บรรณานุกรม

ก้องเกียรติ โอภาสวงการ. "Probability and Statistics" กรุงสยามการพิมพ์, 2527

ดิเรก ลาวัณย์ศิริ. "เครื่องจักรและเทคโนโลยีในงานก่อสร้าง" ภาควิชาวิศวกรรมโยธา, คณะวิศวกรรมศาสตร์, จุฬาลงกรณ์มหาวิทยาลัย, 2527.

_____" และบุญสม เลิศศิริญวงศ์. "การประยุกต์ทฤษฎีความน่าจะเป็นและสถิติในงานวิศวกรรมโยธา". ภาควิชาวิศวกรรมโยธา, คณะวิศวกรรมศาสตร์, จุฬาลงกรณ์มหาวิทยาลัย, 2526.

นราศรี ไววนิชกุล. "การวิจัยขั้นดำเนินงาน 1" คณะพาณิชยศาสตร์และการบัญชี, จุฬาลงกรณ์มหาวิทยาลัย.

_____" และ วีรศักดิ์ สุขอาณารักษ์. "การวิจัยเชิงปฏิบัติการ เล่ม 1" สาขาวิชาวิทยาการจัดการ, มหาวิทยาลัยสุโขทัยธรรมาธิราช, 2528.

ประพัฒน์ อุทธิยภาค "เรียน Apple soft Basic ด้วยตนเอง" บริษัทซีเอ็ดยูเคชั่น จำกัด, 2526.

_____ "เทคนิคการใช้งานเครื่องพิมพ์ Epson" บริษัทซีเอ็ดยูเคชั่น จำกัด, 2527.

พิภัทร์ ศุภิรัญ. "เครื่องจักรและเครื่องมือใช้งานแอสฟัลท์" วารสารทางหลวง ฉบับเดือนพฤษภาคม-ธันวาคม 2528 และฉบับเดือนมกราคม-กุมภาพันธ์ 2529.

วิจิตร ตัณฑสุทธิ์, วันชัย ริจิรวนิช และ ศิริจันทร์ ทองประเสริฐ "การวิจัยดำเนินงาน" ภาควิชาวิศวกรรมอุตสาหการ คณะวิศวกรรมศาสตร์, จุฬาลงกรณ์มหาวิทยาลัย, 2527.

วัชรินทร์ วิทยกุล. "แอสฟัลท์เทคโนโลยี กับการปฏิบัติงานก่อสร้าง เล่ม 1, 2" ภาควิชาวิศวกรรมโยธา คณะวิศวกรรมศาสตร์ มหาวิทยาลัยเกษตรศาสตร์, 2527.

ศูนย์อบรมคอมพิวเตอร์ธุรกิจ. "เทคนิคการใช้เครื่อง Apple II", 2527.

สุมาลี พิสิษฐเกษม และพิชิต สุขเจริญพงษ์. "การวิจัยเชิงปฏิบัติการ เล่ม 2" สาขาวิชาวิทยาการจัดการ, มหาวิทยาลัยสุโขทัยธรรมาธิราช, 2528.

Amir Tavakoli "Productivity Analysis of Construction Operations" Journal of Construction Engineering and Management, Vol. 11, No. 1, March 1985

David M. Himmelblan and Kenneth B. Bischoff "Process Analysis and Simulation : Deterministic System" John Willey and Son Inc, 1968.

Daniel W. Halpin and Ronald W. Woodhead "Design of Construction and Process Operation" John Wiley & Sons.

David B. Ashley "Simulation of Repetitive-Unit Construction" Journal of Construction Division, Vol. 106, No. Co2, June 1980.

Debi Charan Boran "A Simulation Model of Earth Moving Operation for Construction Management" Master thesis, Asian Institute of Technology, Bangkok, Thailand, July 1977.

Donncha P. Kavanagh "Siren : A Repetitive Construction Simulation Model" Journal of Construction Engineering and Management, Vol. 111, No.3, September 1985.

Geoffrey Gordon "System Simulation", Eaglewood Cliffs, N.J. Prentice-Hall, 1969.

Hamdy A. Taha "Operation Research and Introduction" Macmillan Company, New York.

Harge, E "Queueing Theory in Operation Research" Butterworths, London, 1972.

Joe H. Mize and J. gody cox "Essentials of Simulation", Eaglewood Cliffs, N.J Pretice-Hall, 1968.

Jose Lluch, Daniel W. Halpin. "Construction Operation and Microcomputer" Journal of the Construction Division, Vol.108, No. Co. 1, March 1982.

Leon Cooper and Larry J. Leblanc "Introduction of Operations Research Models" W.B. Saunders Company, Philadephia, USA. 1977.

Mihram, G. Arthur "Simulation : Statistical Foundation and Methodology" Academic Press, 1972.

Nicolai Siemens, C.H.Marting and Frank Greenwood "Operation Research" Free Press, New York.

R.L. Peurifoy "Operation Analysis" Construction Planning, Equipment and Method, Mcgraw-Hill, 1982.

Samuel B. Richard "Operations Research for Management Decisions Ronald Press Company, New York, 1968.

Shrikant M. Nandgaonkar "Earthwork Transportation Allocation : Operation Research" Journal of the Construction Division Vol. 107, No. Co 2, June 1981.

Tacher, K.D. "The Art of Simulation" English University Press, 1963.

ภาคผนวก

ภาคผนวก ก

โปรแกรมคอมพิวเตอร์ ในการวางแผนการปูผิวแอสฟัลติกคอนกรีต

```
10  REM  **************
20  REM  *** THESIS ***
30  REM  **************
40  HOME
50  VTAB 5: HTAB 13: PRINT "MASTER  THESIS"
60  HTAB 10: PRINT "IN CIVIL ENGINEERING"
70  HTAB 8: PRINT "CHULALONGKORN UNIVERSITY"
80  PRINT : HTAB 9: INVERSE : PRINT "                    "
90  HTAB 9: PRINT "PROGRAM FOR SIMULATING"
100  HTAB 9: PRINT "   PAVING OPERATION   "
110  HTAB 9: PRINT "                      ": NORMAL : PRINT
120  HTAB 20: PRINT "BY": PRINT
130  HTAB 5: PRINT "THANUS RERKSHANANDANA  B615353"
140  PRINT : HTAB 16: PRINT "JUNE 1986"
150  VTAB 23: HTAB 6: PRINT "PRESS": VTAB 23: HTAB 12: FLASH : PRINT "<ANY
     KEY>": NORMAL
160  VTAB 23: HTAB 22:: PRINT "TO CONTINUE :": VTAB 23: HTAB 13: GET A$
170  DIM PA(5,5),PB(5,5),PC(5,5),PD(5,5),QA(5),QB(5),QC(5),QD(5)
180  DIM RA(5),RB(5),RC(5),SA(5,5),SB(5,5),XA(5),XB(5),XC(5),XD(5),ZD(5),M
     A(5),MB(5)
190  REM  SI=NUMBER OF SITE
200  REM  NP=NUMBER OF PLANT MIX
210  REM  PA=CAPACITY OF PLANT MIX
220  PRINT : PRINT  TAB( 15);"SITE #";J; SPC( 10);" PAVER # ";I
260  PRINT : PRINT "     WAIT TIME OF PAVER ";ZH;" MIN/HR"
500  HOME
510  VTAB 6: HTAB 18: PRINT "MENU": PRINT
520  HTAB 10: PRINT "1. FIND DELAY & TRUCK": PRINT
540  HTAB 10: PRINT "2. QUIT": PRINT : PRINT
545  PRINT : PRINT
550  HTAB 10: PRINT "SELECT NUMBER 1 OR 2"
560  VTAB 15: HTAB 33: INPUT SN
570  IF SN = 1 THEN 610
590  IF SN = 2 THEN  END
600  GOTO 500
610  GOSUB 1010
620  GOSUB 2010
630  GOSUB 3010
640  GOSUB 4010
650  GOSUB 5010
651  PRINT : PRINT : INPUT "  DO YOU WANT HARD COPY (Y/N) ";A$
652  IF A$ = "N" THEN 670
655  HOME : VTAB 12: HTAB 12: FLASH : INPUT "TURN ON PRINTER";A$: NORMAL
660  GOSUB 6010
670  GOTO 500
1000  REM  ***** INPUT SITE & PLANT *****
1010  HOME : HTAB 5: INPUT "HOW MANY OF SITE ?";SI
1020  FOR J = 1 TO SI
1030  HOME : HTAB 5: PRINT "SITE #";J: PRINT
1040  HTAB 5: INPUT "HOW MANY OF PLANT MIX ?";NP(J)
1050  FOR I = 1 TO NP(J)
1060  VTAB 4
1070  PRINT
1080  PRINT "CAPACITY OF PLANT #";I;" (TON/HR)"
1090  PRINT "INSTALL COST #";I;"          (BAHT)"
1100  PRINT "RENT COST #";I;"         (BAHT/DAY)"
```

```
1110  PRINT "OPERATING COST #";I;"   (BAHT/TON)"
1120  VTAB 4: PRINT
1130  HTAB 30: INPUT PA(I,J): HTAB 30: INPUT PB(I,J)
1140  HTAB 30: INPUT PC(I,J): HTAB 30: INPUT PD(I,J)
1150  NEXT I
1160  NEXT J
1170  VTAB 24: INPUT "   DO YOU ACCEPT THIS DATA (Y/N)";A$
1180  IF A$ = "N" THEN 1010
1190  RETURN
2000  REM  ***** INPUT PAVER CHARACTERISTIC *****
2010  HOME : VTAB 2: HTAB 5: INPUT "HOW MANY OF PAVER ?";NV
2020  FOR I = 1 TO NV
2030  VTAB 4: PRINT
2040  PRINT "CAPACITY OF PAVER #";I;" (TON/HR)"
2050  PRINT "INSTALL COST #";I;"          (BAHT)"
2060  PRINT "RENT COST #";I;"         (BAHT/DAY)"
2070  PRINT "OPERATING COST #";I;"   (BAHT/TON)"
2080  VTAB 4: PRINT
2090  HTAB 30: INPUT QA(I): HTAB 30: INPUT QB(I)
2100  HTAB 30: INPUT QC(I): HTAB 30: INPUT QD(I)
2110  NEXT I
2120  VTAB 24: INPUT " DO YOU ACCEPT THIS DATA (Y/N) ";A$
2130  IF A$ = "N" THEN 2010
2140  RETURN
3000  REM  ***** INPUT TRUCK CHARACTERISTIC *****
3010  FOR J = 1 TO SI
3020  HOME : PRINT : PRINT : PRINT "      SITE #";J: VTAB 5
3030  PRINT "CAPACITY OF TRUCK   (TON/VEH)"
3040  PRINT "TRAVEL TIME ==>          (MIN)"
3050  PRINT "TRAVEL TIME <==          (MIN)"
3060  VTAB 5: HTAB 30: INPUT RA(J): HTAB 30: INPUT RB(J): HTAB 30: INPUT
      C(J)
3070  NEXT J
3080  VTAB 24: INPUT "   DO YOU ACCEPT THIS DATA (Y/N) ";A$
3090  IF A$ = "N" THEN 3010
3100  RETURN
4000  REM  ***** INPUT COST *****
4010  HOME
4020  VTAB 2: PRINT "     INPUT COST OF MATERIAL"
4030  FOR J = 1 TO SI
4040  PRINT : PRINT "      SITE #";J
4050  PRINT : INPUT "HOW MANY TYPE OF MATERIAL ?";HT
4060  FOR I = 1 TO HT
4070  PRINT : PRINT "MATERIAL #";I
4080  INPUT "COST       (BAHT/TON)   ";SA(I,J)
4090  INPUT "QUANTITY   (TON/TON)    ";SB(I,J)
4095  PRINT
4100  PRINT "*******************************"
4110  NEXT I
4120  NEXT J
4130  PRINT : INPUT "TOTAL A/C USE  (TON)     ";TA
4140  INPUT "TIME OPERATION (HR/DAY) ";TB
4150  PRINT : PRINT : PRINT : PRINT : PRINT
4160  VTAB 24: INPUT "   DO YOU ACCEPT THIS DATA (Y/N) ";A$
4170  IF A$ = "N" THEN 4010
4180  RETURN
```

```
5000  REM  ***** CALCULATION *****
5010  HOME : PRINT "WAIT A MINUTE"
5020  FOR J = 1 TO SI
5030  FOR I = 1 TO NP(J)
5040 XA(J) = XA(J) + PA(I,J):XB(J) = XB(J) + PB(I,J):XC(J) = XC(J) + PC(I
     ,J)
5050  NEXT I
5060  NEXT J
5062  FOR J = 1 TO SI
5064  FOR I = 1 TO NP(J)
5066 XD(J) = XD(J) + PD(I,J) * PA(I,J) / XA(J)
5068  NEXT I
5070  NEXT J
5080  FOR I = 1 TO NV
5090 YA = YA + QA(I):YB = YB + QB(I):YC = YC + QC(I):YD = YD + QD(I) / NV
5100  NEXT I
5110  FOR J = 1 TO SI
5120 ZA = RA(J) / XA(J) * 60
5130 ZB = RA(J) / YA * 60
5140 ZC = ZA + ZB + RB(J) + RC(J)
5150 ZD(J) =  INT (ZC / ZA + 0.75)
5160 ZE = ZE + XA(J)
5170 ZF = ZF + ZD(J)
5180  NEXT J
5190 ZG = YA - ZE
5200 ZH =  INT (ZG / YA * 6000 + 0.5) / 100
5210  PRINT : PRINT
5220  FOR J = 1 TO SI
5230  PRINT "     USE TRUCK SITE #";J;"  ";ZD(J);" VEH"
5240  NEXT J
5250  PRINT : PRINT "     TOTAL USE TRUCK     ";ZF;" VEH"
5260  PRINT : PRINT "     WAIT TIME OF PAVER ";ZH;" MIN/HR"
5270  FOR J = 1 TO SI
5280  FOR I = 1 TO HT
5290 MA(J) = MA(J) + SA(I,J) * SB(I,J)
5300  NEXT I
5310 MB(J) = XB(J) * ZE / XA(J) / YA + XC(J) / (YB * XA(J)) + XD(J) * MA
     (J)
5315 MB(J) =  INT (MB(J) * 100 + 0.5) / 100
5320  NEXT J
5330 MC = YB / YA + YC / (YB + YA) + YD
5335 MC =  INT (MC * 100 + 0.5) / 100
5337  PRINT
5340  FOR J = 1 TO SI
5350  PRINT : PRINT "SITE #";J
5360  PRINT "COST AT PLANT      (BAHT/TON) ";MB(J)
5370  NEXT J
5380  PRINT : PRINT : PRINT "COST AT PAVER     (BAHT/TON) ";MC
5390  FOR J = 1 TO SI
5400 MD = MB(J) * XA(J) / ZE + MD
5410  NEXT J
5415 MD =  INT ((MD + MC) * 100 + 0.5) / 100
5420  PRINT : PRINT : PRINT "AVERAGE UNIT COST (BAHT/TON) ";MD
5430  RETURN
```

```
6000  REM  ***** PRINT OUT *****
6010  PR# 1
6020  PRINT : PRINT : PRINT : PRINT : PRINT : PRINT
6030  PRINT  TAB( 33);"MASTER  THESIS"
6040  PRINT  TAB( 30);'IN CIVIL ENGINEERING"
6050  PRINT  TAB( 28);"CHULALONGKORN UNIVERSITY"
6060  PRINT : PRINT : PRINT  TAB( 20);"PROGRAM FOR SIMULATING PAVING OPERA
    TION"
6070  PRINT : PRINT : PRINT  TAB( 39);"BY"
6080  PRINT : PRINT : PRINT  TAB( 23);"MR.THANUS RERKSHANANDANA  8615353"
6090  PRINT : PRINT : PRINT : PRINT
6100  FOR J = 1 TO SI
6110  FOR I = 1 TO NP(J)
6120  PRINT : PRINT  TAB( 15);"SITE #";J; SPC( 10);"PLANT #";I
6130  PRINT : PRINT  TAB( 15);"CAPACITY"; SPC( 18 -  LEN ( STR$ (FA(I,J)))
    );FA(I,J); SPC( 5);"TON/HR"
6140  PRINT  TAB( 15);"INSTALL COST"; SPC( 14 -  LEN ( STR$ (FB(I,J))));FB
    (I,J); SPC( 5);"BAHT"
6150  PRINT  TAB( 15);"RENT COST"; SPC( 17 -  LEN ( STR$ (FC(I,J))));FC(I,
    J); SPC( 5);"BAHT/DAY"
6160  PRINT  TAB( 15);"OPERATING COST"; SPC( 12 -  LEN ( STR$ (FD(I,J))));
    FD(I,J); SPC( 5);"BAHT/TON"
6170  PRINT
6180  NEXT I
6190  NEXT J
6200  PRINT  TAB( 15)"........................................"
6210  FOR I = 1 TO NV
6220  PRINT  TAB( 32);"PAVER#";I
6230  PRINT : PRINT  TAB( 15);"CAPACITY"; SPC( 18 -  LEN ( STR$ (QA(I))));
    QA(I); SPC( 5);"TON/HR"
6240  PRINT  TAB( 15);'INSTALL COST"; SPC( 14 -  LEN ( STR$ (QB(I))));QB(I
    ); SPC( 5);"BAHT"
6250  PRINT  TAB( 15);"RENT COST"; SPC( 17 -  LEN ( STR$ (QC(I))));QC(I); SPC(
    5);"BAHT/DAY"
6260  PRINT  TAB( 15);"OPERATING COST"; SPC( 12 -  LEN ( STR$ (QD(I))));QD
    (I); SPC( 5);"BAHT/TON"
6270  PRINT
6280  NEXT I
6290  PRINT  TAB( 15)"........................................"
6300  FOR J = 1 TO SI
6310  PRINT : PRINT  TAB( 15);"SITE #";J; SPC( 10);"TRUCK"
6320  PRINT : PRINT  TAB( 15);"CAPACITY"; SPC( 18 -  LEN ( STR$ (RA(J))));
    RA(J); SPC( 5);"TON/VEH"
6330  PRINT  TAB( 15);"TRAVEL TIME ==>"; SPC( 11 -  LEN ( STR$ (RB(J))));R
    B(J); SPC( 5);"MIN"
6340  PRINT  TAB( 15);"TRAVEL TIME <=="; SPC( 11 -  LEN ( STR$ (RC(J))));R
    C(J); SPC( 5);"MIN"
6350  PRINT
6360  NEXT J
6370  PRINT  TAB( 15)"........................................"
6380  PRINT : PRINT  TAB( 15);"COST OF MATERIAL"
6390  FOR J = 1 TO SI
6400  FOR I = 1 TO HT
6410  PRINT : PRINT  TAB( 15);"SITE #";J; SPC( 10);"MATERIAL TYPE #";I
6420  PRINT : PRINT  TAB( 15);"COST"; SPC( 22 -  LEN ( STR$ (SA(I,J))));SA
    (I,J); SPC( 5);"BAHT/TON"
```

```
6430  PRINT  TAB( 15);"QUANTITY"; SPC( 18 -  LEN ( STR$ (SB(I,J))));SB(I,J
      ); SPC( 5);"TON/TON"
6440  PRINT
6450  NEXT I
6460  NEXT J
6470  PRINT  TAB( 15);"........................................"
6474  PRINT : PRINT  TAB( 15);"TOTAL A/C USE"; SPC( 29 -  LEN ( STR$ (TA)
      );TA; SPC( 5);"TON"
6476  PRINT : PRINT  TAB( 15);"TIME OPERATION"; SPC( 28 -  LEN ( STR$ (TB)
      ));TB; SPC( 5);"HR/DAY"
6478  PRINT
6480  PRINT  TAB( 15);"**********************************************
      ****"
6490  FOR J = 1 TO SI
6500  PRINT : PRINT  TAB( 15);"USE TRUCK SITE #";J; SPC( 25 -  LEN ( STR$
      (ZD(J)));ZD(J); SPC( 5);"VEH"
6510  NEXT J
6520  PRINT : PRINT  TAB( 15);"TOTAL USE TRUCK"; SPC( 27 -  LEN ( STR$ (ZF
      )));ZF; SPC( 5);"VEH"
6530  PRINT : PRINT  TAB( 15);"WAIT TIME OF PAVER"; SPC( 24 -  LEN ( STR$
      (ZH)));ZH; SPC( 5);"MIN/HR"
6540  FOR J = 1 TO SI
6550  PRINT : PRINT  TAB( 15);"COST AT PLANT   SITE #";J; SPC( 19 -  LEN (
      STR$ (MB(J)));MB(J); SPC( 5);"BAHT/TON"
6560  NEXT J
6570  PRINT : PRINT  TAB( 15);"COST AT PAVER"; SPC( 29 -  LEN ( STR$ (MC)
      );MC; SPC( 5);"BAHT/TON"
6580  PRINT : PRINT  TAB( 15);"AVERAGE UNIT COST"; SPC( 25 -  LEN ( STR$ (
      MD));MD; SPC( 5);"BAHT/TON"
6585  PRINT  TAB( 15);"**********************************************
      ****"
6590  PR# 0
6600  RETURN
```

ภาคผนวก ข

ผลลัพธ์จากการใช้คอมพิวเตอร์ วางแผนการปูผิวแอล่าฟัลติกคอนกรีต

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	60	TON/HR
INSTALL COST	750	BAHT/DAY
RENT COST	9000	BAHT/DAY
OPERATING COST	5	BAHT/TON

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5000	BAHT/DAY
OPERATING COST	8	BAHT/TON

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.6	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	2	VEH
TOTAL USE TRUCK	2	VEH
WAIT TIME OF PAVER	45	MIN/HR
COST AT PLANT SITE #1	429.75	BAHT/TON
COST AT PAVER	10.42	BAHT/TON
AVERAGE UNIT COST	440.17	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	80	TON/HR
INSTALL COST	767	BAHT/DAY
RENT COST	9300	BAHT/DAY
OPERATING COST	6	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5000	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	2	VEH
TOTAL USE TRUCK	2	VEH
WAIT TIME OF PAVER	40	MIN/HR
COST AT PLANT SITE #1	427.41	BAHT/TON
COST AT PAVER	10.42	BAHT/TON
AVERAGE UNIT COST	437.83	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	100	TON/HR
INSTALL COST	784	BAHT/DAY
RENT COST	9600	BAHT/DAY
OPERATING COST	7	BAHT/TON

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5000	BAHT/DAY
OPERATING COST	6	BAHT/TON

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	3	VEH
TOTAL USE TRUCK	3	VEH
WAIT TIME OF PAVER	35	MIN/HR
COST AT PLANT SITE #1	426.42	BAHT/TON
COST AT PAVER	10.42	BAHT/TON
AVERAGE UNIT COST	436.84	BAHT/TON

****

MASTER THESIS.
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA 8615353

SITE #1	PLANT #1	
CAPACITY	120	TON/HR
INSTALL COST	800	BAHT/DAY
RENT COST	10000	BAHT/DAY
OPERATING COST	7	BAHT/TON

.....

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5000	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.03	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	3	VEH
TOTAL USE TRUCK	3	VEH
WAIT TIME OF PAVER	30	MIN/HR
COST AT PLANT SITE #1	425.18	BAHT/TON
COST AT PAVER	10.42	BAHT/TON
AVERAGE UNIT COST	435.6	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	140	TON/HR
INSTALL COST	834	BAHT/DAY
RENT COST	10200	BAHT/DAY
OPERATING COST	8	BAHT/TON
	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5000	BAHT/DAY
OPERATING COST	8	BAHT/TON
SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.312	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	3	VEH
TOTAL USE TRUCK	3	VEH
WAIT TIME OF PAVER	25	MIN/HR
COST AT PLANT SITE #1	424.25	BAHT/TON
COST AT PAVER	10.42	BAHT/TON
AVERAGE UNIT COST	434.67	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA 5615353

SITE #1 PLANT #1

CAPACITY	160	TON/HR
INSTALL COST	827	BAHT/DAY
RENT COST	10400	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5000	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	3	VEH
TOTAL USE TRUCK	3	VEH
WAIT TIME OF PAVER	20	MIN/HR
COST AT PLANT SITE #1	423.48	BAHT/TON
COST AT PAVER	10.42	BAHT/TON
AVERAGE UNIT COST	434.9	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA 8615353

SITE #1	PLANT #1	
CAPACITY	180	TON/HR
INSTALL COST	900	BAHT/DAY
RENT COST	10600	BAHT/DAY
OPERATING COST	9	BAHT/TON

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5000	BAHT/DAY
OPERATING COST	8	BAHT/TON

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	4	VEH
TOTAL USE TRUCK	4	VEH
WAIT TIME OF PAVER	15	MIN/HR
COST AT PLANT SITE #1	424.94	BAHT/TON
COST AT PAVER	10.42	BAHT/TON
AVERAGE UNIT COST	435.36	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA B615353

SITE #1 PLANT #1

CAPACITY	200	TON/HR
INSTALL COST	934	BAHT/DAY
RENT COST	10600	BAHT/DAY
OPERATING COST	9	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5000	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	4	VEH
TOTAL USE TRUCK	4	VEH
WAIT TIME OF PAVER	10	MIN/HR
COST AT PLANT SITE #1	424.52	BAHT/TON
COST AT PAVER	10.42	BAHT/TON
AVERAGE UNIT COST	434.94	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA 8615353

SITE #1	PLANT #1	
CAPACITY	240	TON/HR
INSTALL COST	967	BAHT/DAY
RENT COST	11000	BAHT/DAY
OPERATING COST	10	BAHT/TON

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5000	BAHT/DAY
OPERATING COST	8	BAHT/TON

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	5	VEH
TOTAL USE TRUCK	5	VEH
WAIT TIME OF PAVER	0	MIN/HR
COST AT PLANT SITE #1	424.77	BAHT/TON
COST AT PAVER	10.42	BAHT/TON
AVERAGE UNIT COST	435.19	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA ,B615353

SITE #1	PLANT #1	
CAPACITY	100	TON/HR
INSTALL COST	784	BAHT/DAY
RENT COST	9600	BAHT/DAY
OPERATING COST	7	BAHT/TON

.....

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5000	BAHT/DAY
OPERATING COST	6	BAHT/TON

.....

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	3	VEH
TOTAL USE TRUCK	3	VEH
WAIT TIME OF PAVER	35	MIN/HR
COST AT PLANT SITE #1	425.63	BAHT/TON
COST AT PAVER	10.25	BAHT/TON
AVERAGE UNIT COST	435.88	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA 6615353

SITE #1 PLANT #1

CAPACITY	120	TON/HR
INSTALL COST	800	BAHT/DAY
RENT COST	10000	BAHT/DAY
OPERATING COST	7	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5000	BAHT/DAY
OPERATING COST	9	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	3	VEH
TOTAL USE TRUCK	3	VEH
WAIT TIME OF PAVER	30	MIN/HR
COST AT PLANT SITE #1	424.38	BAHT/TON
COST AT PAVER	10.25	BAHT/TON
AVERAGE UNIT COST	434.63	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	140	TON/HR
INSTALL COST	834	BAHT/DAY
RENT COST	10200	BAHT/DAY
OPERATING COST	8	BAHT/TON

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	3000	BAHT/DAY
OPERATING COST	9	BAHT/TON

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	3	VEH
TOTAL USE TRUCK	3	VEH
WAIT TIME OF PAVER	25	MIN/HR
COST AT PLANT SITE #1	424.37	BAHT/TON
COST AT PAVER	10.25	BAHT/TON
AVERAGE UNIT COST	434.62	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING -
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA 3615353

SITE #1 PLANT #1

CAPACITY	150	TON/HR
INSTALL COST	667	BAHT/DAY
RENT COST	10400	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5000	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	3	VEH
TOTAL USE TRUCK	3	VEH
WAIT TIME OF PAVER	20	MIN/HR
COST AT PLANT SITE #1	423.62	BAHT/TON
COST AT PAVER	10.25	BAHT/TON
AVERAGE UNIT COST	433.87	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA 3613353

SITE #1 PLANT #1

CAPACITY	120	TON/HR
INSTALL COST	900	BAHT/DAY
RENT COST	10800	BAHT/DAY
OPERATING COST	9	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	2000	BAHT/DAY
OPERATING COST	3	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	4	VEH
TOTAL USE TRUCK	4	VEH
WAIT TIME OF PAVER	15	MIN/HR
COST AT PLANT SITE #1	424.04	BAHT/TON
COST AT PAVER	10.25	BAHT/TON
AVERAGE UNIT COST	434.29	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA 5615353

SITE #1	PLANT #1	
CAPACITY	200	TON/HR
INSTALL COST	934	BAHT/DAY
RENT COST	10800	BAHT/DAY
OPERATING COST	9	BAHT/TON

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5000	BAHT/DAY
OPERATING COST	6	BAHT/TON

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	4	VEH
TOTAL USE TRUCK	4	VEH
WAIT TIME OF PAVER	10	MIN/HR
COST AT PLANT SITE #1	423.58	BAHT/TON
COST AT PAVER	10.25	BAHT/TON
AVERAGE UNIT COST	433.83	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA B615353

SITE #1 PLANT #1

CAPACITY	240	TON/HR
INSTALL COST	967	BAHT/DAY
RENT COST	11000	BAHT/DAY
OPERATING COST	10	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5000	BAHT/DAY
OPERATING COST	6	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	5	VEH
TOTAL USE TRUCK	5	VEH
WAIT TIME OF PAVER	0	MIN/HR
COST AT PLANT SITE #1	423.8	BAHT/TON
COST AT PAVER	10.25	BAHT/TON
AVERAGE UNIT COST	434.05	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	160	TON/HR
INSTALL COST	867	BAHT/DAY
RENT COST	10400	BAHT/DAY
OPERATING COST	8	BAHT/TON

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	6000	BAHT/DAY
OPERATING COST	8	BAHT/TON

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	3	VEH
TOTAL USE TRUCK	3	VEH
WAIT TIME OF PAVER	20	MIN/HR
COST AT PLANT SITE #1	423.33	BAHT/TON
COST AT PAVER	10.19	BAHT/TON
AVERAGE UNIT COST	433.52	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	180	TON/HR
INSTALL COST	900	BAHT/DAY
RENT COST	10600	BAHT/DAY
OPERATING COST	9	BAHT/TON

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5000	BAHT/DAY
OPERATING COST	8	BAHT/TON

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1500	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	4	VEH
TOTAL USE TRUCK	4	VEH
WAIT TIME OF PAVER	15	MIN/HR
COST AT PLANT SITE #1	423.74	BAHT/TON
COST AT PAVER	10.19	BAHT/TON
AVERAGE UNIT COST	433.93	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	200	TON/HR
INSTALL COST	934	BAHT/DAY
RENT COST	10800	BAHT/DAY
OPERATING COST	7	BAHT/TON

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5000	BAHT/DAY
OPERATING COST	8	BAHT/TON

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	4	VEH
TOTAL USE TRUCK	4	VEH
WAIT TIME OF PAVER	10	MIN/HR
COST AT PLANT SITE #1	423.27	BAHT/TON
COST AT PAVER	10.19	BAHT/TON
AVERAGE UNIT COST	433.46	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	240	TON/HR
INSTALL COST	967	BAHT/DAY
RENT COST	11000	BAHT/DAY
OPERATING COST	10	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5000	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	8	MIN
TRAVEL TIME <==	6	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	5	VEH
TOTAL USE TRUCK	5	VEH
WAIT TIME OF PAVER	0	MIN/HR
COST AT PLANT SITE #1	423.48	BAHT/TON
COST AT PAVER	10.19	BAHT/TON
AVERAGE UNIT COST	433.67	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS REKSHANANDANA B613353

SITE #1	PLANT #1	
CAPACITY	60	TON/HR
INSTALL COST	730	BAHT/DAY
RENT COST	9000	BAHT/DAY
OPERATING COST	5	BAHT/TON

.....

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5700	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	300	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	3	VEH
TOTAL USE TRUCK	3	VEH
WAIT TIME OF PAVER	45	MIN/HR
COST AT PLANT SITE #1	429.75	BAHT/TON
COST AT PAVER	10.71	BAHT/TON
AVERAGE UNIT COST	440.46	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	80	TON/HR
INSTALL COST	767	BAHT/DAY
RENT COST	9300	BAHT/DAY
OPERATING COST	5	BAHT/TON

.....

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5700	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	4	VEH
TOTAL USE TRUCK	4	VEH
WAIT TIME OF PAVER	40	MIN/HR
COST AT PLANT SITE #1	427.41	BAHT/TON
COST AT PAVER	10.71	BAHT/TON
AVERAGE UNIT COST	438.12	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	100	TON/HR
INSTALL COST	784	BAHT/DAY
RENT COST	9600	BAHT/DAY
OPERATING COST	7	BAHT/TON

.....

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5700	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN.
TRAVEL TIME <==	20	MIN.

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	5	VEH
TOTAL USE TRUCK	5	VEH
WAIT TIME OF PAVER	35	MIN/HR
COST AT PLANT SITE #1	426.42	BAHT/TON
COST AT PAVER	10.71	BAHT/TON
AVERAGE UNIT COST	437.13	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	120	TON/HR
INSTALL COST	800	BAHT/DAY
RENT COST	10000	BAHT/DAY
OPERATING COST	7	BAHT/TON

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5700	BAHT/DAY
OPERATING COST	8	BAHT/TON

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	5	VEH
TOTAL USE TRUCK	5	VEH
WAIT TIME OF PAVER	30	MIN/HR
COST AT PLANT SITE #1	425.18	BAHT/TON
COST AT PAVER	10.71	BAHT/TON
AVERAGE UNIT COST	435.89	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	140	TON/HR
INSTALL COST	834	BAHT/DAY
RENT COST	10200	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	3700	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	6	VEH
TOTAL USE TRUCK	6	VEH
WAIT TIME OF PAVER	25	MIN/HR
COST AT PLANT SITE #1	425.2	BAHT/TON
COST AT PAVER	10.71	BAHT/TON
AVERAGE UNIT COST	435.91	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA Bo15333

SITE #1 PLANT #1

CAPACITY	160	TON/HR
INSTALL COST	867	BAHT/DAY
RENT COST	10400	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5700	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	7	VEH
TOTAL USE TRUCK	7	VEH
WAIT TIME OF PAVER	20	MIN/HR
COST AT PLANT SITE #1	424.48	BAHT/TON
COST AT PAVER	10.71	BAHT/TON
AVERAGE UNIT COST	435.19	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA 2615353

SITE #1 PLANT #1

CAPACITY	180	TON/HR
INSTALL COST	900	BAHT/DAY
RENT COST	10600	BAHT/DAY
OPERATING COST	9	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5700	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	300	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	7	VEH
TOTAL USE TRUCK	7	VEH
WAIT TIME OF PAVER	15	MIN/HR
COST AT PLANT SITE #1	424.94	BAHT/TON
COST AT PAVER	10.71	BAHT/TON
AVERAGE UNIT COST	435.65	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA B615353

SITE #1 PLANT #1

CAPACITY	200	TON/HR
INSTALL COST	534	BAHT/DAY
RENT COST	10800	BAHT/DAY
OPERATING COST	9	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5700	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	5	VEH
TOTAL USE TRUCK	8	VEH
WAIT TIME OF PAVER	10	MIN/HR
COST AT PLANT SITE #1	424.52	BAHT/TON
COST AT PAVER	10.71	BAHT/TON
AVERAGE UNIT COST	435.23	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	240	TON/HR
INSTALL COST	967	BAHT/DAY
RENT COST	11000	BAHT/DAY
OPERATING COST	10	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5700	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	7	VEH
TOTAL USE TRUCK	7	VEH
WAIT TIME OF FAVER	0	MIN/HR
COST AT PLANT SITE #1	424.77	BAHT/TON
COST AT FAVER	10.71	BAHT/TON
AVERAGE UNIT COST	435.48	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA 8615353

SITE #1 PLANT #1

CAPACITY	100	TON/HR
INSTALL COST	784	BAHT/DAY
RENT COST	9600	BAHT/DAY
OPERATING COST	7	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5700	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	5	VEH
TOTAL USE TRUCK	5	VEH
WAIT TIME OF PAVER	35	MIN/HR
COST AT PLANT SITE #1	425.63	BAHT/TON
COST AT PAVER	10.54	BAHT/TON
AVERAGE UNIT COST	436.17	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA B615353

SITE #1 PLANT #1

CAPACITY	120	TON/HR
INSTALL COST	800	BAHT/DAY
RENT COST	10000	BAHT/DAY
OPERATING COST	7	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5700	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	5	VEH
TOTAL USE TRUCK	5	VEH
WAIT TIME OF PAVER	30	MIN/HR
COST AT PLANT SITE #1	424.38	BAHT/TON
COST AT PAVER	10.54	BAHT/TON
AVERAGE UNIT COST	434.92	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA B615353

SITE #1 PLANT #1

CAPACITY	140	TON/HR
INSTALL COST	834	BAHT/DAY
RENT COST	10200	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5700	BAHT/DAY
OPERATING COST	6	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	6	VEH
TOTAL USE TRUCK	6	VEH
WAIT TIME OF PAVER	25	MIN/HR
COST AT PLANT SITE #1	424.37	BAHT/TON
COST AT PAVER	10.54	BAHT/TON
AVERAGE UNIT COST	434.91	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA 8615353

SITE #1	PLANT #1	
CAPACITY	160	TON/HR
INSTALL COST	867	BAHT/DAY
RENT COST	10400	BAHT/DAY
OPERATING COST	8	BAHT/TON

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5700	BAHT/DAY
OPERATING COST	8	BAHT/TON

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	7	VEH
TOTAL USE TRUCK	7	VEH
WAIT TIME OF PAVER	20	MIN/HR
COST AT PLANT SITE #1	423.62	BAHT/TON
COST AT PAVER	10.54	BAHT/TON
AVERAGE UNIT COST	434.16	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	180	TON/HR
INSTALL COST	900	BAHT/DAY
RENT COST	10600	BAHT/DAY
OPERATING COST	9	BAHT/TON

.....

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5700	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	7	VEH
TOTAL USE TRUCK	7	VEH
WAIT TIME OF PAVER	15	MIN/HR
COST AT PLANT SITE #1	424.04	BAHT/TON
COST AT PAVER	10.54	BAHT/TON
AVERAGE UNIT COST	434.58	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	200	TON/HR
INSTALL COST	934	BAHT/DAY
RENT COST	10800	BAHT/DAY
OPERATING COST	9	BAHT/TON

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5700	BAHT/DAY
OPERATING COST	6	BAHT/TON

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	8	VEH
TOTAL USE TRUCK	8	VEH
WAIT TIME OF PAVER	10	MIN/HR
COST AT PLANT SITE #1	423.58	BAHT/TON
COST AT PAVER	10.54	BAHT/TON
AVERAGE UNIT COST	434.12	BAHT/TON

. MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA B615353

SITE #1 PLANT #1

CAPACITY	240	TON/HR
INSTALL COST	967	BAHT/DAY
RENT COST	11000	BAHT/DAY
OPERATING COST	10	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5700	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1		
COST		107	BAHT/TON
QUANTITY		.4	TON/TON
SITE #1	MATERIAL TYPE #2		
COST		119	BAHT/TON
QUANTITY		.32	TON/TON
SITE #1	MATERIAL TYPE #3		
COST		119	BAHT/TON
QUANTITY		.23	TON/TON
SITE #1	MATERIAL TYPE #4		
COST		6000	BAHT/TON
QUANTITY		.05	TON/TON
TOTAL A/C USE		1000	TON
TIME OPERATION		10	HR/DAY

USE TRUCK SITE #1	9	VEH
TOTAL USE TRUCK	9	VEH
WAIT TIME OF PAVER	0	MIN/HR
COST AT PLANT SITE #1	423.8	BAHT/TON
COST AT PAVER	10.54	BAHT/TON
AVERAGE UNIT COST	434.34	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA 3615333

SITE #1	PLANT #1	
CAPACITY	160	TON/HR
INSTALL COST	867	BAHT/DAY
RENT COST	10400	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5700	BAHT/DAY
OPERATING COST	6	BAHT/TON

.....

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	7	VEH
TOTAL USE TRUCK	7	VEH
WAIT TIME OF PAVER	20	MIN/HR
COST AT PLANT SITE #1	423.33	BAHT/TON
COST AT PAVER	10.49	BAHT/TON
AVERAGE UNIT COST	433.82	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA 8615353

SITE #1 PLANT #1

CAPACITY	180	TON/HR
INSTALL COST	900	BAHT/DAY
RENT COST	10600	BAHT/DAY
OPERATING COST	9	BAHT/TON

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5700	BAHT/DAY
OPERATING COST	8	BAHT/TON

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1		
COST		107	BAHT/TON
QUANTITY		.4	TON/TON
SITE #1	MATERIAL TYPE #2		
COST		119	BAHT/TON
QUANTITY		.32	TON/TON
SITE #1	MATERIAL TYPE #3		
COST		119	BAHT/TON
QUANTITY		.23	TON/TON
SITE #1	MATERIAL TYPE #4		
COST		6000	BAHT/TON
QUANTITY		.05	TON/TON
TOTAL A/C USE		1500	TON
TIME OPERATION		10	HR/DAY

****

USE TRUCK SITE #1	7	VEH
TOTAL USE TRUCK	7	VEH
WAIT TIME OF PAVER	15	MIN/HR
COST AT PLANT SITE #1	423.74	BAHT/TON
COST AT PAVER	10.49	BAHT/TON
AVERAGE UNIT COST	434.23	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA 3615353

SITE #1	PLANT #1	
CAPACITY	200	TON/HR
INSTALL COST	934	BAHT/DAY
RENT COST	10600	BAHT/DAY
OPERATING COST	9	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	3700	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	8	VEH
TOTAL USE TRUCK	8	VEH
WAIT TIME OF PAVER	10	MIN/HR
COST AT PLANT SITE #1	423.27	BAHT/TON
COST AT PAVER	10.49	BAHT/TON
AVERAGE UNIT COST	433.76	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	240	TON/HR
INSTALL COST	967	BAHT/DAY
RENT COST	11000	BAHT/DAY
OPERATING COST	10	BAHT/TON

.....

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5700	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	22	MIN
TRAVEL TIME <==	20	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1500	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	9	VEH
TOTAL USE TRUCK	9	VEH
WAIT TIME OF PAVER	0	MIN/HR
COST AT PLANT SITE #1	423.48	BAHT/TON
COST AT PAVER	10.49	BAHT/TON
AVERAGE UNIT COST	433.97	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA 5615353

SITE #1 PLANT #1

CAPACITY	60	TON/HR
INSTALL COST	750	BAHT/DAY
RENT COST	9000	BAHT/DAY
OPERATING COST	5	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	107	BAHT/DAY
RENT COST	3400	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	4	VEH
TOTAL USE TRUCK	4	VEH
WAIT TIME OF PAVER	45	MIN/HR
COST AT PLANT SITE #1	429.75	BAHT/TON
COST AT PAVER	11	BAHT/TON
AVERAGE UNIT COST	440.75	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	80	TON/HR
INSTALL COST	767	BAHT/DAY
RENT COST	9300	BAHT/DAY
OPERATING COST	6	BAHT/TON

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5400	BAHT/DAY
OPERATING COST	8	BAHT/TON

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	5	VEH
TOTAL USE TRUCK	5	VEH
WAIT TIME OF PAVER	40	MIN/HR
COST AT PLANT SITE #1	427.41	BAHT/TON
COST AT PAVER	11	BAHT/TON
AVERAGE UNIT COST	438.41	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA B615353

SITE #1 PLANT #1

CAPACITY	100	TON/HR
INSTALL COST	784	BAHT/DAY
RENT COST	9600	BAHT/DAY
OPERATING COST	7	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	6400	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	6	VEH
TOTAL USE TRUCK	6	VEH
WAIT TIME OF PAVER	35	MIN/HR
COST AT PLANT SITE #1	426.42	BAHT/TON
COST AT PAVER	11	BAHT/TON
AVERAGE UNIT COST	437.42	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	120	TON/HR
INSTALL COST	800	BAHT/DAY
RENT COST	10000	BAHT/DAY
OPERATING COST	7	BAHT/TON

.....

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	6400	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	7	VEH
TOTAL USE TRUCK	7	VEH
WAIT TIME OF PAVER	30	MIN/HR
COST AT PLANT SITE #1	425.18	BAHT/TON
COST AT PAVER	11	BAHT/TON
AVERAGE UNIT COST	436.18	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA 8615353

SITE #1	PLANT #1	
CAPACITY	140	TON/HR
INSTALL COST	834	BAHT/DAY
RENT COST	10200	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	6400	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	6	VEH
TOTAL USE TRUCK	6	VEH
WAIT TIME OF PAVER	25	MIN/HR
COST AT PLANT SITE #1	425.2	BAHT/TON
COST AT PAVER	11	BAHT/TON
AVERAGE UNIT COST	436.2	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA 5615353

SITE #1	PLANT #1	
CAPACITY	160	TON/HR
INSTALL COST	867	BAHT/DAY
RENT COST	10400	BAHT/DAY
OPERATING COST	6	BAHT/TON

.....

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	6400	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	300	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	9	VEH
TOTAL USE TRUCK	9	VEH
WAIT TIME OF PAVER	20	MIN/HR
COST AT PLANT SITE #1	424.48	BAHT/TON
COST AT PAVER	11	BAHT/TON
AVERAGE UNIT COST	435.48	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	150	TON/HR
INSTALL COST	700	BAHT/DAY
RENT COST	10600	BAHT/DAY
OPERATING COST	9	BAHT/TON

.....

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	6400	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	10	VEH
TOTAL USE TRUCK	10	VEH
WAIT TIME OF PAVER	15	MIN/HR
COST AT PLANT SITE #1	424.94	BAHT/TON
COST AT PAVER	11	BAHT/TON
AVERAGE UNIT COST	435.94	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA B615353

SITE #1 PLANT #1

CAPACITY	200	TON/HR
INSTALL COST	934	BAHT/DAY
RENT COST	10800	BAHT/DAY
OPERATING COST	9	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	6400	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	11	VEH
TOTAL USE TRUCK	11	VEH
WAIT TIME OF PAVER	10	MIN/HR
COST AT PLANT SITE #1	424.52	BAHT/TON
COST AT PAVER	11	BAHT/TON
AVERAGE UNIT COST	435.52	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA 8615353

SITE #1	PLANT #1	
CAPACITY	240	TON/HR
INSTALL COST	967	BAHT/DAY
RENT COST	11000	BAHT/DAY
OPERATING COST	10	BAHT/TON

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	6400	BAHT/DAY
OPERATING COST	8	BAHT/TON

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	13	VEH
TOTAL USE TRUCK	13	VEH
WAIT TIME OF PAVER	0	MIN/HR
COST AT PLANT SITE #1	424.77	BAHT/TON
COST AT PAVER	11	BAHT/TON
AVERAGE UNIT COST	435.77	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA B613353

SITE #1 PLANT #1

CAPACITY	100	TON/HR
INSTALL COST	784	BAHT/DAY
RENT COST	9600	BAHT/DAY
OPERATING COST	7	BAHT/TON

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	6400	BAHT/DAY
OPERATING COST	8	BAHT/TON

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	6	VEH
TOTAL USE TRUCK	6	VEH
WAIT TIME OF PAVER	35	MIN/HR
COST AT PLANT SITE #1	425.63	BAHT/TON
COST AT PAVER	10.83	BAHT/TON
AVERAGE UNIT COST	436.46	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA 6615353

SITE #1 PLANT #1

CAPACITY	120	TON/HR
INSTALL COST	800	BAHT/DAY
RENT COST	10000	BAHT/DAY
OPERATING COST	7	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	6400	BAHT/DAY
OPERATING COST	3	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	7	VEH
TOTAL USE TRUCK	7	VEH
WAIT TIME OF PAVER	30	MIN/HR
COST AT PLANT SITE #1	424.38	BAHT/TON
COST AT PAVER	10.83	BAHT/TON
AVERAGE UNIT COST	435.21	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	140	TON/HR
INSTALL COST	834	BAHT/DAY
RENT COST	10200	BAHT/DAY
OPERATING COST	8	BAHT/TON

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	6400	BAHT/DAY
OPERATING COST	8	BAHT/TON

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	8	VEH
TOTAL USE TRUCK	8	VEH
WAIT TIME OF PAVER	25	MIN/HR
COST AT PLANT SITE #1	424.37	BAHT/TON
COST AT PAVER	10.83	BAHT/TON
AVERAGE UNIT COST	435.2	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA B615353

SITE #1	PLANT #1	
CAPACITY	160	TON/HR
INSTALL COST	667	BAHT/DAY
RENT COST	10400	BAHT/DAY
OPERATING COST	6	BAHT/TON

.....

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	6400	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	9	VEH
TOTAL USE TRUCK	9	VEH
WAIT TIME OF PAVER	20	MIN/HR
COST AT PLANT . SITE #1	423.62	BAHT/TON
COST AT PAVER	10.83	BAHT/TON
AVERAGE UNIT COST	434.45	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA B615353

SITE #1 PLANT #1

CAPACITY	180	TON/HR
INSTALL COST	900	BAHT/DAY
RENT COST	10600	BAHT/DAY
OPERATING COST	9	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	6400	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	10	VEH
TOTAL USE TRUCK	10	VEH
WAIT TIME OF PAVER	15	MIN/HR
COST AT PLANT SITE #1	424.04	BAHT/TON
COST AT PAVER	10.83	BAHT/TON
AVERAGE UNIT COST	434.87	BAHT/TON

****

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA 8615353

SITE #1	PLANT #1	
CAPACITY	200	TON/HR
INSTALL COST	734	BAHT/DAY
RENT COST	10800	BAHT/DAY
OPERATING COST	9	BAHT/TON

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5400	BAHT/DAY
OPERATING COST	8	BAHT/TON

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	11	VEH
TOTAL USE TRUCK	11	VEH
WAIT TIME OF PAVER	10	MIN/HR
COST AT PLANT SITE #1	423.38	BAHT/TON
COST AT PAVER	10.83	BAHT/TON
AVERAGE UNIT COST	434.41	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR. THANUS RERKSHANANDANA B615353

SITE #1 PLANT #1

CAPACITY	240	TON/HR
INSTALL COST	967	BAHT/DAY
RENT COST	11000	BAHT/DAY
OPERATING COST	10	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	5400	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1000	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	13	VEH
TOTAL USE TRUCK	13	VEH
WAIT TIME OF PAVER	0	MIN/HR
COST AT PLANT SITE #1	423.8	BAHT/TON
COST AT PAVER	10.83	BAHT/TON
AVERAGE UNIT COST	434.63	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA 8615353

SITE #1	PLANT #1	
CAPACITY	160	TON/HR
INSTALL COST	867	BAHT/DAY
RENT COST	10400	BAHT/DAY
OPERATING COST	8	BAHT/TON

	PAVER #1	
CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	8400	BAHT/DAY
OPERATING COST	8	BAHT/TON

SITE #1	TRUCK	
CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1500	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	9	VEH
TOTAL USE TRUCK	9	VEH
WAIT TIME OF PAVER	20	MIN/HR
COST AT PLANT SITE #1	423.33	BAHT/TON
COST AT PAVER	10.78	BAHT/TON
AVERAGE UNIT COST	434.11	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA 3615353

SITE #1 PLANT #1

CAPACITY	180	TON/HR
INSTALL COST	900	BAHT/DAY
RENT COST	10800	BAHT/DAY
OPERATING COST	9	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	6400	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1300	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	10	VEH
TOTAL USE TRUCK	10	VEH
WAIT TIME OF PAVER	.5	MIN/HF
COST AT PLANT SITE #1	424.24	BAHT/TON
COST AT PAVER	10.78	BAHT/TON
AVERAGE UNIT COST	434.81	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA 8615353

SITE #1 PLANT #1

CAPACITY	200	TON/HR
INSTALL COST	934	BAHT/DAY
RENT COST	10800	BAHT/DAY
OPERATING COST	9	BAHT/TON

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	6400	BAHT/DAY
OPERATING COST	6	BAHT/TON

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1500	TON
TIME OPERATION	10	HR/DAY

USE TRUCK SITE #1	11	VEH
TOTAL USE TRUCK	11	VEH
WAIT TIME OF PAVER	10	MIN/HR
COST AT PLANT SITE #1	423.27	BAHT/TON
COST AT PAVER	10.78	BAHT/TON
AVERAGE UNIT COST	434.05	BAHT/TON

MASTER THESIS
IN CIVIL ENGINEERING
CHULALONGKORN UNIVERSITY

PROGRAM FOR SIMULATING PAVING OPERATION

BY

MR.THANUS RERKSHANANDANA B615353

SITE #1 PLANT #1

CAPACITY	240	TON/HR
INSTALL COST	967	BAHT/DAY
RENT COST	11000	BAHT/DAY
OPERATING COST	10	BAHT/TON

.....

PAVER #1

CAPACITY	240	TON/HR
INSTALL COST	167	BAHT/DAY
RENT COST	6400	BAHT/DAY
OPERATING COST	8	BAHT/TON

.....

SITE #1 TRUCK

CAPACITY	24	TON/VEH
TRAVEL TIME ==>	34	MIN
TRAVEL TIME <==	32	MIN

.....

COST OF MATERIAL

SITE #1	MATERIAL TYPE #1	
COST	107	BAHT/TON
QUANTITY	.4	TON/TON
SITE #1	MATERIAL TYPE #2	
COST	119	BAHT/TON
QUANTITY	.32	TON/TON
SITE #1	MATERIAL TYPE #3	
COST	119	BAHT/TON
QUANTITY	.23	TON/TON
SITE #1	MATERIAL TYPE #4	
COST	6000	BAHT/TON
QUANTITY	.05	TON/TON
TOTAL A/C USE	1500	TON
TIME OPERATION	10	HR/DAY

****

USE TRUCK SITE #1	13	VEH
TOTAL USE TRUCK	13	VEH
WAIT TIME OF PAVER	0	MIN/HR
COST AT PLANT SITE #1	423.48	BAHT/TON
COST AT PAVER	10.78	BAHT/TON
AVERAGE UNIT COST	434.26	BAHT/TON

****

ภาคผนวก ค

การคำนวณค่าใช้จ่ายของ Plant, Paver และข้อมูลอื่น ๆ

การคำนวณค่าใช้จ่ายของ Plant, Paver และข้อมูลอื่น ๆ

เนื่องจากโปรแกรมที่ใช้จำลองสภาพการปูผิวแอสฟัลติกคอนกรีต สามารถหาจำนวนรถบรรทุกและค่าใช้จ่ายทั้งหมดที่ใช้ในการปูผิวแอสฟัลติกคอนกรีต ไม่ว่าจะเป็นค่าใช้จ่ายของ Plant หรือของ Paver โดยจุดที่ปูผิวอาจจะอยู่ต้นสายทาง กลางสายทางหรือปลายสายทางก็ตาม ซึ่งรายละเอียดต่าง ๆ ดูจากผลลัพธ์ที่ได้จากตาราง 5.10 - 5.18 แล้วนั้น ในที่นี้จะยอกตัวอย่าง การคำนวณค่าใช้จ่ายของ Plant และ Paver รวมทั้งข้อมูลอื่น ๆ เปรียบเทียบกับผลที่ได้จากโปรแกรมคอมพิวเตอร์ เฉพาะกรณีแรกที่จุดปูผิวอยู่ต้นสายทางและจำนวนแอสฟัลติกคอนกรีตที่ใช้ = 500 ตัน/วัน

1. กรณีจุดที่ปูผิวอยู่ต้นสายทางและจำนวนแอสฟัลติกคอนกรีตที่ใช้ = 500 ตัน/วัน

(ก) ค่าใช้จ่ายของโรงผสมแอสฟัลท์ (Plant)

- ค่าติดตั้ง (Install Cost) = $\frac{750 \text{ (บาท)}}{500 \text{ (ตัน)}} = 1.50$ บาท/ตัน
- ค่าเช่า (Rent Cost) = 9,000 บาท/วัน

$$= \frac{9{,}000 \text{ (บาท)}}{10 \text{(ชม.)} \times 60 \text{(ตัน/ชม.)}}$$

$$= 15 \text{ บาท/ตัน}$$

- ค่าดำเนินการ (Operating Cost) = 5 บาท/ตัน

∴ รวมค่าใช้จ่ายของโรงผสมแอสฟัลท์ = 1.50+15+5 = 21.50 บาท/ตัน

(ข) ค่าใช้จ่ายของเครื่องปูผิว (Paver)

- ค่าติดตั้ง (Install Cost) = $\frac{167 \text{ (บาท)}}{500 \text{ (ตัน)}} = 0.34$ บาท/ตัน
- ค่าเช่า (Rent Cost) = 5,000 บาท/วัน

$$= \frac{5{,}000 \text{ (บาท)}}{10 \text{(ชม.)} \ 240 \text{(ตัน/ชม.)}}$$

$$= 2.08 \text{ บาท/ตัน}$$

- ค่าดำเนินการ (Operating Cost) = 8 บาท/ตัน

∴ รวมค่าใช้จ่ายทั้งหมดของเครื่องปูผิว = 0.34+2.08+8 = 10.42 บาท/ตัน

(ค) ค่าใช้จ่ายของวัสดุ (Material)

ค่าใช้จ่ายของวัสดุชนิดที่ 1 (หินฝุ่น) = 107×0.40 = 42.80 บาท/ตัน

" 2 (หิน $\frac{3}{8}$") = 119×0.32 = 38.08 "

" 3 (หิน $\frac{3}{4}$") = 119×0.23 = 27.37 "

" 4 (ยางแอล์ฟัลท์) = 6,000×0.05=300.00 "

∴ รวมค่าใช้จ่ายทั้งหมดของวัสดุ = 42.80+38.08+27.37+300.00

= 408.25 บาท/ตัน

(ง) จำนวนรถบรรทุกที่ใช้ = (เวลาในการผสมวัสดุผสมร้อนที่โรงผสมแอล์ฟัลท์ + เวลาที่รถบรรทุกวิ่งไป + เวลาในการปูของเครื่องปูผิว + เวลาที่รถบรรทุกวิ่งกลับโรงผสมแอล์ฟัลท์) ÷ เวลาในการผสมวัสดุผสมร้อนที่โรงผสมแอล์ฟัลท์

$$= \frac{27+8+7+6}{27}$$

= 1.78 คัน Use 2 คัน

(จ) เวลาในการรอคอย (เวลาว่าง) ของเครื่องปูผิว = (ผลต่างของความสามารถของเครื่องปูผิวกับโรงผสมแอล์ฟัลท์ ÷ ความสามารถของเครื่องปูผิว)× 60

$$= \frac{240-60}{240} \times 60$$

= 45 นาที

<u>สรุป</u> ค่าใช้จ่ายรวมของ Plant = ค่าใช้จ่ายของ Plant + ค่าใช้จ่ายของวัสดุ

= 21.50+408.25

= 429.75 บาท/ตัน

ค่าใช้จ่ายของ Paver = 10.42 บาท/ตัน

จำนวนรถบรรทุกที่ใช้ = 2 คัน

เวลาในการรอคอย (เวลาว่าง) ของเครื่องปูผิว = 45 นาที

ภาคผนวก ง

การหาค่า Install Cost, Rent Cost และ Operating Cost

ของ Plant และ Paver รวมทั้งค่าวัสดุต่าง ๆ ที่ใช้

การหาค่า Install Cost, Rent Cost และ Operating Cost และ Plant และ Paver รวมทั้งค่าวัสดุต่าง ๆ ที่ใช้

เนื่องจากค่าใช้จ่ายของ Plant และ Paver ขึ้นอยู่กับค่าใช้จ่ายในการติดตั้ง (Install Cost), ค่าเช่า (Rent Cost) และค่าดำเนินการ (Operating Cost) รวมทั้งค่าวัสดุต่าง ๆ ที่ใช้

ในที่นี้จะขอแยกพิจารณาค่าใช้จ่ายออกเป็น 3 กรณีคือ

1. ค่าใช้จ่ายของ Plant ซึ่งประกอบด้วย

ก) ค่าใช้จ่ายในการติดตั้ง Plant (Install Cost) ซึ่งรวมค่าใช้จ่ายในการขนย้าย Plant ด้วยรถเทรลเลอร์, ค่าก่อสร้างฐานรากคอนกรีตเสริมเหล็กของ Plant, ค่าแรงคนงานในการประกอบติดตั้ง รวมทั้งค่าใช้จ่ายอื่น ๆ

ค่า Install Cost ทั้งหมดจะต้องหารด้วยระยะเวลาในการดำเนินงานปูผิวแอสฟัลติกคอนกรีต ในที่นี้ กำหนดระยะเวลาในการดำเนินงานไว้ 2 เดือน (60 วัน)

ขนาด Plant (ตัน/ชม.)	ค่า Install Cost ทั้งหมด (บาท)	ค่า Install Cost ที่ใช้ (บาท/วัน)
60	45,000	750
80	46,000	767
100	47,000	784
120	48,000	800
140	50,000	834
160	52,000	867
180	54,000	900
200	56,000	934
240	58,000	967

ข) ค่าเช่า Plant (Rent Cost) เป็นค่าใช้จ่ายในการเช่า Plant คิดเป็นบาท/วัน

ขนาด Plant (ตัน/ชม.)	ค่าเช่า Plant (บาท/วัน)
60	9,000
80	9,300
100	9,600
120	10,000
140	10,200
160	10,400
180	10,600
200	10,800
240	11,000

ค) ค่าดำเนินงานของ Plant (Operating Cost) เป็นค่าใช้จ่ายในการดำเนินงานของ Plant ซึ่งรวมค่าใช้จ่ายของหัวหน้าควบคุม Plant พร้อมผู้ช่วย พนักงานขับรถตัก สำหรับตักวัสดุเข้าบุ้งหินดิบ, พนักงานขับรถแทรคเตอร์ สำหรับดันวัสดุป้อนรถตัก, คนงานเปิดบุ้งหินดิบ, คนงานต้มยางมะตอย, ค่าน้ำมันดีเซล รถตักและรถแทรคเตอร์, ค่าไฟฟ้าของ Plant

ขนาด Plant (ตัน/ชม.)	ค่า Operating Cost ที่ใช้ (บาท/ตัน)
60	5
80	6
100	7
120	7
140	8
160	8
180	9
200	9
240	10

2. ค่าใช้จ่ายของ Paver ซึ่งประกอบด้วย

ก) ค่าใช้จ่ายในการติดตั้ง Paver (Install Cost) ซึ่งค่าใช้จ่ายนี้ตามความจริงแล้วแทบไม่มีเลย จะมีเพียงค่ายนย้ายของ Paver เท่านั้น ซึ่งค่านี้ขึ้นอยู่กับระยะทางที่ยนย้าย ในที่นี้กำหนดค่า Install Cost = 10,000 บาท แต่เนื่องจากระยะเวลาในการปูผิวเท่ากับ 2 เดือน (60 วัน) ฉะนั้นค่า Install Cost ที่ใช้เท่ากับ 167 บาท/วัน

ข) ค่าเช่า Paver (Rent Cost) ในที่นี้ค่าเช่ายของ Paver จะรวมค่าใช้จ่ายของรถบรรทุกที่ต้องใช้ด้วย ซึ่งค่านี้จะขึ้นอยู่กับระยะทางของจุดที่ปูผิวว่าจะอยู่ต้นสายทาง กลางสายทางหรือปลายสายทาง,ส่วนค่าเช่ายของ Paver เป็นข้อมูลที่ได้จากบริษัทนามประเสริฐก่อสร้าง จำกัด

ตำแหน่งจุดที่ปูผิว	ค่าเช่า Paver (บาท/วัน)	ค่าใช้จ่ายของรถบรรทุก (บาท/วัน)	ค่าใช้จ่ายทั้งหมด (บาท/วัน)
ต้นสายทาง	2,500	2,500	5,000
กลางสายทาง	2,500	3,200	5,700
ปลายสายทาง	2,500	3,900	6,400

ค) ค่าดำเนินงานของ Paver (Operating Cost) เป็นค่าใช้จ่ายในการดำเนินงานของ Paver ซึ่งรวมค่าใช้จ่ายของหัวหน้าควบคุมการปูผิว พนักงานขับรถ Paver ,รถบดล้อเหล็ก, รถบดล้อยาง, คนงานที่จุดปูผิว, ค่าน้ำมันดีเซลรถ Paver, รถบดล้อเหล็ก, รถบดล้อยาง, และค่าใช้จ่ายอื่น ๆ ซึ่งในที่นี้ ค่าใช้จ่ายในการดำเนินงานของ Paver มีค่าเท่ากับ 8 บาท/ตัน

3. ค่าใช้จ่ายของวัสดุ (Material Cost)

วัสดุที่ใช้ในการปูผิวแอสฟัลติกคอนกรีต จำนวน 1Batch ประกอบไปด้วย

ชนิดของวัสดุ	จำนวน (กก.)	จำนวน (%)	ราคาวัสดุ	
			(บาท/ม.^{3})	(บาท/ตัน)
หินฝุ่น	316	40	170	107
หิน $\frac{3}{8}$"	248	32	190	119
หิน $\frac{3}{4}$"	186	23	190	119
ยางมะตอย	36	5	-	6,000
Σ =	786	100		

ประวัติผู้เขียน

นายธนุส ฤกษนันทน์ เกิดเมื่อวันที่ 13 พฤศจิกายน พ.ศ. 2500 ที่จังหวัดพิจิตร สำเร็จการศึกษาปริญญาวิศวกรรมศาสตรบัณฑิต สาขาวิชาวิศวกรรมโยธา จากมหาวิทยาลัยขอนแก่น เมื่อปี พ.ศ. 2523 ปัจจุบันรับราชการ ในตำแหน่งวิศวกรผู้ช่วยตรี กองก่อสร้าง การรถไฟแห่งประเทศไทย