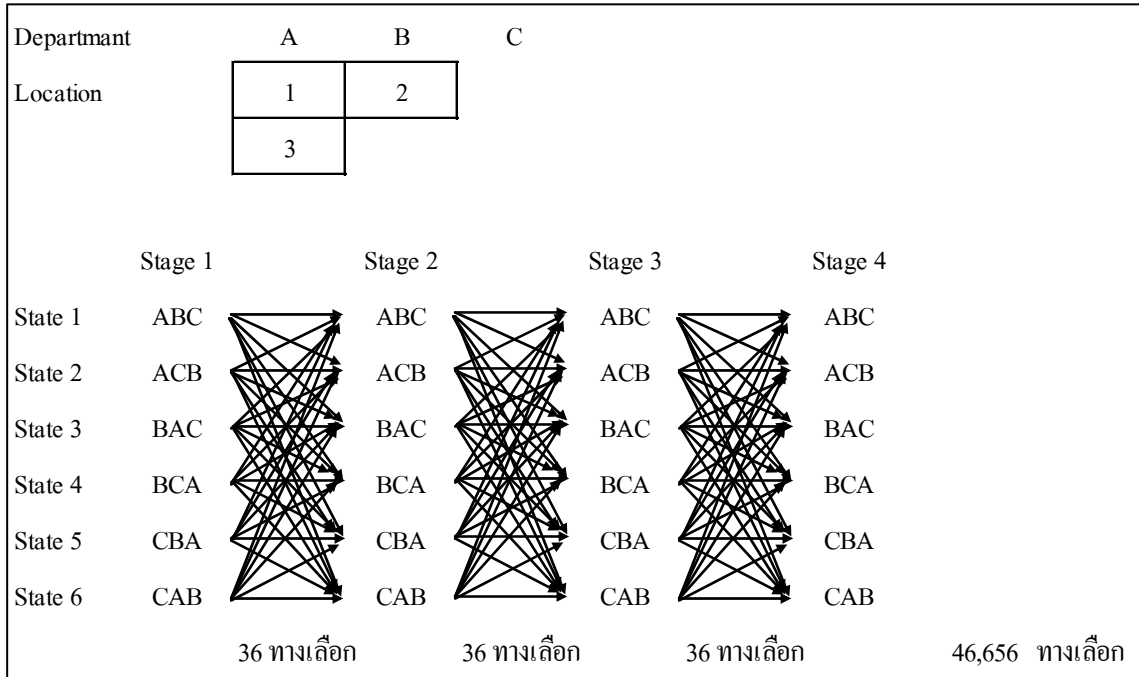


HW 3

ข้อ 1

โจทย์กำหนด



| | | | | |
|---------|---|---|----|----|
| | | A | B | C |
| Stage 1 | A | 0 | 20 | 15 |
| | B | | 0 | 30 |
| | C | | | 0 |

| | | | | |
|---------|---|---|----|----|
| | | A | B | C |
| Stage 2 | A | 0 | 15 | 20 |
| | B | | 0 | 30 |
| | C | | | 0 |

| | | | | |
|---------|---|---|----|----|
| | | A | B | C |
| Stage 3 | A | 0 | 30 | 20 |
| | B | | 0 | 10 |
| | C | | | 0 |

| | | | | |
|---------|---|---|----|----|
| | | A | B | C |
| Stage 4 | A | 0 | 10 | 10 |
| | B | | 0 | 15 |
| | C | | | 0 |

Rearrangement Penalty

| | | | |
|------|---|---|---|
| Cost | 1 | 2 | 3 |
| 1 | 0 | 3 | 4 |
| 2 | 6 | 0 | 5 |
| 3 | 5 | 4 | 0 |

วิธีทำ

หาต้นทุนการขนส่ง Material ระวัง Department ใน แต่ละ Location ในทุกๆ Stages (Period) ได้ค่าใช้จ่ายดังนี้

| | ต้นทุนการขนส่ง Material | | | |
|-----|-------------------------|----|----|----|
| | P1 | P2 | P3 | P4 |
| ABC | 95 | 95 | 70 | 50 |
| ACB | 95 | 95 | 70 | 50 |
| BAC | 80 | 85 | 80 | 45 |
| BCA | 80 | 85 | 80 | 45 |
| CBA | 70 | 80 | 90 | 35 |
| CAB | 70 | 80 | 90 | 35 |

จัดเรียงค่าใช้จ่ายในแต่ละ Stages (Period) จากน้อยไปหามาก

| | P1 | | P2 | | P3 | | P4 |
|-----|----|-----|----|-----|----|-----|----|
| CBA | 70 | CBA | 80 | ABC | 70 | CBA | 35 |
| CAB | 70 | CAB | 80 | ACB | 70 | CAB | 35 |
| BAC | 80 | BAC | 85 | BAC | 80 | BAC | 45 |
| BCA | 80 | BCA | 85 | BCA | 80 | BCA | 45 |
| ABC | 95 | ABC | 95 | CBA | 90 | ABC | 50 |
| ACB | 95 | ACB | 95 | CAB | 90 | ACB | 50 |

หาขอบเขตต่ำสุด และสูงสุดของค่าใช้จ่ายที่เป็นไปได้

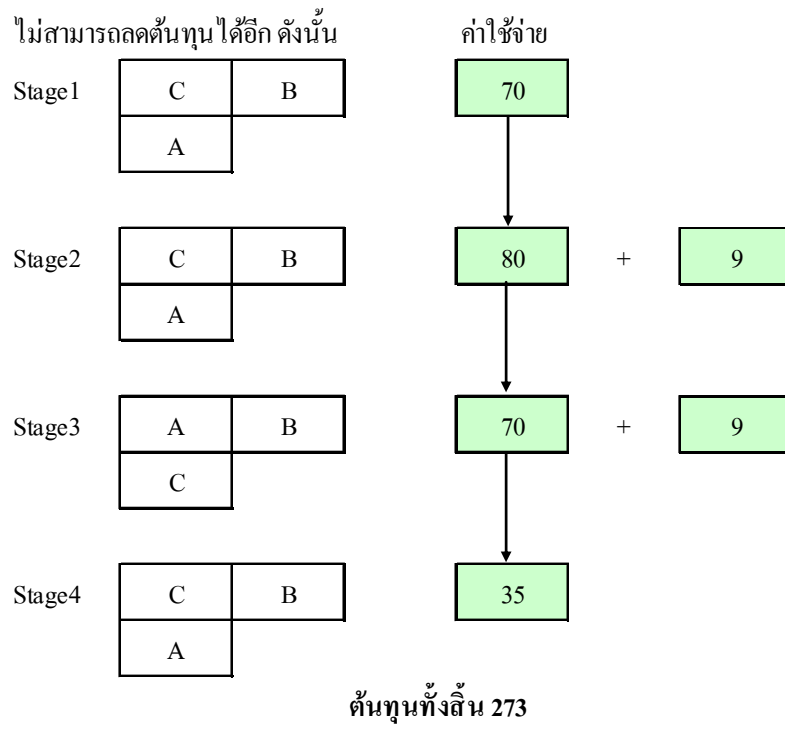
ต้นทุนขอบเขตต่ำสุดไม่คิด Rearrangement

$$= 70 + 80 + 70 + 35 = 255$$

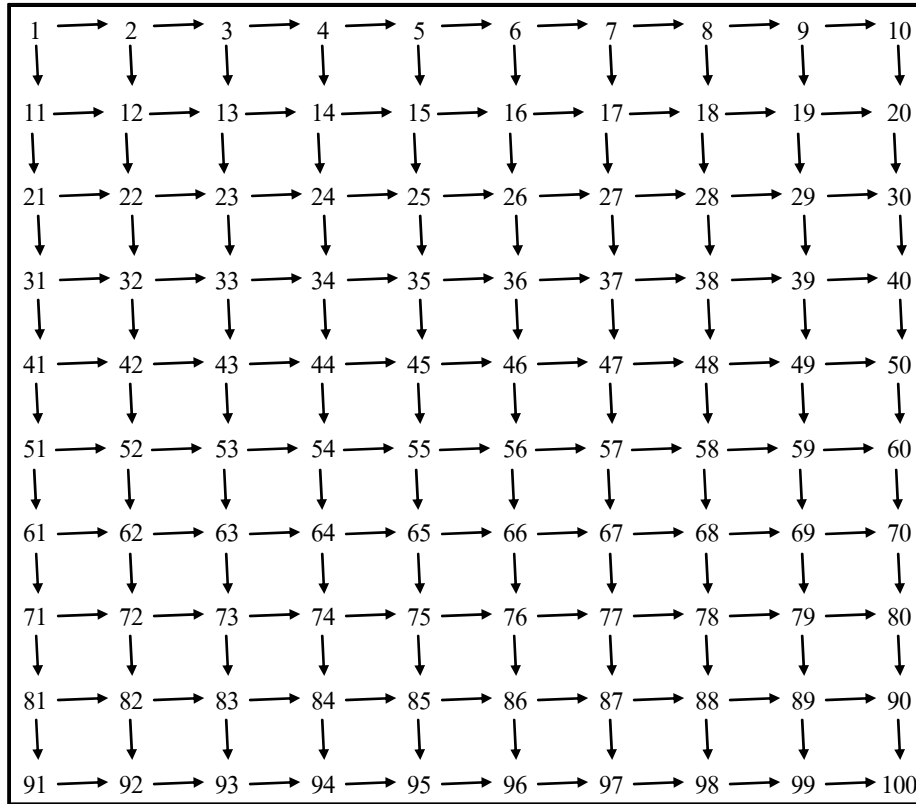
ต้นทุนขอบเขตสูงสุดเมื่อคิด Rearrangement

$$= 70 + 89 + 79 + 35 = 273$$

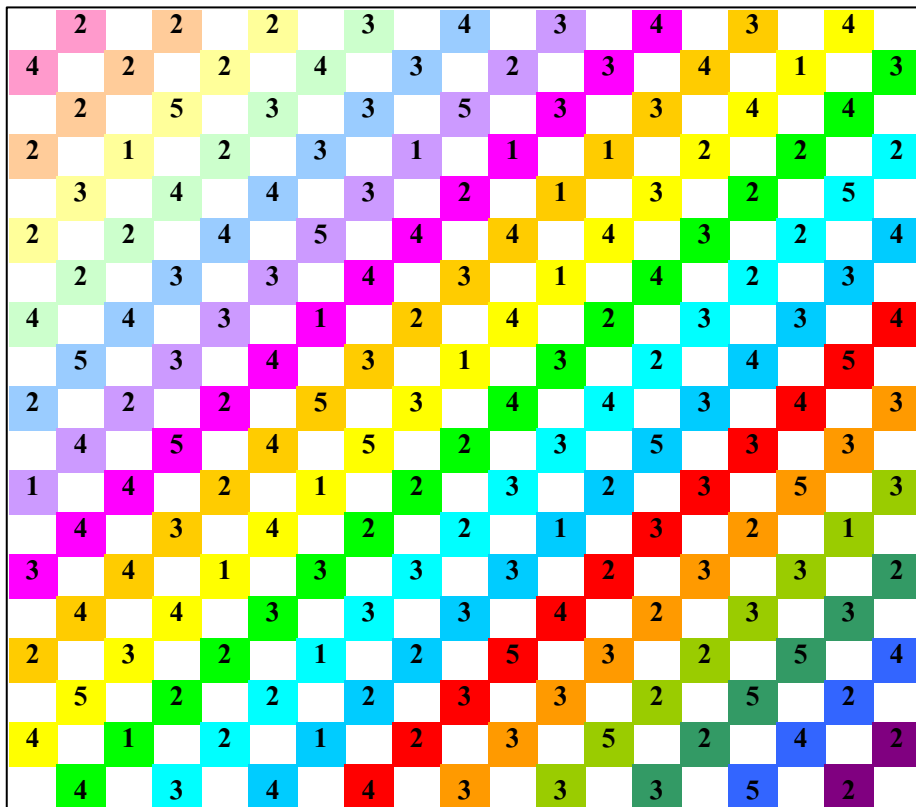
จากการพยายามลดค่าใช้จ่ายของขอบเขตสูงสุดเมื่อคิด Rearrangement ลง พบว่าไม่สามารถลดค่าใช้จ่ายลงได้อีก ดังนั้นจึงสรุปได้ว่า



ข้อที่ 2 Street Network



รูปเส้นทางการเดิน



รูปต้นทุนการเดินทาง

จงหาวิธีการเดินทางจาก 1 ไป 100 ให้เสียต้นทุนการเดินทางน้อยที่สุด

วิธีทำ

| Stage 0 | State | Alt | Return | Decision |
|---------|-------|-----|--------|----------|
| | 1 | - | - | - |

| Stage 1 | State | Alt | Return | Decision |
|---------|-------|------|--------|----------|
| | 2 | 1-2 | 2 | ✓ |
| | 11 | 1-11 | 4 | ✓ |

| Stage 2 | State | Alt | Return | Decision |
|---------|-------|-------|--------|----------|
| | 3 | 2-3 | 4 | ✓ |
| | 12 | 2-12 | 4 | ✓ |
| | | 11-12 | 6 | |
| | 21 | 11-21 | 6 | ✓ |

| Stage 3 | State | Alt | Return | Decision |
|---------|-------|-------|--------|----------|
| | 4 | 3-4 | 6 | ✓ |
| | 13 | 3-13 | 6 | ✓ |
| | | 12-13 | 9 | |
| | 22 | 12-22 | 5 | ✓ |
| | | 21-22 | 9 | |
| | 31 | 21-31 | 8 | ✓ |

| Stage 4 | State | Alt | Return | Decision |
|---------|-------|-------|--------|----------|
| | 5 | 4-5 | 9 | ✓ |
| | 14 | 4-14 | 10 | |
| | | 13-14 | 9 | ✓ |
| | 23 | 13-23 | 8 | ✓ |
| | | 22-23 | 9 | |
| | 32 | 22-32 | 7 | ✓ |
| | | 31-32 | 10 | |
| | 41 | 31-41 | 12 | ✓ |

| Stage 5 | State | Alt | Return | Decision |
|---------|-------|-------|--------|----------|
| | 6 | 5-6 | 13 | ✓ |
| | 15 | 5-15 | 12 | ✓ |
| | | 14-15 | 12 | ✓ |
| | 24 | 14-24 | 12 | ✓ |
| | | 23-24 | 12 | ✓ |

| | | | |
|----|-------|----|---|
| 33 | 23-33 | 12 | |
| | 32-33 | 10 | √ |
| 42 | 32-42 | 11 | √ |
| | 41-42 | 17 | |
| 51 | 41-51 | 14 | √ |

| Stage 6 | State | Alt | Return | Decision |
|---------|-------|-------|--------|----------|
| | 7 | 6-7 | 16 | √ |
| | 16 | 6-16 | 15 | √ |
| | | 15-16 | 17 | |
| | 25 | 15-25 | 13 | √ |
| | | 24-25 | 15 | |
| | 34 | 24-34 | 17 | |
| | | 33-34 | 13 | √ |
| | 43 | 33-43 | 13 | √ |
| | | 42-43 | 14 | |
| | 52 | 42-52 | 12 | √ |
| | | 51-52 | 18 | |
| | 61 | 51-61 | 15 | √ |

| Stage 7 | State | Alt | Return | Decision |
|---------|-------|-------|--------|----------|
| | 8 | 7-8 | 20 | √ |
| | 17 | 7-17 | 19 | |
| | | 16-17 | 18 | √ |
| | 26 | 16-26 | 16 | |
| | | 25-26 | 15 | √ |
| | 35 | 25-35 | 17 | √ |
| | | 34-35 | 17 | √ |
| | 44 | 34-44 | 14 | √ |
| | | 43-44 | 17 | |
| | 53 | 43-53 | 15 | √ |
| | | 52-53 | 17 | |
| | 62 | 52-62 | 16 | √ |
| | | 61-62 | 19 | |
| | 71 | 61-71 | 18 | √ |

| Stage 8 | State | Alt | Return | Decision |
|---------|-------|-----|--------|----------|
| | 9 | 8-9 | 23 | √ |

| | | | |
|----|-------|----|---|
| 18 | 8-18 | 24 | |
| | 17-18 | 21 | √ |
| 27 | 17-27 | 19 | |
| | 26-27 | 16 | √ |
| 36 | 26-36 | 19 | √ |
| | 35-36 | 20 | |
| 45 | 35-45 | 19 | |
| | 44-45 | 17 | √ |
| 54 | 44-54 | 19 | √ |
| | 53-54 | 19 | √ |
| 63 | 53-63 | 17 | √ |
| | 62-63 | 19 | |
| 72 | 62-72 | 20 | √ |
| | 71-72 | 22 | |
| 81 | 71-81 | 20 | √ |

| Stage 9 | State | Alt | Return | Decision |
|---------|-------|-------|--------|----------|
| | 10 | 9-10 | 27 | √ |
| | 19 | 9-19 | 24 | √ |
| | | 18-19 | 25 | |
| | 28 | 18-28 | 23 | |
| | | 27-28 | 19 | √ |
| | 37 | 27-37 | 20 | √ |
| | | 36-37 | 20 | √ |
| | 46 | 36-46 | 23 | |
| | | 45-46 | 18 | √ |
| | 55 | 45-55 | 20 | √ |
| | | 54-55 | 24 | |
| | 64 | 54-64 | 20 | √ |
| | | 63-64 | 21 | |
| | 73 | 63-73 | 18 | √ |
| | | 72-73 | 24 | |
| | 82 | 72-82 | 23 | √ |
| | | 81-82 | 25 | |
| | 91 | 81-91 | 24 | √ |

| Stage 10 | State | Alt | Return | Decision |
|----------|-------|-------|--------|----------|
| | 20 | 10-20 | 30 | |

| | | | |
|----|-------|----|---|
| | 19-20 | 28 | √ |
| 29 | 19-29 | 26 | |
| | 28-29 | 21 | √ |
| 38 | 28-38 | 22 | √ |
| | 37-38 | 24 | |
| 47 | 37-47 | 22 | |
| | 46-47 | 21 | √ |
| 56 | 46-56 | 22 | √ |
| | 55-56 | 22 | √ |
| 65 | 55-65 | 22 | √ |
| | 64-65 | 22 | √ |
| 74 | 64-74 | 23 | |
| | 73-74 | 21 | √ |
| 83 | 73-83 | 20 | √ |
| | 82-83 | 25 | |
| 92 | 82-92 | 24 | √ |
| | 91-92 | 28 | |

| Stage 11 | State | Alt | Return | Decision |
|----------|-------|-------|--------|----------|
| | 30 | 20-30 | 30 | |
| | | 29-30 | 26 | √ |
| | 39 | 29-39 | 23 | √ |
| | | 38-39 | 24 | |
| | 48 | 38-48 | 25 | |
| | | 47-48 | 23 | √ |
| | 57 | 47-57 | 25 | √ |
| | | 56-57 | 25 | √ |
| | 66 | 56-66 | 25 | |
| | | 65-66 | 24 | √ |
| | 75 | 65-75 | 25 | |
| | | 74-75 | 24 | √ |
| | 84 | 74-84 | 22 | √ |
| | | 83-84 | 22 | √ |
| | 93 | 83-93 | 22 | √ |
| | | 92-93 | 27 | |

| Stage 12 | State | Alt | Return | Decision |
|----------|-------|-------|--------|----------|
| | 40 | 30-40 | 30 | |

| | | | |
|----|-------|----|---|
| | 39-40 | 26 | √ |
| 49 | 39-49 | 26 | √ |
| | 48-49 | 27 | |
| 58 | 48-58 | 26 | √ |
| | 57-58 | 30 | |
| 67 | 57-67 | 27 | |
| | 66-67 | 25 | √ |
| 76 | 66-76 | 27 | √ |
| | 75-76 | 27 | √ |
| 85 | 75-85 | 26 | |
| | 84-85 | 24 | √ |
| 94 | 84-94 | 23 | √ |
| | 93-94 | 26 | |

| Stage 12 | State | Alt | Return | Decision |
|----------|-------|-------|--------|----------|
| | 50 | 40-50 | 30 | √ |
| | | 49-50 | 31 | |
| | 59 | 49-59 | 30 | |
| | | 58-59 | 29 | √ |
| | 68 | 58-68 | 29 | |
| | | 67-68 | 28 | √ |
| | 77 | 67-77 | 27 | √ |
| | | 76-77 | 31 | |
| | 86 | 76-86 | 32 | |
| | | 85-86 | 27 | √ |
| | 95 | 85-95 | 26 | √ |
| | | 94-95 | 27 | |

| Stage 13 | State | Alt | Return | Decision |
|----------|-------|-------|--------|----------|
| | 60 | 50-60 | 33 | |
| | | 59-60 | 32 | √ |
| | 69 | 59-69 | 34 | |
| | | 68-69 | 30 | √ |
| | 78 | 68-78 | 31 | |
| | | 77-78 | 29 | √ |
| | 87 | 77-87 | 30 | √ |
| | | 86-87 | 30 | √ |
| | 96 | 86-96 | 30 | |

95-96 29 ✓

| Stage 14 | State | Alt | Return | Decision |
|----------|-------|-------|--------|----------|
| | 70 | 60-70 | 35 | |
| | | 69-70 | 31 | ✓ |
| | 79 | 69-79 | 33 | |
| | | 78-79 | 32 | ✓ |
| | 88 | 78-88 | 31 | ✓ |
| | | 87-88 | 32 | |
| | 97 | 87-97 | 35 | |
| | | 96-97 | 32 | ✓ |

| Stage 15 | State | Alt | Return | Decision |
|----------|-------|-------|--------|----------|
| | 80 | 70-80 | 33 | ✓ |
| | | 79-80 | 35 | |
| | 89 | 79-89 | 37 | |
| | | 88-89 | 36 | ✓ |
| | 98 | 88-98 | 33 | ✓ |
| | | 97-98 | 35 | |

| Stage 16 | State | Alt | Return | Decision |
|----------|-------|-------|--------|----------|
| | 90 | 80-90 | 37 | ✓ |
| | | 89-90 | 38 | |
| | 99 | 89-99 | 40 | |
| | | 98-99 | 38 | ✓ |

| Stage 17 | State | Alt | Return | Decision |
|----------|-------|--------|--------|----------|
| | 100 | 90-100 | 39 | ✓ |
| | | 99-100 | 40 | |

สรุปเส้นทางการเดินทางจาก 1 ไป 100 ได้เส้นทางที่ต้นทุนต่ำที่สุดดังนี้

