer payments within the national economy.
- Foreign currency components of tradable goods for the project are estimated by imported price of local currency amount. Conversion was made at the official exchange rate, since tradable goods and services are valued at their equivalent border prices, and allowances are made for only the costs of handling and transport of goods to the project location.

c) Land and Resettlement

The opportunity cost of land is the potential value of its alternative use, for example, in farming. The majority of the subjective area is classified as no used land, therefore, only the land acquisition cost for some farm land in the subjective area is counted as category of "right of way".

The opportunity cost of resettlement comprises in general compensation payments and related costs. In the subject area, by the reservoir design, there is negligible or no farm habitation, therefore the cost of resettlement is not counted.

The financial cost of land acquisition in the proposed irrigation area is excluded from economic costs, since the benefits expected in the subject land is also excluded in the situation of with project.

(2) Benefit

a) Crop Benefit

Farm Gate Price

Market prices of agricultural commodities, livestocks and others in the project area as well as those in Bangkok and export prices were examined. By quick information survey on farm household, the farm gate price of paddy was also checked.

Considering these financial current prices, the future farm gate economic prices for agricultural commodities projected to 2,000 year by the World Bank where available are applied for economic evaluation.

For the commodities where these forecasts were not available, prices are based on trends established in Bangkok. International crop production forecasts is out of consideration due to its unstable condition. Farm gate prices used in the analysis are given in Table J-1, J-2 and J-3.

Crop Production Cost

In order to distinguish the net production value from gross production value, production costs are carefully examined based on the survey and existing data.

- Farm Input Prices

  Seed financial prices were converted to economic price. At the same time farm input chemicals prices, those of fertilizer and pesticide were also converted to economic price (see Table J-4). Unit prices were calculated as the average of current prices at present but forecasted for future prices in 2000.

- Labour

  Labour is the primary input in production, but in financial terms, it represents little or no cash costs as family labour provides most of required inputs. Farm labourers earn 30 Baht per man-day on an average, however, due to the variation in employment opportunities and wages, a shadow wage rate of 15 Baht per man-day was applied.

- Farmers have no burden of irrigation fee nor O & M cost for irrigation system but pay for hiring the equipment and livestocks for farming.

Cropping Pattern

As presented earlier, in the rainy season, paddy will be planted to 100% of the service area and in the dry season, upland crop to 20% of the service area.

For determination of a "without project" case, it is assumed that existing cropping patterns will continue with same intensity of management and utilization of inputs.

A single "with project" cropping pattern is used on the assumption that introduction of irrigation may maximizes the paddy production in the rainy season and increases the irrigable area by 20% in the dry season. Even though, in the surrounding area, cultivation of some other crops like tobacco and cashew nut is recorded, as dry season crops, it is recognized that due to a lack of water in the proposed service area, there is none or quite negligible possibility of cultivation of dry season crops.

Based on the above conditions, crop benefits were calculated (see Table J-5 and J-6). Integrating all the above mentioned elements of production costs and estimated benefits (see Table J-7), the net production value was considered as 44 percent and 60 percent of the gross production value for paddy in case of without project and with project, respectively, for package of five projects. All other crops net production values were also presented in the same table. As to the basic figures for formulating Table J-7, like target crop production, and required inputs, they were presented in Table J-8 and J-9, respectively.

The project analysis assumes a gradual build up of crop production on as it may needs several years to adapt the designed technologies to suit changing circumstances. For the Sebai-Sebok irrigation project, package of 5 medium scale irrigation projects, it is assumed

that 5 years will be required before maximum returns are generated.

b) Fisheries Benefits

Estimates of reservoir fishery benefits were primarily based on the record from the reservoirs in Amphoes related to the project area. In fact, fish yield varies to large extent according to the size and location of the reservoir. Pond and paddy fields are also the area from where certain amount of fishing is obtained. Fish production in village ponds is estimated in Table J-10.

In case of large reservoir with the surface of more than 1,000 ha, the yield and species of fishing have been studied systematically, but, medium and small reservoir as well as pond, the yield amount depends on various factors which can't be analyzed quantitatively. Fish prices also fluctuate by species and by season.

Hereby, the average yield per rai as 50 kg (312.6 kg/ha) is assumed in case of reservoir and 320 kg (2,000 kg/ha) in case of Muban ponds, considering also the future improvement in the management. An average economic price of fish has been assumed as 30 Baht/kg. The economic benefit correspond to 87% of the gross return after subtraction of production costs (see Table J-11). Integrating both the elements, fisheries benefits are summarized in the Table J-12.

c) Other Economic and Social Benefits

As mentioned previously, in (2) Social Evaluation in J-1 Evaluation Method, the other indirect benefits could be expected more than the above major elements.

Water Utilization

In fact, in the project area, many mubans have complained of insufficiency and un-availability in full year of the required water. These benefits could also be estimated as economic benefit by calculating quantitatively saving time and labour. In the report, however, those benefits will be considered as level-up of living standard of beneficiaries, due to the unknown present situation, for example, of giving the water to the livestocks.

Benefit of Livestock

In accordance with the agricultural development, livestock is also expected to increase in number as working animal and source of food. However, these benefits will be presented qualitatively even

though the amount might be considerable, because firstly, the increasing trend is not available and secondly, the subject is not considered as target plan.

Other Socio Economic Benefits

Hereunder described only the elements of expected benefits, and considering those factors, the project could be justified of its contribution to the regional economics, as a consequence, to the countrywide socio-economics.

- Increase of farm household income and expenditure which will bring the repercussion in the economic activities in the surrounding area.
- Technology and know-how related to the irrigation, farming, cultivation of fish, as well as knowledge of saving, health and community activities will be expanded by virtue of the project realization.
- Utilization of irrigation system will enable the farmers to formulate the farmers association, such as irrigator's association, through which level-up of mutual communication and farm management ability is expected.
- The muban pond will be more conveniently utilized for daily life use and improve the public health in the area.
- Increase of fishing in the project reservoir and the village pond will contribute to obtaining protein sources for villagers.
- Employment opportunity expected in the construction as well as operation and maintenance of the project will contribute to the regional economy.
- The project will improve the farmers living standard as a consequence, contribute to the equal target among the regions.

## J-1-3. Economic Analysis

### (1) NPV, B/C Ratio and EIRR

Basic figures in each item of economic cost with disbursement schedule are attached as Table J-13. The integrated benefits table is attached in the Main Report. Taking into consideration of phasing for benefit, hereby, the benefit stream of projects is tabulated and attached as Table J-14. The comparison of benefit and cost is summarized as follows (see Table J-15 ).

Economic Indicators of the Projects

(unit: present value ... million Baht)

| Projects | NPV and BC Ratio (discount rate at 7%) | | | | Economic Internal Rate of Return (EIRR) |
|---|---|---|---|---|---|
| | Present Value | | Not Present Value (NPV) (1)-(2) | Benefit Cost Ratio (1))/(2) | |
| | Benefit (1) | Costs (2) | | | |
| 1. Lam Se | 101.0 | 88.7 | 12.3 | 1.14 | 8.0 |
| 2. Huai Khum Kam | 231.8 | 192.6 | 39.2 | 1.20 | 8.5 |
| 3. Huai Kham Phak Wan | 122.9 | 96.0 | 26.9 | 1.28 | 8.9 |
| 4. Huai Na Khai | 218.8 | 156.6 | 62.2 | 1.40 | 9.7 |
| 5. Huai Soob | 123.4 | 117.5 | 5.9 | 1.05 | 7.4 |
| Package of the Projects | 797.9 | 651.4 | 146.5 | 1.22 | 8.6 |

### (2) Sensitivity Analysis

With the aim to evaluate the sensitivity, analysis is conducted with assumption of 10 different cases. By this analysis, even though there arise some conditions, the proposed projects could be feasible. The Sensitivity test was conducted only in case of the package project. The parameters adopted by assumed cases are those of "increase of project cost", "overdue in the construction completion period", "reduction of benefits", "delay in benefits realization" and combinations of these four cases.

Sensitivity Test

| Alternative | EIRR |
|---|---|
| | (%) |
| 1. Proto-type | 8.6 |
| 2. 10% increase in capital cost | 7.9 |
| 3. 2 years overdue in the construction completion | 7.9 |
| 4. Combination of 2 and 3 | 7.3 |
| 5. 10% reduction in benefit | 7.7 |
| 6. Combination of 2 and 5 | 7.0 |
| 7. Three-years delay in benefit | 7.9 |
| 8. Combination of 5 and 7 | 7.0 |
| 9. Combination of 2, 5 and 7 | 6.5 |
| 10. Combination of 3 and 7 | 7.3 |
| 11. Combination of 2, 3, 5 and 7 | 5.9 |

(3) Records of Production in Recent Years

As a reference, with an aim to recognize the actualities so as to justify the applied figures, some records regarding the crop production, crop prices, fisheries production and prices are attached hereto (see Table J-16 ~ 20).

## J-2. Impact of the Project on Farm Household

### J-2-1. Farm Household Survey

#### (1) Sample Farm Households

There are 36 villages in the proposed projet areas, of which general information is given in Tables J-21 to J-23. The farm household survey was conducted in July, 1989 by the JICA study team and RID for the selected 100 farm households, about 4.6% of the total 2,310 farm households living in the proposed 5 project areas ; 2 villages per project and 10 sampls per village. With some adequate modification with a help of statistical data, the profiles of farm households are drawn so as to estimate the project profitability at farm level.

#### (2) Income and Expenditure

The summary of survey result is attached on Table J-25. The difference between income and expenditure could be interpreted as saving, since by the same enquiry result, the saving of 4,000 to 5,000 Baht per year is reported. At the same time, among the contents of income, borrowing or receiving from the relatives occupy the large portion of 50.5 percent as shown in Table J-26.

Off farm income is composed of net non-agricultural services of 4,341 Baht and employment of 4,523 Baht, and marks 53.4 percent of gross income.

As shown in Table J-25, the other household expenditure occupys 69.5 percent and the detailed composition of them is summarized in the Table J-27 which shows a large portion of 4 items as 62.9 percent basically required for living (food, close, house and medical care).

### J-2-2. Impact of the Project on Farm Household Account

Based on the above described present conditions, the estimated impact to be brought by the project implementation is calculated and shown in Table J-27. The calculation has been made for two type of owner farm ; the first is the 3.2 ha (20 rai) farm which is the mode of operated area and the second is the half size of the former.

The beneficiary farmers who at present rely more on non-agricultural income, say income by employment which means exodus of labourer, will in future get a large portion of income from agriculture including inland fisheries. Livestocks also will increase in number, but they are excluded from the estimate of benefits since they are not target subject.

Expenditure composition will be also changed; the estimation method is not simple since it depends on to a large extent non economic factor, say social behavior of farmers. With assumption of non increase of basically required four items for living, the evaluation of expenditure composition is also estimated. In connection with the above estimation, the inflation factor is not considered.

## TABLE J-1 : FARM GATE PRICES OF AGRICULTURAL PRODUCTS

| Commodities | Unit | Financial | Economic |
|---|---|---|---|
| Paddy | ฿/ton | 3,400 | 3,160 |
| Groundnuts, in shell, dried | " | 7,000 | 7,000 |
| Soybeans | " | 7,000 | 6,310 |
| Sweet Corn | " | 8,000 | 8,000 |
| String Bean | " | 8,000 | 8,000 |
| Water Melon | " | 2,000 | 2,000 |
| Chilli, dried<br>(Chilli, fresh) | " | 33,500<br>(13,400) | 33,500<br>(13,400) |
| Fresh water fish | " | 30,000 | 30,000 |

## TABLE J-2 : ECONOMIC PRICE OF PADDY

| Item | Unit | Economic Price |
|---|---|---|
| 1) IBRD projection price in 2000 at 1985 constant price (5% broken white rice, FOB Bangkok) | US$/ton | 166 |
| 2) Converted to 1988 constant price (x 1.495 *1) | US$/ton | 248 |
| 3) Converted to Thai Baht (US$1 = ฿25) | ฿/ton | 6,200 |
| 4) Average exported price *2 | ฿/ton | 6,200 |
| 5) Shadow rate *3 of ฿850 of handling charge and others | ฿/ton | 586 |
| 6) Shadow rate *4 of ฿450 of transportation charge from rice mill in the Project Area to Bangkok | ฿/ton | 342 |
| 7) Milled price of rice | ฿/ton | 5,272 |
| 8) Ex-milled price of rice | ฿/ton | 3,480 |
| 9) Shadow rate *5 of ฿390 of milling cost | ฿/ton | 280 |
| 10) Shadow rate *4 of ฿50 of transportation cost from farm-gate to rice mill | ฿/ton | 38 |
| 11) Farm-gate price of paddy | ฿/ton | 3,162 (≒ 3,160) |

Notes: *1 --- IBRD International Inflation Index.

*2 --- Grade differential of average exported rice price from non-glutinous white rice 5% broken is same (weighted average for the last five years).

*3 --- 0.69 of conversion factor for middleman's margin is applied to convert to economic price.

*4 --- 0.76 of conversion factor for transport is applied to convert to economic price.

*5 --- 0.72 of conversion factor for milling margin is applied to convert to economic price.

## TABLE J-3 : ECONOMIC PRICE OF SOYBEANS

| Item | Unit | Economic Price |
|---|---|---|
| 1) IBRD projection price in 2000 at 1985 constant price (CIF Europe) | US$/ton | 148 |
| 2) Converted to 1983 constand price (x 1.495) | US$/ton | 221 |
| 3) Fright and insurance charge | US$/ton | 70 |
| 4) CIF price at Bangkok | US$/ton | 291 |
| 5) Converted to Thai Baht (US$1 = ฿25) | ฿/ton | 7,275 |
| 6) Shadow rate *1 of ฿800 of handling charge and others | ฿/ton | 586 |
| 7) Shadow rate *2 of ฿450 of transportation charge | ฿/ton | 342 |
| 8) Shadow rate *2 of ฿50 of transportation charge from farm-gate to local market | ฿/ton | 38 |
| 9) Farm-gate price of soybeans | ฿/ton | 6,309 (≒ 6,310) |

Notes: *1 --- 0.69 of conversion factor for middleman's margin is applied to convert to economic price.

*2 --- 0.76 of conversion factor for transport is applied to convert to economic price.

## TABLE J-4 : ECONOMIC PRICE OF FERTILIZER

| Items | Unit | 1. Urea | 2. DAP | 3. Potassium Chloride |
|---|---|---|---|---|
| 1. Forcasted price in 2000, 1985 constant Dollars *1 | US$/ton | 132 | 194 | 75 |
| 2. Convert to 1989 constant Dollars *2 | " | 197 | 290 | 112 |
| 3. Freight (US$70) & insurance (2% of FOB price) | " | 71 | 71 | 71 |
| 4. CIF price at Bangkok port | " | 268 | 361 | 183 |
| 5. Convert to Thai Baht *3 | ฿/ton | 6,700 | 9,025 | 4,575 |
| 6. Shadow rate *4 of ฿85 of port handling charges | " | 586 | 586 | 586 |
| 7. Shadow rate *5 of ฿450 of transport from port to wholesale center | " | 342 | 342 | 342 |
| 8. Shadow rate *5 of ฿50 of transport from market to farm-gate | " | 38 | 38 | 38 |
| 9. Farm-gate price of fertilizers | " | 7,666 | 9,991 | 5,541 |
| 10. Farm-gate price of nutrient price | " | 16,665 *6 (≒16,700) | 17,948 *7 (≒17,900) | 9,235 *8 (≒9,200) |

Notes: *1 --- IBRD's projected price (source: IBRD, October, 1988).
*2 --- 149.5 of international price inde (1985 = 100) is applied.
*3 --- US$1 = ฿25
*4 --- 0.69 of conversion factor for middleman's margin is applied.
*5 --- 0.76 of conversion factor for transport is applied.
*6 --- Nitrogen (46 percent of Nitrogen).
*7 --- Phosphorous (N.P.K. ratio is 18-46-0).
*8 --- Potassium (60 percent of Potassium).

## TABLE J-5 ; CROP PRODUCTION AT PRESENT AND IN FUTURE WITHOUT PROJECT

| Project | Area of Paddy Field (A) | Harvested Area 1/ (A) x 0.70 | Present | | Future without Project | |
|---|---|---|---|---|---|---|
| | | | Yield | Production | Yield | Production |
| | ha | ha | tons/ha | tons | tons/ha | tons |
| Lam Se | 1,151 | 806 | 1.41 | 1,136 | 1.47 | 1,185 |
| Huai Khum Kham | 2,706 | 1,894 | 1.34 | 2,538 | 1.40 | 2,652 |
| Huai Kham Phak Wan | 994 | 696 | 1.24 | 863 | 1.30 | 905 |
| Huai Na Khai | 2,164 | 1,515 | 1.27 | 1,924 | 1.33 | 2,015 |
| Huai Soob | 959 | 671 | 0.94 | 631 | 1.00 | 671 |
| Total | 7,974 | 5,582 | | 7,092 | | 7,428 |

Note: 1/--- based on the statistical data of Changwat level and the result of farm survey in the Project area.

**TABLE J-6 : CROP BENEFIT IN THE TARGET YEAR (1/2)** - ECONOMIC -

(unit: ha, '000฿)

| Crops | 1. Lam Se Project | | | 2. Huai Khum Kham Project | | | 3.Huai Kham Phak Wan Project | | |
|---|---|---|---|---|---|---|---|---|---|
| | Harvested Area | Gross Production | Net Production | Harvested Area | Gross Production | Net Production | Harvested Area | Gross Production | Net Production |
| 1. Present | | | | | | | | | |
| - Paddy | 806 | 3,590 | 1,580 | 1,894 | 8,020 | 3,529 | 696 | 2,727 | 1,200 |
| 2. Future without Project | | | | | | | | | |
| - Paddy | 806 | 3,745 | 1,648 | 1,894 | 8,380 | 3,687 | 696 | 2,860 | 1,258 |
| 3. Future with Project | | | | | | | | | |
| - Paddy | 1,100 | 11,951 | 7,171 | 2,600 | 28,247 | 16,948 | 950 | 10,320 | 6,192 |
| - Groundnuts | 121 | 1,323 | 794 | 286 | 3,129 | 1,877 | 104 | 1,141 | 685 |
| - Soybeans | 66 | 650 | 377 | 156 | 1,540 | 893 | - | - | - |
| - Sweet Corn | - | - | - | - | - | - | 57 | 5,704 | 4,905 |
| - String Bean | - | - | - | 52 | 2,440 | 2,123 | - | - | - |
| - Water Melon | 22 | 824 | 610 | - | - | - | 19 | 712 | 527 |
| - Chilli | 11 | 3,872 | 3,330 | 26 | 9,152 | 7,871 | 10 | 3,524 | 3,031 |
| Total | 1,320 | 18,620 | 12,282 | 3,120 | 44,508 | 29,712 | 1,140 | 21,401 | 15,340 |
| 4. Annual Crop Benefit | | | 10,634 | | | 26,025 | | | 14,082 |

**TABLE J-6 : CROP BENEFIT IN THE TARGET YEAR (2/2)** - ECONOMIC -

(unit: ha, '000฿)

| Crops | 4. Huai Na Khai Project | | | 5. Huai Soob Project | | | Package of the Projects | | |
|---|---|---|---|---|---|---|---|---|---|
| | Harvested Area | Gross Production | Net Production | Harvested Area | Gross Production | Net Production | Harvested Area | Gross Production | Net Production |
| 1. Present | | | | | | | | | |
| - Paddy | 1,515 | 6,080 | 2,675 | 671 | 1,994 | 877 | 5,582 | 22,411 | 9,861 |
| 2. Future without Project | | | | | | | | | |
| - Paddy | 1,515 | 6,367 | 2,801 | 671 | 2,120 | 933 | 5,582 | 23,472 | 10,327 |
| 3. Future with Project | | | | | | | | | |
| - Paddy | 2,100 | 22,815 | 13,689 | 920 | 9,995 | 5,997 | 7,670 | 83,328 | 49,997 |
| - Groundnuts | 252 | 2,758 | 1,655 | 108 | 1,183 | 710 | 871 | 9,534 | 5,721 |
| - Soybeans | 126 | 1,243 | 721 | - | - | - | 348 | 3,433 | 1,991 |
| - Sweet Corn | - | - | - | 54 | 5,400 | 4,644 | 111 | 11,104 | 9,549 |
| - String Bean | - | - | - | - | - | - | 52 | 2,440 | 2,123 |
| - Water Melon | - | - | - | - | - | - | 41 | 1,536 | 1,137 |
| - Chilli | 42 | 14,780 | 12,711 | 18 | 6,338 | 5,451 | 107 | 37,666 | 32,394 |
| Total | 2,520 | 41,596 | 28,776 | 1,100 | 22,916 | 16,802 | 9,200 | 149,041 | 102,912 |
| 4. Annual Crop Benefit | | | 25,975 | | | 15,869 | | | 92,585 |

## TABLE J-7 : ECONOMIC PRODUCTION COST FOR CROPS PER HECTARE

| | Without Project | With Project | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Paddy | Paddy | Groundnut | Soybean | Sweet Corn | String Bean | Water Melon | Chilli |
| Yield (kg/ha) | 1,331 | 3,438 | 1,563 | 1,563 | 12,500 | 9,375 | 18,750 | 26,250 |
| Farm Gate Price (₱/kg) | 3.16 | 3.16 | 7.00 | 6.31 | 8.00 | 8.00 | 2.00 | 13.40 |
| Gross Production value (₱/ha) (GPV) --- (A) | 4,206 | 10,864 | 10,940 | 9,863 | 100,000 | 75,000 | 37,500 | 351,750 |
| 1. Seeds | 280 | 182 | 580 | 228 | 499 | 1,225 | 563 | 15,859 |
| 2. Fertilizer | | | | | | | | |
| 16-20- 0 | 719 | 1,078 | - | - | - | - | - | - |
| 15-15-15 | - | - | 2,250 | 1,876 | 9,284 | 5,546 | 6,750 | 23,944 |
| Urea | 1,078 | 1,078 | - | - | - | - | - | - |
| 3. Pesticides | | | | | | | | |
| Liquid | 243 | 243 | - | - | - | - | - | - |
| Granular & power | - | - | 250 | 750 | 500 | 750 | 250 | 875 |
| 4. Labour | 1,219 | 1,406 | 1,008 | 1,008 | 3,656 | 2,016 | 1,828 | 6,398 |
| 5. Draft Animals | 56 | 62 | 73 | 56 | 79 | 56 | 79 | 79 |
| 6. Hiring Equipment | 60 | 240 | 180 | 180 | 180 | 240 | 180 | 240 |
| Total of Cost --- (B) | 2,334 | 4,289 | 4,349 | 4,098 | 14,198 | 9,833 | 9,650 | 47,395 |
| N.P.V. (A)-(B)=(C) | 1,872 | 6,575 | 6,591 | 5,765 | 85,802 | 65,167 | 27,850 | 304,355 |
| % NPV = (c) / (A) | 44 % | 60 % | 60 % | 58 % | 86 % | 87 % | 74 % | 86 % |

Notes : N.P.V.: Net Production Value.
Quantities of inputs are shown in the Table J-9.

Source: Statistical Reports of Changwat. Seminar Report on Technologies Suitable for Implementation Irrigation Facilities.
The Feasibility study on the Lower Northeast Medium Scale Irrigation package projects.

## TABLE J-8 : TARGETED CROP PRODUCTION

| Item & Projects | Paddy | Groundnuts (with shell, dried) | Soybeans | Sweet Corn | String Bean | Water Melon | Chilli (fresh) | Total |
|---|---|---|---|---|---|---|---|---|
| Yield Projection (kg/rai) | 550 | 250 | 250 | 2,000 | 1,500 | 3,000 | 4,200 | |
| (kg/ha) | 3,438 | 1,563 | 1,563 | 12,500 | 9,375 | 18,750 | 26,250 | |
| Planted Area (ha) | | | | | | | | |
| 1. Lam Se | 1,100 | 121 | 66 | - | - | 22 | 11 | 1,320 |
| 2. Huai Khum Kham | 2,600 | 286 | 156 | - | 52 | - | 26 | 3,120 |
| 3. Huai Kham Phak Wan | 950 | 104 | - | 57 | - | 19 | 10 | 1,140 |
| 4. Huai Na Khai | 2,100 | 252 | 126 | - | - | - | 42 | 2,520 |
| 5. Huai Soob | 920 | 108 | - | 54 | - | - | 18 | 1,100 |
| Total | 7,670 | 871 | 348 | 111 | 52 | 41 | 107 | 9,200 |
| Production (tons) | | | | | | | | |
| 1. Lam Se | 3,782 | 189 | 103 | - | - | 412 | 289 | |
| 2. Huai Khum Kham | 8,939 | 447 | 244 | - | 488 | - | 683 | |
| 3. Huai Kham Phak Wan | 3,266 | 163 | - | 713 | - | 356 | 263 | |
| 4. Huai Na Khai | 7,220 | 394 | 197 | - | - | - | 1,103 | |
| 5. Huai Soob | 3,163 | 169 | - | 675 | - | - | 473 | |
| Total | 26,370 | 1,362 | 544 | 1,388 | 488 | 768 | 2,811 | |

## TABLE J-9 : REQUIRED FARM INPUTS QUANTITY PER HECTARE

| Inputs | Unit | Without Project | With Project | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Paddy | Paddy | Groundnut | Soybean | Sweet Corn | String Bean | Water Melon | Chilli |
| 1. Seeds | kg | 62.5 | 40.63 | 75.0 | 31.25 | 31.2 | 50.0 | 375.0 | 31.25 |
| 2. Fertilizer | | | | | | | | | |
| - 16-20- 0 | " | 62.5 | 93.75 | - | - | - | - | - | - |
| - 15-15-15 | " | - | - | 187.5 | 156.3 | 750 | 375 | 562.5 | 562.5 |
| - Urea | " | - | 93.75 | - | - | - | - | - | - |
| 3. Pesticides | | | | | | | | | |
| - Liquid | ℓ | - | 1.56 | - | - | - | - | - | - |
| - Granular & power | | - | - | 6.25 | 18.75 | 12.5 | 18.75 | 6.25 | 6.25 |
| 4. Labour | M/D | 81.25 | 93.75 | 67.2 | 67.2 | 243 | 134 | 121.88 | 121.88 |
| 5. Draft Animals | A/D | 15.63 | 17.19 | 20.31 | 15.63 | 21.88 | 15.63 | 21.88 | 21.88 |
| 6. Hiring Equipment | E/D | 1.0 | 4.00 | 3.00 | 3.00 | 3.00 | 4.00 | 3.00 | 4.00 |

Notes : 1) RID estimates the required amount of Inputs according to Agricaltural Extention Services Guidance.
2) As for item 4, 5 and 6, Farm Household Survey Results are also taken into consideration. Farm Mechanization with complete form, however, is not assumed due to the actuality and forcast for 10-20 years.

Source: Technologies Suitable for Implementation of Irrigation Facilities by RID, December 1983.
The F/S on the Lower Northeast Medium Scale Irrigation Project JICA.

## TABLE J-10 : FISHING AREA AND PRODUCTION IN MUBAN PONDS

| Projects | Type of Pond | | | Total |
|---|---|---|---|---|
| | Type 1 (1.60 ha) | Type 2 (0.80 ha) | Type 3 (0.48 ha) | |
| 1. Number of Muban Pond | | | | |
| - Lam Se | 2 | 1 | 2 | 5 |
| - Huai Khum Kham | 1 | 3 | 7 | 11 |
| - Huai Kham Phak Wan | - | 1 | 4 | 5 |
| - Huai Na Khai | - | 1 | 9 | 10 |
| - Huai Soob | 1 | - | 4 | 5 |
| Total | 4 | 6 | 26 | 36 |
| 2. Total Area of Muban Pond (ha) | | | | |
| - Lam Se | 3.2 | 0.8 | 1.0 | 5.0 |
| - Huai Khum Kham | 1.6 | 2.4 | 3.4 | 7.4 |
| - Huai Kham Phak Wan | - | 0.8 | 1.9 | 2.7 |
| - Huai Na Khai | - | 0.8 | 4.3 | 5.1 |
| - Huai Soob | 1.6 | - | 1.9 | 3.5 |
| Total | 6.4 | 4.8 | 12.5 | 23.7 |
| 3. Fish Production (tons) | | | | |
| - Lam Se | 6.4 | 1.6 | 2.0 | 10.0 |
| - Huai Khum Kham | 3.2 | 4.8 | 6.8 | 14.8 |
| - Huai Kham Phak Wan | - | 1.6 | 3.8 | 5.4 |
| - Huai Na Khai | - | 1.6 | 8.6 | 10.2 |
| - Huai Soob | 3.2 | - | 3.8 | 7.0 |
| Total | 12.8 | 9.6 | 25.0 | 47.4 |

## TABLE J-11 : ECONOMIC PRODUCTION COST FOR FISHERIES

(unit: ฿/5 ha)

| Items | Financial | Economic | |
|---|---|---|---|
| 1. Gross Income<br>30 ฿/kg x 2,000 kg/ha x 5 ha | 300,000 | 300,000 | (100%) |
| 2. Expenditure | | | |
| 2-1. Fixed Cost of Fishery Sub-Committee | | | |
| (a) Salary for manager<br>1 manager x 1,500 ฿/month x 12 month | 18,000 | 17,280 | *1 |
| (b) Depreciation expenses for seine net and pump<br>{seine net --- 18,000 ฿/unit ÷ 5 years<br>pump ------- 30,000 ฿/unit ÷ 10 years | 6,600 | 5,410 | *2 |
| (c) Accumulated fund for repair<br>1 percent of gross income | 3,000 | 2,460 | *2 |
| (d) Others<br>( (a) + (B) + (C) ) x 0.05 | 1,380 | 1,130 | *2 |
| Sub-total | 28,980 | 26,280 | |
| 2-2. Variable Cost | | | |
| (e) Fry, 0.1 ฿/fry x 10,000 fay/ha x 5 ha | 5,000 | 4,600 | *3 |
| (f) Fuel and Oil<br>3ℓ x 30 days x 6 ฿/ℓ | 540 | 520 | *1 |
| (g) Laborer, 490 man-days x 30 ฿/day | 14,700 | 5,590 | *4 |
| •Receiving fry 1 day x 5 persons = 5<br>•Nursing fry 30 days x 2 persons = 60<br>•Transplant 1 day x 5 persons = 5<br>•Fertilizing 180 days x 2 persons =360<br>•Harvesting 3 times x20 persons = 60 | | | |
| (h) Others ( (e) + (f) + (g) ) x 0.05 | 1,010 | 930 | *3 |
| Sub-total | 21,250 | 11,640 | |
| Total | 50,230 | 37,920 | (13%) |
| 3. Net Production value | 249,770 | 262,080 | (87%) |

Notes: Following conversion factors are used to convert economic value.

*1 --- 0.96 of consumption good conversion factor.
*2 --- 0.82 of capital good conversion factor
*3 --- 0.92 of standard conversion factor.
*4 --- 0.38 of labor conversion factor (unskilled workers).

## TABLE J-12 : FISHERY BENEFIT BY PROJECTS

| Project | Total Area of Fish Production (ha) | Fish Production (tons) | Gross Production ('000฿) | Net Production (Benefit) (A) x 0.87 ('000฿) |
|---|---|---|---|---|
| 1. Muban Pond | | | | |
| - Lam Se | 5.0 | 10.0 | 300 | 261 |
| - Huai Khum Kham | 7.4 | 14.8 | 444 | 386 |
| - Huai Kham Phak Wan | 2.7 | 5.4 | 162 | 141 |
| - Huai Na Khai | 5.1 | 10.2 | 306 | 266 |
| - Huai Soob | 3.5 | 7.0 | 210 | 183 |
| Total | 23.7 | 47.4 | 1,422 | 1,237 |
| 2. Reservoir | | | | |
| - Lam Se | 279 | 87.0 | 2,610 | 2,271 |
| - Huai Khum Kham | 454 | 142.0 | 4,260 | 3,706 |
| - Huai Kham Phak Wan | 238 | 74.0 | 2,220 | 1,931 |
| - Huai Na Khai | 559 | 175.0 | 5,250 | 4,567 |
| - Huai Soob | 191 | 60.0 | 1,800 | 1,566 |
| Total | 1,721 | 538.0 | 16,140 | 14,041 |
| 3. Total of Fishery Benefit | | | | |
| - Lam Se | | | 2,910 | 2,532 |
| - Huai Khum Kham | | | 4,704 | 4,092 |
| - Huai Kham Phak Wan | | | 2,382 | 2,072 |
| - Huai Na Khai | | | 2,106 | 4,833 |
| - Huai Soob | | | 2,010 | 1,749 |
| Total | | | 17,562 | 15,278 |

## TABLE J-13 : FINANCIAL AND ECONOMIC PROJECT COST

(unit: million ฿)

| Year | Lam Se | Huai Khum Kham | Huai Kham Phak Wan | Huai Na Khai | Huai Soob | Total |
|---|---|---|---|---|---|---|
| 1. Capital Cost | | | | | | |
| 1-1. Financial | | | | | | |
| 1990 | 1.92 | 2.32 | 1.76 | 2.66 | 1.97 | 10.63 |
| 1991 | 3.61 | 6.44 | 3.33 | 5.92 | 3.43 | 22.73 |
| 1992 | 2.40 | 5.72 | 2.31 | 4.59 | 2.31 | 17.33 |
| 1993 | 17.16 | 22.42 | 15.82 | 23.90 | 17.35 | 96.65 |
| 1994 | 58.11 | 114.53 | 80.40 | 43.85 | 71.68 | 368.57 |
| 1995 | 75.11 | 171.52 | 71.05 | 91.87 | 64.53 | 474.08 |
| 1996 | 16.38 | 47.80 | 15.02 | 124.02 | 66.97 | 270.19 |
| 1997 | 1.74 | 4.18 | 1.66 | 28.17 | 20.30 | 56.05 |
| Total | 176.43 | 374.93 | 191.35 | 324.98 | 248.54 | 1,316.23 |
| 1-2. Economic | | | | | | |
| 1990 | 1.50 | 1.84 | 1.38 | 2.10 | 1.56 | 8.38 |
| 1991 | 2.99 | 5.46 | 2.77 | 4.97 | 2.84 | 19.02 |
| 1992 | 2.11 | 5.03 | 2.03 | 4.04 | 2.03 | 15.25 |
| 1993 | 9.24 | 12.82 | 10.17 | 14.07 | 11.44 | 57.73 |
| 1994 | 35.70 | 72.78 | 51.25 | 27.14 | 46.03 | 232.90 |
| 1995 | 50.25 | 115.68 | 47.40 | 57.62 | 40.70 | 311.65 |
| 1996 | 11.72 | 33.70 | 10.75 | 83.53 | 45.51 | 185.20 |
| 1997 | 1.44 | 3.46 | 1.38 | 19.73 | 13.99 | 40.00 |
| Total | 114.95 | 250.77 | 127.13 | 213.20 | 164.10 | 870.13 |
| 2. O & M Cost | | | | | | |
| 2-1. Financial | 1.39 | 3.28 | 1.20 | 2.65 | 1.16 | 9.68 |
| 2-2. Economic | 1.00 | 2.26 | 0.80 | 1.80 | 0.80 | 6.66 |

## TABLE J-14 : BENEFIT STREAM BY PROJECTS (1/2)

(unit: '000 ฿)

| Year | Net Production without Project | | | Net Production with Project | | | Benefit |
|---|---|---|---|---|---|---|---|
| | Crops | Fish | Total | Crops | Fish | Total | |
| 1. Lam Se Project | | | | | | | |
| 1989 | 1,580 | - | 1,580 | 1,580 | - | 1,580 | 0 |
| 1996 | 1,614 | - | 1,614 | 1,614 | - | 1,614 | 0 |
| 1997 | 1,619 | - | 1,619 | 4,299 | 886 | 5,185 | 3,566 |
| 1998 | 1,625 | - | 1,625 | 7,369 | 1,671 | 9,040 | 7,415 |
| 1999 | 1,631 | - | 1,631 | 10,808 | 2,228 | 13,036 | 11,405 |
| 2000 | 1,636 | - | 1,636 | 11,914 | 2,456 | 14,370 | 12,734 |
| 2001~ | 1,648 | - | 1,648 | 12,282 | 2,532 | 14,814 | 13,166 |
| 2. Huai Khum Kham Project | | | | | | | |
| 1989 | 3,529 | - | 3,529 | 3,529 | - | 3,529 | 0 |
| 1996 | 3,615 | - | 3,615 | 3,615 | - | 3,615 | 0 |
| 1997 | 3,630 | - | 3,630 | 10,399 | 1,432 | 11,831 | 8,201 |
| 1998 | 3,644 | - | 3,644 | 19,610 | 2,701 | 22,311 | 18,667 |
| 1999 | 3,658 | - | 3,658 | 26,147 | 3,601 | 29,748 | 26,090 |
| 2000 | 3,672 | - | 3,672 | 28,821 | 3,969 | 32,790 | 29,118 |
| 2001~ | 3,687 | - | 3,687 | 29,712 | 4,092 | 33,804 | 30,117 |
| 3. Huai Kham Phak Wan Project | | | | | | | |
| 1989 | 1,200 | - | 1,200 | 1,200 | - | 1,200 | 0 |
| 1996 | 1,232 | - | 1,232 | 1,232 | - | 1,232 | 0 |
| 1997 | 1,237 | - | 1,237 | 3,835 | 518 | 4,353 | 3,116 |
| 1998 | 1,242 | - | 1,242 | 9,204 | 1,243 | 10,447 | 9,205 |
| 1999 | 1,247 | - | 1,247 | 13,192 | 1,782 | 14,974 | 13,727 |
| 2000 | 1,253 | - | 1,253 | 14,726 | 1,989 | 16,715 | 15,462 |
| 2001~ | 1,258 | - | 1,258 | 15,340 | 2,072 | 17,412 | 16,154 |

## TABLE J-14 : BENEFIT STREAM BY PROJECTS (2/2)

(unit: '000 ฿)

| Year | Net Production without Project | | | Net Production with Project | | | Benefit |
|---|---|---|---|---|---|---|---|
| | Crops | Fish | Total | Crops | Fish | Total | |
| 4. Huai Na Khai Project | | | | | | | |
| 1989 | 2,675 | - | 2,675 | 2,675 | - | 2,675 | 0 |
| 〃 | | | | | | | |
| 1996 | 2,738 | - | 2,738 | 2,738 | - | 2,738 | 0 |
| 1997 | 2,749 | - | 2,749 | 2,749 | - | 2,749 | 0 |
| 1998 | 2,759 | - | 2,759 | 8,633 | 1,450 | 10,083 | 7,324 |
| 1999 | 2,770 | - | 2,770 | 17,266 | 2,900 | 20,166 | 17,396 |
| 2000 | 2,780 | - | 2,780 | 24,747 | 4,156 | 28,903 | 26,123 |
| 2001 | 2,791 | - | 2,791 | 27,625 | 4,640 | 32,265 | 29,474 |
| 2002~ | 2,801 | - | 2,801 | 28,776 | 4,833 | 33,609 | 30,808 |
| 5. Huai Soob Project | | | | | | | |
| 1989 | 877 | - | 877 | 877 | - | 877 | 0 |
| 〃 | | | | | | | |
| 1996 | 905 | - | 905 | 905 | - | 905 | 0 |
| 1997 | 910 | - | 910 | 910 | - | 910 | 0 |
| 1998 | 914 | - | 914 | 3,360 | 350 | 3,710 | 2,796 |
| 1999 | 919 | - | 919 | 8,401 | 875 | 9,276 | 8,357 |
| 2000 | 924 | - | 924 | 13,946 | 1,452 | 15,398 | 14,474 |
| 2001 | 928 | - | 928 | 16,130 | 1,679 | 17,809 | 16,881 |
| 2002~ | 933 | - | 933 | 16,802 | 1,749 | 18,551 | 17,618 |
| 6. Package of the Projects | | | | | | | |
| 1989 | 9,860 | - | 9,860 | 9,860 | - | 9,860 | 0 |
| 〃 | | | | | | | |
| 1996 | 10,104 | - | 10,104 | 10,104 | - | 10,104 | 0 |
| 1997 | 10,145 | - | 10,145 | 22,192 | 2,836 | 25,028 | 14,883 |
| 1998 | 10,184 | - | 10,184 | 48,176 | 7,415 | 55,591 | 45,407 |
| 1999 | 10,225 | - | 10,225 | 75,814 | 11,386 | 87,200 | 76,975 |
| 2000 | 10,265 | - | 10,265 | 94,154 | 14,022 | 108,176 | 97,911 |
| 2001 | 10,306 | - | 10,306 | 101,089 | 15,015 | 116,104 | 105,798 |
| 2002~ | 10,327 | - | 10,327 | 102,912 | 15,278 | 118,190 | 107,863 |

## TABLE J-15 : PROJECT COST AND BENEFITS (1/6) LAM SE PROJECT

( UNIT : MILLION BAHT )

| YEAR | PROJECT COST | | | BENEFITS | RETURN | PRESENT WORTH VALUE BY DISCOUNT RATE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 6 % | | 7 % | | 8 % | |
| | CAPITAL | O & M | TOTAL | | | (COST) | (BENEFITS) | (COST) | (BENEFITS) | (COST) | (BENEFITS) |
| 1 1990 | 1.50 | 0.00 | 1.50 | 0.00 | -1.50 | 1.50 | 0.00 | 1.50 | 0.00 | 1.50 | 0.00 |
| 2 1991 | 2.99 | 0.00 | 2.99 | 0.00 | -2.99 | 2.66 | 0.00 | 2.61 | 0.00 | 2.56 | 0.00 |
| 3 1992 | 2.11 | 0.00 | 2.11 | 0.00 | -2.11 | 1.77 | 0.00 | 1.72 | 0.00 | 1.67 | 0.00 |
| 4 1993 | 9.24 | 0.00 | 9.24 | 0.00 | -9.24 | 7.32 | 0.00 | 7.05 | 0.00 | 6.79 | 0.00 |
| 5 1994 | 35.70 | 0.00 | 35.70 | 0.00 | -35.70 | 26.68 | 0.00 | 25.45 | 0.00 | 24.30 | 0.00 |
| 6 1995 | 50.25 | 0.00 | 50.25 | 0.00 | -50.25 | 35.42 | 0.00 | 33.48 | 0.00 | 31.67 | 0.00 |
| 7 1996 | 11.72 | 0.00 | 11.72 | 0.00 | -11.72 | 7.79 | 0.00 | 7.30 | 0.00 | 6.84 | 0.00 |
| 8 1997 | 1.44 | 0.38 | 1.82 | 3.57 | 1.75 | 1.14 | 2.24 | 1.06 | 2.08 | 0.98 | 1.93 |
| 9 1998 | 0.00 | 0.54 | 0.54 | 7.42 | 6.88 | 0.32 | 4.39 | 0.29 | 4.04 | 0.27 | 3.71 |
| 10 1999 | 0.00 | 0.69 | 0.69 | 11.41 | 10.72 | 0.39 | 6.37 | 0.35 | 5.80 | 0.32 | 5.29 |
| 11 2000 | 0.00 | 0.83 | 0.83 | 12.73 | 11.90 | 0.44 | 6.71 | 0.39 | 6.05 | 0.36 | 5.46 |
| 12 2001 | 0.00 | 1.45 | 1.45 | 13.17 | 11.72 | 0.72 | 6.55 | 0.64 | 5.85 | 0.58 | 5.23 |
| 13 2002 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.47 | 6.17 | 0.41 | 5.47 | 0.37 | 4.84 |
| 14 2003 | 0.00 | 1.61 | 1.61 | 13.17 | 11.56 | 0.71 | 5.83 | 0.62 | 5.11 | 0.55 | 4.48 |
| 15 2004 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.42 | 5.50 | 0.36 | 4.77 | 0.32 | 4.15 |
| 16 2005 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.39 | 5.18 | 0.34 | 4.46 | 0.29 | 3.84 |
| 17 2006 | 0.00 | 1.45 | 1.45 | 13.17 | 11.72 | 0.54 | 4.89 | 0.46 | 4.17 | 0.39 | 3.56 |
| 18 2007 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.35 | 4.61 | 0.30 | 3.90 | 0.25 | 3.30 |
| 19 2008 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.33 | 4.35 | 0.28 | 3.64 | 0.23 | 3.05 |
| 20 2009 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.31 | 4.11 | 0.26 | 3.40 | 0.21 | 2.83 |
| 21 2010 | 0.00 | 1.61 | 1.61 | 13.17 | 11.56 | 0.47 | 3.87 | 0.39 | 3.18 | 0.32 | 2.62 |
| 22 2011 | 0.00 | 1.45 | 1.45 | 13.17 | 11.72 | 0.40 | 3.65 | 0.33 | 2.97 | 0.27 | 2.42 |
| 23 2012 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.26 | 3.45 | 0.21 | 2.78 | 0.17 | 2.24 |
| 24 2013 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.25 | 3.25 | 0.20 | 2.60 | 0.16 | 2.08 |
| 25 2014 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.23 | 3.07 | 0.18 | 2.43 | 0.15 | 1.92 |
| 26 2015 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.22 | 2.89 | 0.17 | 2.27 | 0.14 | 1.78 |
| 27 2016 | 0.00 | 1.45 | 1.45 | 13.17 | 11.72 | 0.30 | 2.73 | 0.23 | 2.12 | 0.18 | 1.65 |
| 28 2017 | 0.00 | 1.61 | 1.61 | 13.17 | 11.56 | 0.31 | 2.58 | 0.24 | 1.98 | 0.19 | 1.53 |
| 29 2018 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.18 | 2.43 | 0.14 | 1.85 | 0.11 | 1.41 |
| 30 2019 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.17 | 2.29 | 0.13 | 1.73 | 0.10 | 1.31 |
| 31 2020 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.16 | 2.16 | 0.12 | 1.62 | 0.09 | 1.21 |
| 32 2021 | 0.00 | 1.45 | 1.45 | 13.17 | 11.72 | 0.22 | 2.04 | 0.17 | 1.51 | 0.12 | 1.12 |
| 33 2022 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.15 | 1.93 | 0.11 | 1.41 | 0.08 | 1.04 |
| 34 2023 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.14 | 1.82 | 0.10 | 1.32 | 0.07 | 0.96 |
| 35 2024 | 0.00 | 1.61 | 1.61 | 13.17 | 11.56 | 0.21 | 1.71 | 0.15 | 1.23 | 0.11 | 0.89 |
| 36 2025 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.12 | 1.62 | 0.09 | 1.15 | 0.06 | 0.82 |
| 37 2026 | 0.00 | 1.45 | 1.45 | 13.17 | 11.72 | 0.17 | 1.53 | 0.12 | 1.08 | 0.08 | 0.76 |
| 38 2027 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.11 | 1.44 | 0.08 | 1.01 | 0.05 | 0.71 |
| 39 2028 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.10 | 1.36 | 0.07 | 0.94 | 0.05 | 0.65 |
| 40 2029 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.10 | 1.28 | 0.07 | 0.88 | 0.05 | 0.61 |
| 41 2030 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.09 | 1.21 | 0.06 | 0.82 | 0.04 | 0.56 |
| 42 2031 | 0.00 | 2.05 | 2.05 | 13.17 | 11.12 | 0.18 | 1.14 | 0.12 | 0.77 | 0.08 | 0.52 |
| 43 2032 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.08 | 1.08 | 0.05 | 0.72 | 0.04 | 0.48 |
| 44 2033 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.08 | 1.01 | 0.05 | 0.67 | 0.03 | 0.45 |
| 45 2034 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.07 | 0.96 | 0.05 | 0.63 | 0.03 | 0.41 |
| 46 2035 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.07 | 0.90 | 0.04 | 0.59 | 0.03 | 0.38 |
| 47 2036 | 0.00 | 1.45 | 1.45 | 13.17 | 11.72 | 0.09 | 0.85 | 0.06 | 0.55 | 0.04 | 0.35 |
| 48 2037 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.06 | 0.80 | 0.04 | 0.51 | 0.02 | 0.33 |
| 49 2038 | 0.00 | 1.61 | 1.61 | 13.17 | 11.56 | 0.09 | 0.76 | 0.06 | 0.48 | 0.04 | 0.30 |
| 50 2039 | 0.00 | 1.00 | 1.00 | 13.17 | 12.17 | 0.05 | 0.72 | 0.03 | 0.45 | 0.02 | 0.28 |
| TOTAL | 114.95 | 48.69 | 163.64 | 548.76 | 385.12 | 94.84 | 123.43 | 88.76 | 100.96 | 83.37 | 83.48 |

BENEFIT COST RATIO BY DISCOUNT RATE (B/C) = 1.30 ( 6%), 1.14 ( 7%), 1.00 ( 8%)
INTERNAL RATE OF RETURN (IRR) = 8.0 %

## TABLE J-15 : PROJECT COST AND BENEFITS (2/6) HUAI KHUM KHAM PROJECT

( UNIT : MILLION BAHT )

| YEAR | PROJECT COST | | | BENEFITS | RETURN | PRESENT WORTH VALUE BY DISCOUNT RATE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 6 % | | 7 % | | 8 % | |
| | CAPITAL | O & M | TOTAL | | | (COST) | (BENEFITS) | (COST) | (BENEFITS) | (COST) | (BENEFITS) |
| 1 1990 | 1.84 | 0.00 | 1.84 | 0.00 | -1.84 | 1.84 | 0.00 | 1.84 | 0.00 | 1.84 | 0.00 |
| 2 1991 | 5.46 | 0.00 | 5.46 | 0.00 | -5.46 | 4.86 | 0.00 | 4.77 | 0.00 | 4.68 | 0.00 |
| 3 1992 | 5.03 | 0.00 | 5.03 | 0.00 | -5.03 | 4.22 | 0.00 | 4.11 | 0.00 | 3.99 | 0.00 |
| 4 1993 | 12.82 | 0.00 | 12.82 | 0.00 | -12.82 | 10.15 | 0.00 | 9.78 | 0.00 | 9.42 | 0.00 |
| 5 1994 | 72.78 | 0.00 | 72.78 | 0.00 | -72.78 | 54.39 | 0.00 | 51.89 | 0.00 | 49.53 | 0.00 |
| 6 1995 | 115.68 | 0.00 | 115.68 | 0.00 | -115.68 | 81.55 | 0.00 | 77.08 | 0.00 | 72.90 | 0.00 |
| 7 1996 | 33.70 | 0.00 | 33.70 | 0.00 | -33.70 | 22.41 | 0.00 | 20.99 | 0.00 | 19.66 | 0.00 |
| 8 1997 | 3.46 | 0.86 | 4.32 | 8.20 | 3.88 | 2.71 | 5.14 | 2.51 | 4.77 | 2.33 | 4.43 |
| 9 1998 | 0.00 | 1.21 | 1.21 | 18.67 | 17.46 | 0.72 | 11.05 | 0.66 | 10.16 | 0.61 | 9.34 |
| 10 1999 | 0.00 | 1.56 | 1.56 | 26.09 | 24.53 | 0.87 | 14.57 | 0.79 | 13.26 | 0.72 | 12.08 |
| 11 2000 | 0.00 | 1.91 | 1.91 | 29.12 | 27.21 | 1.01 | 15.34 | 0.91 | 13.83 | 0.82 | 12.49 |
| 12 2001 | 0.00 | 3.35 | 3.35 | 30.12 | 26.77 | 1.66 | 14.97 | 1.49 | 13.37 | 1.33 | 11.96 |
| 13 2002 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 1.06 | 14.12 | 0.94 | 12.50 | 0.83 | 11.08 |
| 14 2003 | 0.00 | 3.74 | 3.74 | 30.12 | 26.38 | 1.65 | 13.32 | 1.45 | 11.68 | 1.27 | 10.25 |
| 15 2004 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.94 | 12.57 | 0.82 | 10.92 | 0.71 | 9.50 |
| 16 2005 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.89 | 11.86 | 0.77 | 10.20 | 0.66 | 8.79 |
| 17 2006 | 0.00 | 3.35 | 3.35 | 30.12 | 26.77 | 1.24 | 11.19 | 1.06 | 9.54 | 0.91 | 8.14 |
| 18 2007 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.79 | 10.55 | 0.67 | 8.91 | 0.57 | 7.54 |
| 19 2008 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.75 | 9.96 | 0.62 | 8.33 | 0.52 | 6.98 |
| 20 2009 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.70 | 9.39 | 0.58 | 7.78 | 0.48 | 6.46 |
| 21 2010 | 0.00 | 3.74 | 3.74 | 30.12 | 26.38 | 1.10 | 8.86 | 0.90 | 7.27 | 0.74 | 5.98 |
| 22 2011 | 0.00 | 3.35 | 3.35 | 30.12 | 26.77 | 0.93 | 8.36 | 0.76 | 6.80 | 0.62 | 5.54 |
| 23 2012 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.59 | 7.89 | 0.48 | 6.35 | 0.38 | 5.13 |
| 24 2013 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.56 | 7.44 | 0.45 | 5.94 | 0.36 | 4.75 |
| 25 2014 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.53 | 7.02 | 0.42 | 5.55 | 0.33 | 4.40 |
| 26 2015 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.50 | 6.62 | 0.39 | 5.19 | 0.31 | 4.07 |
| 27 2016 | 0.00 | 3.35 | 3.35 | 30.12 | 26.77 | 0.69 | 6.25 | 0.54 | 4.85 | 0.42 | 3.77 |
| 28 2017 | 0.00 | 3.74 | 3.74 | 30.12 | 26.38 | 0.73 | 5.89 | 0.56 | 4.53 | 0.43 | 3.49 |
| 29 2018 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.42 | 5.56 | 0.32 | 4.23 | 0.24 | 3.23 |
| 30 2019 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.39 | 5.24 | 0.30 | 3.96 | 0.22 | 2.99 |
| 31 2020 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.37 | 4.95 | 0.28 | 3.70 | 0.21 | 2.77 |
| 32 2021 | 0.00 | 3.35 | 3.35 | 30.12 | 26.77 | 0.52 | 4.67 | 0.38 | 3.46 | 0.29 | 2.57 |
| 33 2022 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.33 | 4.40 | 0.24 | 3.23 | 0.18 | 2.38 |
| 34 2023 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.31 | 4.15 | 0.23 | 3.02 | 0.17 | 2.20 |
| 35 2024 | 0.00 | 3.74 | 3.74 | 30.12 | 26.38 | 0.49 | 3.92 | 0.35 | 2.82 | 0.25 | 2.04 |
| 36 2025 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.28 | 3.70 | 0.20 | 2.64 | 0.14 | 1.89 |
| 37 2026 | 0.00 | 3.35 | 3.35 | 30.12 | 26.77 | 0.39 | 3.49 | 0.27 | 2.46 | 0.19 | 1.75 |
| 38 2027 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.25 | 3.29 | 0.17 | 2.30 | 0.12 | 1.62 |
| 39 2028 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.23 | 3.10 | 0.16 | 2.15 | 0.11 | 1.50 |
| 40 2029 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.22 | 2.93 | 0.15 | 2.01 | 0.10 | 1.39 |
| 41 2030 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.21 | 2.76 | 0.14 | 1.88 | 0.10 | 1.28 |
| 42 2031 | 0.00 | 4.83 | 4.83 | 30.12 | 25.29 | 0.42 | 2.61 | 0.28 | 1.76 | 0.19 | 1.19 |
| 43 2032 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.18 | 2.46 | 0.12 | 1.64 | 0.08 | 1.10 |
| 44 2033 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.17 | 2.32 | 0.12 | 1.53 | 0.08 | 1.02 |
| 45 2034 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.16 | 2.19 | 0.11 | 1.43 | 0.07 | 0.94 |
| 46 2035 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.15 | 2.06 | 0.10 | 1.34 | 0.07 | 0.87 |
| 47 2036 | 0.00 | 3.35 | 3.35 | 30.12 | 26.77 | 0.22 | 1.95 | 0.14 | 1.25 | 0.09 | 0.81 |
| 48 2037 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.14 | 1.84 | 0.09 | 1.17 | 0.06 | 0.75 |
| 49 2038 | 0.00 | 3.74 | 3.74 | 30.12 | 26.38 | 0.22 | 1.73 | 0.14 | 1.09 | 0.09 | 0.69 |
| 50 2039 | 0.00 | 2.26 | 2.26 | 30.12 | 27.86 | 0.12 | 1.64 | 0.08 | 1.02 | 0.05 | 0.64 |
| TOTAL | 250.77 | 111.28 | 362.05 | 1256.76 | 894.71 | 206.25 | 283.30 | 192.58 | 231.85 | 180.48 | 191.79 |

BENEFIT COST RATIO BY DISCOUNT RATE (B/C) = 1.37 ( 6%), 1.20 ( 7%), 1.06 ( 8%)
INTERNAL RATE OF RETURN (IRR) = 8.5 %

## TABLE J-15 : PROJECT COST AND BENEFITS (3/6) HUAI KHAM PHAK WAM PROJECT

( UNIT : MILLION BAHT )

| YEAR | PROJECT COST | | | BENEFITS | RETURN | PRESENT WORTH VALUE BY DISCOUNT RATE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 6 % | | 7 % | | 8 % | |
| | CAPITAL | O & M | TOTAL | | | (COST) | (BENEFITS) | (COST) | (BENEFITS) | (COST) | (BENEFITS) |
| 1 1990 | 1.38 | 0.00 | 1.38 | 0.00 | -1.38 | 1.38 | 0.00 | 1.38 | 0.00 | 1.38 | 0.00 |
| 2 1991 | 2.77 | 0.00 | 2.77 | 0.00 | -2.77 | 2.47 | 0.00 | 2.42 | 0.00 | 2.37 | 0.00 |
| 3 1992 | 2.03 | 0.00 | 2.03 | 0.00 | -2.03 | 1.70 | 0.00 | 1.66 | 0.00 | 1.61 | 0.00 |
| 4 1993 | 10.17 | 0.00 | 10.17 | 0.00 | -10.17 | 8.06 | 0.00 | 7.76 | 0.00 | 7.48 | 0.00 |
| 5 1994 | 51.25 | 0.00 | 51.25 | 0.00 | -51.25 | 38.30 | 0.00 | 36.54 | 0.00 | 34.88 | 0.00 |
| 6 1995 | 47.40 | 0.00 | 47.40 | 0.00 | -47.40 | 33.42 | 0.00 | 31.58 | 0.00 | 29.87 | 0.00 |
| 7 1996 | 10.75 | 0.00 | 10.75 | 0.00 | -10.75 | 7.15 | 0.00 | 6.69 | 0.00 | 6.27 | 0.00 |
| 8 1997 | 1.38 | 0.31 | 1.69 | 3.12 | 1.43 | 1.06 | 1.96 | 0.98 | 1.82 | 0.91 | 1.69 |
| 9 1998 | 0.00 | 0.43 | 0.43 | 9.21 | 8.78 | 0.25 | 5.45 | 0.23 | 5.01 | 0.22 | 4.61 |
| 10 1999 | 0.00 | 0.55 | 0.55 | 13.73 | 13.18 | 0.31 | 7.67 | 0.28 | 6.98 | 0.25 | 6.36 |
| 11 2000 | 0.00 | 0.68 | 0.68 | 15.46 | 14.78 | 0.36 | 8.14 | 0.32 | 7.34 | 0.29 | 6.63 |
| 12 2001 | 0.00 | 1.21 | 1.21 | 16.15 | 14.94 | 0.60 | 8.03 | 0.54 | 7.17 | 0.48 | 6.41 |
| 13 2002 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.38 | 7.57 | 0.33 | 6.70 | 0.29 | 5.94 |
| 14 2003 | 0.00 | 1.36 | 1.36 | 16.15 | 14.79 | 0.60 | 7.14 | 0.53 | 6.26 | 0.46 | 5.50 |
| 15 2004 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.33 | 6.74 | 0.29 | 5.85 | 0.25 | 5.09 |
| 16 2005 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.31 | 6.36 | 0.27 | 5.47 | 0.23 | 4.71 |
| 17 2006 | 0.00 | 1.21 | 1.21 | 16.15 | 14.94 | 0.45 | 6.00 | 0.38 | 5.11 | 0.33 | 4.36 |
| 18 2007 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.28 | 5.66 | 0.24 | 4.78 | 0.20 | 4.04 |
| 19 2008 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.26 | 5.34 | 0.22 | 4.47 | 0.19 | 3.74 |
| 20 2009 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.25 | 5.04 | 0.21 | 4.17 | 0.17 | 3.46 |
| 21 2010 | 0.00 | 1.36 | 1.36 | 16.15 | 14.79 | 0.40 | 4.75 | 0.33 | 3.90 | 0.27 | 3.21 |
| 22 2011 | 0.00 | 1.21 | 1.21 | 16.15 | 14.94 | 0.34 | 4.48 | 0.27 | 3.65 | 0.22 | 2.97 |
| 23 2012 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.21 | 4.23 | 0.17 | 3.41 | 0.14 | 2.75 |
| 24 2013 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.20 | 3.99 | 0.16 | 3.18 | 0.13 | 2.55 |
| 25 2014 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.19 | 3.76 | 0.15 | 2.98 | 0.12 | 2.36 |
| 26 2015 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.18 | 3.55 | 0.14 | 2.78 | 0.11 | 2.18 |
| 27 2016 | 0.00 | 1.21 | 1.21 | 16.15 | 14.94 | 0.25 | 3.35 | 0.19 | 2.60 | 0.15 | 2.02 |
| 28 2017 | 0.00 | 1.36 | 1.36 | 16.15 | 14.79 | 0.27 | 3.16 | 0.20 | 2.43 | 0.16 | 1.87 |
| 29 2018 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.15 | 2.98 | 0.11 | 2.27 | 0.09 | 1.73 |
| 30 2019 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.14 | 2.81 | 0.11 | 2.12 | 0.08 | 1.60 |
| 31 2020 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.13 | 2.65 | 0.10 | 1.98 | 0.07 | 1.49 |
| 32 2021 | 0.00 | 1.21 | 1.21 | 16.15 | 14.94 | 0.19 | 2.50 | 0.14 | 1.85 | 0.10 | 1.38 |
| 33 2022 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.12 | 2.36 | 0.09 | 1.73 | 0.06 | 1.27 |
| 34 2023 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.11 | 2.23 | 0.08 | 1.62 | 0.06 | 1.18 |
| 35 2024 | 0.00 | 1.36 | 1.36 | 16.15 | 14.79 | 0.18 | 2.10 | 0.13 | 1.51 | 0.09 | 1.09 |
| 36 2025 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.10 | 1.98 | 0.07 | 1.41 | 0.05 | 1.01 |
| 37 2026 | 0.00 | 1.21 | 1.21 | 16.15 | 14.94 | 0.14 | 1.87 | 0.10 | 1.32 | 0.07 | 0.94 |
| 38 2027 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.09 | 1.76 | 0.06 | 1.23 | 0.04 | 0.87 |
| 39 2028 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.08 | 1.66 | 0.06 | 1.15 | 0.04 | 0.80 |
| 40 2029 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.08 | 1.57 | 0.05 | 1.08 | 0.04 | 0.74 |
| 41 2030 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.07 | 1.48 | 0.05 | 1.01 | 0.03 | 0.69 |
| 42 2031 | 0.00 | 1.78 | 1.78 | 16.15 | 14.37 | 0.15 | 1.40 | 0.10 | 0.94 | 0.07 | 0.64 |
| 43 2032 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.07 | 1.32 | 0.04 | 0.88 | 0.03 | 0.59 |
| 44 2033 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.06 | 1.24 | 0.04 | 0.82 | 0.03 | 0.55 |
| 45 2034 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.06 | 1.17 | 0.04 | 0.77 | 0.03 | 0.51 |
| 46 2035 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.05 | 1.11 | 0.04 | 0.72 | 0.02 | 0.47 |
| 47 2036 | 0.00 | 1.21 | 1.21 | 16.15 | 14.94 | 0.08 | 1.04 | 0.05 | 0.67 | 0.03 | 0.43 |
| 48 2037 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.05 | 0.99 | 0.03 | 0.63 | 0.02 | 0.40 |
| 49 2038 | 0.00 | 1.36 | 1.36 | 16.15 | 14.79 | 0.08 | 0.93 | 0.05 | 0.59 | 0.03 | 0.37 |
| 50 2039 | 0.00 | 0.80 | 0.80 | 16.15 | 15.35 | 0.04 | 0.88 | 0.03 | 0.55 | 0.02 | 0.34 |
| TOTAL | 127.13 | 39.82 | 166.95 | 671.37 | 504.42 | 102.15 | 150.40 | 96.03 | 122.93 | 90.54 | 101.56 |

BENEFIT COST RATIO BY DISCOUNT RATE (B/C) = 1.47 ( 6%), 1.28 ( 7%), 1.12 ( 8%)
INTERNAL RATE OF RETURN (IRR) = 8.9 %

## TABLE J-15 : PROJECT COST AND BENEFITS (4/6) HUAI NA KHAI PROJECT

( UNIT : MILLION BAHT )

| YEAR | PROJECT COST | | | BENEFITS | RETURN | PRESENT WORTH VALUE BY DISCOUNT RATE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 6 % | | 7 % | | 8 % | |
| | CAPITAL | O & M | TOTAL | | | (COST) | (BENEFITS) | (COST) | (BENEFITS) | (COST) | (BENEFITS) |
| 1 1990 | 2.10 | 0.00 | 2.10 | 0.00 | -2.10 | 2.10 | 0.00 | 2.10 | 0.00 | 2.10 | 0.00 |
| 2 1991 | 4.97 | 0.00 | 4.97 | 0.00 | -4.97 | 4.42 | 0.00 | 4.34 | 0.00 | 4.26 | 0.00 |
| 3 1992 | 4.04 | 0.00 | 4.04 | 0.00 | -4.04 | 3.39 | 0.00 | 3.30 | 0.00 | 3.21 | 0.00 |
| 4 1993 | 14.07 | 0.00 | 14.07 | 0.00 | -14.07 | 11.14 | 0.00 | 10.73 | 0.00 | 10.34 | 0.00 |
| 5 1994 | 27.14 | 0.00 | 27.14 | 0.00 | -27.14 | 20.28 | 0.00 | 19.35 | 0.00 | 18.47 | 0.00 |
| 6 1995 | 57.62 | 0.00 | 57.62 | 0.00 | -57.62 | 40.62 | 0.00 | 38.39 | 0.00 | 36.31 | 0.00 |
| 7 1996 | 83.53 | 0.00 | 83.53 | 0.00 | -83.53 | 55.55 | 0.00 | 52.02 | 0.00 | 48.74 | 0.00 |
| 8 1997 | 19.73 | 0.00 | 19.73 | 0.00 | -19.73 | 12.38 | 0.00 | 11.48 | 0.00 | 10.66 | 0.00 |
| 9 1998 | 0.00 | 0.68 | 0.68 | 7.32 | 6.64 | 0.40 | 4.33 | 0.37 | 3.98 | 0.34 | 3.66 |
| 10 1999 | 0.00 | 0.96 | 0.96 | 17.40 | 16.44 | 0.54 | 9.72 | 0.49 | 8.85 | 0.44 | 8.06 |
| 11 2000 | 0.00 | 1.24 | 1.24 | 26.12 | 24.88 | 0.65 | 13.76 | 0.59 | 12.41 | 0.53 | 11.20 |
| 12 2001 | 0.00 | 1.52 | 1.52 | 29.47 | 27.95 | 0.76 | 14.65 | 0.67 | 13.09 | 0.60 | 11.70 |
| 13 2002 | 0.00 | 2.66 | 2.66 | 30.81 | 28.15 | 1.25 | 14.45 | 1.10 | 12.79 | 0.98 | 11.33 |
| 14 2003 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.80 | 13.63 | 0.70 | 11.95 | 0.61 | 10.49 |
| 15 2004 | 0.00 | 2.97 | 2.97 | 30.81 | 27.84 | 1.24 | 12.86 | 1.08 | 11.17 | 0.94 | 9.71 |
| 16 2005 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.71 | 12.13 | 0.61 | 10.44 | 0.53 | 8.99 |
| 17 2006 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.67 | 11.44 | 0.57 | 9.75 | 0.49 | 8.33 |
| 18 2007 | 0.00 | 2.66 | 2.66 | 30.81 | 28.15 | 0.93 | 10.79 | 0.79 | 9.12 | 0.67 | 7.71 |
| 19 2008 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.59 | 10.18 | 0.50 | 8.52 | 0.42 | 7.14 |
| 20 2009 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.56 | 9.61 | 0.47 | 7.96 | 0.39 | 6.61 |
| 21 2010 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.53 | 9.06 | 0.43 | 7.44 | 0.36 | 6.12 |
| 22 2011 | 0.00 | 2.97 | 2.97 | 30.81 | 27.84 | 0.82 | 8.55 | 0.67 | 6.95 | 0.55 | 5.67 |
| 23 2012 | 0.00 | 2.66 | 2.66 | 30.81 | 28.15 | 0.70 | 8.07 | 0.56 | 6.50 | 0.45 | 5.25 |
| 24 2013 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.44 | 7.61 | 0.35 | 6.07 | 0.28 | 4.86 |
| 25 2014 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.42 | 7.18 | 0.33 | 5.68 | 0.26 | 4.50 |
| 26 2015 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.40 | 6.77 | 0.31 | 5.31 | 0.24 | 4.17 |
| 27 2016 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.37 | 6.39 | 0.29 | 4.96 | 0.23 | 3.86 |
| 28 2017 | 0.00 | 2.66 | 2.66 | 30.81 | 28.15 | 0.52 | 6.03 | 0.40 | 4.63 | 0.31 | 3.57 |
| 29 2018 | 0.00 | 2.97 | 2.97 | 30.81 | 27.84 | 0.55 | 5.69 | 0.42 | 4.33 | 0.32 | 3.31 |
| 30 2019 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.31 | 5.36 | 0.24 | 4.05 | 0.18 | 3.06 |
| 31 2020 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.30 | 5.06 | 0.22 | 3.78 | 0.17 | 2.84 |
| 32 2021 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.28 | 4.77 | 0.21 | 3.54 | 0.15 | 2.63 |
| 33 2022 | 0.00 | 2.66 | 2.66 | 30.81 | 28.15 | 0.39 | 4.50 | 0.29 | 3.30 | 0.21 | 2.43 |
| 34 2023 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.25 | 4.25 | 0.18 | 3.09 | 0.13 | 2.25 |
| 35 2024 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.23 | 4.01 | 0.17 | 2.89 | 0.12 | 2.08 |
| 36 2025 | 0.00 | 2.97 | 2.97 | 30.81 | 27.84 | 0.36 | 3.78 | 0.26 | 2.70 | 0.19 | 1.93 |
| 37 2026 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.21 | 3.57 | 0.15 | 2.52 | 0.10 | 1.79 |
| 38 2027 | 0.00 | 2.66 | 2.66 | 30.81 | 28.15 | 0.29 | 3.37 | 0.20 | 2.36 | 0.14 | 1.65 |
| 39 2028 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.19 | 3.18 | 0.13 | 2.20 | 0.09 | 1.53 |
| 40 2029 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.18 | 3.00 | 0.12 | 2.06 | 0.08 | 1.42 |
| 41 2030 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.17 | 2.83 | 0.11 | 1.92 | 0.08 | 1.31 |
| 42 2031 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.16 | 2.67 | 0.10 | 1.80 | 0.07 | 1.22 |
| 43 2032 | 0.00 | 3.84 | 3.84 | 30.81 | 26.97 | 0.31 | 2.52 | 0.21 | 1.68 | 0.14 | 1.13 |
| 44 2033 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.14 | 2.37 | 0.09 | 1.57 | 0.06 | 1.04 |
| 45 2034 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.13 | 2.24 | 0.09 | 1.47 | 0.06 | 0.97 |
| 46 2035 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.12 | 2.11 | 0.08 | 1.37 | 0.05 | 0.89 |
| 47 2036 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.12 | 1.99 | 0.07 | 1.28 | 0.05 | 0.83 |
| 48 2037 | 0.00 | 2.66 | 2.66 | 30.81 | 28.15 | 0.16 | 1.88 | 0.10 | 1.20 | 0.07 | 0.77 |
| 49 2038 | 0.00 | 1.80 | 1.80 | 30.81 | 29.01 | 0.10 | 1.77 | 0.07 | 1.12 | 0.04 | 0.71 |
| 50 2039 | 0.00 | 2.97 | 2.97 | 30.81 | 27.84 | 0.16 | 1.67 | 0.10 | 1.05 | 0.06 | 0.66 |
| TOTAL | 213.20 | 86.71 | 299.91 | 1251.09 | 951.18 | 168.29 | 269.78 | 156.61 | 218.81 | 146.26 | 179.36 |

BENEFIT COST RATIO BY DISCOUNT RATE (B/C) = 1.60 ( 6%), 1.40 ( 7%), 1.23 ( 8%)
INTERNAL RATE OF RETURN (IRR) = 9.7 %

## TABLE J-15 : PROJECT COST AND BENEFITS (5/6) HUAI SOOB PROJECT

( UNIT : MILLION BAHT )

| YEAR | PROJECT COST | | | BENEFITS | RETURN | PRESENT WORTH VALUE BY DISCOUNT RATE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 6 % | | 7 % | | 8 % | |
| | CAPITAL | O & M | TOTAL | | | (COST) | (BENEFITS) | (COST) | (BENEFITS) | (COST) | (BENEFITS) |
| 1 1990 | 1.56 | 0.00 | 1.56 | 0.00 | -1.56 | 1.56 | 0.00 | 1.56 | 0.00 | 1.56 | 0.00 |
| 2 1991 | 2.84 | 0.00 | 2.84 | 0.00 | -2.84 | 2.53 | 0.00 | 2.48 | 0.00 | 2.43 | 0.00 |
| 3 1992 | 2.03 | 0.00 | 2.03 | 0.00 | -2.03 | 1.70 | 0.00 | 1.66 | 0.00 | 1.61 | 0.00 |
| 4 1993 | 11.44 | 0.00 | 11.44 | 0.00 | -11.44 | 9.06 | 0.00 | 8.73 | 0.00 | 8.41 | 0.00 |
| 5 1994 | 46.03 | 0.00 | 46.03 | 0.00 | -46.03 | 34.40 | 0.00 | 32.82 | 0.00 | 31.33 | 0.00 |
| 6 1995 | 40.70 | 0.00 | 40.70 | 0.00 | -40.70 | 28.69 | 0.00 | 27.12 | 0.00 | 25.65 | 0.00 |
| 7 1996 | 45.51 | 0.00 | 45.51 | 0.00 | -45.51 | 30.27 | 0.00 | 28.34 | 0.00 | 26.55 | 0.00 |
| 8 1997 | 13.99 | 0.00 | 13.99 | 0.00 | -13.99 | 8.78 | 0.00 | 8.14 | 0.00 | 7.56 | 0.00 |
| 9 1998 | 0.00 | 0.31 | 0.31 | 2.80 | 2.49 | 0.18 | 1.66 | 0.17 | 1.52 | 0.16 | 1.40 |
| 10 1999 | 0.00 | 0.43 | 0.43 | 8.36 | 7.93 | 0.24 | 4.67 | 0.22 | 4.25 | 0.20 | 3.87 |
| 11 2000 | 0.00 | 0.55 | 0.55 | 14.47 | 13.92 | 0.29 | 7.62 | 0.26 | 6.87 | 0.24 | 6.21 |
| 12 2001 | 0.00 | 0.68 | 0.68 | 16.88 | 16.20 | 0.34 | 8.39 | 0.30 | 7.49 | 0.27 | 6.70 |
| 13 2002 | 0.00 | 1.18 | 1.18 | 17.62 | 16.44 | 0.55 | 8.26 | 0.49 | 7.31 | 0.43 | 6.48 |
| 14 2003 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.35 | 7.79 | 0.31 | 6.83 | 0.27 | 6.00 |
| 15 2004 | 0.00 | 1.32 | 1.32 | 17.62 | 16.30 | 0.55 | 7.35 | 0.48 | 6.39 | 0.42 | 5.55 |
| 16 2005 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.31 | 6.94 | 0.27 | 5.97 | 0.23 | 5.14 |
| 17 2006 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.30 | 6.54 | 0.25 | 5.58 | 0.22 | 4.76 |
| 18 2007 | 0.00 | 1.18 | 1.18 | 17.62 | 16.44 | 0.41 | 6.17 | 0.35 | 5.21 | 0.30 | 4.41 |
| 19 2008 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.26 | 5.82 | 0.22 | 4.87 | 0.19 | 4.08 |
| 20 2009 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.25 | 5.49 | 0.21 | 4.55 | 0.17 | 3.78 |
| 21 2010 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.24 | 5.18 | 0.19 | 4.26 | 0.16 | 3.50 |
| 22 2011 | 0.00 | 1.32 | 1.32 | 17.62 | 16.30 | 0.37 | 4.89 | 0.30 | 3.98 | 0.24 | 3.24 |
| 23 2012 | 0.00 | 1.18 | 1.18 | 17.62 | 16.44 | 0.31 | 4.61 | 0.25 | 3.72 | 0.20 | 3.00 |
| 24 2013 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.20 | 4.35 | 0.16 | 3.47 | 0.13 | 2.78 |
| 25 2014 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.19 | 4.11 | 0.15 | 3.25 | 0.12 | 2.57 |
| 26 2015 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.18 | 3.87 | 0.14 | 3.03 | 0.11 | 2.38 |
| 27 2016 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.17 | 3.65 | 0.13 | 2.84 | 0.10 | 2.21 |
| 28 2017 | 0.00 | 1.18 | 1.18 | 17.62 | 16.44 | 0.23 | 3.45 | 0.18 | 2.65 | 0.14 | 2.04 |
| 29 2018 | 0.00 | 1.32 | 1.32 | 17.62 | 16.30 | 0.24 | 3.25 | 0.19 | 2.48 | 0.14 | 1.89 |
| 30 2019 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.14 | 3.07 | 0.11 | 2.31 | 0.08 | 1.75 |
| 31 2020 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.13 | 2.89 | 0.10 | 2.16 | 0.07 | 1.62 |
| 32 2021 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.12 | 2.73 | 0.09 | 2.02 | 0.07 | 1.50 |
| 33 2022 | 0.00 | 1.18 | 1.18 | 17.62 | 16.44 | 0.17 | 2.58 | 0.13 | 1.89 | 0.09 | 1.39 |
| 34 2023 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.11 | 2.43 | 0.08 | 1.77 | 0.06 | 1.29 |
| 35 2024 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.10 | 2.29 | 0.07 | 1.65 | 0.05 | 1.19 |
| 36 2025 | 0.00 | 1.32 | 1.32 | 17.62 | 16.30 | 0.16 | 2.16 | 0.12 | 1.54 | 0.08 | 1.10 |
| 37 2026 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.09 | 2.04 | 0.07 | 1.44 | 0.05 | 1.02 |
| 38 2027 | 0.00 | 1.18 | 1.18 | 17.62 | 16.44 | 0.13 | 1.92 | 0.09 | 1.35 | 0.06 | 0.95 |
| 39 2028 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.08 | 1.82 | 0.06 | 1.26 | 0.04 | 0.88 |
| 40 2029 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.08 | 1.71 | 0.05 | 1.18 | 0.04 | 0.81 |
| 41 2030 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.07 | 1.62 | 0.05 | 1.10 | 0.03 | 0.75 |
| 42 2031 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.07 | 1.52 | 0.05 | 1.03 | 0.03 | 0.70 |
| 43 2032 | 0.00 | 1.71 | 1.71 | 17.62 | 15.91 | 0.14 | 1.44 | 0.09 | 0.96 | 0.06 | 0.64 |
| 44 2033 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.06 | 1.36 | 0.04 | 0.90 | 0.03 | 0.60 |
| 45 2034 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.06 | 1.28 | 0.04 | 0.84 | 0.03 | 0.55 |
| 46 2035 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.05 | 1.21 | 0.04 | 0.78 | 0.02 | 0.51 |
| 47 2036 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.05 | 1.14 | 0.03 | 0.73 | 0.02 | 0.47 |
| 48 2037 | 0.00 | 1.18 | 1.18 | 17.62 | 16.44 | 0.07 | 1.07 | 0.05 | 0.68 | 0.03 | 0.44 |
| 49 2038 | 0.00 | 0.80 | 0.80 | 17.62 | 16.82 | 0.05 | 1.01 | 0.03 | 0.64 | 0.02 | 0.41 |
| 50 2039 | 0.00 | 1.32 | 1.32 | 17.62 | 16.30 | 0.07 | 0.96 | 0.04 | 0.60 | 0.03 | 0.38 |
| TOTAL | 164.10 | 38.54 | 202.64 | 712.07 | 509.43 | 125.17 | 152.34 | 117.47 | 123.36 | 110.52 | 100.95 |

BENEFIT COST RATIO BY DISCOUNT RATE (B/C) = 1.22 ( 6%), 1.05 ( 7%), 0.91 ( 8%)
INTERNAL RATE OF RETURN (IRR) = 7.4 %

## TABLE J-15 : PROJECT COST AND BENEFITS (6/6) PACKAGE OF THE PROJECTS

( UNIT : MILLION BAHT )

| YEAR | PROJECT COST | | | BENEFITS | RETURN | PRESENT WORTH VALUE BY DISCOUNT RATE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 6 % | | 7 % | | 8 % | |
| | CAPITAL | O & M | TOTAL | | | (COST) | (BENEFITS) | (COST) | (BENEFITS) | (COST) | (BENEFITS) |
| 1 1990 | 8.38 | 0.00 | 8.38 | 0.00 | -8.38 | 8.38 | 0.00 | 8.38 | 0.00 | 8.38 | 0.00 |
| 2 1991 | 19.02 | 0.00 | 19.02 | 0.00 | -19.02 | 16.93 | 0.00 | 16.61 | 0.00 | 16.31 | 0.00 |
| 3 1992 | 15.25 | 0.00 | 15.25 | 0.00 | -15.25 | 12.80 | 0.00 | 12.45 | 0.00 | 12.11 | 0.00 |
| 4 1993 | 57.73 | 0.00 | 57.73 | 0.00 | -57.73 | 45.73 | 0.00 | 44.04 | 0.00 | 42.43 | 0.00 |
| 5 1994 | 232.90 | 0.00 | 232.90 | 0.00 | -232.90 | 174.04 | 0.00 | 166.06 | 0.00 | 158.51 | 0.00 |
| 6 1995 | 311.65 | 0.00 | 311.65 | 0.00 | -311.65 | 219.70 | 0.00 | 207.67 | 0.00 | 196.39 | 0.00 |
| 7 1996 | 185.20 | 0.00 | 185.20 | 0.00 | -185.20 | 123.17 | 0.00 | 115.33 | 0.00 | 108.06 | 0.00 |
| 8 1997 | 40.00 | 1.55 | 41.55 | 14.88 | -26.67 | 26.07 | 9.34 | 24.18 | 8.66 | 22.45 | 8.04 |
| 9 1998 | 0.00 | 3.17 | 3.17 | 45.41 | 42.24 | 1.88 | 26.88 | 1.72 | 24.70 | 1.59 | 22.72 |
| 10 1999 | 0.00 | 4.19 | 4.19 | 76.98 | 72.79 | 2.34 | 42.99 | 2.13 | 39.13 | 1.94 | 35.66 |
| 11 2000 | 0.00 | 5.21 | 5.21 | 97.91 | 92.70 | 2.74 | 51.58 | 2.48 | 46.52 | 2.23 | 41.99 |
| 12 2001 | 0.00 | 8.21 | 8.21 | 105.80 | 97.59 | 4.08 | 52.58 | 3.65 | 46.98 | 3.26 | 42.01 |
| 13 2002 | 0.00 | 7.90 | 7.90 | 107.86 | 99.96 | 3.70 | 50.57 | 3.28 | 44.76 | 2.90 | 39.66 |
| 14 2003 | 0.00 | 9.31 | 9.31 | 107.86 | 98.55 | 4.12 | 47.71 | 3.61 | 41.83 | 3.17 | 36.72 |
| 15 2004 | 0.00 | 8.35 | 8.35 | 107.86 | 99.51 | 3.48 | 45.01 | 3.03 | 39.09 | 2.63 | 34.00 |
| 16 2005 | 0.00 | 6.66 | 6.66 | 107.86 | 101.20 | 2.62 | 42.46 | 2.26 | 36.54 | 1.94 | 31.48 |
| 17 2006 | 0.00 | 8.61 | 8.61 | 107.86 | 99.25 | 3.20 | 40.06 | 2.73 | 34.15 | 2.33 | 29.15 |
| 18 2007 | 0.00 | 7.90 | 7.90 | 107.86 | 99.96 | 2.77 | 37.79 | 2.34 | 31.91 | 1.98 | 26.99 |
| 19 2008 | 0.00 | 6.66 | 6.66 | 107.86 | 101.20 | 2.20 | 35.65 | 1.84 | 29.82 | 1.54 | 24.99 |
| 20 2009 | 0.00 | 6.66 | 6.66 | 107.86 | 101.20 | 2.08 | 33.63 | 1.72 | 27.87 | 1.43 | 23.14 |
| 21 2010 | 0.00 | 9.31 | 9.31 | 107.86 | 98.55 | 2.74 | 31.73 | 2.25 | 26.05 | 1.85 | 21.43 |
| 22 2011 | 0.00 | 10.30 | 10.30 | 107.86 | 97.56 | 2.86 | 29.93 | 2.32 | 24.35 | 1.89 | 19.84 |
| 23 2012 | 0.00 | 7.90 | 7.90 | 107.86 | 99.96 | 2.07 | 28.24 | 1.67 | 22.75 | 1.35 | 18.37 |
| 24 2013 | 0.00 | 6.66 | 6.66 | 107.86 | 101.20 | 1.64 | 26.64 | 1.31 | 21.26 | 1.05 | 17.01 |
| 25 2014 | 0.00 | 6.66 | 6.66 | 107.86 | 101.20 | 1.55 | 25.13 | 1.23 | 19.87 | 0.97 | 15.75 |
| 26 2015 | 0.00 | 6.66 | 6.66 | 107.86 | 101.20 | 1.46 | 23.71 | 1.15 | 18.57 | 0.90 | 14.58 |
| 27 2016 | 0.00 | 8.61 | 8.61 | 107.86 | 99.25 | 1.79 | 22.37 | 1.39 | 17.36 | 1.08 | 13.50 |
| 28 2017 | 0.00 | 10.55 | 10.55 | 107.86 | 97.31 | 2.06 | 21.10 | 1.59 | 16.22 | 1.22 | 12.50 |
| 29 2018 | 0.00 | 8.35 | 8.35 | 107.86 | 99.51 | 1.54 | 19.91 | 1.17 | 15.16 | 0.90 | 11.58 |
| 30 2019 | 0.00 | 6.66 | 6.66 | 107.86 | 101.20 | 1.16 | 18.78 | 0.87 | 14.17 | 0.66 | 10.72 |
| 31 2020 | 0.00 | 6.66 | 6.66 | 107.86 | 101.20 | 1.09 | 17.72 | 0.82 | 13.24 | 0.61 | 9.93 |
| 32 2021 | 0.00 | 8.61 | 8.61 | 107.86 | 99.25 | 1.33 | 16.71 | 0.99 | 12.38 | 0.73 | 9.19 |
| 33 2022 | 0.00 | 7.90 | 7.90 | 107.86 | 99.96 | 1.15 | 15.77 | 0.85 | 11.57 | 0.62 | 8.51 |
| 34 2023 | 0.00 | 6.66 | 6.66 | 107.86 | 101.20 | 0.92 | 14.88 | 0.67 | 10.81 | 0.49 | 7.88 |
| 35 2024 | 0.00 | 9.31 | 9.31 | 107.86 | 98.55 | 1.21 | 14.03 | 0.87 | 10.10 | 0.63 | 7.30 |
| 36 2025 | 0.00 | 8.35 | 8.35 | 107.86 | 99.51 | 1.02 | 13.24 | 0.73 | 9.44 | 0.52 | 6.75 |
| 37 2026 | 0.00 | 8.61 | 8.61 | 107.86 | 99.25 | 1.00 | 12.49 | 0.70 | 8.82 | 0.50 | 6.25 |
| 38 2027 | 0.00 | 7.90 | 7.90 | 107.86 | 99.96 | 0.86 | 11.78 | 0.60 | 8.25 | 0.42 | 5.79 |
| 39 2028 | 0.00 | 6.66 | 6.66 | 107.86 | 101.20 | 0.69 | 11.12 | 0.48 | 7.71 | 0.33 | 5.36 |
| 40 2029 | 0.00 | 6.66 | 6.66 | 107.86 | 101.20 | 0.65 | 10.49 | 0.44 | 7.20 | 0.31 | 4.97 |
| 41 2030 | 0.00 | 6.66 | 6.66 | 107.86 | 101.20 | 0.61 | 9.89 | 0.42 | 6.73 | 0.28 | 4.60 |
| 42 2031 | 0.00 | 11.26 | 11.26 | 107.86 | 96.60 | 0.97 | 9.33 | 0.66 | 6.29 | 0.44 | 4.26 |
| 43 2032 | 0.00 | 9.61 | 9.61 | 107.86 | 98.25 | 0.78 | 8.80 | 0.52 | 5.88 | 0.35 | 3.94 |
| 44 2033 | 0.00 | 6.66 | 6.66 | 107.86 | 101.20 | 0.51 | 8.31 | 0.34 | 5.50 | 0.23 | 3.65 |
| 45 2034 | 0.00 | 6.66 | 6.66 | 107.86 | 101.20 | 0.48 | 7.84 | 0.32 | 5.14 | 0.21 | 3.38 |
| 46 2035 | 0.00 | 6.66 | 6.66 | 107.86 | 101.20 | 0.46 | 7.39 | 0.30 | 4.80 | 0.19 | 3.13 |
| 47 2036 | 0.00 | 8.61 | 8.61 | 107.86 | 99.25 | 0.56 | 6.97 | 0.36 | 4.49 | 0.23 | 2.90 |
| 48 2037 | 0.00 | 7.90 | 7.90 | 107.86 | 99.96 | 0.48 | 6.58 | 0.31 | 4.19 | 0.20 | 2.68 |
| 49 2038 | 0.00 | 9.31 | 9.31 | 107.86 | 98.55 | 0.54 | 6.21 | 0.34 | 3.92 | 0.21 | 2.48 |
| 50 2039 | 0.00 | 8.35 | 8.35 | 107.86 | 99.51 | 0.45 | 5.86 | 0.28 | 3.66 | 0.18 | 2.30 |
| TOTAL | 870.13 | 325.04 | 1195.17 | 4439.66 | 3244.49 | 696.69 | 979.17 | 651.43 | 797.85 | 611.15 | 657.09 |

BENEFIT COST RATIO BY DISCOUNT RATE (B/C) = 1.41 ( 6%), 1.22 ( 7%), 1.08 ( 8%)
INTERNAL RATE OF RETURN (IRR) = 8.6 %

## TABLE J-16 : PLANTED AREA AND HARVESTED AREA OF WET SEASON PADDY BY CHANGWAT

| Changwat | 1982/83 | 1983/84 | 1984/85 | 1985/86 | 1986/87 | Average |
|---|---|---|---|---|---|---|
| 1. Area of Paddy Land ('000 rai) | | | | | | |
| - Yasothon | 1,164 | 1,188 | 1,172 | 1,155 | 1,197 | 1,175 |
| - Ubon Ratchathani | 4,017 | 4,093 | 4,150 | 4,123 | 4,180 | 4,113 |
| Total | 5,181 | 5,281 | 5,322 | 5,278 | 5,377 | 5,288 |
| 2. Planted Area of Paddy ('000 rai) | | | | | | |
| - Yasothon | 710 | 999 | 999 | 1,083 | 933 | 945 |
| - Ubon Ratchathani | 3,394 | 3,352 | 3,502 | 3,705 | 3,646 | 3,520 |
| Total | 4,104 | 4,351 | 4,501 | 4,788 | 4,579 | 4,465 |
| 3. Harvested Area of Paddy ('000 rai) | | | | | | |
| - Yasothon | 680 | 966 | 981 | 1,073 | 919 | 924 |
| - Ubon Ratchathani | 3,084 | 3,334 | 3,421 | 3,588 | 3,607 | 3,407 |
| Total | 3,764 | 4,300 | 4,402 | 4,661 | 4,526 | 4,331 |
| 4. Percentage of Planted Area (Paddy Land = 100) | | | | | | |
| - Yasothon | 61.0 | 84.1 | 85.2 | 93.7 | 78.0 | 80.4 |
| - Ubon Ratchathani | 84.5 | 81.9 | 84.4 | 89.9 | 87.2 | 85.6 |
| Total | 79.2 | 82.4 | 84.6 | 90.7 | 85.2 | 84.4 |
| 5. Percentage of Harvested Area (Paddy Land = 100) | | | | | | |
| - Yasothon | 58.4 | 81.3 | 83.7 | 92.9 | 76.8 | 78.6 |
| - Ubon Ratchathani | 76.8 | 81.4 | 82.4 | 87.0 | 86.3 | 82.8 |
| Total | 72.7 | 81.4 | 82.7 | 88.3 | 84.2 | 81.9 |

Source: "Agricultural Statistics of Thailand" Office of Agricultural Economics, MOAC.

## TABLE J-17 : FARM GATE PRICE OF AGRICULTURAL PRODUCTS (AVERAGE OF WHOLE COUNTRY)

(unit: ฿/kg)

| Products | 1983/84 | 1984/85 | 1985/86 | 1986/87 | 1987/88 |
|---|---|---|---|---|---|
| Wet Season Paddy | 2.76 | 2.30 | 2.32 | 2.41 | 3.79 |
| Soybeans | 6.07 | 6.00 | 6.09 | 6.15 | 8.01 |
| Groundnuts in shell, dried | 7.48 | 5.30 | 7.11 | 4.99 | 6.99 |
| Chilli, dried | 33.99 | 32.31 | 29.37 | 31.00 | 40.68 |

Source: "Agricultural Statistics of Thailand, Crop year 1987/88" Office of Agricultural Economics, MOAC.

## TABLE J-18 : EXPORT PRICE OF AGRICULTURAL PRODUCTS (FOB PRICE AT BANGKOK)

(unit: '000 ฿/ton)

| Commodities | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|
| White rice | 5.73 | 5.58 | 5.68 | 4.50 | 5.04 |
| White rice 5% broken | 6.08 | 5.89 | 5.45 | 4.70 | 5.11 |
| Groundnut, shelled | - | 12.93 | 17.52 | 14.94 | 13.92 |
| Groundnut, in shell | - | 10.24 | 9.93 | 10.16 | 8.74 |
| Soybean | 8.96 | 8.75 | 9.26 | 9.33 | 10.21 |
| Water melon | 3.20 | 4.55 | 4.02 | 3.89 | 4.16 |
| Chilli, dried | 56.48 | 26.48 | 23.98 | 25.40 | 41.53 |

Source: "Agricultural Statistics of Thailand, Crops year 1987/88" Office of Agricultural Economics, MOAC.

**TABLE J-19 : FARM GATE PRICE OF FRESH WATER FISH (AVERAGE OF WHOLE COUNTRY)**

(unit: ฿/kg)

| Species | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|
| Local carp | 20.50 | 19.24 | 18.82 | 17.77 |
| Tilapia (Pla - Nil) | 14.47 | 14.57 | 17.74 | 12.00 |
| Tilapia (Malayan) | | | | 18.23 |
| Common carp | 27.88 | 27.98 | 27.56 | 25.54 |
| Cat fish (Pla-Swai) | 21.18 | 21.48 | 12.99 | 9.85 |

Source: "Agricultural Statistics of Thailand", MOAC.

**TABLE J-20 : PRODUCTION OF FRESH WATER FISH FARM BY POND CULTURE (TOTAL OF WHOLE COUNTRY)**

| Items | | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|
| Area | (ha) | 37,330 | 52,247 | 61,294 | 80,983 | 90,691 |
| Production | (tons) | 26,527 | 26,071 | 30,508 | 45,947 | 50,007 |
| Yield | (tons/ha) | 0.71 | 0.50 | 0.50 | 0.57 | 0.55 |
| Total Value | (million ฿) | 587 | 680 | 888 | 1,039 | 1,204 |
| Fish Price | (฿/kg) | 22.12 | 26.07 | 29.09 | 22.61 | 24.08 |

Source: "Agricultural Statistics of Thailand", MOAC.

## TABLE J-21 : ADMINISTRATIVE DIVISION OF THE PROJECT AREA

| Province | Amphoe | Tambon | Villages Concerned |
|---|---|---|---|
| 1. Lam Se Project | | | |
| Yasothon | -Leong Nok Tha | -Hong Sang | -Nondaeng |
| | | -Kud Chiang Mee | -Sawad |
| | | | -Kudkoon |
| | | | -Nong Bua |
| | | | -Kudeadonnua |
| 2. Huai Khum Kham Project | | | |
| Ubon Ratchathani | -Trakan Phutphon | -Korn Sai | -Donmuang |
| | | | -Kornoai |
| | | | -Ban Hua Saphan |
| | | | -Ban Suksamran |
| | | -Kasem | -Ban Kasem |
| | | | -Ban Muaod Air |
| | | | -Ban Kok |
| | | | -Kham Saming (1) |
| | | | -Kham Saming (2) |
| | | | -Ban Nong Or |
| | | | -Ban Nong Tao |
| | | | -Ban Kung Phudthakan |
| | | | -Kham Saming (3) |
| 3. Huai Kham Phak Wan Project | | | |
| Ubon Ratchathani | -Trakan Phutphon | -Kussankorn | -Kussakorn |
| | | | -Jick |
| | | | -Sri Suk |
| | | | -Kung Yai |
| | | | -Kung Noi |
| 4. Huai Na Khai Project | | | |
| Ubon Ratchathani | -Tan Sum | -Nakai | -Nakai |
| | | | -Nonjick |
| | | | -Non Yang |
| | | | -Don Kwang |
| | | | -Don Wai |
| | | | -Kok Kai |
| | | | -Kam he |
| | | | -Hong Daeng |
| | | | -Non Samran |
| | | -Kamwa | -Huai Ku |
| 5. Huai Soob Project | | | |
| Ubon Ratchathani | -Sri Muang Mai | -Kam Lai | -Nong Chuak |
| | | | -Park Huai Daeng |
| | | -Don Yai | -Kok |

## TABLE J-22 : POPULATION, HOUSEHOLD AND AGRICULTURAL AREA IN THE PROJECTS (1988)

(unit: households, persons, ha)

| Villages Concerned | Total Population | Total Household | Agricultural Household[1/] | | Agricultural Area |
|---|---|---|---|---|---|
| | | | Household | Population | |
| 1. Lam Se Project | | | | | |
| -Nondaeng | 699 | 129 | | | 760 |
| -Sawad | 895 | 155 | | | 580 |
| -Kudkoon | 525 | 75 | | | 440 |
| -Nong Bua | 229 | 42 | | | 110 |
| -Kudeadonnua | 889 | 163 | | | 360 |
| Total | 3,237 | 564 | 490 | 2,960 | 2,250 |
| 2. Huai Khum Kham Project | | | | | |
| -Donmuang | 526 | 72 | | | 190 |
| -Kornsai | 607 | 85 | | | 250 |
| -Ban Hua Saphan | 209 | 36 | | | 100 |
| -Ban Suksaman | 161 | 25 | | | 90 |
| -Ban Kasem | 583 | 91 | | | 270 |
| -Ban Muaod Air | 192 | 28 | | | 100 |
| -Ban Kok | 415 | 72 | | | 240 |
| -Kham Saming (1) | 528 | 90 | | | 450 |
| -Kham Saming (2) | 734 | 103 | | | 480 |
| -Ban Nong Or | 726 | 127 | | | 260 |
| -Ban Nong Tao | 433 | 59 | | | 230 |
| -Ban Kung Phudthakan | 343 | 56 | | | 230 |
| -Kham Saming (3) | 600 | 97 | | | 230 |
| Total | 6,057 | 941 | 860 | 5,330 | 3,120 |
| 3. Huai Kham Phak Wan Project | | | | | |
| -Kussakorn | 730 | 123 | | | 350 |
| -Jick | 252 | 53 | | | 130 |
| -Sri Suk | 445 | 80 | | | 350 |
| -Kung Yai | 202 | 32 | | | 120 |
| -Kung Noi | 350 | 64 | | | 170 |
| Total | 1,979 | 352 | 320 | 1,990 | 1,120 |
| 4. Huai Na Khai Project | | | | | |
| -Nakai | 692 | 105 | | | 460 |
| -Nonjick | 429 | 74 | | | 210 |
| -Non Yang | 342 | 50 | | | 220 |
| -Don Kwang | 200 | 34 | | | 140 |
| -Don Wai | 308 | 44 | | | 280 |
| -Kok Kai | 275 | 36 | | | 210 |
| -Kam He | 117 | 15 | | | 60 |
| -Hong Daeng | 108 | 20 | | | 100 |
| -Non Samran | 155 | 24 | | | 70 |
| -Huai Ku | 457 | 79 | | | 430 |
| Total | 3,083 | 481 | 420 | 2,460 | 2,180 |
| 5. Huai Soob Project | | | | | |
| -Nong Chuak | 1,159 | 203 | | | 980 |
| -Park Huai Daeng | 260 | 38 | | | 90 |
| -Kok | 78 | 13 | | | 30 |
| Total | 1,497 | 254 | 220 | 1,320 | 1,100 |
| Total of Five Projects | 15,853 | 2,592 | 2,310 | 14,060 | 9,770 |

Note : 1/ --- estimated (based on "1980, Population and Housing Census")

Source: "Provincial Statistics, 1988" NSO.

## TABLE J-23 : AGRICULTURAL RELATED DATA OF VILLAGES IN THE PROJECT AREA (1/2)

| Projects | Tambon | Village No. | As, reference Total Area/rai | Average Yield of Paddy rai/H.H. | Agri-cultural area rai/H.H. | Water availa-bility | Rice Mill No. | Wage in 1988 ฿/day | Major Animals | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Swine | | Cow | | Buffalo | |
| | | | | | | | | | H.H. | Unit | H.H. | Unit | H.H. | Unit |
| Lam Se | Hong Sang | 8 | 6,600 | 300 | 40.5 | | | | 4 | 45 | 7 | 121 | 127 | 325 |
| | Kud | 3 | 2,850 | 200 | 28.2 | | | | 7 | 35 | 24 | 72 | 132 | 264 |
| | Chiang | 4 | 1,729 | 300 | 18.2 | N.A. | N.A. | N.A. | 5 | 22 | 27 | 96 | 51 | 118 |
| | Mee | 7 | 729 | 250 | 16.8 | | | | 1 | 1 | 9 | 25 | 40 | 123 |
| | | 9 | 1,866 | 300 | 16.8 | | | | - | - | 15 | 51 | 150 | 532 |
| Huai Khum Kham | Korn Sai | 2 | N.A. | 200 | 13.3 | No | 2 | 30 | 8 | 10 | 16 | 104 | 59 | 169 |
| | | 5 | | 300 | 23.9 | No | 5 | 30 | 26 | 55 | 7 | 66 | 59 | 188 |
| | | 12 | | 150 | 14.7 | No | 2 | 30 | 6 | 9 | 9 | 72 | 33 | 41 |
| | | 17 | | 200 | 22.9 | No | - | 30 | 1 | 1 | 6 | 33 | 24 | 65 |
| | Kasem | 1 | N.A. | 300 | 18.8 | No | 2 | 30 | 10 | 25 | 9 | 34 | 83 | 166 |
| | | 4 | | 100 | 22.1 | Yes | - | 45 | 11 | 12 | 4 | 20 | 19 | 35 |
| | | 5 | | 150 | 23.1 | Yes | 2 | 30 | 17 | 20 | 9 | 18 | 64 | 126 |
| | | 11 | | 300 | 57.1 | No | - | 30 | 5 | 15 | 7 | 20 | 90 | 170 |
| | | 12 | | 200 | 28.0 | No | 1 | 30 | 10 | 15 | 7 | 20 | 86 | 105 |
| | | 13 | | 150 | 12.8 | No | 3 | 30 | 80 | 80 | 70 | 70 | 120 | 180 |
| | | 14 | | 300 | 27.1 | Yes | 3 | 30 | 20 | 25 | 15 | 33 | 59 | 104 |
| | | 15 | | 150 | 15.3 | Yes | - | 50 | 15 | 20 | 6 | 42 | 53 | 115 |
| | | 20 | | 300 | 15.0 | No | 3 | 30 | 8 | 32 | 15 | 35 | 90 | 100 |

## TABLE J-23 : AGRICULTURAL RELATED DATA OF VILLAGES IN THE PROJECT AREA (2/2)

| Projects | Tambon | Village No. | As, reference Total Area/rai | Average Yield of Paddy rai/rai | Agri-cultural area rai/H.H. | Water availa-bility | Rice Mill No. | Water in 1988 ฿/day | Major Animals | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Swine | | Cow | | Buffalo | |
| | | | | | | | | | H.H. | Unit | H.H. | Unit | H.H. | Unit |
| Huai Kham Phak Wan | Kussa-korn | 1 | N.A. | 150 | 12.0 | Yes | 3 | 30 | 9 | 39 | 11 | 24 | 71 | 175 |
| | | 2 | | 200 | 15.0 | No | 1 | 25 | 5 | 33 | 12 | 40 | 47 | 68 |
| | | 4 | | 150 | 27.5 | No | 2 | 25 | 10 | 20 | 50 | 250 | 70 | 200 |
| | | 5 | | 350 | 22.2 | No | 2 | 30 | 10 | 42 | 3 | 6 | 23 | 42 |
| | | 6 | | 200 | 21.7 | No | 1 | 59 | 1 | 3 | 50 | 54 | 62 | 65 |
| Huai Na Khai | Nakai | 1 | 3,647 | 250 | 31.1 | No | 3 | 30 | 30 | 50 | 25 | 106 | 80 | 224 |
| | | 2 | 1,202 | 200 | 18.5 | No | 4 | 30 | 8 | 40 | 11 | 33 | 63 | 123 |
| | | 4 | 1,453 | 200 | 33.3 | No | 3 | 30 | 10 | 25 | 15 | 55 | 48 | 145 |
| | | 5 | 1,005 | 150 | 31.0 | No | 1 | 30 | 1 | 12 | 12 | 127 | 18 | 74 |
| | | 6 | 1,970 | 200 | 42.8 | No | 3 | 30 | 4 | 17 | 39 | 150 | 48 | 100 |
| | | 7 | 1,746 | 200 | 29.8 | No | - | 30 | - | - | 3 | 13 | 33 | 100 |
| | | 10 | 2,500 | 300 | 20.0 | No | 1 | 30 | - | - | 5 | 25 | 15 | 30 |
| | | 11 | 1,200 | 200 | 30.0 | No | 1 | 30 | 2 | 10 | 5 | 39 | 20 | 72 |
| | | 12 | 442 | 150 | 17.9 | No | - | 30 | 1 | 1 | 2 | 7 | 20 | 55 |
| | Kamwa | 3 | 1,000 | 200 | 38.7 | No | 2 | 30 | 2 | 10 | 10 | 57 | - | - |
| Huai Soob | Kam Lai | 10 | 5,715 | 150 | 17.4 | No | 3 | 25 | 7 | 48 | 40 | 141 | 108 | 372 |
| | | 14 | 1,450 | 150 | 16.7 | No | - | 25 | - | - | - | - | 23 | 58 |
| | Don Yai | 6 | 520 | 150 | 18.1 | Yes | - | 25 | - | - | 3 | 6 | 10 | 23 |

Source: "Provincial Statistics, 1988", NSO.

## TABLE J-24 : NUMBER OF FARM BY SIZE OF OPERATING AREA, 1978

| Size of Area | Changwat Yasothon | Changwat Ubon Ratchathani | Total | (%) |
|---|---|---|---|---|
| under 2 rai | 300 | 1,356 | 1,656 | ( 0.8) |
| 2.0 - 3.9 | 1,187 | 4,366 | 5,553 | ( 2.8) |
| 4.0 - 5.9 | 2,346 | 5,979 | 8,325 | ( 4.1) |
| 6.0 - 9.9 | 5,428 | 10,670 | 16,098 | ( 8.0) |
| 10.0 - 14.9 | 8,647 | 19,395 | 28,042 | (13.9) |
| 15.0 - 19.9 | 7,415 | 18,730 | 26,145 | (13.0) |
| 20.0 - 24.9 | 6,873 | 19,093 | 25,966 | (12.9) |
| 25.0 - 29.9 | 4,736 | 15,511 | 20,247 | (10.0) |
| 30.0 - 39.9 | 7,411 | 24,675 | 32,086 | (15.9) |
| 40.0 - 49.9 | 3,100 | 12,172 | 15,272 | ( 7.6) |
| 50.0 - 59.9 | 1,776 | 8,401 | 10,177 | ( 5.1) |
| 60.0 - 79.9 | 834 | 3,906 | 4,740 | ( 2.4) |
| 80.0 - 99.9 | 913 | 4,613 | 5,526 | ( 2.7) |
| 100 rai and over | 267 | 1,381 | 1,648 | ( 0.8) |
| Total | 51,233 | 150,248 | 201,481 | (100.0) |

Source: "1978 Agricultural Census Report" NSO, Office of Prime Minister.

## TABLE J-25 : FARM HOUSEHOLD INCOME AND EXPENDITURE BY SURVEY RESULT

| Projects | Province & Amphoe | Agriculture Income | | (A) Total | (B) Off Farm Income | Farm H.H. Gross Income | Agriculture Expenditure | | (A E) Total | (B E) Other H.H. Expenditure | Farm H.H. Gross Expenditure |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Crops | Livestocks | | | | Crops | Livestocks | | | |
| Lam Se | Yasothon | (23.6) | (14.4) | (38) | (62) | (100 %) | (22.3) | (2.7) | (25) | (75) | (100 %) |
| | | 4,374 ฿ | 2,658 ฿ | 7,032 ฿ | 11,466 ฿ | 18,498 ฿ | 2,545 ฿ | 305 ฿ | 2,850 ฿ | 8,531 ฿ | 11,381 ฿ |
| | | | | | ( E :5,326) | | | | | | |
| | | | | | (Non:6,140) | | | | | | |
| | Leong Nok Tha | (Kind 9,466) | | | | | (Kind 430) | | | (Kind 9,195) | |
| Huai Khum Kham | Ubon Ratchathani | (22.7) | (29.1) | (51.8) | (48.2) | (100 %) | (20.9) | (6.8) | (27.7) | (72.3) | (100 %) |
| | | 3,205 | 4,112 | 7,317 | 6,816 | 14,133 | 2,278 | 744 | 3,022 | 7,877 | 10,899 |
| | | | | | ( E :3,921) | | | | | | |
| | | | | | (Non:2,895) | | | | | | |
| | Trakarn Phut Phon | (Kind 16,362) | | | | | (Kind 451) | | | (Kind 15,681) | |
| Huai Kham Phak Wan | Ubon Ratchathani | (26.5) | (40.5) | (67.0) | (33.0) | (100 %) | (20) | (20.2) | (40.2) | (59.8) | (100 %) |
| | | 6,331 | 9,657 | 15,988 | 7,878 | 23,866 | 3,575 | 3,597 | 7,172 | 10,660 | 17,832 |
| | | | | | ( E :3,356) | | | | | | |
| | | | | | (Non:4,552) | | | | | | |
| | Trakarn Phutphon | (Kind 9,099) | | | | | (Kind 826) | | | (Kind 8,604) | |
| Huai Na Khai | Ubon Ratchathani | (4.6) | (12.0) | (16.6) | (83.4) | (100 %) | (12.5) | (3.1) | (15.6) | (84.4) | (100 %) |
| | | 640 | 1,693 | 2,333 | 11,690 | 14,023 | 1,144 | 286 | 1,430 | 7,735 | 9,165 |
| | | | | | ( E :7,665) | | | | | | |
| | | | | | (Non:4,025) | | | | | | |
| | Tan Sum | (Kind 3,580) | | | | | (Kind 441) | | | (Kind 2,897) | |
| Huai Soob | Ubon Ratchathani | (3.9) | (43.3) | (47.2) | (52.8) | (100 %) | (23.2) | (12.2) | (35.4) | (64.6) | (100 %) |
| | | 483 | 5,331 | 5,814 | 6,504 | 12,318 | 2,581 | 1,351 | 3,932 | 7,177 | 11,109 |
| | | | | | ( E :2,347) | | | | | | |
| | | | | | (Non:4,157) | | | | | | |
| | Sri Muang Mai | (Kind 7,058) | | | | | (Kind 659) | | | (Kind 6,492) | |
| Package of the Projects (Average) | | (18.2) | (28.3) | (46.5) | (53.5) | (100 %) | (20.1) | (10.4) | (30.5) | (69.5) | (100 %) |
| | | 3,006 | 4,690 | 7,696 | 8,871 | 16,567 | 2,425 | 1,257 | 3,682 | 8,396 | 12,078 |
| | | | | | ( E :4,523) | | | | | | |
| | | | | | (Non:4,341) | | | | | | |
| | | (Kind 9,113) | | | | | (Kind 561) | | | (Kind 8,574) | |

Notes : 1. Income and expenditure in ( ) are excluded in total, since household account is made by cash.
2. In the colum of off farm income, E: Income by employment, Non: Non agricultural services such as commerce etc.
3. In the income, includs borrowing and in the expenditure excluds saving. Therefore, (I)-(E) = Saving.

Source: Farm Household survey in 1989 July, by RID and JICA survey team.

## TABLE J-26 : COMPOSITION OF NON-AGRICULTURAL INCOME

(unit: Bhat)

| Projects | Sell product from Home stead area | | Home Industry | | Small Factory | | Forest Product | | Received money from Relatives | | Fish catching | | Trading Services | | Total (NBI) * | | % of Total of Sample H.H. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | % of F | Baht | % of F | Baht | % of F | Baht | % of F | Baht | % of F | Baht | % of F | Baht | % of F | Baht | % of F | Baht | |
| Lam Se | 20 | 1,635 (26.6%) | 3 | 30 (0.5%) | 5 | 2,200 (35.8%) | 5 | 100 (1.6%) | 15 | 800 (13.0%) | 0 | 0 | 25 | 1,375 (22.4%) | 70 | 6,140 (100%) | (70 %) |
| Huai Khum Kham | 0 | 0 | 5 | 420 (14.3%) | 0 | 0 | 0 | 0 | 25 | 2,475 (85.5%) | 0 | 0 | 0 | 0 | 30 | 2,895 (100%) | (31.6%) |
| Huai Kham Phak Wan | 0 | 0 | 3 | 30 (1.1%) | 0 | 0 | 5 | 113 (2.5%) | 30 | 3,225 (71.3%) | 0 | 0 | 15 | 1,135 (25.1%) | 45 | 4,503 (100%) | (45 %) |
| Huai Na Khai | 5 | 75 (7.9%) | 0 | 0 | 0 | 0 | 10 | 45 (1.1%) | 30 | 2,275 (56.5%) | 5 | 230 (6.2%) | 10 | 1,380 (34.3%) | 55 | 4,005 (100%) | (55 %) |
| Huai Soob | 10 | 60 (1.4%) | 10 | 125 (3 %) | 5 | 20 (0.5%) | 10 | 185 (4.4%) | 45 | 2,185 (52.6%) | 0 | 0 | 20 | 1,583 (38.1%) | 80 | 4,158 (100%) | (80 %) |
| Package of projects (Average) | 7 | 354 (8.2%) | 4.2 | 121 (2.8%) | 2 | 444 (10.2%) | 6 | 89 (2.1%) | 29 | 2,192 (50.5%) | 1 | 46 (1.0%) | 14 | 1,095 (25.2%) | 56 | 4,341 (100%) | (56.3%) |

Note : NBI % of total means that this % of sampled H.H. occupys of works for Non Agricultural Income.

Source: Farm Household Survey in July 1989 by RID and JICA survey team.

## TABLE J-27 : COMPOSITION OF FARM HOUSEHOLD EXPENDITURE

(unit: Bhat)

| Projects \ Items | Total | * Food & Beverage | Alcohol & Tobaco | * Clothes & shoes | * Housing | Personal care | Communi-cations | Recreation & sports | Religion & ceremonies | Festival & party | Educa-tion | * Medical care | Non consump-tion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lam Se | (100%) | (42.3%) | (6.1%) | (9.0%) | (3.5%) | (10.4%) | (6.5%) | (3.4%) | (3.0%) | (3.9%) | (4.8%) | (6.8%) | (0.3%) |
| | 8,531 ฿ | 3,608 | 520 | 769 | 298 | 888 | 552 | 288 | 259 | 333 | 412 | 578 | 22 |
| Huai Khum Kham | (100%) | (51.2%) | (2.4%) | (8.9%) | (2.7%) | (13.3%) | (2.9%) | (1.3%) | (3.3%) | (4.1%) | (3.5%) | (3.1%) | (1.4%) |
| | 7,877 ฿ | 4,030 | 188 | 703 | 216 | 1,205 | 225 | 100 | 259 | 323 | 279 | 243 | 109 |
| Huai Kham Phak Wan | (100%) | (36.4%) | (2.4%) | (7.3%) | (2.9%) | (13.1%) | (5.3%) | (1.0%) | (4.3%) | (5.8%) | (14.5%) | (6.6%) | (0.4%) |
| | 10,660 ฿ | 3,879 | 258 | 777 | 309 | 1,398 | 566 | 95 | 463 | 623 | 1,545 | 708 | 40 |
| Huai Na Khai | (100%) | (45.9%) | (3.7%) | (9.5%) | (5.3%) | (11.6%) | (2.8%) | (1.4%) | (2.2%) | (4.8%) | (3.4%) | (6.3%) | (3.0%) |
| | 7,735 ฿ | 3,548 | 286 | 737 | 412 | 900 | 213 | 110 | 173 | 368 | 266 | 488 | 233 |
| Huai Soob | (100%) | (41.6%) | (2.5%) | (11.1%) | (4.2%) | (14.3%) | (6.2%) | (1.8%) | (2.6%) | (2.4%) | (2.7%) | (9.4%) | (1.1%) |
| | 7,177 ฿ | 2,987 | 179 | 797 | 304 | 1,025 | 443 | 130 | 184 | 171 | 194 | 687 | 75 |
| Package of projects (Average) | (100%) | (37.8%) | (3.6%) | (12.4%) | (2.5%) | (8.0%) | (5.6%) | (1.1%) | (3.0%) | (5.5%) | (6.9%) | (10.2%) | (3.4%) |
| | 8,396 ฿ | 3,551 | 335 | 1,161 | 235 | 748 | 529 | 107 | 285 | 518 | 643 | 954 | 318 |

Note : * marked items will be fixed as basically required items for living.

Source: Farm Household Survey in July 1989 by RID and JICA survey team.

## TABLE J-28 : IMPROVEMENT OF FARM INCOME

| Items | 1.6 ha (10 rai) Farm | | | 3.2 ha (20 rai) Farm | | |
|---|---|---|---|---|---|---|
| | | With Project | | | With Project | |
| | Without Project | Paddy Farm | Paddy + Dry Season Crops | Without Project | Paddy Farm | Paddy + Dry Season Crops |
| 1. Operated Area (ha) | 1.60 | 1.54 | 1.54 | 3.20 | 3.07 | 3.07 |
| 2. Harvested Area (ha) | | | | | | |
| - Paddy | 1.12 | 1.54 | 1.54 | 2.24 | 3.07 | 3.07 |
| - Groundnuts | - | - | 0.18 | - | - | 0.35 |
| - Soybean | - | - | 0.07 | - | - | 0.14 |
| - Sweet Corn | - | - | 0.02 | - | - | 0.04 |
| - String Bean | - | - | 0.01 | - | - | 0.02 |
| - Water Melon | - | - | 0.01 | - | - | 0.02 |
| - Chilli | - | - | 0.02 | - | - | 0.04 |
| Total | 1.12 | 1.54 | 1.85 | 2.24 | 3.07 | 3.68 |
| 3. Production (kg) | | | | | | |
| - Paddy | 1,491 | 5,295 | 5,295 | 2,981 | 10,555 | 10,555 |
| - Groundnuts | - | - | 281 | - | - | 547 |
| - Soybean | - | - | 109 | - | - | 219 |
| - Sweet Corn | - | - | 250 | - | - | 500 |
| - String Bean | - | - | 94 | - | - | 188 |
| - Water Melon | - | - | 188 | - | - | 375 |
| - Chilli | - | - | 525 | - | - | 1,050 |
| 4. Gross Income 1/ (฿) | 5,068 | 18,001 | 30,896 | 10,136 | 35,885 | 61,566 |
| 5. Production Cost (฿) | 1,249 | 7,278 | 11,310 | 2,498 | 14,509 | 22,528 |
| 6. Net Income from Crops (฿) | 3,819 | 10,723 | 19,586 | 7,638 | 21,376 | 39,038 |
| 7. Net Income from Livestocks 1/, 2/ (฿) | 3,433 | 3,433 | 3,433 | 3,433 | 3,433 | 3,433 |
| 8. Net Income from Fisheries 3/ (฿) | - | 6,614 | 6,614 | - | 6,614 | 6,614 |
| 9. Agricultural Income (฿) | 7,252 | 20,770 | 29,633 | 11,071 | 31,423 | 49,085 |
| 10. Non-Agricultural Income (B) 2/ | 8,871 | 8,871 | 8,871 | 8,871 | 8,871 | 8,871 |
| 11. Total Farm Income (฿) | 16,123 | 29,641 | 38,504 | 19,942 | 40,294 | 57,956 |
| 12. Income per Capita 4/ (฿) | | | | | | |
| - Total | 2,643 | 4,859 | 6,312 | 3,269 | 6,609 | 9,501 |
| - Excluding Non-Agricultural Income | 1,189 | 3,405 | 4,858 | 1,815 | 5,151 | 8,047 |

Notes : 1/ --- included income by kind.
2/ --- The figures are based on the result of farm survey in the Project area.
3/ --- Supposing that all beneficiaries can receive the fishery income from Muban pond and reservoir equally, the amount of income per household is estimated as follows.
- Fishery net production --- Muban pond 1,237,000฿
Reservoir 14,041,000฿
Total (1) 15,278,000฿
- Total beneficiaries (2) 2,310 farms
- Fishery income per household (1)/(2) 6,614฿/farm
4/ --- Average size of family in the Project area is 6.1 persons.

JICA