Dijkstra's Algorithm

- 8 – Connected Grid

- Cost for each move = c

- Cost represented in the bottom left of each cell. Format: cost(parent cell)

- Visited cells marked by a ✓ on top right.

Team Vulcan

Visited Set – {START,32,33,41}

0	1	2	3	4	5	6	GOAL
INF	INF	INF	INF	INF	INF	INF	INF
8	9	10	11	12	13	14	15
				INF		INF	INF
16	17	18	19	20	21	22	23
				INF	INF	INF	
24	25	26	27	28	29	30	31
INF	INF	INF	INF	INF	INF		INF
32 ✓	33 ✓	34	35	36	37	38	39
INF, c(START)	INF, c(START)					INF	INF
START ✓	41 ✓	42	43	44	45	46	47
0	INF, c(START)	INF	INF	INF	INF	INF	INF

ighbors of - START

rs – 32,33,41

Visited Set – {START,32,33,41,24,25}

0	1	2	3	4	5	6	GOAL
INF	INF	INF	INF	INF	INF	INF	INF
8	9	10	11	12	13	14	15
				INF		INF	INF
16	17	18	19	20	21	22	23
				INF	INF	INF	
24 ✓	25 ✓	26	27	28	29	30	31
INF, 2c(32)	INF, 2c(32)	INF	INF	INF	INF		INF
32 ✓	33 ✓	34	35	36	37	38	39
INF, c(START)	INF, c(START)					INF	INF
START ✓	41 ✓	42	43	44	45	46	47
0	INF, c(START)	INF	INF	INF	INF	INF	INF

neighbors of - 32

bors – 24,25

Visited Set – {START,32,33,41,24,25,26,42}

0	1	2	3	4	5	6	GOAL
INF	INF	INF	INF	INF	INF	INF	INF
8	9	10	11	12	13	14	15
				INF		INF	INF
16	17	18	19	20	21	22	23
				INF	INF	INF	
24 ✓	25 ✓	26 ✓	27	28	29	30	31
INF, 2c(32)	INF, 2c(32)	INF, 2c(33)	INF	INF	INF		INF
32 ✓	33 ✓	34	35	36	37	38	39
INF, c(START)	INF, c(START)					INF	INF
START ✓	41 ✓	42 ✓	43	44	45	46	47
0	INF, c(START)	INF, 2c(33)	INF	INF	INF	INF	INF

ghbors of - 41

rs – None

Visited Set – {START,32,33,41,24,25,26,42}

0	1	2	3	4	5	6	GOAL
INF	INF	INF	INF	INF	INF	INF	INF
8	9	10	11	12	13	14	15
				INF		INF	INF
16	17	18	19	20	21	22	23
				INF	INF	INF	
24 ✓	25 ✓	26 ✓	27	28	29	30	31
~~INF~~, 2c(32)	~~INF~~, 2c(32)	~~INF~~, 2c(33)	INF	INF	INF		INF
32 ✓	33 ✓	34	35	36	37	38	39
~~INF~~, c(START)	~~INF~~, c(START)					INF	INF
START ✓	41 ✓	42 ✓	43	44	45	46	47
0	~~INF~~, c(START)	~~INF~~, 2c(33)	INF	INF	INF	INF	INF

ghbors of – 24

rs – None

0	1	2	3	4	5	6	GOAL
INF	INF	INF	INF	INF	INF	INF	INF
8	9	10	11	12	13	14	15
				INF		INF	INF
16	17	18	19	20	21	22	23
				INF	INF	INF	
24 ✓	25 ✓	26 ✓	27	28	29	30	31
INF, 2c(32)	INF, 2c(32)	INF, 2c(33)	INF	INF	INF		INF
32 ✓	33 ✓	34	35	36	37	38	39
INF, c(START)	INF, c(START)					INF	INF
START ✓	41 ✓	42 ✓	43	44	45	46	47
0	INF, c(START)	INF, 2c(33)	INF	INF	INF	INF	INF

ghbors of – 25

rs – None

Visited Set – {START,32,33,41,24,25,26,42,27}

Current costs
0 – Start
c – 32, 33,41
2c – 24,25,26,42
3c - 27
INF – All other (Unvisited Set)

0	1	2	3	4	5	6	GOAL
INF	INF	INF	INF	INF	INF	INF	INF
8	9	10	11	12	13	14	15
				INF		INF	INF
16	17	18	19	20	21	22	23
				INF	INF	INF	
24 ✓	25 ✓	26 ✓	27 ✓	28	29	30	31
INF, 2c(32)	INF, 2c(32)	INF, 2c(33)	INF, 3c(26)	INF	INF		INF
32 ✓	33 ✓	34	35	36	37	38	39
INF, c(START)	INF, c(START)					INF	INF
START ✓	41 ✓	42 ✓	43	44	45	46	47
0	INF, c(START)	INF, 2c(33)	INF	INF	INF	INF	INF

neighbors of - 26

bors – 27

Visited Set – {START,32,33,41,24,25,26,42,27,43}

0	1	2	3	4	5	6	GOAL
INF	INF	INF	INF	INF	INF	INF	INF
8	9	10	11	12	13	14	15
				INF		INF	INF
16	17	18	19	20	21	22	23
				INF	INF	INF	
24 ✓	25 ✓	26 ✓	27 ✓	28	29	30	31
INF, 2c(32)	INF, 2c(32)	INF, 2c(33)	INF, 3c(26)	INF	INF		INF
32 ✓	33 ✓	34	35	36	37	38	39
INF, c(START)	INF, c(START)					INF	INF
START ✓	41 ✓	42 ✓	43 ✓	44	45	46	47
0	INF, c(START)	INF, 2c(33)	INF, 3c(42)	INF	INF	INF	INF

neighbors of - 42

bors – 43

Visited Set – {START,32,33,41,24,25,26,42,27,43,20,28}

Current costs
0 – Start
c – 32, 33,41
2c – 24,25,26,42
3c – 27,43
4c – 20,28
INF – All other (Unvisited Set)

0	1	2	3	4	5	6	GOAL
INF	INF	INF	INF	INF	INF	INF	INF
8	9	10	11	12	13	14	15
				INF		INF	INF
16	17	18	19	20 ✓	21	22	23
				INF, 4c(27)	INF	INF	
24 ✓	25 ✓	26 ✓	27 ✓	28 ✓	29	30	31
INF, 2c(32)	INF, 2c(32)	INF, 2c(33)	INF, 3c(26)	INF, 4c(27)	INF		INF
32 ✓	33 ✓	34	35	36	37	38	39
INF, c(START)	INF, c(START)					INF	INF
START ✓	41 ✓	42 ✓	43 ✓	44	45	46	47
0	INF, c(START)	INF, 2c(33)	INF, 3c(42)	INF	INF	INF	INF

neighbors of - 27
bors – 20,28

Visited Set – {START,32,33,41,24,25,26,42,27,43,20,28,44}

Current costs
0 – Start
c – 32, 33,41
2c – 24,25,26,42
3c – 27,43
4c – 20,28,44
INF – All other (Unvisited Set)

0	1	2	3	4	5	6	GOAL
INF	INF	INF	INF	INF	INF	INF	INF
8	9	10	11	12	13	14	15
				INF		INF	INF
16	17	18	19	20 ✓	21	22	23
				~~INF~~, 4c(27)	INF	INF	
24 ✓	25 ✓	26 ✓	27 ✓	28 ✓	29	30	31
~~INF~~, 2c(32)	~~INF~~, 2c(32)	~~INF~~, 2c(33)	~~INF~~, 3c(26)	~~INF~~, 4c(27)	INF		INF
32 ✓	33 ✓	34	35	36	37	38	39
~~INF~~, c(START)	~~INF~~, c(START)					INF	INF
START ✓	41 ✓	42 ✓	43 ✓	44 ✓	45	46	47
0	~~INF~~, c(START)	~~INF~~, 2c(33)	~~INF~~, 3c(42)	~~INF~~, 4c(43)	INF	INF	INF

neighbors of - 43

bors – 44

Visited Set – {START,32,33,41,24,25,26,42,27,43,20,28,44,12,21,29}

0	1	2	3	4	5	6	GOAL
INF	INF	INF	INF	INF	INF	INF	INF
8	9	10	11	12 ✓	13	14	15
				INF, 5c(20)		INF	INF
16	17	18	19	20 ✓	21 ✓	22	23
				INF, 4c(27)	INF, 5c(20)	INF	
24 ✓	25 ✓	26 ✓	27 ✓	28 ✓	29 ✓	30	31
INF, 2c(32)	INF, 2c(32)	INF, 2c(33)	INF, 3c(26)	INF, 4c(27)	INF, 5c(20)		INF
32 ✓	33 ✓	34	35	36	37	38	39
INF, c(START)	INF, c(START)					INF	INF
START ✓	41 ✓	42 ✓	43 ✓	44 ✓	45	46	47
0	INF, c(START)	INF, 2c(33)	INF, 3c(42)	INF, 4c(43)	INF	INF	INF

neighbors of - 20

bors – 12,21,29

Visited Set – {START,32,33,41,24,25,26,42,27,43,20,28,44,12,21,29}

0	1	2	3	4	5	6	GOAL
INF	INF	INF	INF	INF	INF	INF	INF
8	9	10	11	12 ✓	13	14	15
				~~INF~~, 5c(20)		INF	INF
16	17	18	19	20 ✓	21 ✓	22	23
				~~INF~~, 4c(27)	~~INF~~, 5c(20)	INF	
24 ✓	25 ✓	26 ✓	27 ✓	28 ✓	29 ✓	30	31
~~INF~~, 2c(32)	~~INF~~, 2c(32)	~~INF~~, 2c(33)	~~INF~~, 3c(26)	~~INF~~, 4c(27)	~~INF~~, 5c(20)		INF
32 ✓	33 ✓	34	35	36	37	38	39
~~INF~~, c(START)	~~INF~~, c(START)					INF	INF
START ✓	41 ✓	42 ✓	43 ✓	44 ✓	45	46	47
0	~~INF~~, c(START)	~~INF~~, 2c(33)	~~INF~~, 3c(42)	~~INF~~, 4c(43)	INF	INF	INF

neighbors of - 28

bors – None

Visited Set – {START,32,33,41,24,25,26,42,27,43,20,28,44,12,21,29,45}

0	1	2	3	4	5	6	GOAL
INF	INF	INF	INF	INF	INF	INF	INF
8	9	10	11	12 ✓	13	14	15
				INF, 5c(20)		INF	INF
16	17	18	19	20 ✓	21 ✓	22	23
				INF, 4c(27)	INF, 5c(20)	INF	
24 ✓	25 ✓	26 ✓	27 ✓	28 ✓	29 ✓	30	31
INF, 2c(32)	INF, 2c(32)	INF, 2c(33)	INF, 3c(26)	INF, 4c(27)	INF, 5c(20)		INF
32 ✓	33 ✓	34	35	36	37	38	39
INF, c(START)	INF, c(START)					INF	INF
START ✓	41 ✓	42 ✓	43 ✓	44 ✓	45 ✓	46	47
0	INF, c(START)	INF, 2c(33)	INF, 3c(42)	INF, 4c(43)	INF, 5c(44)	INF	INF

neighbors of - 44

bors – 45

Visited Set – {START,32,33,41,24,25,26,42,27,43,20,28,44,12,21,29,45,3,4,5}

Current costs
0 – Start
c – 32, 33,41
2c – 24,25,26,42
3c – 27,43
4c – 20,28,44
5c – 12,21,29,45
6c – 3,4,5
INF – All other (Unvisited Set)

0	1	2	3 ✓	4 ✓	5 ✓	6	GOAL
INF	INF	INF	INF, 6c(12)	INF, 6c(12)	INF, 6c(12)	INF	INF
8	9	10	11	12 ✓	13	14	15
				INF, 5c(20)		INF	INF
16	17	18	19	20 ✓	21 ✓	22	23
				INF, 4c(27)	INF, 5c(20)	INF	
24 ✓	25 ✓	26 ✓	27 ✓	28 ✓	29 ✓	30	31
INF, 2c(32)	INF, 2c(32)	INF, 2c(33)	INF, 3c(26)	INF, 4c(27)	INF, 5c(20)		INF
32 ✓	33 ✓	34	35	36	37	38	39
INF, c(START)	INF, c(START)					INF	INF
START ✓	41 ✓	42 ✓	43 ✓	44 ✓	45 ✓	46	47
0	INF, c(START)	INF, 2c(33)	INF, 3c(42)	INF, 4c(43)	INF, 5c(44)	INF	INF

neighbors of - 12

bors – 3,4,5

Visited Set – {START,32,33,41,24,25,26,42,27,43,20,28,44,12,21,29,45,3,4,5,14,22}

Current costs
0 – Start
c – 32, 33,41
2c – 24,25,26,42
3c – 27,43
4c – 20,28,44
5c – 12,21,29,45
6c – 3,4,5,14,22
INF – All other (Unvisited Set)

0	1	2	3 ✓	4 ✓	5 ✓	6	GOAL
INF	INF	INF	INF, 6c(12)	INF, 6c(12)	INF, 6c(12)	INF	INF
8	9	10	11	12 ✓	13	14 ✓	15
				INF, 5c(20)		INF, 6c(21)	INF
16	17	18	19	20 ✓	21 ✓	22 ✓	23
				INF, 4c(27)	INF, 5c(20)	INF, 6c(21)	
24 ✓	25 ✓	26 ✓	27 ✓	28 ✓	29 ✓	30	31
INF, 2c(32)	INF, 2c(32)	INF, 2c(33)	INF, 3c(26)	INF, 4c(27)	INF, 5c(20)		INF
32 ✓	33 ✓	34	35	36	37	38	39
INF, c(START)	INF, c(START)					INF	INF
START ✓	41 ✓	42 ✓	43 ✓	44 ✓	45 ✓	46	47
0	INF, c(START)	INF, 2c(33)	INF, 3c(42)	INF, 4c(43)	INF, 5c(44)	INF	INF

neighbors of - 21

bors – 14,22

Visited Set – {START,32,33,41,24,25,26,42,27,43,20,28,44,12,21,29,45,3,4,5,14,22,38}

Current costs
0 – Start
c – 32, 33,41
2c – 24,25,26,42
3c – 27,43
4c – 20,28,44
5c – 12,21,29,45
6c – 3,4,5,14,22,38
INF – All other (Unvisited Set)

neighbors of - 29

bors – 38

Visited Set – {START,32,33,41,24,25,26,42,27,43,20,28,44,12,21,29,45,3,4,5,14,22,38,46}

neighbors of - 45

bors – 46

Visited Set – {START,32,33,41,24,25,26,42,27,43,20,28,44,12,21,29,45,3,4,5,14,22,38,46,2}

neighbors of - 3

bors – 2

Visited Set – {START,32,33,41,24,25,26,42,27,43,20,28,44,12,21,29,45,3,4,5,14,22,38,46,2}

0	1	2 ✓	3 ✓	4 ✓	5 ✓	6	GOAL
INF	INF	~~INF~~, 7c(3)	~~INF~~, 6c(12)	~~INF~~, 6c(12)	~~INF~~, 6c(12)	INF	INF
8	9	10	11	12 ✓	13	14 ✓	15
				~~INF~~, 5c(20)		~~INF~~, 6c(21)	INF
16	17	18	19	20 ✓	21 ✓	22 ✓	23
				~~INF~~, 4c(27)	~~INF~~, 5c(20)	~~INF~~, 6c(21)	
24 ✓	25 ✓	26 ✓	27 ✓	28 ✓	29 ✓	30	31
~~INF~~, 2c(32)	~~INF~~, 2c(32)	~~INF~~, 2c(33)	~~INF~~, 3c(26)	~~INF~~, 4c(27)	~~INF~~, 5c(20)		INF
32 ✓	33 ✓	34	35	36	37	38 ✓	39
~~INF~~, c(START)	~~INF~~, c(START)					~~INF~~, 6c(29)	INF
START ✓	41 ✓	42 ✓	43 ✓	44 ✓	45 ✓	46 ✓	47
0	~~INF~~, c(START)	~~INF~~, 2c(33)	~~INF~~, 3c(42)	~~INF~~, 4c(43)	~~INF~~, 5c(44)	~~INF~~, 6c(45)	INF

neighbors of - 4

bors – None

Visited Set – {START,32,33,41,24,25,26,42,27,43,20,28,44,12,21,29,45,3,4,5,14,22,38,46,2,6}

0	1	2 ✓	3 ✓	4 ✓	5 ✓	6 ✓	GOAL
INF	INF	~~INF~~, 7c(3)	~~INF~~, 6c(12)	~~INF~~, 6c(12)	~~INF~~, 6c(12)	~~INF~~, 7c(5)	INF
8	9	10	11	12 ✓	13	14 ✓	15
				~~INF~~, 5c(20)		~~INF~~, 6c(21)	INF
16	17	18	19	20 ✓	21 ✓	22 ✓	23
				~~INF~~, 4c(27)	~~INF~~, 5c(20)	~~INF~~, 6c(21)	
24 ✓	25 ✓	26 ✓	27 ✓	28 ✓	29 ✓	30	31
~~INF~~, 2c(32)	~~INF~~, 2c(32)	~~INF~~, 2c(33)	~~INF~~, 3c(26)	~~INF~~, 4c(27)	~~INF~~, 5c(20)		INF
32 ✓	33 ✓	34	35	36	37	38 ✓	39
~~INF~~, c(START)	~~INF~~, c(START)					~~INF~~, 6c(29)	INF
START ✓	41 ✓	42 ✓	43 ✓	44 ✓	45 ✓	46 ✓	47
0	~~INF~~, c(START)	~~INF~~, 2c(33)	~~INF~~, 3c(42)	~~INF~~, 4c(43)	~~INF~~, 5c(44)	~~INF~~, 6c(45)	INF

neighbors of - 5

bors – 6

Although we have added GOAL to our visited set, its still not the least cost in the stack so we have to keep going until we can be sure that this is the least path and GOAL is the next point we chose.

Current costs
0 – Start
c – 32, 33,41
2c – 24,25,26,42
3c – 27,43
4c – 20,28,44
5c – 12,21,29,45
6c – 3,4,5,14,22,38,46
7c – 2,6, GOAL,15
INF – All other (Unvisited Set)

0	1	2 ✓	3 ✓	4 ✓	5 ✓	6 ✓	GOAL ✓
INF	INF	INF, 7c(3)	INF, 6c(12)	INF, 6c(12)	INF, 6c(12)	INF, 7c(5)	INF, 7c(14)
8	9	10	11	12 ✓	13	14 ✓	15 ✓
				INF, 5c(20)		INF, 6c(21)	INF, 7c(14)
16	17	18	19	20 ✓	21 ✓	22 ✓	23
				INF, 4c(27)	INF, 5c(20)	INF, 6c(21)	
24 ✓	25 ✓	26 ✓	27 ✓	28 ✓	29 ✓	30	31
INF, 2c(32)	INF, 2c(32)	INF, 2c(33)	INF, 3c(26)	INF, 4c(27)	INF, 5c(20)	INF	
32 ✓	33 ✓	34	35	36	37	38 ✓	39
INF, c(START)	INF, c(START)					INF, 6c(29)	INF
START ✓	41 ✓	42 ✓	43 ✓	44 ✓	45 ✓	46 ✓	47
0	INF, c(START)	INF, 2c(33)	INF, 3c(42)	INF, 4c(43)	INF, 5c(44)	INF, 6c(45)	INF

neighbors of - 14
bors – GOAL,15

Visited Set – {START,32,33,41,24,25,26,42,27,43,20,28,44,12,21,29,45,3,4,5,14,22,38,46,2,6,GOAL,15,31}

Current costs
0 – Start
c – 32, 33,41
2c – 24,25,26,42
3c – 27,43
4c – 20,28,44
5c – 12,21,29,45
6c – 3,4,5,14,22,38,46
7c – 2,6, GOAL,15,31
INF – All other (Unvisited Set)

0	1	2 ✓	3 ✓	4 ✓	5 ✓	6 ✓	GOAL ✓
INF	INF	INF, 7c(3)	INF, 6c(12)	INF, 6c(12)	INF, 6c(12)	INF, 7c(5)	INF, 7c(14)
8	9	10	11	12 ✓	13	14 ✓	15 ✓
				INF, 5c(20)		INF, 6c(21)	INF, 7c(14)
16	17	18	19	20 ✓	21 ✓	22 ✓	23
				INF, 4c(27)	INF, 5c(20)	INF, 6c(21)	
24 ✓	25 ✓	26 ✓	27 ✓	28 ✓	29 ✓	30	31 ✓
INF, 2c(32)	INF, 2c(32)	INF, 2c(33)	INF, 3c(26)	INF, 4c(27)	INF, 5c(20)		INF, 7c(22)
32	33 ✓	34	35	36	37	38 ✓	39
INF, c(START)	INF, c(START)					INF, 6c(29)	INF
START ✓	41 ✓	42 ✓	43 ✓	44 ✓	45 ✓	46 ✓	47
0	INF, c(START)	INF, 2c(33)	INF, 3c(42)	INF, 4c(43)	INF, 5c(44)	INF, 6c(45)	INF

neighbors of - 22

bors – 31

Visited Set – {START,32,33,41,24,25,26,42,27,43,20,28,44,12,21,29,45,3,4,5,14,22,38,46,2,6,GOAL,15,31,39,47}

Current costs
0 – Start
c – 32, 33,41
2c – 24,25,26,42
3c – 27,43
4c – 20,28,44
5c – 12,21,29,45
6c – 3,4,5,14,22,38,46
7c – 2,6, GOAL,15,31,39,47
INF – All other (Unvisited Set)

0	1	2 ✓	3 ✓	4 ✓	5 ✓	6 ✓	GOAL ✓
INF	INF	INF, 7c(3)	INF, 6c(12)	INF, 6c(12)	INF, 6c(12)	INF, 7c(5)	INF, 7c(14)
8	9	10	11	12 ✓	13	14 ✓	15 ✓
				INF, 5c(20)		INF, 6c(21)	INF, 7c(14)
16	17	18	19	20 ✓	21 ✓	22 ✓	23
				INF, 4c(27)	INF, 5c(20)	INF, 6c(21)	
24 ✓	25 ✓	26 ✓	27 ✓	28 ✓	29 ✓	30	31 ✓
INF, 2c(32)	INF, 2c(32)	INF, 2c(33)	INF, 3c(26)	INF, 4c(27)	INF, 5c(20)		INF, 7c(22)
32	33 ✓	34	35	36	37	38 ✓	39 ✓
INF, c(START)	INF, c(START)					INF, 6c(29)	INF, 7c(38)
START ✓	41 ✓	42 ✓	43 ✓	44 ✓	45 ✓	46 ✓	47 ✓
0	INF, c(START)	INF, 2c(33)	INF, 3c(42)	INF, 4c(43)	INF, 5c(44)	INF, 6c(45)	INF, 7c(38)

neighbors of - 38
bors – 39,47

Visited Set – {START,32,33,41,24,25,26,42,27,43,20,28,44,12,21,29,45,3,4,5,14,22,38,46,2,6,GOAL,15,31,39,47}

Current costs
0 – Start
c – 32, 33,41
2c – 24,25,26,42
3c – 27,43
4c – 20,28,44
5c – 12,21,29,45
6c – 3,4,5,14,22,38,46
7c – 2,6, GOAL,15,31,39,47
INF – All other (Unvisited Set)

0	1	2 ✓	3 ✓	4 ✓	5 ✓	6 ✓	GOAL ✓
INF	INF	INF, 7c(3)	INF, 6c(12)	INF, 6c(12)	INF, 6c(12)	INF, 7c(5)	INF, 7c(14)
8	9	10	11	12 ✓	13	14 ✓	15 ✓
				INF, 5c(20)		INF, 6c(21)	INF, 7c(14)
16	17	18	19	20 ✓	21 ✓	22 ✓	23
				INF, 4c(27)	INF, 5c(20)	INF, 6c(21)	
24 ✓	25 ✓	26 ✓	27 ✓	28 ✓	29 ✓	30	31 ✓
INF, 2c(32)	INF, 2c(32)	INF, 2c(33)	INF, 3c(26)	INF, 4c(27)	INF, 5c(20)		INF, 7c(22)
32 ✓	33 ✓	34	35	36	37	38 ✓	39 ✓
INF, c(START)	INF, c(START)					INF, 6c(29)	INF, 7c(38)
START ✓	41 ✓	42 ✓	43 ✓	44 ✓	45 ✓	46 ✓	47 ✓
0	INF, c(START)	INF, 2c(33)	INF, 3c(42)	INF, 4c(43)	INF, 5c(44)	INF, 6c(45)	INF, 7c(38)

neighbors of - 46

bors – None

Visited Set – {START,32,33,41,24,25,26,42,27,43,20,28,44,12,21,29,45,3,4,5,14,22,38,46,2,6,GOAL,15,31,39,47}

Path 1 – {START,33,26,27,20,21,14,GOAL} , Cost – 7c

Next we can pick GOAL as our next point in the stack since the least cost right now is 7c.