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1 C:\Users\Subramanian\AppData\Local\Programs\Python\
  Python39\python.exe "C:/Users/Subramanian/
  IdeaProjects/Data_for_michael_ani and hyperparameter
  tuning/scenario1_genetic_algorithm.py"
2 LHS sampling is: [[88, 14, 14, 7, 20, 2], [102, 14,
  15, 5, 31, 4], [118, 15, 15, 24, 30, 3], [10, 14, 15
  , 47, 25, 4], [91, 15, 15, 37, 7, 3], [7, 14, 14, 12
  , 41, 4], [19, 14, 14, 27, 17, 2], [74, 15, 15, 31,
  12, 5], [59, 14, 14, 10, 3, 4], [69, 14, 14, 17, 26,
  5], [138, 15, 15, 2, 33, 5], [39, 15, 15, 11, 28, 4
  ], [14, 15, 15, 9, 48, 4], [121, 15, 15, 15, 13, 3
  ], [27, 14, 15, 4, 35, 5], [85, 14, 15, 19, 23, 5], [
  71, 14, 15, 5, 3, 2], [83, 14, 15, 48, 5, 5], [95, 15
  , 15, 44, 45, 4], [105, 14, 14, 49, 50, 3], [56, 15,
  14, 21, 48, 2], [111, 14, 14, 21, 38, 2], [47, 14, 15
  , 43, 34, 4], [127, 14, 14, 23, 27, 3], [46, 14, 15,
  13, 6, 2], [133, 15, 15, 18, 9, 4], [8, 15, 14, 40,
  10, 5], [66, 15, 15, 45, 19, 3], [29, 14, 14, 35, 40
  , 4], [17, 14, 14, 11, 36, 4], [116, 15, 15, 25, 46,
  3], [131, 15, 14, 31, 15, 3], [32, 15, 15, 16, 23, 3
  ], [64, 14, 15, 27, 42, 3], [139, 14, 14, 22, 17, 3
  ], [135, 14, 14, 46, 5, 3], [115, 14, 14, 3, 30, 3
  ], [73, 15, 15, 36, 11, 3], [77, 15, 14, 24, 4, 4], [
  54, 15, 14, 30, 37, 2], [4, 15, 14, 18, 41, 3], [42,
  15, 14, 20, 40, 2], [31, 15, 14, 49, 24, 2], [60, 15
  , 14, 32, 29, 5], [22, 14, 14, 6, 44, 3], [110, 14,
  14, 28, 49, 3], [51, 15, 15, 34, 8, 3], [80, 15, 14,
  36, 21, 4], [50, 14, 15, 47, 43, 5], [37, 15, 14, 15
  , 16, 4], [24, 14, 14, 34, 32, 3], [99, 14, 15, 8, 45
  , 4], [126, 15, 15, 41, 22, 2], [94, 15, 14, 42, 13,
  3], [86, 14, 15, 28, 14, 4], [13, 15, 14, 32, 11, 4
  ], [107, 15, 15, 13, 19, 4], [123, 14, 14, 38, 26, 4
  ], [101, 15, 15, 42, 37, 4], [38, 14, 15, 39, 34, 5]]
3 2
4 Start point is: 2
5 16
6 16
7 (5.52, 6.66) (7.37, 3.27)
8 14 14
9 The travel time for UGV from depot B to NW UGV stop
  is: 3907

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10 The UGV travel time between two UGV stops is: 4980
11 24969222.0
12 End node is [24]
13 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
   , 16, 17, 18, 19, 20, 21, 22, 23]
14 [25, 26, 27, 28, 29]
15 Objective: 5000000
16 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
   17 18 19 20 21 22 23 25 26 27 28 29
17 30
18 Route for vehicle 0:
19 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
   Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
20 Distance of the route: 0 ft
21 Remaining Fuel of the route: 287700
22 Total Time of the route: 0 seconds
23
24 Total Distance of all routes: 0 ft
25 Total Fuel remaining of all routes: 287700
26 Total Time of all routes: 0 seconds
27 4
28 Start point is: 4
29 31
30 16
31 (4.8, 3.81) (7.98, 3.78)
32 14 15
33 The travel time for UGV from depot B to NW UGV stop
   is: 1663
34 The UGV travel time between two UGV stops is: 3956
35 10829341.5
36 End node is [24]
37 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
   , 16, 17, 18, 19, 20, 21, 22, 23]
38 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37,
   38, 39, 40, 41, 42]
39 Objective: 18000000
40 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
   17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33 34
   35 36 37 38 39 40 41 42
41 43
42 Route for vehicle 0:
```

```
43 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
44 Distance of the route: 0 ft
45 Remaining Fuel of the route: 287700
46 Total Time of the route: 0 seconds
47
48 Total Distance of all routes: 0 ft
49 Total Fuel remaining of all routes: 287700
50 Total Time of all routes: 0 seconds
51 3
52 Start point is: 3
53 16
54 16
55 (5.52, 6.66) (8.29, 4.03)
56 15 15
57 The travel time for UGV from depot B to NW UGV stop
    is: 3775
58 The UGV travel time between two UGV stops is: 5132
59 ****
*
60 UGV route goes infeasible although UAV has a solution
61 ****
*
62 52718896.5
63 End node is [18]
64 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
    , 16, 17]
65 []
66 ****No solution found*****
67 4
68 Start point is: 4
69 31
70 16
71 (7.06, 3.02) (5.76, 7.62)
72 14 15
73 The travel time for UGV from depot B to NW UGV stop
    is: 4461
74 The UGV travel time between two UGV stops is: 4917
75 19589406.0
76 End node is [24]
77 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
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77 , 16, 17, 18, 19, 20, 21, 22, 23]
78 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44, 45]
79 Objective: 21000000
80 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42 43 44 45
81 46
82 Route for vehicle 0:
83 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
84 Distance of the route: 0 ft
85 Remaining Fuel of the route: 287700
86 Total Time of the route: 0 seconds
87
88 Total Distance of all routes: 0 ft
89 Total Fuel remaining of all routes: 287700
90 Total Time of all routes: 0 seconds
91 3
92 Start point is: 3
93 16
94 16
95 (5.88, 8.09) (7.37, 3.27)
96 15 15
97 The travel time for UGV from depot B to NW UGV stop
    is: 4296
98 The UGV travel time between two UGV stops is: 5230
99 ****
**  

100 UGV route goes infeasible although UAV has a
    solution
101 ****
**  

102 53077444.5
103 End node is [18]
104 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
105 []
106 ****No solution found*****
107 4
108 Start point is: 4
```

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109 31
110 16
111 (7.06, 3.02) (5.4, 6.19)
112 14 14
113 The travel time for UGV from depot B to NW UGV stop
    is: 4461
114 The UGV travel time between two UGV stops is: 4648
115 18765436.5
116 End node is [24]
117 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
118 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44, 45]
119 Objective: 21000000
120 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42 43 44 45
121 46
122 Route for vehicle 0:
123 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
124 Distance of the route: 0 ft
125 Remaining Fuel of the route: 287700
126 Total Time of the route: 0 seconds
127
128 Total Distance of all routes: 0 ft
129 Total Fuel remaining of all routes: 287700
130 Total Time of all routes: 0 seconds
131 2
132 Start point is: 2
133 16
134 16
135 (7.37, 3.27) (5.64, 7.14)
136 14 14
137 The travel time for UGV from depot B to NW UGV stop
    is: 3164
138 The UGV travel time between two UGV stops is: 5168
139 ****
    **
140 UGV route goes infeasible although UAV has a
    solution
```

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141 ****
142 **
143 End node is [24]
144 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
   15, 16, 17, 18, 19, 20, 21, 22, 23]
145 [25, 26, 27, 28, 29, 30, 31]
146 Objective: 7000000
147 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
   16 17 18 19 20 21 22 23 25 26 27 28 29 30 31
148 32
149 Route for vehicle 0:
150 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
   Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
151 Distance of the route: 0 ft
152 Remaining Fuel of the route: 287700
153 Total Time of the route: 0 seconds
154
155 Total Distance of all routes: 0 ft
156 Total Fuel remaining of all routes: 287700
157 Total Time of all routes: 0 seconds
158 5
159 Start point is: 5
160 16
161 31
162 (5.04, 4.76) (7.06, 3.02)
163 15 15
164 The travel time for UGV from depot B to NW UGV stop
   is: 3798
165 The UGV travel time between two UGV stops is: 3879
166 17336076.0
167 End node is [24]
168 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
   15, 16, 17, 18, 19, 20, 21, 22, 23]
169 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
   , 38, 39, 40, 41, 42, 43, 44, 45, 46]
170 Objective: 5447
171 Dropped nodes: 1 2 3 5 6 7 8 9 10 11 13 14 15 16 17
   18 19 20 21 23
172 47
173 47
```

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174 47
175 47
176 47
177 47
178 47
179 47
180 47
181 47
182 47
183 47
184 47
185 47
186 47
187 47
188 47
189 47
190 47
191 47
192 47
193 47
194 47
195 47
196 47
197 47
198 Route for vehicle 0:
199 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 30 Fuel(166878) Time(610,670) Slack(0)
    FuelSlack(0,0) Distance(20137) -> 4 Fuel(46056)
    Time(1220,1400) Slack(776) FuelSlack(147858,193914)
    Distance(40274) -> 25 Fuel(139842) Time(2742,3071)
    Slack(0) FuelSlack(0,0) Distance(64917) -> 26 Fuel(
    124476) Time(2819,3268) Slack(0) FuelSlack(0,0)
    Distance(67478) -> 27 Fuel(108804) Time(2927,3407)
    Slack(0) FuelSlack(0,0) Distance(70090) -> 28 Fuel(
    93438) Time(3124,3484) Slack(0) FuelSlack(0,0)
    Distance(72651) -> 29 Fuel(77766) Time(3323,3563)
    Slack(0) FuelSlack(0,0) Distance(75263) -> 31 Fuel(
    46722) Time(3599,3719) Slack(0) FuelSlack(0,0)
    Distance(80437) -> 12 Fuel(31050) Time(3798,3798)
    Slack(825) FuelSlack(170508,170508) Distance(83049
    ) -> 46 Fuel(148242) Time(5327,5327) Slack(0)
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199 FuelSlack(0,0) Distance(106292) -> 45 Fuel(139950)
    Time(5368,5368) Slack(0) FuelSlack(0,0) Distance(
    107674) -> 44 Fuel(131304) Time(5411,5411) Slack(0)
    FuelSlack(0,0) Distance(109115) -> 43 Fuel(123012)
    Time(5452,5452) Slack(0) FuelSlack(0,0) Distance(
    110497) -> 42 Fuel(114408) Time(5495,5495) Slack(0)
    FuelSlack(0,0) Distance(111931) -> 41 Fuel(106116)
    Time(5536,5536) Slack(0) FuelSlack(0,0) Distance(
    113313) -> 40 Fuel(97470) Time(5579,5579) Slack(0)
    FuelSlack(0,0) Distance(114754) -> 39 Fuel(89178)
    Time(5620,5620) Slack(0) FuelSlack(0,0) Distance(
    116136) -> 38 Fuel(80574) Time(5663,5663) Slack(0)
    FuelSlack(0,0) Distance(117570) -> 37 Fuel(72282)
    Time(5704,5704) Slack(0) FuelSlack(0,0) Distance(
    118952) -> 36 Fuel(63636) Time(5747,5747) Slack(0)
    FuelSlack(0,0) Distance(120393) -> 35 Fuel(55344)
    Time(5788,5788) Slack(0) FuelSlack(0,0) Distance(
    121775) -> 34 Fuel(46740) Time(5831,5831) Slack(0)
    FuelSlack(0,0) Distance(123209) -> 33 Fuel(38448)
    Time(5872,5872) Slack(0) FuelSlack(0,0) Distance(
    124591) -> 32 Fuel(30114) Time(5914,5914) Slack(0)
    FuelSlack(0,0) Distance(125980) -> 22 Fuel(21510)
    Time(5957,5957) Slack(855) FuelSlack(21510,287700)
    Distance(127414) -> 24 Fuel(287700) Time(8412,8412)
    Distance(180214)

200 Distance of the route: 180214 ft
201 Remaining Fuel of the route: 287700
202 Total Time of the route: 8412 seconds
203
204 Total Distance of all routes: 180214 ft
205 Total Fuel remaining of all routes: 287700
206 Total Time of all routes: 8412 seconds
207 4
208 Start point is: 4
209 31
210 16
211 (8.6, 4.29) (5.64, 7.14)
212 14 14
213 The travel time for UGV from depot B to NW UGV stop
    is: 5215
214 The UGV travel time between two UGV stops is: 5772

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215 22446145.5
216 End node is [24]
217 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
218 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40]
219 Objective: 16000000
220 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40
221 41
222 Route for vehicle 0:
223 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
224 Distance of the route: 0 ft
225 Remaining Fuel of the route: 287700
226 Total Time of the route: 0 seconds
227
228 Total Distance of all routes: 0 ft
229 Total Fuel remaining of all routes: 287700
230 Total Time of all routes: 0 seconds
231 5
232 Start point is: 5
233 16
234 31
235 (8.91, 4.54) (5.64, 7.14)
236 14 14
237 The travel time for UGV from depot B to NW UGV stop
    is: 0
238 The UGV travel time between two UGV stops is: 5923
239 22657707.0
240 End node is [24]
241 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
242 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41]
243 Objective: 16001408
244 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 12 13 14 15 16
    17 18 19 20 21 22 23 25 27 28 29 30 31 32 33 34 35
    36 37 38 39 40 41
245 42
```

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246 42
247 42
248 Route for vehicle 0:
249 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 26 Fuel(148134) Time(704,704) Slack(0)
    ) FuelSlack(0,0) Distance(23261) -> 6 Fuel(8568)
    Time(1408,1408) Slack(897) FuelSlack(8423,287700)
    Distance(46522) -> 24 Fuel(287700) Time(2305,2305)
    Distance(46522)
250 Distance of the route: 46522 ft
251 Remaining Fuel of the route: 287700
252 Total Time of the route: 2305 seconds
253
254 Total Distance of all routes: 46522 ft
255 Total Fuel remaining of all routes: 287700
256 Total Time of all routes: 2305 seconds
257 5
258 Start point is: 5
259 16
260 31
261 (5.52, 6.66) (8.91, 4.54)
262 15 15
263 The travel time for UGV from depot B to NW UGV stop
    is: 4488
264 The UGV travel time between two UGV stops is: 5414
265 20306328.0
266 End node is [24]
267 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
268 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39]
269 Objective: 15000000
270 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39
271 40
272 Route for vehicle 0:
273 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
274 Distance of the route: 0 ft
275 Remaining Fuel of the route: 287700
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276 Total Time of the route: 0 seconds
277
278 Total Distance of all routes: 0 ft
279 Total Fuel remaining of all routes: 287700
280 Total Time of all routes: 0 seconds
281 4
282 Start point is: 4
283 31
284 16
285 (7.98, 3.78) (5.64, 7.14)
286 15 15
287 The travel time for UGV from depot B to NW UGV stop
is: 4586
288 The UGV travel time between two UGV stops is: 5167
289 20024218.5
290 End node is [24]
291 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
15, 16, 17, 18, 19, 20, 21, 22, 23]
292 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
, 38, 39, 40, 41, 42]
293 Objective: 18000000
294 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41 42
295 43
296 Route for vehicle 0:
297 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
298 Distance of the route: 0 ft
299 Remaining Fuel of the route: 287700
300 Total Time of the route: 0 seconds
301
302 Total Distance of all routes: 0 ft
303 Total Fuel remaining of all routes: 287700
304 Total Time of all routes: 0 seconds
305 4
306 Start point is: 4
307 31
308 16
309 (7.37, 3.27) (5.04, 4.76)
310 15 15
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311 The travel time for UGV from depot B to NW UGV stop  
is: 4304  
312 The UGV travel time between two UGV stops is: 4020  
313 17074269.0  
314 End node is [24]  
315 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,  
15, 16, 17, 18, 19, 20, 21, 22, 23]  
316 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37  
, 38, 39, 40, 41, 42, 43, 44]  
317 Objective: 20000000  
318 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15  
16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33  
34 35 36 37 38 39 40 41 42 43 44  
319 45  
320 Route for vehicle 0:  
321 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)  
Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)  
322 Distance of the route: 0 ft  
323 Remaining Fuel of the route: 287700  
324 Total Time of the route: 0 seconds  
325  
326 Total Distance of all routes: 0 ft  
327 Total Fuel remaining of all routes: 287700  
328 Total Time of all routes: 0 seconds  
329 3  
330 Start point is: 3  
331 16  
332 16  
333 (5.88, 8.09) (8.29, 4.03)  
334 15 15  
335 The travel time for UGV from depot B to NW UGV stop  
is: 4296  
336 The UGV travel time between two UGV stops is: 5653  
337 *****  
**  
338 UGV route goes infeasible although UAV has a  
solution  
339 *****  
**  
340 53567818.5  
341 End node is [18]
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```
342 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
     15, 16, 17]
343 []
344 *****No solution found*****
345 5
346 Start point is: 5
347 16
348 31
349 (7.68, 3.53) (5.4, 6.19)
350 14 15
351 The travel time for UGV from depot B to NW UGV stop
     is: 599
352 The UGV travel time between two UGV stops is: 4685
353 19778298.0
354 End node is [24]
355 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
     15, 16, 17, 18, 19, 20, 21, 22, 23]
356 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
     , 38, 39, 40, 41, 42, 43]
357 Objective: 15004294
358 Dropped nodes: 1 2 3 4 7 8 9 10 11 12 13 14 15 16 17
     19 20 21 22 23 29 30 31 32 33 34 35 36 37 38 39 40
     41 42 43
359 44
360 44
361 44
362 44
363 44
364 44
365 44
366 44
367 Route for vehicle 0:
368 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
     Distance(0) -> 28 Fuel(160866) Time(640,700) Slack(0
     ) FuelSlack(0,0) Distance(21139) -> 6 Fuel(34032)
     Time(1280,1460) Slack(815) FuelSlack(132348,166380)
     Distance(42278) -> 27 Fuel(155352) Time(2763,2947)
     Slack(0) FuelSlack(0,0) Distance(64336) -> 5 Fuel(
     23004) Time(3431,3615) Slack(851) FuelSlack(170862,
     170862) Distance(86394) -> 25 Fuel(139842) Time(5028
     ,5212) Slack(0) FuelSlack(0,0) Distance(111037) ->
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368 26 Fuel(124476) Time(5169,5289) Slack(0) FuelSlack(0  
,0) Distance(113598) -> 18 Fuel(77760) Time(5524,  
5524) Slack(675) FuelSlack(77760,287700) Distance(  
121384) -> 24 Fuel(287700) Time(6819,6819) Distance(  
141862)  
369 Distance of the route: 141862 ft  
370 Remaining Fuel of the route: 287700  
371 Total Time of the route: 6819 seconds  
372  
373 Total Distance of all routes: 141862 ft  
374 Total Fuel remaining of all routes: 287700  
375 Total Time of all routes: 6819 seconds  
376 5  
377 Start point is: 5  
378 16  
379 31  
380 (5.16, 5.24) (7.37, 3.27)  
381 14 15  
382 The travel time for UGV from depot B to NW UGV stop  
is: 4257  
383 The UGV travel time between two UGV stops is: 4196  
384 18850555.5  
385 End node is [24]  
386 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,  
15, 16, 17, 18, 19, 20, 21, 22, 23]  
387 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37  
, 38, 39, 40, 41, 42, 43, 44, 45]  
388 Objective: 5507  
389 Dropped nodes: 1 3 4 5 6 7 8 9 10 11 13 14 15 16 17  
18 19 21 22 23  
390 46  
391 46  
392 46  
393 46  
394 46  
395 46  
396 46  
397 46  
398 46  
399 46  
400 46
```

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401 46
402 46
403 46
404 46
405 46
406 46
407 46
408 46
409 46
410 46
411 46
412 46
413 46
414 46
415 Route for vehicle 0:
416 0 Fuel(253693) Time(58,58) Slack(60) FuelSlack(0,0)
    Distance(0) -> 28 Fuel(126859) Time(758,758) Slack(
        120) FuelSlack(0,0) Distance(21139) -> 2 Fuel(25)
        Time(1518,1518) Slack(925) FuelSlack(147858,147883)
        Distance(42278) -> 25 Fuel(139842) Time(3189,3189)
        Slack(120) FuelSlack(0,0) Distance(66921) -> 26 Fuel
        (124476) Time(3386,3386) Slack(120) FuelSlack(0,0)
        Distance(69482) -> 27 Fuel(108804) Time(3585,3585)
        Slack(120) FuelSlack(0,0) Distance(72094) -> 29 Fuel
        (77760) Time(3861,3861) Slack(120) FuelSlack(0,0)
        Distance(77268) -> 30 Fuel(62088) Time(4060,4060)
        Slack(120) FuelSlack(0,0) Distance(79880) -> 12 Fuel
        (46722) Time(4257,4257) Slack(774) FuelSlack(201852,
        201852) Distance(82441) -> 45 Fuel(132570) Time(5814
        ,5814) Slack(0) FuelSlack(0,0) Distance(108296) ->
        44 Fuel(124278) Time(5855,5855) Slack(0) FuelSlack(0
        ,0) Distance(109678) -> 43 Fuel(115632) Time(5898,
        5898) Slack(0) FuelSlack(0,0) Distance(111119) -> 42
        Fuel(107340) Time(5939,5939) Slack(0) FuelSlack(0,0
        ) Distance(112501) -> 41 Fuel(98736) Time(5982,5982
        ) Slack(0) FuelSlack(0,0) Distance(113935) -> 40
        Fuel(90444) Time(6023,6023) Slack(0) FuelSlack(0,0
        ) Distance(115317) -> 39 Fuel(81798) Time(6066,6066)
        Slack(0) FuelSlack(0,0) Distance(116758) -> 38 Fuel(
        73506) Time(6107,6107) Slack(0) FuelSlack(0,0)
        Distance(118140) -> 37 Fuel(64902) Time(6150,6150)
```

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416 Slack(0) FuelSlack(0,0) Distance(119574) -> 36 Fuel(
  56610) Time(6191,6191) Slack(0) FuelSlack(0,0)
  Distance(120956) -> 35 Fuel(47964) Time(6234,6234)
  Slack(0) FuelSlack(0,0) Distance(122397) -> 34 Fuel(
  39672) Time(6275,6275) Slack(0) FuelSlack(0,0)
  Distance(123779) -> 33 Fuel(31068) Time(6318,6318)
  Slack(0) FuelSlack(0,0) Distance(125213) -> 32 Fuel(
  22776) Time(6359,6359) Slack(0) FuelSlack(0,0)
  Distance(126595) -> 31 Fuel(14442) Time(6401,6401)
  Slack(0) FuelSlack(0,0) Distance(127984) -> 20 Fuel(
  5838) Time(6444,6444) Slack(906) FuelSlack(5838,
  287700) Distance(129418) -> 24 Fuel(287700) Time(
  8950,8950) Distance(182218)
417 Distance of the route: 182218 ft
418 Remaining Fuel of the route: 287700
419 Total Time of the route: 8950 seconds
420
421 Total Distance of all routes: 182218 ft
422 Total Fuel remaining of all routes: 287700
423 Total Time of all routes: 8950 seconds
424 2
425 Start point is: 2
426 16
427 16
428 (8.91, 4.54) (5.88, 8.09)
429 14 15
430 The travel time for UGV from depot B to NW UGV stop
  is: 3918
431 The UGV travel time between two UGV stops is: 5934
432 ****
  **
433 UGV route goes infeasible although UAV has a
  solution
434 ****
  **
435 29325091.5
436 End node is [24]
437 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
  15, 16, 17, 18, 19, 20, 21, 22, 23]
438 []
439 Objective: 0

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440 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15  
        16 17 18 19 20 21 22 23  
441 25  
442 Route for vehicle 0:  
443 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)  
        Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)  
444 Distance of the route: 0 ft  
445 Remaining Fuel of the route: 287700  
446 Total Time of the route: 0 seconds  
447  
448 Total Distance of all routes: 0 ft  
449 Total Fuel remaining of all routes: 287700  
450 Total Time of all routes: 0 seconds  
451 5  
452 Start point is: 5  
453 16  
454 31  
455 (4.92, 4.29) (7.37, 3.27)  
456 14 15  
457 The travel time for UGV from depot B to NW UGV stop  
    is: 3888  
458 The UGV travel time between two UGV stops is: 3851  
459 17400688.5  
460 End node is [24]  
461 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,  
    15, 16, 17, 18, 19, 20, 21, 22, 23]  
462 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37  
    , 38, 39, 40, 41, 42, 43, 44, 45, 46, 47]  
463 Objective: 5446  
464 Dropped nodes: 1 2 4 5 6 7 8 9 10 11 13 14 15 16 17  
        18 19 20 21 22  
465 48  
466 48  
467 48  
468 48  
469 48  
470 48  
471 48  
472 48  
473 48  
474 48
```

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475 48
476 48
477 48
478 48
479 48
480 48
481 48
482 48
483 48
484 48
485 48
486 48
487 48
488 48
489 48
490 48
491 48
492 Route for vehicle 0:
493 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 30 Fuel(166878) Time(610,670) Slack(0)
    FuelSlack(0,0) Distance(20137) -> 3 Fuel(46056)
    Time(1220,1400) Slack(776) FuelSlack(147858,193914)
    Distance(40274) -> 25 Fuel(139842) Time(2742,3071)
    Slack(0) FuelSlack(0,0) Distance(64917) -> 26 Fuel(
    124476) Time(2819,3268) Slack(0) FuelSlack(0,0)
    Distance(67478) -> 27 Fuel(108804) Time(2898,3420)
    Slack(0) FuelSlack(0,0) Distance(70090) -> 28 Fuel(
    93438) Time(3017,3497) Slack(0) FuelSlack(0,0)
    Distance(72651) -> 29 Fuel(77766) Time(3216,3576)
    Slack(0) FuelSlack(0,0) Distance(75263) -> 31 Fuel(
    46722) Time(3492,3732) Slack(0) FuelSlack(0,0)
    Distance(80437) -> 32 Fuel(31050) Time(3691,3811)
    Slack(0) FuelSlack(0,0) Distance(83049) -> 12 Fuel(
    15684) Time(3888,3888) Slack(874) FuelSlack(139770,
    139770) Distance(85610) -> 47 Fuel(163614) Time(5388
    ,5388) Slack(0) FuelSlack(0,0) Distance(106291) ->
    46 Fuel(155322) Time(5429,5429) Slack(0) FuelSlack(0
    ,0) Distance(107673) -> 45 Fuel(146676) Time(5472,
    5472) Slack(0) FuelSlack(0,0) Distance(109114) -> 44
    Fuel(138384) Time(5513,5513) Slack(0) FuelSlack(0,0
    ) Distance(110496) -> 43 Fuel(129780) Time(5556,5556)
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493 ) Slack(0) FuelSlack(0,0) Distance(111930) -> 42
    Fuel(121488) Time(5597,5597) Slack(0) FuelSlack(0,0)
    ) Distance(113312) -> 41 Fuel(112842) Time(5640,5640
    ) Slack(0) FuelSlack(0,0) Distance(114753) -> 40
    Fuel(104550) Time(5681,5681) Slack(0) FuelSlack(0,0)
    ) Distance(116135) -> 39 Fuel(95946) Time(5724,5724
    ) Slack(0) FuelSlack(0,0) Distance(117569) -> 38
    Fuel(87654) Time(5765,5765) Slack(0) FuelSlack(0,0)
    Distance(118951) -> 37 Fuel(79008) Time(5808,5808)
    Slack(0) FuelSlack(0,0) Distance(120392) -> 36 Fuel(
    70716) Time(5849,5849) Slack(0) FuelSlack(0,0)
    Distance(121774) -> 35 Fuel(62112) Time(5892,5892)
    Slack(0) FuelSlack(0,0) Distance(123208) -> 34 Fuel(
    53820) Time(5933,5933) Slack(0) FuelSlack(0,0)
    Distance(124590) -> 33 Fuel(45486) Time(5975,5975)
    Slack(0) FuelSlack(0,0) Distance(125979) -> 23 Fuel(
    36882) Time(6018,6018) Slack(806) FuelSlack(36882,
    287700) Distance(127413) -> 24 Fuel(287700) Time(
    8424,8424) Distance(180213)
494 Distance of the route: 180213 ft
495 Remaining Fuel of the route: 287700
496 Total Time of the route: 8424 seconds
497
498 Total Distance of all routes: 180213 ft
499 Total Fuel remaining of all routes: 287700
500 Total Time of all routes: 8424 seconds
501 4
502 Start point is: 4
503 31
504 16
505 (5.16, 5.24) (7.68, 3.53)
506 15 15
507 The travel time for UGV from depot B to NW UGV stop
    is: 1034
508 The UGV travel time between two UGV stops is: 4340
509 10922544.0
510 End node is [24]
511 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
512 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43]

```

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513 Objective: 19000000
514 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42 43
515 44
516 Route for vehicle 0:
517 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
518 Distance of the route: 0 ft
519 Remaining Fuel of the route: 287700
520 Total Time of the route: 0 seconds
521
522 Total Distance of all routes: 0 ft
523 Total Fuel remaining of all routes: 287700
524 Total Time of all routes: 0 seconds
525 3
526 Start point is: 3
527 16
528 16
529 (5.16, 5.24) (7.98, 3.78)
530 14 14
531 The travel time for UGV from depot B to NW UGV stop
    is: 3385
532 The UGV travel time between two UGV stops is: 4731
533 ****
      **
534 UGV route goes infeasible although UAV has a
    solution
535 ****
      **
536 55935220.5
537 End node is [18]
538 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
539 [25, 26, 27]
540 ****No solution found*****
541 2
542 Start point is: 2
543 16
544 16
545 (8.6, 4.29) (5.28, 5.71)
```

```
546 15 14
547 The travel time for UGV from depot B to NW UGV stop
is: 3516
548 The UGV travel time between two UGV stops is: 5214
549 ****
**  

550 UGV route goes infeasible although UAV has a
solution
551 ****
**  

552 25732435.5
553 End node is [24]
554 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
15, 16, 17, 18, 19, 20, 21, 22, 23]
555 [25, 26, 27, 28, 29, 30]
556 Objective: 6000000
557 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
16 17 18 19 20 21 22 23 25 26 27 28 29 30
558 31
559 Route for vehicle 0:
560 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
561 Distance of the route: 0 ft
562 Remaining Fuel of the route: 287700
563 Total Time of the route: 0 seconds
564
565 Total Distance of all routes: 0 ft
566 Total Fuel remaining of all routes: 287700
567 Total Time of all routes: 0 seconds
568 2
569 Start point is: 2
570 16
571 16
572 (5.88, 8.09) (7.98, 3.78)
573 14 14
574 The travel time for UGV from depot B to NW UGV stop
is: 4465
575 The UGV travel time between two UGV stops is: 5840
576 ****
**  

577 UGV route goes infeasible although UAV has a
```

```
577 solution
578 ****
579 29163882.0
580 End node is [24]
581 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
   15, 16, 17, 18, 19, 20, 21, 22, 23]
582 [25, 26, 27]
583 Objective: 3000000
584 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
   16 17 18 19 20 21 22 23 25 26 27
585 28
586 Route for vehicle 0:
587 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
   Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
588 Distance of the route: 0 ft
589 Remaining Fuel of the route: 287700
590 Total Time of the route: 0 seconds
591
592 Total Distance of all routes: 0 ft
593 Total Fuel remaining of all routes: 287700
594 Total Time of all routes: 0 seconds
595 4
596 Start point is: 4
597 31
598 16
599 (8.29, 4.03) (5.4, 6.19)
600 14 15
601 The travel time for UGV from depot B to NW UGV stop
   is: 5065
602 The UGV travel time between two UGV stops is: 4963
603 21089481.0
604 End node is [24]
605 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
   15, 16, 17, 18, 19, 20, 21, 22, 23]
606 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
   , 38, 39, 40, 41]
607 Objective: 17000000
608 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
   16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
   34 35 36 37 38 39 40 41
```

```
609 42
610 Route for vehicle 0:
611 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
612 Distance of the route: 0 ft
613 Remaining Fuel of the route: 287700
614 Total Time of the route: 0 seconds
615
616 Total Distance of all routes: 0 ft
617 Total Fuel remaining of all routes: 287700
618 Total Time of all routes: 0 seconds
619 3
620 Start point is: 3
621 16
622 16
623 (5.4, 6.19) (8.6, 4.29)
624 14 14
625 The travel time for UGV from depot B to NW UGV stop
    is: 3754
626 The UGV travel time between two UGV stops is: 5402
627 ****
**  

628 UGV route goes infeasible although UAV has a
    solution
629 ****
**  

630 54110971.5
631 End node is [18]
632 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
633 []
634 *****No solution found*****
635 2
636 Start point is: 2
637 16
638 16
639 (8.29, 4.03) (5.28, 5.71)
640 14 15
641 The travel time for UGV from depot B to NW UGV stop
    is: 3616
642 The UGV travel time between two UGV stops is: 4787
```

```
643 24328209.0
644 End node is [24]
645 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
646 [25, 26, 27, 28, 29, 30, 31]
647 Objective: 7000000
648 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31
649 32
650 Route for vehicle 0:
651 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
652 Distance of the route: 0 ft
653 Remaining Fuel of the route: 287700
654 Total Time of the route: 0 seconds
655
656 Total Distance of all routes: 0 ft
657 Total Fuel remaining of all routes: 287700
658 Total Time of all routes: 0 seconds
659 4
660 Start point is: 4
661 31
662 16
663 (4.92, 4.29) (8.91, 4.54)
664 15 15
665 The travel time for UGV from depot B to NW UGV stop
    is: 1379
666 The UGV travel time between two UGV stops is: 4555
667 11419224.0
668 End node is [24]
669 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
670 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39]
671 Objective: 15000000
672 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39
673 40
674 Route for vehicle 0:
675 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
```

```
675 Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
676 Distance of the route: 0 ft
677 Remaining Fuel of the route: 287700
678 Total Time of the route: 0 seconds
679
680 Total Distance of all routes: 0 ft
681 Total Fuel remaining of all routes: 287700
682 Total Time of all routes: 0 seconds
683 5
684 Start point is: 5
685 16
686 31
687 (7.06, 3.02) (5.52, 6.66)
688 15 14
689 The travel time for UGV from depot B to NW UGV stop
is: 841
690 The UGV travel time between two UGV stops is: 4829
691 11110332.0
692 End node is [24]
693 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
15, 16, 17, 18, 19, 20, 21, 22, 23]
694 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
, 38, 39]
695 Objective: 15000000
696 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
34 35 36 37 38 39
697 40
698 Route for vehicle 0:
699 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
700 Distance of the route: 0 ft
701 Remaining Fuel of the route: 287700
702 Total Time of the route: 0 seconds
703
704 Total Distance of all routes: 0 ft
705 Total Fuel remaining of all routes: 287700
706 Total Time of all routes: 0 seconds
707 3
708 Start point is: 3
709 16
```

```
710 16
711 (8.91, 4.54) (5.28, 5.71)
712 15 15
713 The travel time for UGV from depot B to NW UGV stop
    is: 3786
714 The UGV travel time between two UGV stops is: 5069
715 ****
    **
716 UGV route goes infeasible although UAV has a
    solution
717 ****
    **
718 53773837.5
719 End node is [18]
720 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
721 []
722 *****No solution found*****
723 4
724 Start point is: 4
725 31
726 16
727 (7.68, 3.53) (5.64, 7.14)
728 14 14
729 The travel time for UGV from depot B to NW UGV stop
    is: 4767
730 The UGV travel time between two UGV stops is: 5323
731 21202842.0
732 End node is [24]
733 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
734 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43]
735 Objective: 19000000
736 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42 43
737 44
738 Route for vehicle 0:
739 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
```

```
740 Distance of the route: 0 ft
741 Remaining Fuel of the route: 287700
742 Total Time of the route: 0 seconds
743
744 Total Distance of all routes: 0 ft
745 Total Fuel remaining of all routes: 287700
746 Total Time of all routes: 0 seconds
747 4
748 Start point is: 4
749 31
750 16
751 (7.37, 3.27) (5.4, 6.19)
752 14 14
753 The travel time for UGV from depot B to NW UGV stop
    is: 4612
754 The UGV travel time between two UGV stops is: 4799
755 19362517.5
756 End node is [24]
757 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
758 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44]
759 Objective: 20000000
760 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42 43 44
761 45
762 Route for vehicle 0:
763 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
764 Distance of the route: 0 ft
765 Remaining Fuel of the route: 287700
766 Total Time of the route: 0 seconds
767
768 Total Distance of all routes: 0 ft
769 Total Fuel remaining of all routes: 287700
770 Total Time of all routes: 0 seconds
771 3
772 Start point is: 3
773 16
774 16
```

```
775 (5.28, 5.71) (8.29, 4.03)
776 15 15
777 The travel time for UGV from depot B to NW UGV stop
    is: 3430
778 The UGV travel time between two UGV stops is: 4787
779 ****
    **
780 UGV route goes infeasible although UAV has a
    solution
781 ****
    **
782 52125316.5
783 End node is [18]
784 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
785 [25]
786 *****No solution found*****
787 3
788 Start point is: 3
789 16
790 16
791 (5.88, 8.09) (8.6, 4.29)
792 15 14
793 The travel time for UGV from depot B to NW UGV stop
    is: 4296
794 The UGV travel time between two UGV stops is: 6141
795 ****
    **
796 UGV route goes infeasible although UAV has a
    solution
797 ****
    **
798 58985812.5
799 End node is [18]
800 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
801 []
802 *****No solution found*****
803 3
804 Start point is: 3
805 16
```

```
806 16
807 (7.98, 3.78) (4.8, 3.81)
808 15 15
809 The travel time for UGV from depot B to NW UGV stop
is: 3363
810 The UGV travel time between two UGV stops is: 3956
811 ****
812 UGV route goes infeasible although UAV has a
solution
813 ****
814 41815876.5
815 End node is [18]
816 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
15, 16, 17]
817 []
818 *****No solution found*****
819 3
820 Start point is: 3
821 16
822 16
823 (8.91, 4.54) (5.04, 4.76)
824 14 15
825 The travel time for UGV from depot B to NW UGV stop
is: 3946
826 The UGV travel time between two UGV stops is: 4724
827 ****
828 UGV route goes infeasible although UAV has a
solution
829 ****
830 53135955.0
831 End node is [18]
832 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
15, 16, 17]
833 [25]
834 *****No solution found*****
835 3
836 Start point is: 3
```

```
837 16
838 16
839 (5.64, 7.14) (8.91, 4.54)
840 14 14
841 The travel time for UGV from depot B to NW UGV stop
is: 4124
842 The UGV travel time between two UGV stops is: 5923
843 ****
844 **
845 UGV route goes infeasible although UAV has a
solution
846 ****
847 **
848 End node is [18]
849 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
15, 16, 17]
850 []
851 ****No solution found****
852 3
853 Start point is: 3
854 16
855 16
856 (5.16, 5.24) (8.91, 4.54)
857 14 14
858 The travel time for UGV from depot B to NW UGV stop
is: 3385
859 ****
860 **
861 UGV route goes infeasible although UAV has a
solution
862 ****
863 **
864 End node is [18]
865 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
15, 16, 17]
866 []
867 ****No solution found****
868 3
```

```
868 Start point is: 3
869 16
870 16
871 (5.16, 5.24) (8.29, 4.03)
872 14 14
873 The travel time for UGV from depot B to NW UGV stop
is: 3385
874 The UGV travel time between two UGV stops is: 4882
875 ****
876 UGV route goes infeasible although UAV has a
solution
877 ****
878 47373462.0
879 End node is [18]
880 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
15, 16, 17]
881 [25, 26]
882 Objective: 7096
883 Dropped nodes: 2 3 4 5 6 7 8 9 10 11 13 14 15 16
884 27
885 27
886 27
887 27
888 27
889 27
890 27
891 27
892 27
893 27
894 27
895 27
896 Route for vehicle 0:
897 0 Fuel(287700) Time(1557,1557) Slack(60) FuelSlack(0
,0) Distance(0) -> 22 Fuel(85854) Time(2636,2636)
Slack(120) FuelSlack(0,0) Distance(33641) -> 21 Fuel
(70488) Time(2833,2833) Slack(120) FuelSlack(0,0)
Distance(36202) -> 23 Fuel(39444) Time(3109,3109)
Slack(120) FuelSlack(0,0) Distance(41376) -> 1 Fuel(
8400) Time(3385,3385) Slack(898) FuelSlack(12375,
```

```

897 49723) Distance(46550) -> 24 Fuel(275325) Time(4360,
4387) Slack(27) FuelSlack(0,0) Distance(49111) -> 17
Fuel(28948) Time(5658,5751) Slack(832) FuelSlack(
93752,151648) Distance(90174) -> 20 Fuel(193948)
Time(8111,8204) Slack(27) FuelSlack(0,0) Distance(
140609) -> 26 Fuel(54382) Time(8935,9028) Slack(27)
FuelSlack(0,0) Distance(163870) -> 25 Fuel(41764)
Time(9118,9211) Slack(27) FuelSlack(0,0) Distance(
165973) -> 12 Fuel(28948) Time(9302,9395) Slack(832)
) FuelSlack(0,68392) Distance(168109) -> 19 Fuel(
287700) Time(10982,11075) Slack(27) FuelSlack(0,0)
Distance(193038) -> 18 Fuel(39444) Time(12355,12355
) Distance(234414)

898 Distance of the route: 234414 ft
899 Remaining Fuel of the route: 39444
900 Total Time of the route: 12355 seconds
901
902 Total Distance of all routes: 234414 ft
903 Total Fuel remaining of all routes: 39444
904 Total Time of all routes: 12355 seconds
905 3
906 Start point is: 3
907 16
908 16
909 (4.92, 4.29) (7.06, 3.02)
910 15 15
911 The travel time for UGV from depot B to NW UGV stop
is: 2916
912 The UGV travel time between two UGV stops is: 3710
913 ****
**  

914 UGV route goes infeasible although UAV has a
solution
915 ****
**  

916 40349949.0
917 End node is [18]
918 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
15, 16, 17]
919 [25, 26, 27, 28, 29, 30, 31, 32]
920 Objective: 5669

```

```
921 Dropped nodes: 2 3 4 5 6 7 8 9 11 12 13 14 16 17
922 33
923 33
924 33
925 33
926 33
927 33
928 33
929 33
930 33
931 33
932 33
933 33
934 33
935 33
936 33
937 33
938 33
939 33
940 Route for vehicle 0:
941 0 Fuel(287700) Time(1537,1537) Slack(45) FuelSlack(0,0) Distance(0) -> 25 Fuel(132570) Time(2365,2380) Slack(105) FuelSlack(0,0) Distance(25855) -> 24 Fuel(117204) Time(2562,2577) Slack(105) FuelSlack(0,0) Distance(28416) -> 1 Fuel(70794) Time(2916,2931) Slack(697) FuelSlack(15366,86160) Distance(36151) -> 26 Fuel(272334) Time(3690,3933) Slack(0) FuelSlack(0,0) Distance(38712) -> 15 Fuel(52716) Time(4799,5162) Slack(755) FuelSlack(52716,54624) Distance(75315) -> 23 Fuel(287700) Time(6868,7231) Slack(0) FuelSlack(0,0) Distance(118687) -> 22 Fuel(272028) Time(6947,7430) Slack(0) FuelSlack(0,0) Distance(121299) -> 21 Fuel(256662) Time(7024,7627) Slack(0) FuelSlack(0,0) Distance(123860) -> 20 Fuel(240990) Time(7125,7826) Slack(0) FuelSlack(0,0) Distance(126472) -> 19 Fuel(225624) Time(7322,8023) Slack(0) FuelSlack(0,0) Distance(129033) -> 32 Fuel(77766) Time(8188,8889) Slack(0) FuelSlack(0,0) Distance(153676) -> 31 Fuel(65148) Time(8371,8978) Slack(0) FuelSlack(0,0) Distance(155779) -> 30 Fuel(52332) Time(8555,9042) Slack(0) FuelSlack(0,0)
```

```

941 Distance(157915) -> 29 Fuel(39714) Time(8738,9105)
    Slack(0) FuelSlack(0,0) Distance(160018) -> 28 Fuel(
    27342) Time(8920,9167) Slack(0) FuelSlack(0,0)
    Distance(162080) -> 27 Fuel(14526) Time(9104,9231)
    Slack(0) FuelSlack(0,0) Distance(164216) -> 10 Fuel(
    1908) Time(9287,9294) Slack(918) FuelSlack(0,287700
    ) Distance(166319) -> 18 Fuel(287700) Time(10850,
    10850) Distance(187405)
942 Distance of the route: 187405 ft
943 Remaining Fuel of the route: 287700
944 Total Time of the route: 10850 seconds
945
946 Total Distance of all routes: 187405 ft
947 Total Fuel remaining of all routes: 287700
948 Total Time of all routes: 10850 seconds
949 4
950 Start point is: 4
951 31
952 16
953 (5.4, 6.19) (7.06, 3.02)
954 15 14
955 The travel time for UGV from depot B to NW UGV stop
    is: 689
956 The UGV travel time between two UGV stops is: 4648
957 10108570.5
958 End node is [24]
959 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
960 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44, 45]
961 Objective: 21000000
962 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42 43 44 45
963 46
964 Route for vehicle 0:
965 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
966 Distance of the route: 0 ft
967 Remaining Fuel of the route: 287700
968 Total Time of the route: 0 seconds

```

```
969
970 Total Distance of all routes: 0 ft
971 Total Fuel remaining of all routes: 287700
972 Total Time of all routes: 0 seconds
973 2
974 Start point is: 2
975 16
976 16
977 (8.6, 4.29) (5.04, 4.76)
978 15 14
979 The travel time for UGV from depot B to NW UGV stop
    is: 3516
980 The UGV travel time between two UGV stops is: 4844
981 24068965.5
982 End node is [24]
983 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
984 [25, 26, 27, 28, 29, 30, 31, 32]
985 Objective: 8000000
986 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32
987 33
988 Route for vehicle 0:
989 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
990 Distance of the route: 0 ft
991 Remaining Fuel of the route: 287700
992 Total Time of the route: 0 seconds
993
994 Total Distance of all routes: 0 ft
995 Total Fuel remaining of all routes: 287700
996 Total Time of all routes: 0 seconds
997 3
998 Start point is: 3
999 16
1000 16
1001 (7.06, 3.02) (5.04, 4.76)
1002 15 14
1003 The travel time for UGV from depot B to NW UGV stop
    is: 2941
```

```
1004 The UGV travel time between two UGV stops is: 4090
1005 ****
***  
1006 UGV route goes infeasible although UAV has a
solution  
1007 ****
***  
1008 44448616.5  
1009 End node is [18]  
1010 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
15, 16, 17]  
1011 [25, 26, 27, 28, 29, 30, 31]  
1012 Objective: 6295  
1013 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 13 14 15 16  
1014 32  
1015 32  
1016 32  
1017 32  
1018 32  
1019 32  
1020 32  
1021 32  
1022 32  
1023 32  
1024 32  
1025 32  
1026 32  
1027 32  
1028 32  
1029 32  
1030 32  
1031 Route for vehicle 0:  
1032 0 Fuel(278251) Time(1540,1540) Slack(60) FuelSlack(
0,0) Distance(0) -> 26 Fuel(139117) Time(2302,2302
) Slack(120) FuelSlack(0,0) Distance(23189) -> 27
Fuel(126301) Time(2486,2486) Slack(120) FuelSlack(0
,0) Distance(25325) -> 31 Fuel(75883) Time(2860,
2860) Slack(120) FuelSlack(0,0) Distance(33728) ->
30 Fuel(63265) Time(3043,3043) Slack(120) FuelSlack
(0,0) Distance(35831) -> 29 Fuel(50449) Time(3227,
3227) Slack(120) FuelSlack(0,0) Distance(37967) ->
```

```

1032 28 Fuel(37831) Time(3410,3410) Slack(120) FuelSlack
    (0,0) Distance(40070) -> 6 Fuel(25) Time(3720,3720
    ) Slack(925) FuelSlack(27443,27493) Distance(46371
    ) -> 23 Fuel(260257) Time(5217,5217) Slack(120)
    FuelSlack(0,0) Distance(65265) -> 17 Fuel(25) Time(
    6651,6651) Slack(925) FuelSlack(178877,178927)
    Distance(108637) -> 19 Fuel(108823) Time(9176,9176
    ) Slack(120) FuelSlack(0,0) Distance(161443) -> 20
    Fuel(93457) Time(9373,9373) Slack(120) FuelSlack(0,
    0) Distance(164004) -> 21 Fuel(77785) Time(9572,
    9572) Slack(120) FuelSlack(0,0) Distance(166616
    ) -> 22 Fuel(62419) Time(9769,9769) Slack(120)
    FuelSlack(0,0) Distance(169177) -> 24 Fuel(31069)
    Time(10047,10047) Slack(120) FuelSlack(0,0)
    Distance(174402) -> 12 Fuel(25) Time(10323,10323)
    Slack(925) FuelSlack(15672,15697) Distance(179576
    ) -> 25 Fuel(272028) Time(11327,11327) Slack(120)
    FuelSlack(0,0) Distance(182188) -> 18 Fuel(116898)
    Time(12230,12230) Distance(208043)

1033 Distance of the route: 208043 ft
1034 Remaining Fuel of the route: 116898
1035 Total Time of the route: 12230 seconds
1036
1037 Total Distance of all routes: 208043 ft
1038 Total Fuel remaining of all routes: 116898
1039 Total Time of all routes: 12230 seconds
1040 2
1041 Start point is: 2
1042 16
1043 16
1044 (8.29, 4.03) (4.8, 3.81)
1045 15 14
1046 The travel time for UGV from depot B to NW UGV stop
    is: 3375
1047 The UGV travel time between two UGV stops is: 4324
1048 21700785.0
1049 End node is [24]
1050 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
1051 [25, 26]
1052 Objective: 2000000

```

```

1053 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26
1054 27
1055 Route for vehicle 0:
1056 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
1057 Distance of the route: 0 ft
1058 Remaining Fuel of the route: 287700
1059 Total Time of the route: 0 seconds
1060
1061 Total Distance of all routes: 0 ft
1062 Total Fuel remaining of all routes: 287700
1063 Total Time of all routes: 0 seconds
1064 2
1065 Start point is: 2
1066 16
1067 16
1068 (7.68, 3.53) (5.88, 8.09)
1069 15 14
1070 The travel time for UGV from depot B to NW UGV stop
    is: 3097
1071 The UGV travel time between two UGV stops is: 5693
1072 ****
    ***
1073 UGV route goes infeasible although UAV has a
    solution
1074 ****
    ***
1075 27967134.0
1076 End node is [24]
1077 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
1078 [25, 26, 27, 28]
1079 Objective: 4000000
1080 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28
1081 29
1082 Route for vehicle 0:
1083 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )

```

```
1083 )
1084 Distance of the route: 0 ft
1085 Remaining Fuel of the route: 287700
1086 Total Time of the route: 0 seconds
1087
1088 Total Distance of all routes: 0 ft
1089 Total Fuel remaining of all routes: 287700
1090 Total Time of all routes: 0 seconds
1091 5
1092 Start point is: 5
1093 16
1094 31
1095 (8.6, 4.29) (5.76, 7.62)
1096 15 14
1097 The travel time for UGV from depot B to NW UGV stop
    is: 140
1098 The UGV travel time between two UGV stops is: 5957
1099 23644701.0
1100 End node is [24]
1101 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
1102 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40]
1103 Objective: 16000000
1104 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40
1105 41
1106 Route for vehicle 0:
1107 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
1108 Distance of the route: 0 ft
1109 Remaining Fuel of the route: 287700
1110 Total Time of the route: 0 seconds
1111
1112 Total Distance of all routes: 0 ft
1113 Total Fuel remaining of all routes: 287700
1114 Total Time of all routes: 0 seconds
1115 3
1116 Start point is: 3
```

```
1117 16
1118 16
1119 (7.68, 3.53) (4.8, 3.81)
1120 14 14
1121 The travel time for UGV from depot B to NW UGV stop
    is: 3347
1122 The UGV travel time between two UGV stops is: 4026
1123 ****
***  

1124 UGV route goes infeasible although UAV has a
    solution
1125 ****
***  

1126 44061463.5
1127 End node is [18]
1128 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
1129 []
1130 *****No solution found*****
1131 3
1132 Start point is: 3
1133 16
1134 16
1135 (5.76, 7.62) (7.98, 3.78)
1136 14 14
1137 The travel time for UGV from depot B to NW UGV stop
    is: 4309
1138 The UGV travel time between two UGV stops is: 5655
1139 ****
***  

1140 UGV route goes infeasible although UAV has a
    solution
1141 ****
***  

1142 60935248.5
1143 End node is [18]
1144 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
1145 []
1146 *****No solution found*****
1147 3
```

```
1148 Start point is: 3
1149 16
1150 16
1151 (8.29, 4.03) (5.88, 8.09)
1152 15 15
1153 The travel time for UGV from depot B to NW UGV stop
    is: 3504
1154 The UGV travel time between two UGV stops is: 5653
1155 ****
1156 ***UGV route goes infeasible although UAV has a
    solution
1157 ****
1158 ***
1159 End node is [18]
1160 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
1161 []
1162 *****No solution found*****
1163 4
1164 Start point is: 4
1165 31
1166 16
1167 (5.76, 7.62) (7.06, 3.02)
1168 15 14
1169 The travel time for UGV from depot B to NW UGV stop
    is: 172
1170 The UGV travel time between two UGV stops is: 5202
1171 10538544.0
1172 End node is [24]
1173 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
1174 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44, 45]
1175 Objective: 21000000
1176 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42 43 44 45
1177 46
1178 Route for vehicle 0:
```

```
1179 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
1180 Distance of the route: 0 ft
1181 Remaining Fuel of the route: 287700
1182 Total Time of the route: 0 seconds
1183
1184 Total Distance of all routes: 0 ft
1185 Total Fuel remaining of all routes: 287700
1186 Total Time of all routes: 0 seconds
1187 5
1188 Start point is: 5
1189 16
1190 31
1191 (8.29, 4.03) (5.76, 7.62)
1192 14 15
1193 The travel time for UGV from depot B to NW UGV stop
    is: 301
1194 The UGV travel time between two UGV stops is: 5480
1195 22592505.0
1196 End node is [24]
1197 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
1198 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40]
1199 Objective: 16000000
1200 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40
1201 41
1202 Route for vehicle 0:
1203 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
1204 Distance of the route: 0 ft
1205 Remaining Fuel of the route: 287700
1206 Total Time of the route: 0 seconds
1207
1208 Total Distance of all routes: 0 ft
1209 Total Fuel remaining of all routes: 287700
1210 Total Time of all routes: 0 seconds
```

```
1211 4
1212 Start point is: 4
1213 31
1214 16
1215 (7.98, 3.78) (5.4, 6.19)
1216 15 14
1217 The travel time for UGV from depot B to NW UGV stop
    is: 4586
1218 The UGV travel time between two UGV stops is: 5100
1219 19779780.0
1220 End node is [24]
1221 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
1222 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42]
1223 Objective: 18000000
1224 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42
1225 43
1226 Route for vehicle 0:
1227 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
1228 Distance of the route: 0 ft
1229 Remaining Fuel of the route: 287700
1230 Total Time of the route: 0 seconds
1231
1232 Total Distance of all routes: 0 ft
1233 Total Fuel remaining of all routes: 287700
1234 Total Time of all routes: 0 seconds
1235 3
1236 Start point is: 3
1237 16
1238 16
1239 (7.68, 3.53) (5.04, 4.76)
1240 14 14
1241 The travel time for UGV from depot B to NW UGV stop
    is: 3347
1242 The UGV travel time between two UGV stops is: 4395
1243 *****
```

```
1243 ***
1244 UGV route goes infeasible although UAV has a
    solution
1245 ****
    ***
1246 48835117.5
1247 End node is [18]
1248 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
1249 [25, 26, 27, 28, 29]
1250 Objective: 7285
1251 Dropped nodes: 1 3 4 6 7 8 9 10 11 13 14 15 17
1252 30
1253 30
1254 30
1255 30
1256 30
1257 30
1258 30
1259 30
1260 30
1261 30
1262 30
1263 30
1264 30
1265 30
1266 30
1267 30
1268 Route for vehicle 0:
1269 0 Fuel(286453) Time(1597,1597) Slack(60) FuelSlack(
    0,0) Distance(0) -> 25 Fuel(131323) Time(2440,2440
    ) Slack(120) FuelSlack(0,0) Distance(25855) -> 27
    Fuel(25015) Time(3096,3096) Slack(120) FuelSlack(0,
    0) Distance(43573) -> 26 Fuel(12397) Time(3279,3279
    ) Slack(120) FuelSlack(0,0) Distance(45676) -> 2
    Fuel(25) Time(3461,3461) Slack(925) FuelSlack(50418
    ,50443) Distance(47738) -> 29 Fuel(237282) Time(
    4640,4640) Slack(120) FuelSlack(0,0) Distance(56141
    ) -> 28 Fuel(224664) Time(4823,4823) Slack(120)
    FuelSlack(0,0) Distance(58244) -> 5 Fuel(186858)
    Time(5133,5133) Slack(324) FuelSlack(196806,196831
```

```

1269 ) Distance(64545) -> 22 Fuel(277752) Time(6066,6066
      ) Slack(120) FuelSlack(0,0) Distance(84668) -> 24
      Fuel(246402) Time(6344,6344) Slack(120) FuelSlack(0
      ,0) Distance(89893) -> 16 Fuel(25) Time(7708,7708)
      Slack(925) FuelSlack(178877,178927) Distance(130956
      ) -> 19 Fuel(108823) Time(10233,10233) Slack(120)
      FuelSlack(0,0) Distance(183762) -> 20 Fuel(93457)
      Time(10430,10430) Slack(120) FuelSlack(0,0)
      Distance(186323) -> 21 Fuel(77785) Time(10629,10629
      ) Slack(120) FuelSlack(0,0) Distance(188935) -> 12
      Fuel(25) Time(11141,11141) Slack(925) FuelSlack(0,
      101551) Distance(201895) -> 23 Fuel(287700) Time(
      12301,12301) Slack(120) FuelSlack(0,0) Distance(
      209681) -> 18 Fuel(101526) Time(13361,13361)
      Distance(240710)

1270 Distance of the route: 240710 ft
1271 Remaining Fuel of the route: 101526
1272 Total Time of the route: 13361 seconds
1273
1274 Total Distance of all routes: 240710 ft
1275 Total Fuel remaining of all routes: 101526
1276 Total Time of all routes: 13361 seconds
1277 4
1278 Start point is: 4
1279 31
1280 16
1281 (5.64, 7.14) (7.68, 3.53)
1282 14 15
1283 The travel time for UGV from depot B to NW UGV stop
      is: 369
1284 The UGV travel time between two UGV stops is: 5030
1285 10545931.5
1286 End node is [24]
1287 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
1288 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39, 40, 41, 42, 43]
1289 Objective: 19000000
1290 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
      16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
      34 35 36 37 38 39 40 41 42 43

```

```
1291 44
1292 Route for vehicle 0:
1293 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
1294 Distance of the route: 0 ft
1295 Remaining Fuel of the route: 287700
1296 Total Time of the route: 0 seconds
1297
1298 Total Distance of all routes: 0 ft
1299 Total Fuel remaining of all routes: 287700
1300 Total Time of all routes: 0 seconds
1301 2
1302 Start point is: 2
1303 16
1304 16
1305 (5.28, 5.71) (8.6, 4.29)
1306 15 15
1307 The travel time for UGV from depot B to NW UGV stop
    is: 3301
1308 The UGV travel time between two UGV stops is: 4928
1309 24725494.5
1310 End node is [24]
1311 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
1312 [25, 26, 27, 28, 29, 30]
1313 Objective: 6000000
1314 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30
1315 31
1316 Route for vehicle 0:
1317 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
1318 Distance of the route: 0 ft
1319 Remaining Fuel of the route: 287700
1320 Total Time of the route: 0 seconds
1321
1322 Total Distance of all routes: 0 ft
1323 Total Fuel remaining of all routes: 287700
1324 Total Time of all routes: 0 seconds
```

```
1325 3
1326 Start point is: 3
1327 16
1328 16
1329 (5.04, 4.76) (7.68, 3.53)
1330 15 14
1331 The travel time for UGV from depot B to NW UGV stop
    is: 3085
1332 The UGV travel time between two UGV stops is: 4395
1333 ****
***  
1334 UGV route goes infeasible although UAV has a
    solution
1335 ****
***  
1336 46192956.0
1337 End node is [18]
1338 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
1339 [25, 26, 27, 28, 29]
1340 *****No solution found*****  
1341 4
1342 Start point is: 4
1343 31
1344 16
1345 (5.28, 5.71) (7.37, 3.27)
1346 14 15
1347 The travel time for UGV from depot B to NW UGV stop
    is: 924
1348 The UGV travel time between two UGV stops is: 4365
1349 10170226.5
1350 End node is [24]
1351 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31, 32, 33]
1352 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44]
1353 Objective: 20000000
1354 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42 43 44
1355 45
```

```
1356 Route for vehicle 0:  
1357 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)  
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0  
    )  
1358 Distance of the route: 0 ft  
1359 Remaining Fuel of the route: 287700  
1360 Total Time of the route: 0 seconds  
1361  
1362 Total Distance of all routes: 0 ft  
1363 Total Fuel remaining of all routes: 287700  
1364 Total Time of all routes: 0 seconds  
1365 4  
1366 Start point is: 4  
1367 31  
1368 16  
1369 (7.37, 3.27) (4.92, 4.29)  
1370 15 14  
1371 The travel time for UGV from depot B to NW UGV stop  
    is: 4304  
1372 The UGV travel time between two UGV stops is: 4060  
1373 16994889.0  
1374 End node is [24]  
1375 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,  
    15, 16, 17, 18, 19, 20, 21, 22, 23]  
1376 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37  
    , 38, 39, 40, 41, 42, 43, 44]  
1377 Objective: 20000000  
1378 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15  
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33  
    34 35 36 37 38 39 40 41 42 43 44  
1379 45  
1380 Route for vehicle 0:  
1381 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)  
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0  
    )  
1382 Distance of the route: 0 ft  
1383 Remaining Fuel of the route: 287700  
1384 Total Time of the route: 0 seconds  
1385  
1386 Total Distance of all routes: 0 ft  
1387 Total Fuel remaining of all routes: 287700
```

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1388 Total Time of all routes: 0 seconds
1389 4
1390 Start point is: 4
1391 31
1392 16
1393 (5.4, 6.19) (7.98, 3.78)
1394 15 15
1395 The travel time for UGV from depot B to NW UGV stop
    is: 689
1396 The UGV travel time between two UGV stops is: 4822
1397 10542067.5
1398 End node is [24]
1399 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
1400 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42]
1401 Objective: 18000000
1402 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42
1403 43
1404 Route for vehicle 0:
1405 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
1406 Distance of the route: 0 ft
1407 Remaining Fuel of the route: 287700
1408 Total Time of the route: 0 seconds
1409
1410 Total Distance of all routes: 0 ft
1411 Total Fuel remaining of all routes: 287700
1412 Total Time of all routes: 0 seconds
1413 4
1414 Start point is: 4
1415 31
1416 16
1417 (4.92, 4.29) (8.6, 4.29)
1418 14 14
1419 The travel time for UGV from depot B to NW UGV stop
    is: 1478
1420 The UGV travel time between two UGV stops is: 4663
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1421 12321832.5
1422 End node is [24]
1423 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
1424 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40]
1425 Objective: 16000000
1426 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40
1427 41
1428 Route for vehicle 0:
1429 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
1430 Distance of the route: 0 ft
1431 Remaining Fuel of the route: 287700
1432 Total Time of the route: 0 seconds
1433
1434 Total Distance of all routes: 0 ft
1435 Total Fuel remaining of all routes: 287700
1436 Total Time of all routes: 0 seconds
1437 4
1438 Start point is: 4
1439 31
1440 16
1441 (5.88, 8.09) (7.68, 3.53)
1442 15 15
1443 The travel time for UGV from depot B to NW UGV stop
    is: 0
1444 The UGV travel time between two UGV stops is: 5375
1445 10804759.5
1446 End node is [24]
1447 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
1448 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43]
1449 Objective: 19000000
1450 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42 43
```

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1451 44
1452 Route for vehicle 0:
1453 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
1454 Distance of the route: 0 ft
1455 Remaining Fuel of the route: 287700
1456 Total Time of the route: 0 seconds
1457
1458 Total Distance of all routes: 0 ft
1459 Total Fuel remaining of all routes: 287700
1460 Total Time of all routes: 0 seconds
1461 5
1462 Start point is: 5
1463 16
1464 31
1465 (7.98, 3.78) (5.52, 6.66)
1466 14 15
1467 The travel time for UGV from depot B to NW UGV stop
    is: 452
1468 The UGV travel time between two UGV stops is: 4991
1469 10883413.5
1470 End node is [24]
1471 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
1472 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39]
1473 Objective: 15000000
1474 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39
1475 40
1476 Route for vehicle 0:
1477 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
1478 Distance of the route: 0 ft
1479 Remaining Fuel of the route: 287700
1480 Total Time of the route: 0 seconds
1481
1482 Total Distance of all routes: 0 ft
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1483 Total Fuel remaining of all routes: 287700
1484 Total Time of all routes: 0 seconds
1485 Candidate 1: [83, 14, 15, 48, 5, 5446, 5]
1486 Candidate 2: [80, 15, 14, 36, 21, 50000000, 4]
1487 Candidate 1: [74, 15, 15, 31, 12, 5447, 5]
1488 Candidate 2: [29, 14, 14, 35, 40, 50000000, 4]
1489 Father before deletion: [83, 14, 15, 48, 5, 5446, 5
    ]
1490 Mother before deletion: [74, 15, 15, 31, 12, 5447,
    5]
1491 Father after deletion: [83, 14, 15, 48, 5, 5]
1492 Mother after deletion: [74, 15, 15, 31, 12, 5]
1493 010100110000111000001111001100000000010100000101
1494 010010100000111100001111000111110000110000000101
1495 Offspring1 after mutation:
    010100110000111000001111000111000000010100000101
1496 Offspring2 after mutation:
    010010100000111100001111001100100000110000000101
1497 48 48
1498 [83, 14, 15, 28, 5, 5]
1499 [74, 15, 15, 50, 12, 5]
1500 Candidate 1: [85, 14, 15, 19, 23, 5507, 5]
1501 Candidate 2: [7, 14, 14, 12, 41, 50000000, 4]
1502 Candidate 1: [73, 15, 15, 36, 11, 5005669, 3]
1503 Candidate 2: [110, 14, 14, 28, 49, 50000000, 3]
1504 Father before deletion: [85, 14, 15, 19, 23, 5507,
    5]
1505 Mother before deletion: [73, 15, 15, 36, 11,
    5005669, 3]
1506 Father after deletion: [85, 14, 15, 19, 23, 5]
1507 Mother after deletion: [73, 15, 15, 36, 11, 3]
1508 010101010000111000001111000100110001011100000101
1509 010010010000111100001111001001000000101100000011
1510 Offspring1 after mutation:
    010101010000111000001111000100110001011100000101
1511 Offspring2 after mutation:
    010010010000111100001111001001000000101100000011
1512 48 48
1513 [85, 14, 15, 19, 23, 5]
1514 [73, 15, 15, 36, 11, 3]
1515 Candidate 1: [4, 15, 14, 18, 41, 5006295, 3]

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1516 Candidate 2: [10, 14, 15, 47, 25, 50000000, 4]
1517 Candidate 1: [115, 14, 14, 3, 30, 5007096, 3]
1518 Candidate 2: [71, 14, 15, 5, 3, 50000000, 2]
1519 Father before deletion: [4, 15, 14, 18, 41, 5006295
, 3]
1520 Mother before deletion: [115, 14, 14, 3, 30,
5007096, 3]
1521 Father after deletion: [4, 15, 14, 18, 41, 3]
1522 Mother after deletion: [115, 14, 14, 3, 30, 3]
1523 000001000000111100001110000100100010100100000011
1524 011100110000111000001110000000110001111000000011
1525 Offspring1 after mutation:
000001000000111100001110000100100010100100000011
1526 Offspring2 after mutation:
011100110000111000001110000000110001111000000011
1527 48 48
1528 [4, 15, 14, 18, 41, 3]
1529 [115, 14, 14, 3, 30, 3]
1530 Candidate 1: [24, 14, 14, 34, 32, 5007285, 3]
1531 Candidate 2: [54, 15, 14, 30, 37, 50000000, 2]
1532 Candidate 1: [27, 14, 15, 4, 35, 15004294, 5]
1533 Candidate 2: [101, 15, 15, 42, 37, 50000000, 4]
1534 Father before deletion: [24, 14, 14, 34, 32,
5007285, 3]
1535 Mother before deletion: [27, 14, 15, 4, 35,
15004294, 5]
1536 Father after deletion: [24, 14, 14, 34, 32, 3]
1537 Mother after deletion: [27, 14, 15, 4, 35, 5]
1538 00011000000011100000111000100010001000000000011
1539 00011011000011100000111100001000010001100000101
1540 Offspring1 after mutation:
00011000000011100000111100000010001000000000011
1541 Offspring2 after mutation:
000110110000111000001110001001000010001100000101
1542 48 48
1543 [24, 14, 15, 2, 32, 3]
1544 [27, 14, 14, 36, 35, 5]
1545 Candidate 1: [69, 14, 14, 17, 26, 16001408, 5]
1546 Candidate 2: [138, 15, 15, 2, 33, 50000000, 5]
1547 Candidate 1: [88, 14, 14, 7, 20, 50000000, 2]
1548 Candidate 2: [39, 15, 15, 11, 28, 50000000, 4]

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1549 Father before deletion: [69, 14, 14, 17, 26,
    16001408, 5]
1550 Mother before deletion: [88, 14, 14, 7, 20,
    50000000, 2]
1551 Father after deletion: [69, 14, 14, 17, 26, 5]
1552 Mother after deletion: [88, 14, 14, 7, 20, 2]
1553 010001010000111000001110000100010001101000000101
1554 01011000000011100000111000001110001010000000010
1555 Offspring1 after mutation:
    010001010000111000001110000100010001101000000101
1556 Offspring2 after mutation:
    01011000000011100000111000001110001010000000010
1557 48 48
1558 [69, 14, 14, 17, 26, 5]
1559 [88, 14, 14, 7, 20, 2]
1560 Candidate 1: [102, 14, 15, 5, 31, 50000000, 4]
1561 Candidate 2: [131, 15, 14, 31, 15, 50000000, 3]
1562 Candidate 1: [118, 15, 15, 24, 30, 50000000, 3]
1563 Candidate 2: [37, 15, 14, 15, 16, 50000000, 4]
1564 Father before deletion: [102, 14, 15, 5, 31,
    50000000, 4]
1565 Mother before deletion: [118, 15, 15, 24, 30,
    50000000, 3]
1566 Father after deletion: [102, 14, 15, 5, 31, 4]
1567 Mother after deletion: [118, 15, 15, 24, 30, 3]
1568 011001100000111000001111000001010001111100000100
1569 011101100000111100001111000110000001111000000011
1570 Offspring1 after mutation:
    011001100000111100001111000110010001111100000100
1571 Offspring2 after mutation:
    011101100000111000001111000001000001111000000011
1572 48 48
1573 [102, 15, 15, 25, 31, 4]
1574 [118, 14, 15, 4, 30, 3]
1575 Candidate 1: [10, 14, 15, 47, 25, 50000000, 4]
1576 Candidate 2: [123, 14, 14, 38, 26, 50000000, 4]
1577 Candidate 1: [91, 15, 15, 37, 7, 50000000, 3]
1578 Candidate 2: [126, 15, 15, 41, 22, 50000000, 2]
1579 Father before deletion: [10, 14, 15, 47, 25,
    50000000, 4]
1580 Mother before deletion: [91, 15, 15, 37, 7,

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1580 50000000, 3]
1581 Father after deletion: [10, 14, 15, 47, 25, 4]
1582 Mother after deletion: [91, 15, 15, 37, 7, 3]
1583 000010100000111000001111001011110001100100000100
1584 010110110000111100001111001001010000011100000011
1585 Offspring1 after mutation:
    000110100000111000001111001011110001100100000100
1586 Offspring2 after mutation:
    010010110000111100001111001001010000011100000011
1587 48 48
1588 [26, 14, 15, 47, 25, 4]
1589 [75, 15, 15, 37, 7, 3]
1590 Candidate 1: [7, 14, 14, 12, 41, 50000000, 4]
1591 Candidate 2: [86, 14, 15, 28, 14, 50000000, 4]
1592 Candidate 1: [19, 14, 14, 27, 17, 50000000, 2]
1593 Candidate 2: [85, 14, 15, 19, 23, 5507, 5]
1594 Father before deletion: [7, 14, 14, 12, 41,
    50000000, 4]
1595 Mother before deletion: [85, 14, 15, 19, 23, 5507,
    5]
1596 Father after deletion: [7, 14, 14, 12, 41, 4]
1597 Mother after deletion: [85, 14, 15, 19, 23, 5]
1598 000001110000111000001110000011000010100100000100
1599 010101010000111000001111000100110001011100000101
1600 Offspring1 after mutation:
    000001010000111000001111000100000010100100000100
1601 Offspring2 after mutation:
    010101110000111000001110000011110001011100000101
1602 48 48
1603 [5, 14, 15, 16, 41, 4]
1604 [87, 14, 14, 15, 23, 5]
1605 Candidate 1: [59, 14, 14, 10, 3, 50000000, 4]
1606 Candidate 2: [118, 15, 15, 24, 30, 50000000, 3]
1607 Candidate 1: [138, 15, 15, 2, 33, 50000000, 5]
1608 Candidate 2: [91, 15, 15, 37, 7, 50000000, 3]
1609 Father before deletion: [59, 14, 14, 10, 3,
    50000000, 4]
1610 Mother before deletion: [138, 15, 15, 2, 33,
    50000000, 5]
1611 Father after deletion: [59, 14, 14, 10, 3, 4]
1612 Mother after deletion: [138, 15, 15, 2, 33, 5]

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1613 00111011000011100000111000001010000001100000100
1614 100010100000111100001111000000100010000100000101
1615 Offspring1 after mutation:
    001110110000111000001111000000100010000100000100
1616 Offspring2 after mutation:
    10001010000011110000111000001010000001100000101
1617 48 48
1618 [59, 14, 15, 2, 33, 4]
1619 [138, 15, 14, 10, 3, 5]
1620 Candidate 1: [39, 15, 15, 11, 28, 50000000, 4]
1621 Candidate 2: [105, 14, 14, 49, 50, 50000000, 3]
1622 Candidate 1: [14, 15, 15, 9, 48, 50000000, 4]
1623 Candidate 2: [102, 14, 15, 5, 31, 50000000, 4]
1624 Father before deletion: [39, 15, 15, 11, 28,
    50000000, 4]
1625 Mother before deletion: [14, 15, 15, 9, 48,
    50000000, 4]
1626 Father after deletion: [39, 15, 15, 11, 28, 4]
1627 Mother after deletion: [14, 15, 15, 9, 48, 4]
1628 001001110000111100001111000010110001110000000100
1629 000011100000111100001111000010010011000000000100
1630 Offspring1 after mutation:
    000011100000111100001111000010110001110000000100
1631 Offspring2 after mutation:
    001001110000111100001111000010010011000000000100
1632 48 48
1633 [14, 15, 15, 11, 28, 4]
1634 [39, 15, 15, 9, 48, 4]
1635 Candidate 1: [121, 15, 15, 15, 13, 50000000, 3]
1636 Candidate 2: [135, 14, 14, 46, 5, 50000000, 3]
1637 Candidate 1: [71, 14, 15, 5, 3, 50000000, 2]
1638 Candidate 2: [13, 15, 14, 32, 11, 50000000, 4]
1639 Father before deletion: [121, 15, 15, 15, 13,
    50000000, 3]
1640 Mother before deletion: [71, 14, 15, 5, 3, 50000000
    , 2]
1641 Father after deletion: [121, 15, 15, 15, 13, 3]
1642 Mother after deletion: [71, 14, 15, 5, 3, 2]
1643 011110010000111100001111000011110000110100000011
1644 010001110000111000001111000001010000001100000010
1645 Offspring1 after mutation:
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1645 011110010000111000001111000001010000001100000011
1646 Offspring2 after mutation:
    010001110000111100001111000011110000110100000010
1647 48 48
1648 [121, 14, 15, 5, 3, 3]
1649 [71, 15, 15, 15, 13, 2]
1650 Candidate 1: [95, 15, 15, 44, 45, 50000000, 4]
1651 Candidate 2: [17, 14, 14, 11, 36, 50000000, 4]
1652 Candidate 1: [105, 14, 14, 49, 50, 50000000, 3]
1653 Candidate 2: [31, 15, 14, 49, 24, 50000000, 2]
1654 Father before deletion: [95, 15, 15, 44, 45,
    50000000, 4]
1655 Mother before deletion: [105, 14, 14, 49, 50,
    50000000, 3]
1656 Father after deletion: [95, 15, 15, 44, 45, 4]
1657 Mother after deletion: [105, 14, 14, 49, 50, 3]
1658 01011110000111100001111001011000010110100000100
1659 011010010000111000001110001100010011001000000011
1660 Offspring1 after mutation:
    01011110000111100001110001100010011001000000100
1661 Offspring2 after mutation:
    011010010000111000001111001011000010110100000011
1662 48 48
1663 [95, 15, 14, 49, 50, 4]
1664 [105, 14, 15, 44, 45, 3]
1665 Candidate 1: [56, 15, 14, 21, 48, 50000000, 2]
1666 Candidate 2: [133, 15, 15, 18, 9, 50000000, 4]
1667 Candidate 1: [111, 14, 14, 21, 38, 50000000, 2]
1668 Candidate 2: [60, 15, 14, 32, 29, 50000000, 5]
1669 Father before deletion: [56, 15, 14, 21, 48,
    50000000, 2]
1670 Mother before deletion: [111, 14, 14, 21, 38,
    50000000, 2]
1671 Father after deletion: [56, 15, 14, 21, 48, 2]
1672 Mother after deletion: [111, 14, 14, 21, 38, 2]
1673 001110000000111100001110000101010011000000000010
1674 011011110000111000001110000101010010011000000010
1675 Offspring1 after mutation:
    001110000000111100001110000101010011000000000010
1676 Offspring2 after mutation:
    011011110000111000001110000101010010011000000010
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1677 48 48
1678 [56, 15, 14, 21, 48, 2]
1679 [111, 14, 14, 21, 38, 2]
1680 Candidate 1: [47, 14, 15, 43, 34, 50000000, 4]
1681 Candidate 2: [74, 15, 15, 31, 12, 5447, 5]
1682 Candidate 1: [127, 14, 14, 23, 27, 50000000, 3]
1683 Candidate 2: [121, 15, 15, 15, 13, 50000000, 3]
1684 Father before deletion: [74, 15, 15, 31, 12, 5447,
5]
1685 Mother before deletion: [127, 14, 14, 23, 27,
50000000, 3]
1686 Father after deletion: [74, 15, 15, 31, 12, 5]
1687 Mother after deletion: [127, 14, 14, 23, 27, 3]
1688 0100101000001111000011110000110000000101
1689 01111110000111000001110000101110001101100000011
1690 Offspring1 after mutation:
010011110000111000001110000111110000110000000101
1691 Offspring2 after mutation:
011110100000111100001111000101110001101100000011
1692 48 48
1693 [79, 14, 14, 31, 12, 5]
1694 [122, 15, 15, 23, 27, 3]
1695 Candidate 1: [46, 14, 15, 13, 6, 50000000, 2]
1696 Candidate 2: [139, 14, 14, 22, 17, 50000000, 3]
1697 Candidate 1: [133, 15, 15, 18, 9, 50000000, 4]
1698 Candidate 2: [14, 15, 15, 9, 48, 50000000, 4]
1699 Father before deletion: [46, 14, 15, 13, 6,
50000000, 2]
1700 Mother before deletion: [133, 15, 15, 18, 9,
50000000, 4]
1701 Father after deletion: [46, 14, 15, 13, 6, 2]
1702 Mother after deletion: [133, 15, 15, 18, 9, 4]
1703 001011100000111000001111000011010000011000000010
1704 100001010000111100001111000100100000100100000100
1705 Offspring1 after mutation:
001011100000111100001111000100100000011000000010
1706 Offspring2 after mutation:
1000010100001111000001111000011010000100100000100
1707 48 48
1708 [46, 15, 15, 18, 6, 2]
1709 [133, 14, 15, 13, 9, 4]

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1710 Candidate 1: [8, 15, 14, 40, 10, 50000000, 5]
1711 Candidate 2: [22, 14, 14, 6, 44, 50000000, 3]
1712 Candidate 1: [66, 15, 15, 45, 19, 50000000, 3]
1713 Candidate 2: [95, 15, 15, 44, 45, 50000000, 4]
1714 Father before deletion: [8, 15, 14, 40, 10,
    50000000, 5]
1715 Mother before deletion: [66, 15, 15, 45, 19,
    50000000, 3]
1716 Father after deletion: [8, 15, 14, 40, 10, 5]
1717 Mother after deletion: [66, 15, 15, 45, 19, 3]
1718 00001000000111100001110001010000000101000000101
1719 010000100000111100001111001011010001001100000011
1720 Offspring1 after mutation:
    010000100000111100001110001010000000101000000101
1721 Offspring2 after mutation:
    000010000000111100001111001011010001001100000011
1722 48 48
1723 [66, 15, 14, 40, 10, 5]
1724 [8, 15, 15, 45, 19, 3]
1725 Candidate 1: [29, 14, 14, 35, 40, 50000000, 4]
1726 Candidate 2: [27, 14, 15, 4, 35, 15004294, 5]
1727 Candidate 1: [17, 14, 14, 11, 36, 50000000, 4]
1728 Candidate 2: [116, 15, 15, 25, 46, 50000000, 3]
1729 Father before deletion: [27, 14, 15, 4, 35,
    15004294, 5]
1730 Mother before deletion: [17, 14, 14, 11, 36,
    50000000, 4]
1731 Father after deletion: [27, 14, 15, 4, 35, 5]
1732 Mother after deletion: [17, 14, 14, 11, 36, 4]
1733 000110110000111000001111000001000010001100000101
1734 000100010000111000001110000010110010010000000100
1735 Offspring1 after mutation:
    000110010000111000001110000010110010010000000101
1736 Offspring2 after mutation:
    000100110000111000001111000001000010001100000100
1737 48 48
1738 [25, 14, 14, 11, 36, 5]
1739 [19, 14, 15, 4, 35, 4]
1740 Candidate 1: [116, 15, 15, 25, 46, 50000000, 3]
1741 Candidate 2: [88, 14, 14, 7, 20, 50000000, 2]
1742 Candidate 1: [131, 15, 14, 31, 15, 50000000, 3]

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1743 Candidate 2: [73, 15, 15, 36, 11, 5005669, 3]
1744 Father before deletion: [116, 15, 15, 25, 46,
    50000000, 3]
1745 Mother before deletion: [73, 15, 15, 36, 11,
    5005669, 3]
1746 Father after deletion: [116, 15, 15, 25, 46, 3]
1747 Mother after deletion: [73, 15, 15, 36, 11, 3]
1748 011101000000111100001111000110010010111000000011
1749 010010010000111100001111001001000000101100000011
1750 Offspring1 after mutation:
    011101000000111100001111000110010010111000000011
1751 Offspring2 after mutation:
    010010010000111100001111001001000000101100000011
1752 48 48
1753 [116, 15, 15, 25, 46, 3]
1754 [73, 15, 15, 36, 11, 3]
1755 Candidate 1: [32, 15, 15, 16, 23, 50000000, 3]
1756 Candidate 2: [115, 14, 14, 3, 30, 5007096, 3]
1757 Candidate 1: [64, 14, 15, 27, 42, 50000000, 3]
1758 Candidate 2: [38, 14, 15, 39, 34, 50000000, 5]
1759 Father before deletion: [115, 14, 14, 3, 30,
    5007096, 3]
1760 Mother before deletion: [64, 14, 15, 27, 42,
    50000000, 3]
1761 Father after deletion: [115, 14, 14, 3, 30, 3]
1762 Mother after deletion: [64, 14, 15, 27, 42, 3]
1763 011100110000111000001110000000110001111000000011
1764 010000000000111000001111000110110010101000000011
1765 Offspring1 after mutation:
    011100110000111000001110000000110001111000000011
1766 Offspring2 after mutation:
    010000000000111000001111000110110010101000000011
1767 48 48
1768 [115, 14, 14, 3, 30, 3]
1769 [64, 14, 15, 27, 42, 3]
1770 Candidate 1: [139, 14, 14, 22, 17, 50000000, 3]
1771 Candidate 2: [107, 15, 15, 13, 19, 50000000, 4]
1772 Candidate 1: [135, 14, 14, 46, 5, 50000000, 3]
1773 Candidate 2: [42, 15, 14, 20, 40, 50000000, 2]
1774 Father before deletion: [139, 14, 14, 22, 17,
    50000000, 3]
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1775 Mother before deletion: [135, 14, 14, 46, 5,
    50000000, 3]
1776 Father after deletion: [139, 14, 14, 22, 17, 3]
1777 Mother after deletion: [135, 14, 14, 46, 5, 3]
1778 100010110000111000001110000101100001000100000011
1779 10000111000011100000111000101110000010100000011
1780 Offspring1 after mutation:
    100010110000111000001110001001100001000100000011
1781 Offspring2 after mutation:
    100001110000111000001110000111100000010100000011
1782 48 48
1783 [139, 14, 14, 38, 17, 3]
1784 [135, 14, 14, 30, 5, 3]
1785 Candidate 1: [77, 15, 14, 24, 4, 50000000, 4]
1786 Candidate 2: [83, 14, 15, 48, 5, 5446, 5]
1787 Candidate 1: [54, 15, 14, 30, 37, 50000000, 2]
1788 Candidate 2: [66, 15, 15, 45, 19, 50000000, 3]
1789 Father before deletion: [83, 14, 15, 48, 5, 5446, 5
    ]
1790 Mother before deletion: [54, 15, 14, 30, 37,
    50000000, 2]
1791 Father after deletion: [83, 14, 15, 48, 5, 5]
1792 Mother after deletion: [54, 15, 14, 30, 37, 2]
1793 01010011000011100000111100110000000010100000101
1794 001101100000111100001110000111100010010100000010
1795 Offspring1 after mutation:
    01010011000011100000111000110000000010100000101
1796 Offspring2 after mutation:
    001101100000111100001111000111100010010100000010
1797 48 48
1798 [83, 14, 14, 48, 5, 5]
1799 [54, 15, 15, 30, 37, 2]
1800 Candidate 1: [42, 15, 14, 20, 40, 50000000, 2]
1801 Candidate 2: [69, 14, 14, 17, 26, 16001408, 5]
1802 Candidate 1: [31, 15, 14, 49, 24, 50000000, 2]
1803 Candidate 2: [19, 14, 14, 27, 17, 50000000, 2]
1804 Father before deletion: [69, 14, 14, 17, 26,
    16001408, 5]
1805 Mother before deletion: [31, 15, 14, 49, 24,
    50000000, 2]
1806 Father after deletion: [69, 14, 14, 17, 26, 5]

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1807 Mother after deletion: [31, 15, 14, 49, 24, 2]
1808 010001010000111000001110000100010001101000000101
1809 00011111000011110000111000110001000110000000010
1810 Offspring1 after mutation:
    010001010000111100001110000100010001101000000101
1811 Offspring2 after mutation:
    00011111000011100000111000110001000110000000010
1812 48 48
1813 [69, 15, 14, 17, 26, 5]
1814 [31, 14, 14, 49, 24, 2]
1815 Candidate 1: [60, 15, 14, 32, 29, 50000000, 5]
1816 Candidate 2: [64, 14, 15, 27, 42, 50000000, 3]
1817 Candidate 1: [22, 14, 14, 6, 44, 50000000, 3]
1818 Candidate 2: [99, 14, 15, 8, 45, 50000000, 4]
1819 Father before deletion: [60, 15, 14, 32, 29,
    50000000, 5]
1820 Mother before deletion: [22, 14, 14, 6, 44,
    50000000, 3]
1821 Father after deletion: [60, 15, 14, 32, 29, 5]
1822 Mother after deletion: [22, 14, 14, 6, 44, 3]
1823 001111000000111100001110001000000001110100000101
1824 00010110000011100000111000001100010110000000011
1825 Offspring1 after mutation:
    001111100000111100001110001000000001110100000101
1826 Offspring2 after mutation:
    00010100000011100000111000001100010110000000011
1827 48 48
1828 [62, 15, 14, 32, 29, 5]
1829 [20, 14, 14, 6, 44, 3]
1830 Candidate 1: [110, 14, 14, 28, 49, 50000000, 3]
1831 Candidate 2: [50, 14, 15, 47, 43, 50000000, 5]
1832 Candidate 1: [51, 15, 15, 34, 8, 50000000, 3]
1833 Candidate 2: [46, 14, 15, 13, 6, 50000000, 2]
1834 Father before deletion: [110, 14, 14, 28, 49,
    50000000, 3]
1835 Mother before deletion: [51, 15, 15, 34, 8,
    50000000, 3]
1836 Father after deletion: [110, 14, 14, 28, 49, 3]
1837 Mother after deletion: [51, 15, 15, 34, 8, 3]
1838 011011100000111000001110000111000011000100000011
1839 001100110000111100001111001000100000100000000011

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1840 Offspring1 after mutation:
    011011100000111000001110001000100011000100000011
1841 Offspring2 after mutation:
    00110011000011110000111100011100000010000000011
1842 48 48
1843 [110, 14, 14, 34, 49, 3]
1844 [51, 15, 15, 28, 8, 3]
1845 Candidate 1: [80, 15, 14, 36, 21, 50000000, 4]
1846 Candidate 2: [111, 14, 14, 21, 38, 50000000, 2]
1847 Candidate 1: [50, 14, 15, 47, 43, 50000000, 5]
1848 Candidate 2: [94, 15, 14, 42, 13, 50000000, 3]
1849 Father before deletion: [80, 15, 14, 36, 21,
    50000000, 4]
1850 Mother before deletion: [50, 14, 15, 47, 43,
    50000000, 5]
1851 Father after deletion: [80, 15, 14, 36, 21, 4]
1852 Mother after deletion: [50, 14, 15, 47, 43, 5]
1853 010100000000111100001110001001000001010100000100
1854 001100100000111000001111001011110010101100000101
1855 Offspring1 after mutation:
    010100100000111000001111001011110010101100000100
1856 Offspring2 after mutation:
    001100000000111100001110001001000001010100000101
1857 48 48
1858 [82, 14, 15, 47, 43, 4]
1859 [48, 15, 14, 36, 21, 5]
1860 Candidate 1: [37, 15, 14, 15, 16, 50000000, 4]
1861 Candidate 2: [127, 14, 14, 23, 27, 50000000, 3]
1862 Candidate 1: [99, 14, 15, 8, 45, 50000000, 4]
1863 Candidate 2: [59, 14, 14, 10, 3, 50000000, 4]
1864 Father before deletion: [37, 15, 14, 15, 16,
    50000000, 4]
1865 Mother before deletion: [99, 14, 15, 8, 45,
    50000000, 4]
1866 Father after deletion: [37, 15, 14, 15, 16, 4]
1867 Mother after deletion: [99, 14, 15, 8, 45, 4]
1868 001001010000111100001110000011110001000000000100
1869 011000110000111000001111000010000010110100000100
1870 Offspring1 after mutation:
    001001010000111100001111000010000001000000000100
1871 Offspring2 after mutation:

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1871 011000110000111000001110000011110010110100000100
1872 48 48
1873 [37, 15, 15, 8, 16, 4]
1874 [99, 14, 14, 15, 45, 4]
1875 Candidate 1: [126, 15, 15, 41, 22, 50000000, 2]
1876 Candidate 2: [56, 15, 14, 21, 48, 50000000, 2]
1877 Candidate 1: [94, 15, 14, 42, 13, 50000000, 3]
1878 Candidate 2: [47, 14, 15, 43, 34, 50000000, 4]
1879 Father before deletion: [126, 15, 15, 41, 22,
    50000000, 2]
1880 Mother before deletion: [94, 15, 14, 42, 13,
    50000000, 3]
1881 Father after deletion: [126, 15, 15, 41, 22, 2]
1882 Mother after deletion: [94, 15, 14, 42, 13, 3]
1883 01111100000111100001111001010010001011000000010
1884 0101111000001111000001110001010100000110100000011
1885 Offspring1 after mutation:
    01111100000111100001111001010010001011000000010
1886 Offspring2 after mutation:
    0101111000001111000001110001010100000110100000011
1887 48 48
1888 [126, 15, 15, 41, 22, 2]
1889 [94, 15, 14, 42, 13, 3]
1890 Candidate 1: [86, 14, 15, 28, 14, 50000000, 4]
1891 Candidate 2: [4, 15, 14, 18, 41, 5006295, 3]
1892 Candidate 1: [13, 15, 14, 32, 11, 50000000, 4]
1893 Candidate 2: [8, 15, 14, 40, 10, 50000000, 5]
1894 Father before deletion: [4, 15, 14, 18, 41, 5006295
    , 3]
1895 Mother before deletion: [13, 15, 14, 32, 11,
    50000000, 4]
1896 Father after deletion: [4, 15, 14, 18, 41, 3]
1897 Mother after deletion: [13, 15, 14, 32, 11, 4]
1898 000001000000111100001110000100100010100100000011
1899 00001101000011110000111000100000000101100000100
1900 Offspring1 after mutation:
    00000100000011110000111000100000000101100000101
1901 Offspring2 after mutation:
    000011010000111100001110000100100010100100000010
1902 48 48
1903 [4, 15, 14, 32, 11, 5]

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1904 [13, 15, 14, 18, 41, 2]
1905 5
1906 Start point is: 5
1907 16
1908 31
1909 (4.92, 4.29) (7.37, 3.27)
1910 14 15
1911 The travel time for UGV from depot B to NW UGV stop
    is: 3888
1912 The UGV travel time between two UGV stops is: 3851
1913 17400688.5
1914 End node is [24]
1915 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
1916 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44, 45, 46, 47]
1917 Objective: 5446
1918 Dropped nodes: 1 2 4 5 6 7 8 9 10 11 13 14 15 16 17
    18 19 20 21 22
1919 48
1920 48
1921 48
1922 48
1923 48
1924 48
1925 48
1926 48
1927 48
1928 48
1929 48
1930 48
1931 48
1932 48
1933 48
1934 48
1935 48
1936 48
1937 48
1938 48
1939 48
1940 48
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1941 48
1942 48
1943 48
1944 48
1945 48
1946 Route for vehicle 0:
1947 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
  Distance(0) -> 30 Fuel(166878) Time(610,670) Slack(
  0) FuelSlack(0,0) Distance(20137) -> 3 Fuel(46056)
  Time(1220,1400) Slack(776) FuelSlack(147858,193914
  ) Distance(40274) -> 25 Fuel(139842) Time(2742,3071
  ) Slack(0) FuelSlack(0,0) Distance(64917) -> 26
  Fuel(124476) Time(2819,3268) Slack(0) FuelSlack(0,0
  ) Distance(67478) -> 27 Fuel(108804) Time(2898,3420
  ) Slack(0) FuelSlack(0,0) Distance(70090) -> 28
  Fuel(93438) Time(3017,3497) Slack(0) FuelSlack(0,0
  ) Distance(72651) -> 29 Fuel(77766) Time(3216,3576
  ) Slack(0) FuelSlack(0,0) Distance(75263) -> 31
  Fuel(46722) Time(3492,3732) Slack(0) FuelSlack(0,0
  ) Distance(80437) -> 32 Fuel(31050) Time(3691,3811
  ) Slack(0) FuelSlack(0,0) Distance(83049) -> 12
  Fuel(15684) Time(3888,3888) Slack(874) FuelSlack(
  139770,139770) Distance(85610) -> 47 Fuel(163614)
  Time(5388,5388) Slack(0) FuelSlack(0,0) Distance(
  106291) -> 46 Fuel(155322) Time(5429,5429) Slack(0
  ) FuelSlack(0,0) Distance(107673) -> 45 Fuel(146676
  ) Time(5472,5472) Slack(0) FuelSlack(0,0) Distance(
  109114) -> 44 Fuel(138384) Time(5513,5513) Slack(0
  ) FuelSlack(0,0) Distance(110496) -> 43 Fuel(129780
  ) Time(5556,5556) Slack(0) FuelSlack(0,0) Distance(
  111930) -> 42 Fuel(121488) Time(5597,5597) Slack(0
  ) FuelSlack(0,0) Distance(113312) -> 41 Fuel(112842
  ) Time(5640,5640) Slack(0) FuelSlack(0,0) Distance(
  114753) -> 40 Fuel(104550) Time(5681,5681) Slack(0
  ) FuelSlack(0,0) Distance(116135) -> 39 Fuel(95946
  ) Time(5724,5724) Slack(0) FuelSlack(0,0) Distance(
  117569) -> 38 Fuel(87654) Time(5765,5765) Slack(0
  ) FuelSlack(0,0) Distance(118951) -> 37 Fuel(79008)
  Time(5808,5808) Slack(0) FuelSlack(0,0) Distance(
  120392) -> 36 Fuel(70716) Time(5849,5849) Slack(0
  ) FuelSlack(0,0) Distance(121774) -> 35 Fuel(62112)

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1947 Time(5892,5892) Slack(0) FuelSlack(0,0) Distance(
    123208) -> 34 Fuel(53820) Time(5933,5933) Slack(0)
    FuelSlack(0,0) Distance(124590) -> 33 Fuel(45486)
    Time(5975,5975) Slack(0) FuelSlack(0,0) Distance(
    125979) -> 23 Fuel(36882) Time(6018,6018) Slack(806
    ) FuelSlack(36882,287700) Distance(127413) -> 24
    Fuel(287700) Time(8424,8424) Distance(180213)
1948 Distance of the route: 180213 ft
1949 Remaining Fuel of the route: 287700
1950 Total Time of the route: 8424 seconds
1951
1952 Total Distance of all routes: 180213 ft
1953 Total Fuel remaining of all routes: 287700
1954 Total Time of all routes: 8424 seconds
1955 5
1956 Start point is: 5
1957 16
1958 31
1959 (5.04, 4.76) (7.06, 3.02)
1960 15 15
1961 The travel time for UGV from depot B to NW UGV stop
    is: 3798
1962 The UGV travel time between two UGV stops is: 3879
1963 17336076.0
1964 End node is [24]
1965 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
1966 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44, 45, 46]
1967 Objective: 5447
1968 Dropped nodes: 1 2 3 5 6 7 8 9 10 11 13 14 15 16 17
    18 19 20 21 23
1969 47
1970 47
1971 47
1972 47
1973 47
1974 47
1975 47
1976 47
1977 47
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1978 47
1979 47
1980 47
1981 47
1982 47
1983 47
1984 47
1985 47
1986 47
1987 47
1988 47
1989 47
1990 47
1991 47
1992 47
1993 47
1994 47
1995 Route for vehicle 0:
1996 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 30 Fuel(166878) Time(610,670) Slack(
    0) FuelSlack(0,0) Distance(20137) -> 4 Fuel(46056)
    Time(1220,1400) Slack(776) FuelSlack(147858,193914
    ) Distance(40274) -> 25 Fuel(139842) Time(2742,3071
    ) Slack(0) FuelSlack(0,0) Distance(64917) -> 26
    Fuel(124476) Time(2819,3268) Slack(0) FuelSlack(0,0
    ) Distance(67478) -> 27 Fuel(108804) Time(2927,3407
    ) Slack(0) FuelSlack(0,0) Distance(70090) -> 28
    Fuel(93438) Time(3124,3484) Slack(0) FuelSlack(0,0
    ) Distance(72651) -> 29 Fuel(77766) Time(3323,3563
    ) Slack(0) FuelSlack(0,0) Distance(75263) -> 31
    Fuel(46722) Time(3599,3719) Slack(0) FuelSlack(0,0
    ) Distance(80437) -> 12 Fuel(31050) Time(3798,3798
    ) Slack(825) FuelSlack(170508,170508) Distance(
    83049) -> 46 Fuel(148242) Time(5327,5327) Slack(0)
    FuelSlack(0,0) Distance(106292) -> 45 Fuel(139950)
    Time(5368,5368) Slack(0) FuelSlack(0,0) Distance(
    107674) -> 44 Fuel(131304) Time(5411,5411) Slack(0
    ) FuelSlack(0,0) Distance(109115) -> 43 Fuel(123012
    ) Time(5452,5452) Slack(0) FuelSlack(0,0) Distance(
    110497) -> 42 Fuel(114408) Time(5495,5495) Slack(0
    ) FuelSlack(0,0) Distance(111931) -> 41 Fuel(106116
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1996 ) Time(5536,5536) Slack(0) FuelSlack(0,0) Distance(
    113313) -> 40 Fuel(97470) Time(5579,5579) Slack(0)
    FuelSlack(0,0) Distance(114754) -> 39 Fuel(89178)
    Time(5620,5620) Slack(0) FuelSlack(0,0) Distance(
    116136) -> 38 Fuel(80574) Time(5663,5663) Slack(0)
    FuelSlack(0,0) Distance(117570) -> 37 Fuel(72282)
    Time(5704,5704) Slack(0) FuelSlack(0,0) Distance(
    118952) -> 36 Fuel(63636) Time(5747,5747) Slack(0)
    FuelSlack(0,0) Distance(120393) -> 35 Fuel(55344)
    Time(5788,5788) Slack(0) FuelSlack(0,0) Distance(
    121775) -> 34 Fuel(46740) Time(5831,5831) Slack(0)
    FuelSlack(0,0) Distance(123209) -> 33 Fuel(38448)
    Time(5872,5872) Slack(0) FuelSlack(0,0) Distance(
    124591) -> 32 Fuel(30114) Time(5914,5914) Slack(0)
    FuelSlack(0,0) Distance(125980) -> 22 Fuel(21510)
    Time(5957,5957) Slack(855) FuelSlack(21510,287700)
    Distance(127414) -> 24 Fuel(287700) Time(8412,8412
    ) Distance(180214)

1997 Distance of the route: 180214 ft
1998 Remaining Fuel of the route: 287700
1999 Total Time of the route: 8412 seconds
2000
2001 Total Distance of all routes: 180214 ft
2002 Total Fuel remaining of all routes: 287700
2003 Total Time of all routes: 8412 seconds
2004 5
2005 Start point is: 5
2006 16
2007 31
2008 (5.16, 5.24) (7.37, 3.27)
2009 14 15
2010 The travel time for UGV from depot B to NW UGV stop
    is: 4257
2011 The UGV travel time between two UGV stops is: 4196
2012 18850555.5
2013 End node is [24]
2014 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
2015 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44, 45]
2016 Objective: 5507

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2017 Dropped nodes: 1 3 4 5 6 7 8 9 10 11 13 14 15 16 17  
18 19 21 22 23  
2018 46  
2019 46  
2020 46  
2021 46  
2022 46  
2023 46  
2024 46  
2025 46  
2026 46  
2027 46  
2028 46  
2029 46  
2030 46  
2031 46  
2032 46  
2033 46  
2034 46  
2035 46  
2036 46  
2037 46  
2038 46  
2039 46  
2040 46  
2041 46  
2042 46  
2043 Route for vehicle 0:  
2044 0 Fuel(253693) Time(58,58) Slack(60) FuelSlack(0,0)  
) Distance(0) -> 28 Fuel(126859) Time(758,758)  
Slack(120) FuelSlack(0,0) Distance(21139) -> 2 Fuel  
(25) Time(1518,1518) Slack(925) FuelSlack(147858,  
147883) Distance(42278) -> 25 Fuel(139842) Time(  
3189,3189) Slack(120) FuelSlack(0,0) Distance(66921  
) -> 26 Fuel(124476) Time(3386,3386) Slack(120)  
FuelSlack(0,0) Distance(69482) -> 27 Fuel(108804)  
Time(3585,3585) Slack(120) FuelSlack(0,0) Distance(  
72094) -> 29 Fuel(77760) Time(3861,3861) Slack(120)  
) FuelSlack(0,0) Distance(77268) -> 30 Fuel(62088)  
Time(4060,4060) Slack(120) FuelSlack(0,0) Distance(  
79880) -> 12 Fuel(46722) Time(4257,4257) Slack(774
```

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2044 ) FuelSlack(201852,201852) Distance(82441) -> 45
      Fuel(132570) Time(5814,5814) Slack(0) FuelSlack(0,0)
      ) Distance(108296) -> 44 Fuel(124278) Time(5855,
      5855) Slack(0) FuelSlack(0,0) Distance(109678) ->
      43 Fuel(115632) Time(5898,5898) Slack(0) FuelSlack(
      0,0) Distance(111119) -> 42 Fuel(107340) Time(5939,
      5939) Slack(0) FuelSlack(0,0) Distance(112501) ->
      41 Fuel(98736) Time(5982,5982) Slack(0) FuelSlack(0
      ,0) Distance(113935) -> 40 Fuel(90444) Time(6023,
      6023) Slack(0) FuelSlack(0,0) Distance(115317) ->
      39 Fuel(81798) Time(6066,6066) Slack(0) FuelSlack(0
      ,0) Distance(116758) -> 38 Fuel(73506) Time(6107,
      6107) Slack(0) FuelSlack(0,0) Distance(118140) ->
      37 Fuel(64902) Time(6150,6150) Slack(0) FuelSlack(0
      ,0) Distance(119574) -> 36 Fuel(56610) Time(6191,
      6191) Slack(0) FuelSlack(0,0) Distance(120956) ->
      35 Fuel(47964) Time(6234,6234) Slack(0) FuelSlack(0
      ,0) Distance(122397) -> 34 Fuel(39672) Time(6275,
      6275) Slack(0) FuelSlack(0,0) Distance(123779) ->
      33 Fuel(31068) Time(6318,6318) Slack(0) FuelSlack(0
      ,0) Distance(125213) -> 32 Fuel(22776) Time(6359,
      6359) Slack(0) FuelSlack(0,0) Distance(126595) ->
      31 Fuel(14442) Time(6401,6401) Slack(0) FuelSlack(0
      ,0) Distance(127984) -> 20 Fuel(5838) Time(6444,
      6444) Slack(906) FuelSlack(5838,287700) Distance(
      129418) -> 24 Fuel(287700) Time(8950,8950) Distance
      (182218)

2045 Distance of the route: 182218 ft
2046 Remaining Fuel of the route: 287700
2047 Total Time of the route: 8950 seconds
2048
2049 Total Distance of all routes: 182218 ft
2050 Total Fuel remaining of all routes: 287700
2051 Total Time of all routes: 8950 seconds
2052 3
2053 Start point is: 3
2054 16
2055 16
2056 (4.92, 4.29) (7.06, 3.02)
2057 15 15
2058 The travel time for UGV from depot B to NW UGV stop

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2058 is: 2916
2059 The UGV travel time between two UGV stops is: 3710
2060 ****
2061 *** UGV route goes infeasible although UAV has a
2062 solution ****
2063 40349949.0
2064 End node is [18]
2065 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
2066 15, 16, 17]
2067 [25, 26, 27, 28, 29, 30, 31, 32]
2068 Objective: 5669
2069 Dropped nodes: 2 3 4 5 6 7 8 9 11 12 13 14 16 17
2070 33
2071 33
2072 33
2073 33
2074 33
2075 33
2076 33
2077 33
2078 33
2079 33
2080 33
2081 33
2082 33
2083 33
2084 33
2085 33
2086 33
2087 Route for vehicle 0:
2088 0 Fuel(287700) Time(1537,1537) Slack(45) FuelSlack(
2089 0,0) Distance(0) -> 25 Fuel(132570) Time(2365,2380
2090 ) Slack(105) FuelSlack(0,0) Distance(25855) -> 24
2091 Fuel(117204) Time(2562,2577) Slack(105) FuelSlack(0
2092 ,0) Distance(28416) -> 1 Fuel(70794) Time(2916,2931
2093 ) Slack(697) FuelSlack(15366,86160) Distance(36151
2094 ) -> 26 Fuel(272334) Time(3690,3933) Slack(0)
```

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2088 FuelSlack(0,0) Distance(38712) -> 15 Fuel(52716)
    Time(4799,5162) Slack(755) FuelSlack(52716,54624)
    Distance(75315) -> 23 Fuel(287700) Time(6868,7231)
    Slack(0) FuelSlack(0,0) Distance(118687) -> 22 Fuel
    (272028) Time(6947,7430) Slack(0) FuelSlack(0,0)
    Distance(121299) -> 21 Fuel(256662) Time(7024,7627
    ) Slack(0) FuelSlack(0,0) Distance(123860) -> 20
    Fuel(240990) Time(7125,7826) Slack(0) FuelSlack(0,0
    ) Distance(126472) -> 19 Fuel(225624) Time(7322,
    8023) Slack(0) FuelSlack(0,0) Distance(129033) ->
    32 Fuel(77766) Time(8188,8889) Slack(0) FuelSlack(0
    ,0) Distance(153676) -> 31 Fuel(65148) Time(8371,
    8978) Slack(0) FuelSlack(0,0) Distance(155779) ->
    30 Fuel(52332) Time(8555,9042) Slack(0) FuelSlack(0
    ,0) Distance(157915) -> 29 Fuel(39714) Time(8738,
    9105) Slack(0) FuelSlack(0,0) Distance(160018) ->
    28 Fuel(27342) Time(8920,9167) Slack(0) FuelSlack(0
    ,0) Distance(162080) -> 27 Fuel(14526) Time(9104,
    9231) Slack(0) FuelSlack(0,0) Distance(164216) ->
    10 Fuel(1908) Time(9287,9294) Slack(918) FuelSlack(
    0,287700) Distance(166319) -> 18 Fuel(287700) Time(
    10850,10850) Distance(187405)

2089 Distance of the route: 187405 ft
2090 Remaining Fuel of the route: 287700
2091 Total Time of the route: 10850 seconds
2092
2093 Total Distance of all routes: 187405 ft
2094 Total Fuel remaining of all routes: 287700
2095 Total Time of all routes: 10850 seconds
2096 5
2097 Start point is: 5
2098 16
2099 31
2100 (4.92, 4.29) (7.37, 3.27)
2101 14 15
2102 The travel time for UGV from depot B to NW UGV stop
    is: 3888
2103 The UGV travel time between two UGV stops is: 3851
2104 17160688.5
2105 End node is [24]
2106 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,

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2106 15, 16, 17, 18, 19, 20, 21, 22, 23]
2107 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39, 40, 41, 42, 43, 44, 45, 46, 47]
2108 Objective: 15003229
2109 Dropped nodes: 1 3 4 5 6 7 8 9 10 12 13 14 15 16 17
                  18 19 20 21 22 23 33 34 35 36 37 38 39 40 41 42 43
                  44 45 46 47
2110 48
2111 48
2112 48
2113 48
2114 48
2115 48
2116 48
2117 48
2118 48
2119 48
2120 48
2121 Route for vehicle 0:
2122 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
      Distance(0) -> 30 Fuel(166878) Time(610,670) Slack(
      0) FuelSlack(0,0) Distance(20137) -> 2 Fuel(46056)
      Time(1220,1400) Slack(776) FuelSlack(147858,193914
      ) Distance(40274) -> 25 Fuel(139842) Time(2742,3071
      ) Slack(0) FuelSlack(0,0) Distance(64917) -> 26
      Fuel(124476) Time(2819,3268) Slack(0) FuelSlack(0,0
      ) Distance(67478) -> 27 Fuel(108804) Time(2898,3420
      ) Slack(0) FuelSlack(0,0) Distance(70090) -> 28
      Fuel(93438) Time(3017,3497) Slack(0) FuelSlack(0,0
      ) Distance(72651) -> 29 Fuel(77766) Time(3216,3576
      ) Slack(0) FuelSlack(0,0) Distance(75263) -> 31
      Fuel(46722) Time(3492,3732) Slack(0) FuelSlack(0,0
      ) Distance(80437) -> 32 Fuel(31050) Time(3691,3811
      ) Slack(0) FuelSlack(0,0) Distance(83049) -> 11
      Fuel(15684) Time(3888,3888) Slack(874) FuelSlack(
      15684,287700) Distance(85610) -> 24 Fuel(287700)
      Time(5401,5401) Distance(106719)
2123 Distance of the route: 106719 ft
2124 Remaining Fuel of the route: 287700
2125 Total Time of the route: 5401 seconds
2126
```

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2127 Total Distance of all routes: 106719 ft
2128 Total Fuel remaining of all routes: 287700
2129 Total Time of all routes: 5401 seconds
2130 5
2131 Start point is: 5
2132 16
2133 31
2134 (5.04, 4.76) (7.06, 3.02)
2135 15 15
2136 The travel time for UGV from depot B to NW UGV stop
    is: 3798
2137 The UGV travel time between two UGV stops is: 3879
2138 17564076.0
2139 End node is [24]
2140 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
2141 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44, 45, 46]
2142 Objective: 5447
2143 Dropped nodes: 1 2 3 5 6 7 8 9 10 11 13 14 15 16 17
    18 19 20 21 23
2144 47
2145 47
2146 47
2147 47
2148 47
2149 47
2150 47
2151 47
2152 47
2153 47
2154 47
2155 47
2156 47
2157 47
2158 47
2159 47
2160 47
2161 47
2162 47
2163 47
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2164 47
2165 47
2166 47
2167 47
2168 47
2169 47
2170 Route for vehicle 0:
2171 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 30 Fuel(166878) Time(610,670) Slack(
    0) FuelSlack(0,0) Distance(20137) -> 4 Fuel(46056)
    Time(1220,1400) Slack(776) FuelSlack(147858,193914
    ) Distance(40274) -> 25 Fuel(139842) Time(2742,3071
    ) Slack(0) FuelSlack(0,0) Distance(64917) -> 26
    Fuel(124476) Time(2819,3268) Slack(0) FuelSlack(0,0
    ) Distance(67478) -> 27 Fuel(108804) Time(2927,3407
    ) Slack(0) FuelSlack(0,0) Distance(70090) -> 28
    Fuel(93438) Time(3124,3484) Slack(0) FuelSlack(0,0
    ) Distance(72651) -> 29 Fuel(77766) Time(3323,3563
    ) Slack(0) FuelSlack(0,0) Distance(75263) -> 31
    Fuel(46722) Time(3599,3719) Slack(0) FuelSlack(0,0
    ) Distance(80437) -> 12 Fuel(31050) Time(3798,3798
    ) Slack(825) FuelSlack(170508,170508) Distance(
    83049) -> 46 Fuel(148242) Time(5327,5327) Slack(0)
    FuelSlack(0,0) Distance(106292) -> 45 Fuel(139950)
    Time(5368,5368) Slack(0) FuelSlack(0,0) Distance(
    107674) -> 44 Fuel(131304) Time(5411,5411) Slack(0
    ) FuelSlack(0,0) Distance(109115) -> 43 Fuel(123012
    ) Time(5452,5452) Slack(0) FuelSlack(0,0) Distance(
    110497) -> 42 Fuel(114408) Time(5495,5495) Slack(0
    ) FuelSlack(0,0) Distance(111931) -> 41 Fuel(106116
    ) Time(5536,5536) Slack(0) FuelSlack(0,0) Distance(
    113313) -> 40 Fuel(97470) Time(5579,5579) Slack(0)
    FuelSlack(0,0) Distance(114754) -> 39 Fuel(89178)
    Time(5620,5620) Slack(0) FuelSlack(0,0) Distance(
    116136) -> 38 Fuel(80574) Time(5663,5663) Slack(0)
    FuelSlack(0,0) Distance(117570) -> 37 Fuel(72282)
    Time(5704,5704) Slack(0) FuelSlack(0,0) Distance(
    118952) -> 36 Fuel(63636) Time(5747,5747) Slack(0)
    FuelSlack(0,0) Distance(120393) -> 35 Fuel(55344)
    Time(5788,5788) Slack(0) FuelSlack(0,0) Distance(
    121775) -> 34 Fuel(46740) Time(5831,5831) Slack(0)
```

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2171 FuelSlack(0,0) Distance(123209) -> 33 Fuel(38448)
    Time(5872,5872) Slack(0) FuelSlack(0,0) Distance(
    124591) -> 32 Fuel(30114) Time(5914,5914) Slack(0)
    FuelSlack(0,0) Distance(125980) -> 22 Fuel(21510)
    Time(5957,5957) Slack(855) FuelSlack(21510,287700)
    Distance(127414) -> 24 Fuel(287700) Time(8412,8412
    ) Distance(180214)
2172 Distance of the route: 180214 ft
2173 Remaining Fuel of the route: 287700
2174 Total Time of the route: 8412 seconds
2175
2176 Total Distance of all routes: 180214 ft
2177 Total Fuel remaining of all routes: 287700
2178 Total Time of all routes: 8412 seconds
2179 5
2180 Start point is: 5
2181 16
2182 31
2183 (5.16, 5.24) (7.37, 3.27)
2184 14 15
2185 The travel time for UGV from depot B to NW UGV stop
    is: 4257
2186 The UGV travel time between two UGV stops is: 4196
2187 18850555.5
2188 End node is [24]
2189 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
2190 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44, 45]
2191 Objective: 5507
2192 Dropped nodes: 1 3 4 5 6 7 8 9 10 11 13 14 15 16 17
    18 19 21 22 23
2193 46
2194 46
2195 46
2196 46
2197 46
2198 46
2199 46
2200 46
2201 46
```

```
2202 46
2203 46
2204 46
2205 46
2206 46
2207 46
2208 46
2209 46
2210 46
2211 46
2212 46
2213 46
2214 46
2215 46
2216 46
2217 46
2218 Route for vehicle 0:
2219 0 Fuel(253693) Time(58,58) Slack(60) FuelSlack(0,0)
) Distance(0) -> 28 Fuel(126859) Time(758,758)
Slack(120) FuelSlack(0,0) Distance(21139) -> 2 Fuel
(25) Time(1518,1518) Slack(925) FuelSlack(147858,
147883) Distance(42278) -> 25 Fuel(139842) Time(
3189,3189) Slack(120) FuelSlack(0,0) Distance(66921
) -> 26 Fuel(124476) Time(3386,3386) Slack(120)
FuelSlack(0,0) Distance(69482) -> 27 Fuel(108804)
Time(3585,3585) Slack(120) FuelSlack(0,0) Distance(
72094) -> 29 Fuel(77760) Time(3861,3861) Slack(120
) FuelSlack(0,0) Distance(77268) -> 30 Fuel(62088)
Time(4060,4060) Slack(120) FuelSlack(0,0) Distance(
79880) -> 12 Fuel(46722) Time(4257,4257) Slack(774
) FuelSlack(201852,201852) Distance(82441) -> 45
Fuel(132570) Time(5814,5814) Slack(0) FuelSlack(0,0)
) Distance(108296) -> 44 Fuel(124278) Time(5855,
5855) Slack(0) FuelSlack(0,0) Distance(109678) ->
43 Fuel(115632) Time(5898,5898) Slack(0) FuelSlack(
0,0) Distance(111119) -> 42 Fuel(107340) Time(5939,
5939) Slack(0) FuelSlack(0,0) Distance(112501) ->
41 Fuel(98736) Time(5982,5982) Slack(0) FuelSlack(0
,0) Distance(113935) -> 40 Fuel(90444) Time(6023,
6023) Slack(0) FuelSlack(0,0) Distance(115317) ->
39 Fuel(81798) Time(6066,6066) Slack(0) FuelSlack(0
```

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2219 ,0) Distance(116758) -> 38 Fuel(73506) Time(6107,
6107) Slack(0) FuelSlack(0,0) Distance(118140) ->
37 Fuel(64902) Time(6150,6150) Slack(0) FuelSlack(0
,0) Distance(119574) -> 36 Fuel(56610) Time(6191,
6191) Slack(0) FuelSlack(0,0) Distance(120956) ->
35 Fuel(47964) Time(6234,6234) Slack(0) FuelSlack(0
,0) Distance(122397) -> 34 Fuel(39672) Time(6275,
6275) Slack(0) FuelSlack(0,0) Distance(123779) ->
33 Fuel(31068) Time(6318,6318) Slack(0) FuelSlack(0
,0) Distance(125213) -> 32 Fuel(22776) Time(6359,
6359) Slack(0) FuelSlack(0,0) Distance(126595) ->
31 Fuel(14442) Time(6401,6401) Slack(0) FuelSlack(0
,0) Distance(127984) -> 20 Fuel(5838) Time(6444,
6444) Slack(906) FuelSlack(5838,287700) Distance(
129418) -> 24 Fuel(287700) Time(8950,8950) Distance
(182218)

2220 Distance of the route: 182218 ft
2221 Remaining Fuel of the route: 287700
2222 Total Time of the route: 8950 seconds
2223
2224 Total Distance of all routes: 182218 ft
2225 Total Fuel remaining of all routes: 287700
2226 Total Time of all routes: 8950 seconds
2227 3
2228 Start point is: 3
2229 16
2230 16
2231 (4.92, 4.29) (7.06, 3.02)
2232 15 15
2233 The travel time for UGV from depot B to NW UGV stop
is: 2916
2234 The UGV travel time between two UGV stops is: 3710
2235 ****
2236 UGV route goes infeasible although UAV has a
solution
2237 ****
2238 40349949.0
2239 End node is [18]
2240 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,

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2240 15, 16, 17]
2241 [25, 26, 27, 28, 29, 30, 31, 32]
2242 Objective: 5669
2243 Dropped nodes: 2 3 4 5 6 7 8 9 11 12 13 14 16 17
2244 33
2245 33
2246 33
2247 33
2248 33
2249 33
2250 33
2251 33
2252 33
2253 33
2254 33
2255 33
2256 33
2257 33
2258 33
2259 33
2260 33
2261 33
2262 Route for vehicle 0:
2263 0 Fuel(287700) Time(1537,1537) Slack(45) FuelSlack(
    0,0) Distance(0) -> 25 Fuel(132570) Time(2365,2380
    ) Slack(105) FuelSlack(0,0) Distance(25855) -> 24
    Fuel(117204) Time(2562,2577) Slack(105) FuelSlack(0
    ,0) Distance(28416) -> 1 Fuel(70794) Time(2916,2931
    ) Slack(697) FuelSlack(15366,86160) Distance(36151
    ) -> 26 Fuel(272334) Time(3690,3933) Slack(0)
    FuelSlack(0,0) Distance(38712) -> 15 Fuel(52716)
    Time(4799,5162) Slack(755) FuelSlack(52716,54624)
    Distance(75315) -> 23 Fuel(287700) Time(6868,7231)
    Slack(0) FuelSlack(0,0) Distance(118687) -> 22 Fuel
    (272028) Time(6947,7430) Slack(0) FuelSlack(0,0)
    Distance(121299) -> 21 Fuel(256662) Time(7024,7627
    ) Slack(0) FuelSlack(0,0) Distance(123860) -> 20
    Fuel(240990) Time(7125,7826) Slack(0) FuelSlack(0,0
    ) Distance(126472) -> 19 Fuel(225624) Time(7322,
    8023) Slack(0) FuelSlack(0,0) Distance(129033) ->
    32 Fuel(77766) Time(8188,8889) Slack(0) FuelSlack(0
```

```
2263 ,0) Distance(153676) -> 31 Fuel(65148) Time(8371,
8978) Slack(0) FuelSlack(0,0) Distance(155779) ->
30 Fuel(52332) Time(8555,9042) Slack(0) FuelSlack(0
,0) Distance(157915) -> 29 Fuel(39714) Time(8738,
9105) Slack(0) FuelSlack(0,0) Distance(160018) ->
28 Fuel(27342) Time(8920,9167) Slack(0) FuelSlack(0
,0) Distance(162080) -> 27 Fuel(14526) Time(9104,
9231) Slack(0) FuelSlack(0,0) Distance(164216) ->
10 Fuel(1908) Time(9287,9294) Slack(918) FuelSlack(
0,287700) Distance(166319) -> 18 Fuel(287700) Time(
10850,10850) Distance(187405)
2264 Distance of the route: 187405 ft
2265 Remaining Fuel of the route: 287700
2266 Total Time of the route: 10850 seconds
2267
2268 Total Distance of all routes: 187405 ft
2269 Total Fuel remaining of all routes: 287700
2270 Total Time of all routes: 10850 seconds
2271 3
2272 Start point is: 3
2273 16
2274 16
2275 (7.06, 3.02) (5.04, 4.76)
2276 15 14
2277 The travel time for UGV from depot B to NW UGV stop
is: 2941
2278 The UGV travel time between two UGV stops is: 4090
2279 ****
***  

2280 UGV route goes infeasible although UAV has a
solution
2281 ****
***  

2282 44448616.5
2283 End node is [18]
2284 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
15, 16, 17]
2285 [25, 26, 27, 28, 29, 30, 31]
2286 Objective: 6295
2287 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 13 14 15 16
2288 32
```

```
2289 32
2290 32
2291 32
2292 32
2293 32
2294 32
2295 32
2296 32
2297 32
2298 32
2299 32
2300 32
2301 32
2302 32
2303 32
2304 32
2305 Route for vehicle 0:
2306 0 Fuel(278251) Time(1540,1540) Slack(60) FuelSlack(
    0,0) Distance(0) -> 26 Fuel(139117) Time(2302,2302
) Slack(120) FuelSlack(0,0) Distance(23189) -> 27
Fuel(126301) Time(2486,2486) Slack(120) FuelSlack(0
,0) Distance(25325) -> 31 Fuel(75883) Time(2860,
2860) Slack(120) FuelSlack(0,0) Distance(33728) ->
30 Fuel(63265) Time(3043,3043) Slack(120) FuelSlack
(0,0) Distance(35831) -> 29 Fuel(50449) Time(3227,
3227) Slack(120) FuelSlack(0,0) Distance(37967) ->
28 Fuel(37831) Time(3410,3410) Slack(120) FuelSlack
(0,0) Distance(40070) -> 6 Fuel(25) Time(3720,3720
) Slack(925) FuelSlack(27443,27493) Distance(46371
) -> 23 Fuel(260257) Time(5217,5217) Slack(120)
FuelSlack(0,0) Distance(65265) -> 17 Fuel(25) Time(
6651,6651) Slack(925) FuelSlack(178877,178927)
Distance(108637) -> 19 Fuel(108823) Time(9176,9176
) Slack(120) FuelSlack(0,0) Distance(161443) -> 20
Fuel(93457) Time(9373,9373) Slack(120) FuelSlack(0,
0) Distance(164004) -> 21 Fuel(77785) Time(9572,
9572) Slack(120) FuelSlack(0,0) Distance(166616
) -> 22 Fuel(62419) Time(9769,9769) Slack(120)
FuelSlack(0,0) Distance(169177) -> 24 Fuel(31069)
Time(10047,10047) Slack(120) FuelSlack(0,0)
Distance(174402) -> 12 Fuel(25) Time(10323,10323)
```

```
2306 Slack(925) FuelSlack(15672,15697) Distance(179576
    ) -> 25 Fuel(272028) Time(11327,11327) Slack(120)
    FuelSlack(0,0) Distance(182188) -> 18 Fuel(116898)
    Time(12230,12230) Distance(208043)
2307 Distance of the route: 208043 ft
2308 Remaining Fuel of the route: 116898
2309 Total Time of the route: 12230 seconds
2310
2311 Total Distance of all routes: 208043 ft
2312 Total Fuel remaining of all routes: 116898
2313 Total Time of all routes: 12230 seconds
2314 3
2315 Start point is: 3
2316 16
2317 16
2318 (5.16, 5.24) (8.29, 4.03)
2319 14 14
2320 The travel time for UGV from depot B to NW UGV stop
    is: 3385
2321 The UGV travel time between two UGV stops is: 4882
2322 ****
2323 ***
2324 ****
2325 47373462.0
2326 End node is [18]
2327 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
2328 [25, 26]
2329 Objective: 7096
2330 Dropped nodes: 2 3 4 5 6 7 8 9 10 11 13 14 15 16
2331 27
2332 27
2333 27
2334 27
2335 27
2336 27
2337 27
2338 27
```

```
2339 27
2340 27
2341 27
2342 27
2343 Route for vehicle 0:
2344 0 Fuel(287700) Time(1557,1557) Slack(60) FuelSlack(
    0,0) Distance(0) -> 22 Fuel(85854) Time(2636,2636)
    Slack(120) FuelSlack(0,0) Distance(33641) -> 21
    Fuel(70488) Time(2833,2833) Slack(120) FuelSlack(0,
    0) Distance(36202) -> 23 Fuel(39444) Time(3109,3109
    ) Slack(120) FuelSlack(0,0) Distance(41376) -> 1
    Fuel(8400) Time(3385,3385) Slack(898) FuelSlack(
    12375,49723) Distance(46550) -> 24 Fuel(275325)
    Time(4360,4387) Slack(27) FuelSlack(0,0) Distance(
    49111) -> 17 Fuel(28948) Time(5658,5751) Slack(832
    ) FuelSlack(93752,151648) Distance(90174) -> 20
    Fuel(193948) Time(8111,8204) Slack(27) FuelSlack(0,
    0) Distance(140609) -> 26 Fuel(54382) Time(8935,
    9028) Slack(27) FuelSlack(0,0) Distance(163870) ->
    25 Fuel(41764) Time(9118,9211) Slack(27) FuelSlack(
    0,0) Distance(165973) -> 12 Fuel(28948) Time(9302,
    9395) Slack(832) FuelSlack(0,68392) Distance(168109
    ) -> 19 Fuel(287700) Time(10982,11075) Slack(27)
    FuelSlack(0,0) Distance(193038) -> 18 Fuel(39444)
    Time(12355,12355) Distance(234414)
2345 Distance of the route: 234414 ft
2346 Remaining Fuel of the route: 39444
2347 Total Time of the route: 12355 seconds
2348
2349 Total Distance of all routes: 234414 ft
2350 Total Fuel remaining of all routes: 39444
2351 Total Time of all routes: 12355 seconds
2352 3
2353 Start point is: 3
2354 16
2355 16
2356 (7.68, 3.53) (5.04, 4.76)
2357 14 15
2358 The travel time for UGV from depot B to NW UGV stop
    is: 3347
2359 The UGV travel time between two UGV stops is: 4164
```

```
2360 ****
***  
2361 UGV route goes infeasible although UAV has a
solution  
2362 ****
***  
2363 42927876.0  
2364 End node is [18]  
2365 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
15, 16, 17]  
2366 [25, 26, 27, 28, 29]  
2367 Objective: 2006057  
2368 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 13 14 15 16 28
29  
2369 30  
2370 30  
2371 30  
2372 30  
2373 30  
2374 30  
2375 30  
2376 30  
2377 30  
2378 30  
2379 30  
2380 30  
2381 30  
2382 Route for vehicle 0:  
2383 0 Fuel(287700) Time(1537,1537) Slack(6) FuelSlack(0
,0) Distance(0) -> 25 Fuel(132570) Time(2326,2380)
Slack(66) FuelSlack(0,0) Distance(25855) -> 27 Fuel
(26262) Time(2982,3036) Slack(66) FuelSlack(0,0)
Distance(43573) -> 26 Fuel(13644) Time(3165,3219)
Slack(66) FuelSlack(0,0) Distance(45676) -> 6 Fuel(
1272) Time(3347,3401) Slack(920) FuelSlack(0,42595
) Distance(47738) -> 24 Fuel(287700) Time(4785,4844
) Slack(0) FuelSlack(0,0) Distance(64857) -> 17
Fuel(41323) Time(6029,6208) Slack(792) FuelSlack(
153692,220231) Distance(105920) -> 19 Fuel(134008)
Time(8421,8733) Slack(0) FuelSlack(0,0) Distance(
158726) -> 20 Fuel(118642) Time(8520,8930) Slack(0
```

```
2383 ) FuelSlack(0,0) Distance(161287) -> 21 Fuel(102970
      ) Time(8719,9129) Slack(0) FuelSlack(0,0) Distance(
      163899) -> 22 Fuel(87604) Time(8916,9237) Slack(0)
      FuelSlack(0,0) Distance(166460) -> 23 Fuel(71932)
      Time(9115,9316) Slack(0) FuelSlack(0,0) Distance(
      169072) -> 12 Fuel(25216) Time(9470,9551) Slack(844
      ) FuelSlack(0,287700) Distance(176858) -> 18 Fuel(
      287700) Time(11099,11099) Distance(200101)
2384 Distance of the route: 200101 ft
2385 Remaining Fuel of the route: 287700
2386 Total Time of the route: 11099 seconds
2387
2388 Total Distance of all routes: 200101 ft
2389 Total Fuel remaining of all routes: 287700
2390 Total Time of all routes: 11099 seconds
2391 5
2392 Start point is: 5
2393 16
2394 31
2395 (7.68, 3.53) (5.4, 6.19)
2396 14 14
2397 The travel time for UGV from depot B to NW UGV stop
      is: 599
2398 The UGV travel time between two UGV stops is: 4953
2399 21349806.0
2400 End node is [24]
2401 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
2402 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39, 40, 41, 42, 43]
2403 Objective: 16002695
2404 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 13 14 15 16 17
      18 19 20 21 22 23 25 29 30 31 32 33 34 35 36 37 38
      39 40 41 42 43
2405 44
2406 44
2407 44
2408 44
2409 44
2410 44
2411 Route for vehicle 0:
```

```

2412 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 28 Fuel(160866) Time(640,640) Slack(
    0) FuelSlack(0,0) Distance(21139) -> 12 Fuel(40128
    ) Time(1249,1249) Slack(796) FuelSlack(171198,
    171492) Distance(41262) -> 27 Fuel(156336) Time(
    2708,2708) Slack(0) FuelSlack(0,0) Distance(63156
    ) -> 26 Fuel(140664) Time(2787,2787) Slack(0)
    FuelSlack(0,0) Distance(65768) -> 6 Fuel(1098) Time
    (3491,3491) Slack(921) FuelSlack(1098,287700)
    Distance(89029) -> 24 Fuel(287700) Time(4412,4412)
    Distance(89029)

2413 Distance of the route: 89029 ft
2414 Remaining Fuel of the route: 287700
2415 Total Time of the route: 4412 seconds
2416
2417 Total Distance of all routes: 89029 ft
2418 Total Fuel remaining of all routes: 287700
2419 Total Time of all routes: 4412 seconds
2420 5
2421 Start point is: 5
2422 16
2423 31
2424 (8.91, 4.54) (5.64, 7.14)
2425 14 14
2426 The travel time for UGV from depot B to NW UGV stop
    is: 0
2427 The UGV travel time between two UGV stops is: 5923
2428 22657707.0
2429 End node is [24]
2430 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
2431 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41]
2432 Objective: 16001408
2433 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 12 13 14 15 16
    17 18 19 20 21 22 23 25 27 28 29 30 31 32 33 34 35
    36 37 38 39 40 41
2434 42
2435 42
2436 42
2437 Route for vehicle 0:

```

```
2438 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 26 Fuel(148134) Time(704,704) Slack(
    0) FuelSlack(0,0) Distance(23261) -> 6 Fuel(8568)
    Time(1408,1408) Slack(897) FuelSlack(8423,287700)
    Distance(46522) -> 24 Fuel(287700) Time(2305,2305)
    Distance(46522)
2439 Distance of the route: 46522 ft
2440 Remaining Fuel of the route: 287700
2441 Total Time of the route: 2305 seconds
2442
2443 Total Distance of all routes: 46522 ft
2444 Total Fuel remaining of all routes: 287700
2445 Total Time of all routes: 2305 seconds
2446 2
2447 Start point is: 2
2448 16
2449 16
2450 (5.52, 6.66) (7.37, 3.27)
2451 14 14
2452 The travel time for UGV from depot B to NW UGV stop
    is: 3907
2453 The UGV travel time between two UGV stops is: 4980
2454 24969222.0
2455 End node is [24]
2456 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
2457 [25, 26, 27, 28, 29]
2458 Objective: 5000000
2459 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29
2460 30
2461 Route for vehicle 0:
2462 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
2463 Distance of the route: 0 ft
2464 Remaining Fuel of the route: 287700
2465 Total Time of the route: 0 seconds
2466
2467 Total Distance of all routes: 0 ft
2468 Total Fuel remaining of all routes: 287700
```

```
2469 Total Time of all routes: 0 seconds
2470 4
2471 Start point is: 4
2472 31
2473 16
2474 (4.8, 3.81) (7.98, 3.78)
2475 15 15
2476 The travel time for UGV from depot B to NW UGV stop
    is: 1552
2477 The UGV travel time between two UGV stops is: 3956
2478 10823421.0
2479 End node is [24]
2480 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
2481 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42]
2482 Objective: 18000000
2483 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42
2484 43
2485 Route for vehicle 0:
2486 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
2487 Distance of the route: 0 ft
2488 Remaining Fuel of the route: 287700
2489 Total Time of the route: 0 seconds
2490
2491 Total Distance of all routes: 0 ft
2492 Total Fuel remaining of all routes: 287700
2493 Total Time of all routes: 0 seconds
2494 3
2495 Start point is: 3
2496 16
2497 16
2498 (5.52, 6.66) (8.29, 4.03)
2499 14 15
2500 The travel time for UGV from depot B to NW UGV stop
    is: 3935
2501 The UGV travel time between two UGV stops is: 5132
```

```
2502 ****
      ***
2503 UGV route goes infeasible although UAV has a
      solution
2504 ****
      ***
2505 50750806.5
2506 End node is [18]
2507 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
2508 []
2509 *****No solution found*****
2510 4
2511 Start point is: 4
2512 31
2513 16
2514 (7.68, 3.53) (5.28, 5.71)
2515 14 15
2516 The travel time for UGV from depot B to NW UGV stop
      is: 4767
2517 The UGV travel time between two UGV stops is: 4509
2518 19363425.0
2519 End node is [24]
2520 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
2521 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39, 40, 41, 42, 43]
2522 Objective: 19000000
2523 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
      16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
      34 35 36 37 38 39 40 41 42 43
2524 44
2525 Route for vehicle 0:
2526 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
      Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
      )
2527 Distance of the route: 0 ft
2528 Remaining Fuel of the route: 287700
2529 Total Time of the route: 0 seconds
2530
2531 Total Distance of all routes: 0 ft
```

```
2532 Total Fuel remaining of all routes: 287700
2533 Total Time of all routes: 0 seconds
2534 3
2535 Start point is: 3
2536 16
2537 16
2538 (5.16, 5.24) (7.06, 3.02)
2539 15 15
2540 The travel time for UGV from depot B to NW UGV stop
    is: 3261
2541 The UGV travel time between two UGV stops is: 4055
2542 ****
***  
2543 UGV route goes infeasible although UAV has a
    solution
2544 ****
***  
2545 42972549.0
2546 End node is [18]
2547 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
2548 [25, 26, 27, 28, 29, 30]
2549 Objective: 6441
2550 Dropped nodes: 3 4 5 6 8 9 10 11 12 14 15 16 17
2551 31
2552 31
2553 31
2554 31
2555 31
2556 31
2557 31
2558 31
2559 31
2560 31
2561 31
2562 31
2563 31
2564 31
2565 31
2566 31
2567 31
```

```
2568 Route for vehicle 0:  
2569 0 Fuel(287700) Time(1537,1537) Slack(56) FuelSlack(0,0) Distance(0) -> 27 Fuel(123378) Time(2422,2426)  
) Slack(116) FuelSlack(0,0) Distance(27387) -> 28  
Fuel(110760) Time(2605,2609) Slack(116) FuelSlack(0,0) Distance(29490) -> 2 Fuel(4452) Time(3261,3265)  
) Slack(910) FuelSlack(0,152616) Distance(47208)  
) -> 22 Fuel(287700) Time(4406,4425) Slack(0)  
FuelSlack(0,0) Distance(54994) -> 21 Fuel(272334)  
Time(4483,4622) Slack(0) FuelSlack(0,0) Distance(57555) -> 19 Fuel(241290) Time(4639,4898) Slack(0)  
FuelSlack(0,0) Distance(62729) -> 20 Fuel(225924)  
Time(4716,5090) Slack(0) FuelSlack(0,0) Distance(65290) -> 23 Fuel(179208) Time(4951,5325) Slack(0)  
FuelSlack(0,0) Distance(73076) -> 1 Fuel(148164)  
Time(5107,5481) Slack(448) FuelSlack(9055,189487)  
Distance(78250) -> 24 Fuel(278645) Time(5774,6118)  
Slack(0) FuelSlack(0,0) Distance(80811) -> 13 Fuel(32268) Time(7138,7362) Slack(821) FuelSlack(255432,  
287700) Distance(121874) -> 25 Fuel(32268) Time(9353,9473) Slack(0) FuelSlack(0,0) Distance(164446)  
) -> 7 Fuel(19650) Time(9536,9536) Slack(861)  
FuelSlack(45084,45084) Distance(166549) -> 26 Fuel(262266) Time(10525,10525) Slack(0) FuelSlack(0,0)  
Distance(170788) -> 30 Fuel(211848) Time(10779,  
10779) Slack(0) FuelSlack(0,0) Distance(179191) ->  
29 Fuel(199230) Time(10842,10842) Slack(0)  
FuelSlack(0,0) Distance(181294) -> 18 Fuel(9474)  
Time(11800,11800) Distance(212920)  
2570 Distance of the route: 212920 ft  
2571 Remaining Fuel of the route: 9474  
2572 Total Time of the route: 11800 seconds  
2573  
2574 Total Distance of all routes: 212920 ft  
2575 Total Fuel remaining of all routes: 9474  
2576 Total Time of all routes: 11800 seconds  
2577 4  
2578 Start point is: 4  
2579 31  
2580 16  
2581 (7.06, 3.02) (5.16, 5.24)
```

```
2582 14 15
2583 The travel time for UGV from depot B to NW UGV stop
      is: 4461
2584 The UGV travel time between two UGV stops is: 4055
2585 17499645.0
2586 End node is [24]
2587 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
2588 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39, 40, 41, 42, 43, 44, 45]
2589 Objective: 21000000
2590 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
      16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
      34 35 36 37 38 39 40 41 42 43 44 45
2591 46
2592 Route for vehicle 0:
2593 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
      Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
      )
2594 Distance of the route: 0 ft
2595 Remaining Fuel of the route: 287700
2596 Total Time of the route: 0 seconds
2597
2598 Total Distance of all routes: 0 ft
2599 Total Fuel remaining of all routes: 287700
2600 Total Time of all routes: 0 seconds
2601 5
2602 Start point is: 5
2603 16
2604 31
2605 (5.4, 6.19) (7.37, 3.27)
2606 14 14
2607 The travel time for UGV from depot B to NW UGV stop
      is: 4627
2608 The UGV travel time between two UGV stops is: 4799
2609 20958237.0
2610 End node is [24]
2611 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
2612 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39, 40, 41, 42, 43]
```

```
2613 Objective: 15004294
2614 Dropped nodes: 3 4 5 6 8 9 10 11 12 13 14 15 16 17
    18 19 20 21 22 23 29 30 31 32 33 34 35 36 37 38 39
    40 41 42 43
2615 44
2616 44
2617 44
2618 44
2619 44
2620 44
2621 44
2622 44
2623 Route for vehicle 0:
2624 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 28 Fuel(160866) Time(640,640) Slack(
    0) FuelSlack(0,0) Distance(21139) -> 1 Fuel(34032)
    Time(1280,1280) Slack(815) FuelSlack(166273,166380
    ) Distance(42278) -> 27 Fuel(155352) Time(2763,2763
    ) Slack(0) FuelSlack(0,0) Distance(64336) -> 2 Fuel
    (23004) Time(3431,3431) Slack(851) FuelSlack(170862
    ,170862) Distance(86394) -> 25 Fuel(139842) Time(
    5028,5028) Slack(0) FuelSlack(0,0) Distance(111037
    ) -> 26 Fuel(124476) Time(5105,5105) Slack(0)
    FuelSlack(0,0) Distance(113598) -> 7 Fuel(77760)
    Time(5340,5340) Slack(675) FuelSlack(77760,287700)
    Distance(121384) -> 24 Fuel(287700) Time(6635,6635
    ) Distance(141862)
2625 Distance of the route: 141862 ft
2626 Remaining Fuel of the route: 287700
2627 Total Time of the route: 6635 seconds
2628
2629 Total Distance of all routes: 141862 ft
2630 Total Fuel remaining of all routes: 287700
2631 Total Time of all routes: 6635 seconds
2632 4
2633 Start point is: 4
2634 31
2635 16
2636 (8.6, 4.29) (5.64, 7.14)
2637 14 15
2638 The travel time for UGV from depot B to NW UGV stop
```

```
2638 is: 5215
2639 The UGV travel time between two UGV stops is: 5449
2640 21994539.0
2641 End node is [24]
2642 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
2643 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40]
2644 Objective: 16000000
2645 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40
2646 41
2647 Route for vehicle 0:
2648 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
2649 Distance of the route: 0 ft
2650 Remaining Fuel of the route: 287700
2651 Total Time of the route: 0 seconds
2652
2653 Total Distance of all routes: 0 ft
2654 Total Fuel remaining of all routes: 287700
2655 Total Time of all routes: 0 seconds
2656 5
2657 Start point is: 5
2658 16
2659 31
2660 (5.52, 6.66) (8.91, 4.54)
2661 15 14
2662 The travel time for UGV from depot B to NW UGV stop
    is: 4488
2663 The UGV travel time between two UGV stops is: 5734
2664 20751288.0
2665 End node is [24]
2666 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
2667 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39]
2668 Objective: 15000000
2669 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
```

```

2669 16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
      34 35 36 37 38 39
2670 40
2671 Route for vehicle 0:
2672 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
      Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
      )
2673 Distance of the route: 0 ft
2674 Remaining Fuel of the route: 287700
2675 Total Time of the route: 0 seconds
2676
2677 Total Distance of all routes: 0 ft
2678 Total Fuel remaining of all routes: 287700
2679 Total Time of all routes: 0 seconds
2680 4
2681 Start point is: 4
2682 31
2683 16
2684 (7.37, 3.27) (5.04, 4.76)
2685 15 15
2686 The travel time for UGV from depot B to NW UGV stop
      is: 4304
2687 The UGV travel time between two UGV stops is: 4020
2688 16858269.0
2689 End node is [24]
2690 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
2691 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39, 40, 41, 42, 43, 44]
2692 Objective: 20000000
2693 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
      16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
      34 35 36 37 38 39 40 41 42 43 44
2694 45
2695 Route for vehicle 0:
2696 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
      Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
      )
2697 Distance of the route: 0 ft
2698 Remaining Fuel of the route: 287700
2699 Total Time of the route: 0 seconds

```

```
2700
2701 Total Distance of all routes: 0 ft
2702 Total Fuel remaining of all routes: 287700
2703 Total Time of all routes: 0 seconds
2704 4
2705 Start point is: 4
2706 31
2707 16
2708 (7.98, 3.78) (5.64, 7.14)
2709 15 15
2710 The travel time for UGV from depot B to NW UGV stop
    is: 4586
2711 The UGV travel time between two UGV stops is: 5167
2712 20240218.5
2713 End node is [24]
2714 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
2715 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42]
2716 Objective: 18000000
2717 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42
2718 43
2719 Route for vehicle 0:
2720 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
2721 Distance of the route: 0 ft
2722 Remaining Fuel of the route: 287700
2723 Total Time of the route: 0 seconds
2724
2725 Total Distance of all routes: 0 ft
2726 Total Fuel remaining of all routes: 287700
2727 Total Time of all routes: 0 seconds
2728 3
2729 Start point is: 3
2730 16
2731 16
2732 (5.88, 8.09) (8.29, 4.03)
2733 14 15
```

```
2734 The travel time for UGV from depot B to NW UGV stop  
      is: 4493  
2735 The UGV travel time between two UGV stops is: 5653  
2736 ****  
      ***  
2737 UGV route goes infeasible although UAV has a  
      solution  
2738 ****  
      ***  
2739 51763675.5  
2740 End node is [18]  
2741 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,  
      15, 16, 17]  
2742 []  
2743 *****No solution found*****  
2744 2  
2745 Start point is: 2  
2746 16  
2747 16  
2748 (8.91, 4.54) (5.88, 8.09)  
2749 15 15  
2750 The travel time for UGV from depot B to NW UGV stop  
      is: 3657  
2751 The UGV travel time between two UGV stops is: 5934  
2752 ****  
      ***  
2753 UGV route goes infeasible although UAV has a  
      solution  
2754 ****  
      ***  
2755 28765296.0  
2756 End node is [24]  
2757 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,  
      15, 16, 17, 18, 19, 20, 21, 22, 23]  
2758 []  
2759 Objective: 0  
2760 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15  
      16 17 18 19 20 21 22 23  
2761 25  
2762 Route for vehicle 0:  
2763 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
```

```
2763 Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
2764 Distance of the route: 0 ft
2765 Remaining Fuel of the route: 287700
2766 Total Time of the route: 0 seconds
2767
2768 Total Distance of all routes: 0 ft
2769 Total Fuel remaining of all routes: 287700
2770 Total Time of all routes: 0 seconds
2771 4
2772 Start point is: 4
2773 31
2774 16
2775 (5.16, 5.24) (7.68, 3.53)
2776 15 14
2777 The travel time for UGV from depot B to NW UGV stop
    is: 1034
2778 The UGV travel time between two UGV stops is: 4584
2779 11583126.0
2780 End node is [24]
2781 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
2782 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43]
2783 Objective: 19000000
2784 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42 43
2785 44
2786 Route for vehicle 0:
2787 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
2788 Distance of the route: 0 ft
2789 Remaining Fuel of the route: 287700
2790 Total Time of the route: 0 seconds
2791
2792 Total Distance of all routes: 0 ft
2793 Total Fuel remaining of all routes: 287700
2794 Total Time of all routes: 0 seconds
2795 3
```

```
2796 Start point is: 3
2797 16
2798 16
2799 (5.16, 5.24) (7.98, 3.78)
2800 14 15
2801 The travel time for UGV from depot B to NW UGV stop
    is: 3385
2802 The UGV travel time between two UGV stops is: 4477
2803 ****
2804 ***  
UGV route goes infeasible although UAV has a
    solution
2805 ****
2806 ***
2807 53070216.0
2808 End node is [18]
2809 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
2810 [25, 26, 27]
2811 Objective: 8650
2812 Dropped nodes: 2 3 4 5 7 8 9 12 13 14 15 17
2813 28
2814 28
2815 28
2816 28
2817 28
2818 28
2819 28
2820 28
2821 28
2822 28
2823 28
2824 28
2825 28
2826 28
2827 Route for vehicle 0:
2828 0 Fuel(279325) Time(1590,1590) Slack(60) FuelSlack(
    0,0) Distance(0) -> 23 Fuel(93151) Time(2590,2590)
    Slack(120) FuelSlack(0,0) Distance(31029) -> 21
    Fuel(62107) Time(2866,2866) Slack(120) FuelSlack(0,
```

```

2828 0) Distance(36203) -> 24 Fuel(15391) Time(3221,3221
    ) Slack(120) FuelSlack(0,0) Distance(43989) -> 6
    Fuel(25) Time(3418,3418) Slack(925) FuelSlack(
    120852,120877) Distance(46550) -> 27 Fuel(166848)
    Time(4953,4953) Slack(120) FuelSlack(0,0) Distance(
    66692) -> 26 Fuel(154230) Time(5136,5136) Slack(120
    ) FuelSlack(0,0) Distance(68795) -> 1 Fuel(41172)
    Time(5827,5827) Slack(792) FuelSlack(54563,54588)
    Distance(87638) -> 22 Fuel(274309) Time(6854,6854)
    Slack(120) FuelSlack(0,0) Distance(95424) -> 16
    Fuel(25) Time(8359,8359) Slack(925) FuelSlack(
    135791,135841) Distance(141138) -> 19 Fuel(151909)
    Time(10884,10884) Slack(120) FuelSlack(0,0)
    Distance(193944) -> 11 Fuel(25) Time(11771,11771)
    Slack(925) FuelSlack(12618,12643) Distance(219258
    ) -> 25 Fuel(275082) Time(12759,12759) Slack(120)
    FuelSlack(0,0) Distance(221361) -> 10 Fuel(262464)
    Time(12942,12942) Slack(81) FuelSlack(262464,287700
    ) Distance(223464) -> 20 Fuel(287700) Time(13732,
    13732) Slack(120) FuelSlack(0,0) Distance(246884
    ) -> 18 Fuel(54810) Time(15028,15028) Distance(
    285699)

2829 Distance of the route: 285699 ft
2830 Remaining Fuel of the route: 54810
2831 Total Time of the route: 15028 seconds
2832
2833 Total Distance of all routes: 285699 ft
2834 Total Fuel remaining of all routes: 54810
2835 Total Time of all routes: 15028 seconds
2836 2
2837 Start point is: 2
2838 16
2839 16
2840 (8.6, 4.29) (5.28, 5.71)
2841 15 14
2842 The travel time for UGV from depot B to NW UGV stop
    is: 3516
2843 The UGV travel time between two UGV stops is: 5214
2844 ****
***
```

2845 UGV route goes infeasible although UAV has a

```
2845 solution
2846 ****
***  
2847 25732435.5
2848 End node is [24]
2849 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
2850 [25, 26, 27, 28, 29, 30]
2851 Objective: 6000000
2852 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30
2853 31
2854 Route for vehicle 0:
2855 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
2856 Distance of the route: 0 ft
2857 Remaining Fuel of the route: 287700
2858 Total Time of the route: 0 seconds
2859
2860 Total Distance of all routes: 0 ft
2861 Total Fuel remaining of all routes: 287700
2862 Total Time of all routes: 0 seconds
2863 2
2864 Start point is: 2
2865 16
2866 16
2867 (5.88, 8.09) (7.98, 3.78)
2868 14 14
2869 The travel time for UGV from depot B to NW UGV stop
    is: 4465
2870 The UGV travel time between two UGV stops is: 5840
2871 ****
***  
2872 UGV route goes infeasible although UAV has a
solution
2873 ****
***  
2874 29163882.0
2875 End node is [24]
2876 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
```

```
2876 15, 16, 17, 18, 19, 20, 21, 22, 23]
2877 [25, 26, 27]
2878 Objective: 3000000
2879 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27
2880 28
2881 Route for vehicle 0:
2882 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
2883 Distance of the route: 0 ft
2884 Remaining Fuel of the route: 287700
2885 Total Time of the route: 0 seconds
2886
2887 Total Distance of all routes: 0 ft
2888 Total Fuel remaining of all routes: 287700
2889 Total Time of all routes: 0 seconds
2890 5
2891 Start point is: 5
2892 16
2893 31
2894 (5.64, 7.14) (7.06, 3.02)
2895 14 14
2896 The travel time for UGV from depot B to NW UGV stop
    is: 4997
2897 The UGV travel time between two UGV stops is: 5018
2898 22648845.0
2899 End node is [24]
2900 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
2901 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41]
2902 Objective: 16001408
2903 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 12 13 14 15 16
    17 18 19 20 21 22 23 25 27 28 29 30 31 32 33 34 35
    36 37 38 39 40 41
2904 42
2905 42
2906 42
2907 Route for vehicle 0:
2908 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
```

```
2908 Distance(0) -> 26 Fuel(148134) Time(704,704) Slack(0)
    FuelSlack(0,0) Distance(23261) -> 6 Fuel(8568)
    Time(1408,1408) Slack(897) FuelSlack(8423,287700)
    Distance(46522) -> 24 Fuel(287700) Time(2305,2305)
    Distance(46522)
2909 Distance of the route: 46522 ft
2910 Remaining Fuel of the route: 287700
2911 Total Time of the route: 2305 seconds
2912
2913 Total Distance of all routes: 46522 ft
2914 Total Fuel remaining of all routes: 287700
2915 Total Time of all routes: 2305 seconds
2916 3
2917 Start point is: 3
2918 16
2919 16
2920 (4.8, 3.81) (8.6, 4.29)
2921 15 15
2922 The travel time for UGV from depot B to NW UGV stop
    is: 2740
2923 The UGV travel time between two UGV stops is: 4238
2924 ****
    ***
2925 UGV route goes infeasible although UAV has a
    solution
2926 ****
    ***
2927 43904163.0
2928 End node is [18]
2929 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
2930 []
2931 ****No solution found*****
2932 2
2933 Start point is: 2
2934 16
2935 16
2936 (8.29, 4.03) (5.28, 5.71)
2937 15 15
2938 The travel time for UGV from depot B to NW UGV stop
    is: 3375
```

```
2939 The UGV travel time between two UGV stops is: 4787
2940 23632723.5
2941 End node is [24]
2942 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
2943 [25, 26, 27, 28, 29, 30, 31]
2944 Objective: 70000000
2945 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31
2946 32
2947 Route for vehicle 0:
2948 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
2949 Distance of the route: 0 ft
2950 Remaining Fuel of the route: 287700
2951 Total Time of the route: 0 seconds
2952
2953 Total Distance of all routes: 0 ft
2954 Total Fuel remaining of all routes: 287700
2955 Total Time of all routes: 0 seconds
2956 4
2957 Start point is: 4
2958 31
2959 16
2960 (4.92, 4.29) (8.91, 4.54)
2961 14 15
2962 The travel time for UGV from depot B to NW UGV stop
    is: 1478
2963 The UGV travel time between two UGV stops is: 4555
2964 11578558.5
2965 End node is [24]
2966 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
2967 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39]
2968 Objective: 150000000
2969 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39
2970 40
```

```
2971 Route for vehicle 0:  
2972 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)  
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0  
    )  
2973 Distance of the route: 0 ft  
2974 Remaining Fuel of the route: 287700  
2975 Total Time of the route: 0 seconds  
2976  
2977 Total Distance of all routes: 0 ft  
2978 Total Fuel remaining of all routes: 287700  
2979 Total Time of all routes: 0 seconds  
2980 5  
2981 Start point is: 5  
2982 16  
2983 31  
2984 (8.91, 4.54) (5.28, 5.71)  
2985 15 14  
2986 The travel time for UGV from depot B to NW UGV stop  
    is: 0  
2987 The UGV travel time between two UGV stops is: 5364  
2988 20264778.0  
2989 End node is [24]  
2990 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,  
    15, 16, 17, 18, 19, 20, 21, 22, 23]  
2991 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37  
    , 38, 39, 40, 41, 42, 43, 44]  
2992 Objective: 16002790  
2993 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 13 14 15 16 17  
    18 19 20 21 22 23 25 30 31 32 33 34 35 36 37 38 39  
    40 41 42 43 44  
2994 45  
2995 45  
2996 45  
2997 45  
2998 45  
2999 45  
3000 45  
3001 Route for vehicle 0:  
3002 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)  
    Distance(0) -> 29 Fuel(164833) Time(620,620) Slack(  
    0) FuelSlack(0,0) Distance(20478) -> 28 Fuel(149161
```

```

3002 ) Time(699,699) Slack(0) FuelSlack(0,0) Distance(
      23090) -> 12 Fuel(22327) Time(1339,1339) Slack(853
      ) FuelSlack(154455,154675) Distance(44229) -> 27
      Fuel(155352) Time(2860,2860) Slack(0) FuelSlack(0,0
      ) Distance(66287) -> 26 Fuel(139680) Time(2939,2939
      ) Slack(0) FuelSlack(0,0) Distance(68899) -> 6 Fuel
      (114) Time(3643,3643) Slack(924) FuelSlack(114,
      287700) Distance(92160) -> 24 Fuel(287700) Time(
      4567,4567) Distance(92160)
3003 Distance of the route: 92160 ft
3004 Remaining Fuel of the route: 287700
3005 Total Time of the route: 4567 seconds
3006
3007 Total Distance of all routes: 92160 ft
3008 Total Fuel remaining of all routes: 287700
3009 Total Time of all routes: 4567 seconds
3010 3
3011 Start point is: 3
3012 16
3013 16
3014 (7.06, 3.02) (5.52, 6.66)
3015 15 15
3016 The travel time for UGV from depot B to NW UGV stop
      is: 2941
3017 The UGV travel time between two UGV stops is: 4569
3018 ****
      ***
3019 UGV route goes infeasible although UAV has a
      solution
3020 ****
      ***
3021 48578490.0
3022 End node is [18]
3023 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
3024 []
3025 Objective: 8201
3026 Dropped nodes: 1 2 3 4 7 8 9 10 11 12 13 14 15
3027 25
3028 25
3029 25

```

```
3030 25
3031 25
3032 25
3033 25
3034 25
3035 25
3036 25
3037 25
3038 Route for vehicle 0:
3039 0 Fuel(287700) Time(1537,1537) Slack(0) FuelSlack(0,0) Distance(0) -> 24 Fuel(85332) Time(2559,2619)
    Slack(0) FuelSlack(0,0) Distance(33728) -> 23 Fuel(72714) Time(2622,2802) Slack(0) FuelSlack(0,0)
    Distance(35831) -> 6 Fuel(9474) Time(2941,3241)
    Slack(894) FuelSlack(79127,284556) Distance(46371)
    ) -> 19 Fuel(208573) Time(3898,4229) Slack(0)
    FuelSlack(0,0) Distance(48474) -> 5 Fuel(195955)
    Time(3961,4412) Slack(295) FuelSlack(0,215881)
    Distance(50577) -> 20 Fuel(287700) Time(4835,5285)
    Slack(0) FuelSlack(0,0) Distance(54816) -> 17 Fuel(19926) Time(6307,6637) Slack(861) FuelSlack(0,27894)
    ) Distance(99445) -> 21 Fuel(287700) Time(8644,8910)
    ) Slack(0) FuelSlack(0,0) Distance(146067) -> 16
    Fuel(7968) Time(10176,10322) Slack(899) FuelSlack(0,118728) Distance(192689) -> 22 Fuel(287700) Time(
    12575,12695) Slack(0) FuelSlack(0,0) Distance(241358) -> 18 Fuel(110760) Time(13588,13588)
    Distance(270848)
3040 Distance of the route: 270848 ft
3041 Remaining Fuel of the route: 110760
3042 Total Time of the route: 13588 seconds
3043
3044 Total Distance of all routes: 270848 ft
3045 Total Fuel remaining of all routes: 110760
3046 Total Time of all routes: 13588 seconds
3047 5
3048 Start point is: 5
3049 16
3050 31
3051 (7.68, 3.53) (5.16, 5.24)
3052 14 14
```

```
3053 The travel time for UGV from depot B to NW UGV stop  
is: 599  
3054 The UGV travel time between two UGV stops is: 4584  
3055 19426767.0  
3056 End node is [24]  
3057 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,  
15, 16, 17, 18, 19, 20, 21, 22, 23]  
3058 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37  
, 38, 39, 40, 41, 42, 43, 44, 45]  
3059 Objective: 6535  
3060 Dropped nodes: 1 2 3 4 6 8 9 10 11 12 13 14 15 16  
17 19 20 21 22  
3061 46  
3062 46  
3063 46  
3064 46  
3065 46  
3066 46  
3067 46  
3068 46  
3069 46  
3070 46  
3071 46  
3072 46  
3073 46  
3074 46  
3075 46  
3076 46  
3077 46  
3078 46  
3079 46  
3080 46  
3081 46  
3082 46  
3083 46  
3084 46  
3085 46  
3086 46  
3087 Route for vehicle 0:  
3088 0 Fuel(250307) Time(0,0) Slack(0) FuelSlack(0,0)  
Distance(0) -> 30 Fuel(129485) Time(610,670) Slack(
```

3088 0) FuelSlack(0,0) Distance(20137) -> 7 Fuel(26771)
 Time(1173,1259) Slack(839) FuelSlack(110987,137758
) Distance(37256) -> 29 Fuel(176713) Time(2658,2744
) Slack(34) FuelSlack(0,0) Distance(55754) -> 5
 Fuel(53846) Time(3398,3484) Slack(751) FuelSlack(
 201704,201704) Distance(76232) -> 25 Fuel(139842)
 Time(4895,4981) Slack(34) FuelSlack(0,0) Distance(
 100875) -> 26 Fuel(124476) Time(5092,5178) Slack(34
) FuelSlack(0,0) Distance(103436) -> 27 Fuel(108804
) Time(5291,5377) Slack(34) FuelSlack(0,0) Distance
 (106048) -> 28 Fuel(93438) Time(5488,5574) Slack(34
) FuelSlack(0,0) Distance(108609) -> 18 Fuel(46722
) Time(5843,5843) Slack(774) FuelSlack(201852,
 201852) Distance(116395) -> 45 Fuel(132570) Time(
 7400,7400) Slack(0) FuelSlack(0,0) Distance(142250
) -> 44 Fuel(124278) Time(7441,7441) Slack(0)
 FuelSlack(0,0) Distance(143632) -> 43 Fuel(115632)
 Time(7484,7484) Slack(0) FuelSlack(0,0) Distance(
 145073) -> 42 Fuel(107340) Time(7525,7525) Slack(0
) FuelSlack(0,0) Distance(146455) -> 41 Fuel(98736
) Time(7568,7568) Slack(0) FuelSlack(0,0) Distance(
 147889) -> 40 Fuel(90444) Time(7609,7609) Slack(0)
 FuelSlack(0,0) Distance(149271) -> 39 Fuel(81798)
 Time(7652,7652) Slack(0) FuelSlack(0,0) Distance(
 150712) -> 38 Fuel(73506) Time(7693,7693) Slack(0)
 FuelSlack(0,0) Distance(152094) -> 37 Fuel(64902)
 Time(7736,7736) Slack(0) FuelSlack(0,0) Distance(
 153528) -> 36 Fuel(56610) Time(7777,7777) Slack(0)
 FuelSlack(0,0) Distance(154910) -> 35 Fuel(47964)
 Time(7820,7820) Slack(0) FuelSlack(0,0) Distance(
 156351) -> 34 Fuel(39672) Time(7861,7861) Slack(0)
 FuelSlack(0,0) Distance(157733) -> 33 Fuel(31068)
 Time(7904,7904) Slack(0) FuelSlack(0,0) Distance(
 159167) -> 32 Fuel(22776) Time(7945,7945) Slack(0)
 FuelSlack(0,0) Distance(160549) -> 31 Fuel(14442)
 Time(7987,7987) Slack(0) FuelSlack(0,0) Distance(
 161938) -> 23 Fuel(5838) Time(8030,8030) Slack(906
) FuelSlack(5838,287700) Distance(163372) -> 24
 Fuel(287700) Time(10536,10536) Distance(216172)
 3089 Distance of the route: 216172 ft
 3090 Remaining Fuel of the route: 287700

```
3091 Total Time of the route: 10536 seconds
3092
3093 Total Distance of all routes: 216172 ft
3094 Total Fuel remaining of all routes: 287700
3095 Total Time of all routes: 10536 seconds
3096 4
3097 Start point is: 4
3098 31
3099 16
3100 (7.37, 3.27) (5.64, 7.14)
3101 14 15
3102 The travel time for UGV from depot B to NW UGV stop
    is: 4612
3103 The UGV travel time between two UGV stops is: 4886
3104 19459266.0
3105 End node is [24]
3106 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
3107 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44]
3108 Objective: 20000000
3109 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42 43 44
3110 45
3111 Route for vehicle 0:
3112 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
3113 Distance of the route: 0 ft
3114 Remaining Fuel of the route: 287700
3115 Total Time of the route: 0 seconds
3116
3117 Total Distance of all routes: 0 ft
3118 Total Fuel remaining of all routes: 287700
3119 Total Time of all routes: 0 seconds
3120 3
3121 Start point is: 3
3122 16
3123 16
3124 (5.28, 5.71) (8.29, 4.03)
```

```
3125 15 15
3126 The travel time for UGV from depot B to NW UGV stop
      is: 3430
3127 The UGV travel time between two UGV stops is: 4787
3128 ****
      ***
3129 UGV route goes infeasible although UAV has a
      solution
3130 ****
      ***
3131 52125316.5
3132 End node is [18]
3133 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
3134 [25]
3135 *****No solution found*****
3136 3
3137 Start point is: 3
3138 16
3139 16
3140 (4.92, 4.29) (7.06, 3.02)
3141 15 15
3142 The travel time for UGV from depot B to NW UGV stop
      is: 2916
3143 The UGV travel time between two UGV stops is: 3710
3144 ****
      ***
3145 UGV route goes infeasible although UAV has a
      solution
3146 ****
      ***
3147 40349949.0
3148 End node is [18]
3149 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
3150 [25, 26, 27, 28, 29, 30, 31, 32]
3151 Objective: 5669
3152 Dropped nodes: 2 3 4 5 6 7 8 9 11 12 13 14 16 17
3153 33
3154 33
3155 33
```

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3156 33
3157 33
3158 33
3159 33
3160 33
3161 33
3162 33
3163 33
3164 33
3165 33
3166 33
3167 33
3168 33
3169 33
3170 33
3171 Route for vehicle 0:
3172 0 Fuel(287700) Time(1537,1537) Slack(45) FuelSlack(
    0,0) Distance(0) -> 25 Fuel(132570) Time(2365,2380
) Slack(105) FuelSlack(0,0) Distance(25855) -> 24
Fuel(117204) Time(2562,2577) Slack(105) FuelSlack(0
,0) Distance(28416) -> 1 Fuel(70794) Time(2916,2931
) Slack(697) FuelSlack(15366,86160) Distance(36151
) -> 26 Fuel(272334) Time(3690,3933) Slack(0)
FuelSlack(0,0) Distance(38712) -> 15 Fuel(52716)
Time(4799,5162) Slack(755) FuelSlack(52716,54624)
Distance(75315) -> 23 Fuel(287700) Time(6868,7231)
Slack(0) FuelSlack(0,0) Distance(118687) -> 22 Fuel
(272028) Time(6947,7430) Slack(0) FuelSlack(0,0)
Distance(121299) -> 21 Fuel(256662) Time(7024,7627
) Slack(0) FuelSlack(0,0) Distance(123860) -> 20
Fuel(240990) Time(7125,7826) Slack(0) FuelSlack(0,0
) Distance(126472) -> 19 Fuel(225624) Time(7322,
8023) Slack(0) FuelSlack(0,0) Distance(129033) ->
32 Fuel(77766) Time(8188,8889) Slack(0) FuelSlack(0
,0) Distance(153676) -> 31 Fuel(65148) Time(8371,
8978) Slack(0) FuelSlack(0,0) Distance(155779) ->
30 Fuel(52332) Time(8555,9042) Slack(0) FuelSlack(0
,0) Distance(157915) -> 29 Fuel(39714) Time(8738,
9105) Slack(0) FuelSlack(0,0) Distance(160018) ->
28 Fuel(27342) Time(8920,9167) Slack(0) FuelSlack(0
,0) Distance(162080) -> 27 Fuel(14526) Time(9104,
```

```
3172 9231) Slack(0) FuelSlack(0,0) Distance(164216) ->
    10 Fuel(1908) Time(9287,9294) Slack(918) FuelSlack(
    0,287700) Distance(166319) -> 18 Fuel(287700) Time(
    10850,10850) Distance(187405)
3173 Distance of the route: 187405 ft
3174 Remaining Fuel of the route: 287700
3175 Total Time of the route: 10850 seconds
3176
3177 Total Distance of all routes: 187405 ft
3178 Total Fuel remaining of all routes: 287700
3179 Total Time of all routes: 10850 seconds
3180 3
3181 Start point is: 3
3182 16
3183 16
3184 (5.16, 5.24) (8.29, 4.03)
3185 14 14
3186 The travel time for UGV from depot B to NW UGV stop
    is: 3385
3187 The UGV travel time between two UGV stops is: 4882
3188 ****
3189 ***
3189 UGV route goes infeasible although UAV has a
    solution
3190 ****
3191 ***
3191 47373462.0
3192 End node is [18]
3193 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
3194 [25, 26]
3195 Objective: 7096
3196 Dropped nodes: 2 3 4 5 6 7 8 9 10 11 13 14 15 16
3197 27
3198 27
3199 27
3200 27
3201 27
3202 27
3203 27
3204 27
```

```
3205 27
3206 27
3207 27
3208 27
3209 Route for vehicle 0:
3210 0 Fuel(287700) Time(1557,1557) Slack(60) FuelSlack(
    0,0) Distance(0) -> 22 Fuel(85854) Time(2636,2636)
    Slack(120) FuelSlack(0,0) Distance(33641) -> 21
    Fuel(70488) Time(2833,2833) Slack(120) FuelSlack(0,
    0) Distance(36202) -> 23 Fuel(39444) Time(3109,3109
    ) Slack(120) FuelSlack(0,0) Distance(41376) -> 1
    Fuel(8400) Time(3385,3385) Slack(898) FuelSlack(
    12375,49723) Distance(46550) -> 24 Fuel(275325)
    Time(4360,4387) Slack(27) FuelSlack(0,0) Distance(
    49111) -> 17 Fuel(28948) Time(5658,5751) Slack(832
    ) FuelSlack(93752,151648) Distance(90174) -> 20
    Fuel(193948) Time(8111,8204) Slack(27) FuelSlack(0,
    0) Distance(140609) -> 26 Fuel(54382) Time(8935,
    9028) Slack(27) FuelSlack(0,0) Distance(163870) ->
    25 Fuel(41764) Time(9118,9211) Slack(27) FuelSlack(
    0,0) Distance(165973) -> 12 Fuel(28948) Time(9302,
    9395) Slack(832) FuelSlack(0,68392) Distance(168109
    ) -> 19 Fuel(287700) Time(10982,11075) Slack(27)
    FuelSlack(0,0) Distance(193038) -> 18 Fuel(39444)
    Time(12355,12355) Distance(234414)
3211 Distance of the route: 234414 ft
3212 Remaining Fuel of the route: 39444
3213 Total Time of the route: 12355 seconds
3214
3215 Total Distance of all routes: 234414 ft
3216 Total Fuel remaining of all routes: 39444
3217 Total Time of all routes: 12355 seconds
3218 3
3219 Start point is: 3
3220 16
3221 16
3222 (8.91, 4.54) (5.04, 4.76)
3223 14 15
3224 The travel time for UGV from depot B to NW UGV stop
    is: 3946
3225 The UGV travel time between two UGV stops is: 4724
```

```
3226 ****
      ***
3227 UGV route goes infeasible although UAV has a
      solution
3228 ****
      ***
3229 53135955.0
3230 End node is [18]
3231 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
3232 [25]
3233 *****No solution found*****
3234 3
3235 Start point is: 3
3236 16
3237 16
3238 (5.64, 7.14) (8.91, 4.54)
3239 14 14
3240 The travel time for UGV from depot B to NW UGV stop
      is: 4124
3241 The UGV travel time between two UGV stops is: 5923
3242 ****
      ***
3243 UGV route goes infeasible although UAV has a
      solution
3244 ****
      ***
3245 59115967.5
3246 End node is [18]
3247 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
3248 []
3249 *****No solution found*****
3250 3
3251 Start point is: 3
3252 16
3253 16
3254 (5.16, 5.24) (8.91, 4.54)
3255 14 14
3256 The travel time for UGV from depot B to NW UGV stop
      is: 3385
```

```
3257 The UGV travel time between two UGV stops is: 5183
3258 ****
3259 *** UGV route goes infeasible although UAV has a
3260 solution ****
3261 49663918.5
3262 End node is [18]
3263 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
3264 15, 16, 17]
3265 ***No solution found*****
3266 5
3267 Start point is: 5
3268 16
3269 31
3270 (4.92, 4.29) (7.37, 3.27)
3271 14 14
3272 The travel time for UGV from depot B to NW UGV stop
3273 is: 3888
3274 The UGV travel time between two UGV stops is: 4060
3275 17863728.0
3276 End node is [24]
3277 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
3278 15, 16, 17, 18, 19, 20, 21, 22, 23]
3279 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
3280 , 38, 39, 40, 41, 42, 43, 44, 45, 46, 47]
3281 Objective: 5446
3282 Dropped nodes: 1 2 4 5 6 7 8 9 10 11 13 14 15 16 17
3283 18 19 20 21 22
3284 48
3285 48
3286 48
3287 48
3288 48
3289 48
```

```
3290 48
3291 48
3292 48
3293 48
3294 48
3295 48
3296 48
3297 48
3298 48
3299 48
3300 48
3301 48
3302 48
3303 48
3304 48
3305 48
3306 48
3307 Route for vehicle 0:
3308 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 30 Fuel(166878) Time(610,670) Slack(
    0) FuelSlack(0,0) Distance(20137) -> 3 Fuel(46056)
    Time(1220,1400) Slack(776) FuelSlack(147858,193914
    ) Distance(40274) -> 25 Fuel(139842) Time(2742,3071
    ) Slack(0) FuelSlack(0,0) Distance(64917) -> 26
    Fuel(124476) Time(2819,3268) Slack(0) FuelSlack(0,0
    ) Distance(67478) -> 27 Fuel(108804) Time(2898,3420
    ) Slack(0) FuelSlack(0,0) Distance(70090) -> 28
    Fuel(93438) Time(3017,3497) Slack(0) FuelSlack(0,0
    ) Distance(72651) -> 29 Fuel(77766) Time(3216,3576
    ) Slack(0) FuelSlack(0,0) Distance(75263) -> 31
    Fuel(46722) Time(3492,3732) Slack(0) FuelSlack(0,0
    ) Distance(80437) -> 32 Fuel(31050) Time(3691,3811
    ) Slack(0) FuelSlack(0,0) Distance(83049) -> 12
    Fuel(15684) Time(3888,3888) Slack(874) FuelSlack(
    139770,139770) Distance(85610) -> 47 Fuel(163614)
    Time(5388,5388) Slack(0) FuelSlack(0,0) Distance(
    106291) -> 46 Fuel(155322) Time(5429,5429) Slack(0
    ) FuelSlack(0,0) Distance(107673) -> 45 Fuel(146676
    ) Time(5472,5472) Slack(0) FuelSlack(0,0) Distance(
    109114) -> 44 Fuel(138384) Time(5513,5513) Slack(0
    ) FuelSlack(0,0) Distance(110496) -> 43 Fuel(129780
```

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3308 ) Time(5556,5556) Slack(0) FuelSlack(0,0) Distance(
    111930) -> 42 Fuel(121488) Time(5597,5597) Slack(0
) FuelSlack(0,0) Distance(113312) -> 41 Fuel(112842
) Time(5640,5640) Slack(0) FuelSlack(0,0) Distance(
    114753) -> 40 Fuel(104550) Time(5681,5681) Slack(0
) FuelSlack(0,0) Distance(116135) -> 39 Fuel(95946
) Time(5724,5724) Slack(0) FuelSlack(0,0) Distance(
    117569) -> 38 Fuel(87654) Time(5765,5765) Slack(0
) FuelSlack(0,0) Distance(118951) -> 37 Fuel(79008)
Time(5808,5808) Slack(0) FuelSlack(0,0) Distance(
    120392) -> 36 Fuel(70716) Time(5849,5849) Slack(0
) FuelSlack(0,0) Distance(121774) -> 35 Fuel(62112)
Time(5892,5892) Slack(0) FuelSlack(0,0) Distance(
    123208) -> 34 Fuel(53820) Time(5933,5933) Slack(0
) FuelSlack(0,0) Distance(124590) -> 33 Fuel(45486)
Time(5975,5975) Slack(0) FuelSlack(0,0) Distance(
    125979) -> 23 Fuel(36882) Time(6018,6018) Slack(806
) FuelSlack(36882,287700) Distance(127413) -> 24
Fuel(287700) Time(8424,8424) Distance(180213)

3309 Distance of the route: 180213 ft
3310 Remaining Fuel of the route: 287700
3311 Total Time of the route: 8424 seconds
3312
3313 Total Distance of all routes: 180213 ft
3314 Total Fuel remaining of all routes: 287700
3315 Total Time of all routes: 8424 seconds
3316 2
3317 Start point is: 2
3318 16
3319 16
3320 (8.6, 4.29) (5.04, 4.76)
3321 15 15
3322 The travel time for UGV from depot B to NW UGV stop
    is: 3516
3323 The UGV travel time between two UGV stops is: 4583
3324 23244799.5
3325 End node is [24]
3326 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
3327 [25, 26, 27, 28, 29, 30, 31, 32]
3328 Objective: 8000000

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3329 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
      16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32
3330 33
3331 Route for vehicle 0:
3332 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
      Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
      )
3333 Distance of the route: 0 ft
3334 Remaining Fuel of the route: 287700
3335 Total Time of the route: 0 seconds
3336
3337 Total Distance of all routes: 0 ft
3338 Total Fuel remaining of all routes: 287700
3339 Total Time of all routes: 0 seconds
3340 5
3341 Start point is: 5
3342 16
3343 31
3344 (8.91, 4.54) (5.64, 7.14)
3345 15 14
3346 The travel time for UGV from depot B to NW UGV stop
      is: 0
3347 The UGV travel time between two UGV stops is: 5923
3348 22657707.0
3349 End node is [24]
3350 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
3351 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39, 40, 41]
3352 Objective: 16001408
3353 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 12 13 14 15 16
      17 18 19 20 21 22 23 25 27 28 29 30 31 32 33 34 35
      36 37 38 39 40 41
3354 42
3355 42
3356 42
3357 Route for vehicle 0:
3358 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
      Distance(0) -> 26 Fuel(148134) Time(704,704) Slack(
      0) FuelSlack(0,0) Distance(23261) -> 6 Fuel(8568)
      Time(1408,1408) Slack(897) FuelSlack(8423,287700)

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3358 Distance(46522) -> 24 Fuel(287700) Time(2305,2305)
    Distance(46522)
3359 Distance of the route: 46522 ft
3360 Remaining Fuel of the route: 287700
3361 Total Time of the route: 2305 seconds
3362
3363 Total Distance of all routes: 46522 ft
3364 Total Fuel remaining of all routes: 287700
3365 Total Time of all routes: 2305 seconds
3366 2
3367 Start point is: 2
3368 16
3369 16
3370 (7.68, 3.53) (5.88, 8.09)
3371 14 14
3372 The travel time for UGV from depot B to NW UGV stop
    is: 3318
3373 The UGV travel time between two UGV stops is: 5693
3374 ****
***  

3375 UGV route goes infeasible although UAV has a
    solution
3376 ****
***  

3377 28678309.5
3378 End node is [24]
3379 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
3380 [25, 26, 27, 28]
3381 Objective: 4000000
3382 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28
3383 29
3384 Route for vehicle 0:
3385 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
3386 Distance of the route: 0 ft
3387 Remaining Fuel of the route: 287700
3388 Total Time of the route: 0 seconds
3389
```

```
3390 Total Distance of all routes: 0 ft
3391 Total Fuel remaining of all routes: 287700
3392 Total Time of all routes: 0 seconds
3393 5
3394 Start point is: 5
3395 16
3396 31
3397 (8.91, 4.54) (4.8, 3.81)
3398 15 14
3399 The travel time for UGV from depot B to NW UGV stop
    is: 0
3400 The UGV travel time between two UGV stops is: 4625
3401 8927134.5
3402 End node is [24]
3403 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
3404 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39]
3405 Objective: 15000000
3406 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39
3407 40
3408 Route for vehicle 0:
3409 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
3410 Distance of the route: 0 ft
3411 Remaining Fuel of the route: 287700
3412 Total Time of the route: 0 seconds
3413
3414 Total Distance of all routes: 0 ft
3415 Total Fuel remaining of all routes: 287700
3416 Total Time of all routes: 0 seconds
3417 3
3418 Start point is: 3
3419 16
3420 16
3421 (7.37, 3.27) (5.76, 7.62)
3422 14 14
3423 The travel time for UGV from depot B to NW UGV stop
```

```
3423 is: 3192
3424 The UGV travel time between two UGV stops is: 5353
3425 ****
3426 *** UGV route goes infeasible although UAV has a
3427 solution
3428 ****
3429 ***
3430 End node is [18]
3431 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
3432 15, 16, 17]
3433 []
3434 Objective: 7908
3435 Dropped nodes: 1 2 3 4 5 7 8 9 10 13 14 15
3436 25
3437 25
3438 25
3439 25
3440 25
3441 25
3442 25
3443 25
3444 25
3445 25
3446 Route for vehicle 0:
3447 0 Fuel(274969) Time(1552,1552) Slack(60) FuelSlack(
3448 0,0) Distance(0) -> 22 Fuel(98029) Time(2505,2505)
3449 Slack(120) FuelSlack(0,0) Distance(29490) -> 24
3450 Fuel(72595) Time(2753,2753) Slack(120) FuelSlack(0,
3451 0) Distance(33729) -> 6 Fuel(9355) Time(3192,3192)
3452 Slack(895) FuelSlack(10571,29281) Distance(44269
3453 ) -> 20 Fuel(277129) Time(4151,4181) Slack(90)
3454 FuelSlack(0,0) Distance(46405) -> 17 Fuel(9355)
3455 Time(5623,5653) Slack(895) FuelSlack(0,158407)
3456 Distance(91034) -> 23 Fuel(287700) Time(8085,8115)
3457 Slack(90) FuelSlack(0,0) Distance(141778) -> 12
3458 Fuel(149052) Time(8905,8935) Slack(445) FuelSlack(
3459 101881,287700) Distance(164886) -> 19 Fuel(185819)
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3447 Time(9427,9937) Slack(0) FuelSlack(0,0) Distance(
    167447) -> 11 Fuel(170453) Time(9586,10134) Slack(
    377) FuelSlack(0,178421) Distance(170008) -> 21
    Fuel(287700) Time(11220,11366) Slack(0) FuelSlack(0
    ,0) Distance(193428) -> 16 Fuel(7968) Time(12752,
    12778) Slack(899) FuelSlack(0,287700) Distance(
    240050) -> 18 Fuel(287700) Time(14317,14317)
    Distance(261171)
3448 Distance of the route: 261171 ft
3449 Remaining Fuel of the route: 287700
3450 Total Time of the route: 14317 seconds
3451
3452 Total Distance of all routes: 261171 ft
3453 Total Fuel remaining of all routes: 287700
3454 Total Time of all routes: 14317 seconds
3455 3
3456 Start point is: 3
3457 16
3458 16
3459 (5.76, 7.62) (7.98, 3.78)
3460 14 14
3461 The travel time for UGV from depot B to NW UGV stop
    is: 4309
3462 The UGV travel time between two UGV stops is: 5655
3463 ****
3464 UGV route goes infeasible although UAV has a
    solution
3465 ****
3466 61804828.5
3467 End node is [18]
3468 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
3469 []
3470 *****No solution found*****
3471 3
3472 Start point is: 3
3473 16
3474 16
3475 (8.29, 4.03) (5.88, 8.09)

```

```
3476 15 15
3477 The travel time for UGV from depot B to NW UGV stop
      is: 3504
3478 The UGV travel time between two UGV stops is: 5653
3479 ****
      ***
3480 UGV route goes infeasible although UAV has a
      solution
3481 ****
      ***
3482 52972582.5
3483 End node is [18]
3484 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
3485 []
3486 *****No solution found*****
3487 4
3488 Start point is: 4
3489 31
3490 16
3491 (4.8, 3.81) (7.37, 3.27)
3492 14 15
3493 The travel time for UGV from depot B to NW UGV stop
      is: 1663
3494 The UGV travel time between two UGV stops is: 3675
3495 10854786.0
3496 End node is [24]
3497 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
3498 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39, 40, 41, 42, 43, 44]
3499 Objective: 20000000
3500 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
      16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
      34 35 36 37 38 39 40 41 42 43 44
3501 45
3502 Route for vehicle 0:
3503 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
      Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
      )
3504 Distance of the route: 0 ft
```

```
3505 Remaining Fuel of the route: 287700
3506 Total Time of the route: 0 seconds
3507
3508 Total Distance of all routes: 0 ft
3509 Total Fuel remaining of all routes: 287700
3510 Total Time of all routes: 0 seconds
3511 5
3512 Start point is: 5
3513 16
3514 31
3515 (8.29, 4.03) (5.52, 6.66)
3516 15 14
3517 The travel time for UGV from depot B to NW UGV stop
    is: 281
3518 The UGV travel time between two UGV stops is: 5432
3519 11289598.5
3520 End node is [24]
3521 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
3522 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39]
3523 Objective: 15000000
3524 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39
3525 40
3526 Route for vehicle 0:
3527 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
3528 Distance of the route: 0 ft
3529 Remaining Fuel of the route: 287700
3530 Total Time of the route: 0 seconds
3531
3532 Total Distance of all routes: 0 ft
3533 Total Fuel remaining of all routes: 287700
3534 Total Time of all routes: 0 seconds
3535 4
3536 Start point is: 4
3537 31
3538 16
```

```
3539 (7.98, 3.78) (5.4, 6.19)
3540 15 15
3541 The travel time for UGV from depot B to NW UGV stop
    is: 4586
3542 The UGV travel time between two UGV stops is: 4822
3543 19079871.0
3544 End node is [24]
3545 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
3546 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42]
3547 Objective: 18000000
3548 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42
3549 43
3550 Route for vehicle 0:
3551 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
3552 Distance of the route: 0 ft
3553 Remaining Fuel of the route: 287700
3554 Total Time of the route: 0 seconds
3555
3556 Total Distance of all routes: 0 ft
3557 Total Fuel remaining of all routes: 287700
3558 Total Time of all routes: 0 seconds
3559 4
3560 Start point is: 4
3561 31
3562 16
3563 (5.64, 7.14) (7.68, 3.53)
3564 14 14
3565 The travel time for UGV from depot B to NW UGV stop
    is: 369
3566 The UGV travel time between two UGV stops is: 5323
3567 11279073.0
3568 End node is [24]
3569 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
3570 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37]
```

```
3570 , 38, 39, 40, 41, 42, 43]
3571 Objective: 19000000
3572 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42 43
3573 44
3574 Route for vehicle 0:
3575 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
3576 Distance of the route: 0 ft
3577 Remaining Fuel of the route: 287700
3578 Total Time of the route: 0 seconds
3579
3580 Total Distance of all routes: 0 ft
3581 Total Fuel remaining of all routes: 287700
3582 Total Time of all routes: 0 seconds
3583 2
3584 Start point is: 2
3585 16
3586 16
3587 (5.28, 5.71) (8.6, 4.29)
3588 15 15
3589 The travel time for UGV from depot B to NW UGV stop
    is: 3301
3590 The UGV travel time between two UGV stops is: 4928
3591 24725494.5
3592 End node is [24]
3593 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
3594 [25, 26, 27, 28, 29, 30]
3595 Objective: 6000000
3596 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30
3597 31
3598 Route for vehicle 0:
3599 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
3600 Distance of the route: 0 ft
3601 Remaining Fuel of the route: 287700
```

```
3602 Total Time of the route: 0 seconds
3603
3604 Total Distance of all routes: 0 ft
3605 Total Fuel remaining of all routes: 287700
3606 Total Time of all routes: 0 seconds
3607 3
3608 Start point is: 3
3609 16
3610 16
3611 (5.04, 4.76) (7.68, 3.53)
3612 15 14
3613 The travel time for UGV from depot B to NW UGV stop
      is: 3085
3614 The UGV travel time between two UGV stops is: 4395
3615 ****
      ***
3616 UGV route goes infeasible although UAV has a
      solution
3617 ****
      ***
3618 46192956.0
3619 End node is [18]
3620 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
3621 [25, 26, 27, 28, 29]
3622 ****No solution found*****
3623 5
3624 Start point is: 5
3625 16
3626 31
3627 (7.06, 3.02) (5.04, 4.76)
3628 15 14
3629 The travel time for UGV from depot B to NW UGV stop
      is: 841
3630 The UGV travel time between two UGV stops is: 4090
3631 18262155.0
3632 End node is [24]
3633 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
3634 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37,
      , 38, 39, 40, 41, 42, 43, 44, 45, 46]
```

```
3635 Objective: 15005357
3636 Dropped nodes: 1 2 3 6 8 9 10 11 12 14 15 16 17 18
    19 20 21 22 23 32 33 34 35 36 37 38 39 40 41 42 43
    44 45 46
3637 47
3638 47
3639 47
3640 47
3641 47
3642 47
3643 47
3644 47
3645 47
3646 47
3647 47
3648 47
3649 Route for vehicle 0:
3650 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 31 Fuel(166848) Time(610,610) Slack(
        0) FuelSlack(0,0) Distance(20142) -> 7 Fuel(74280)
        Time(1077,1077) Slack(686) FuelSlack(176230,176466
    ) Distance(35570) -> 30 Fuel(185514) Time(2279,2279
    ) Slack(0) FuelSlack(0,0) Distance(52601) -> 5 Fuel
        (64692) Time(2889,2889) Slack(717) FuelSlack(187559
    ,187559) Distance(72738) -> 29 Fuel(164833) Time(
        4226,4226) Slack(0) FuelSlack(0,0) Distance(93216
    ) -> 4 Fuel(41966) Time(4846,4846) Slack(790)
        FuelSlack(189824,189824) Distance(113694) -> 25
        Fuel(139842) Time(6382,6382) Slack(0) FuelSlack(0,0
    ) Distance(138337) -> 26 Fuel(124476) Time(6459,
        6459) Slack(0) FuelSlack(0,0) Distance(140898) ->
        27 Fuel(108804) Time(6538,6538) Slack(0) FuelSlack(
            0,0) Distance(143510) -> 28 Fuel(93438) Time(6615,
            6615) Slack(0) FuelSlack(0,0) Distance(146071) ->
            13 Fuel(31051) Time(6930,6930) Slack(825) FuelSlack
            (31051,287700) Distance(156469) -> 24 Fuel(287700)
            Time(8375,8375) Distance(176936)
3651 Distance of the route: 176936 ft
3652 Remaining Fuel of the route: 287700
3653 Total Time of the route: 8375 seconds
3654
```

```
3655 Total Distance of all routes: 176936 ft
3656 Total Fuel remaining of all routes: 287700
3657 Total Time of all routes: 8375 seconds
3658 2
3659 Start point is: 2
3660 16
3661 16
3662 (7.37, 3.27) (4.92, 4.29)
3663 15 14
3664 The travel time for UGV from depot B to NW UGV stop
    is: 2953
3665 The UGV travel time between two UGV stops is: 4060
3666 20587681.5
3667 End node is [24]
3668 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
3669 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    ]
3670 Objective: 130000000
3671 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37
3672 38
3673 Route for vehicle 0:
3674 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
3675 Distance of the route: 0 ft
3676 Remaining Fuel of the route: 287700
3677 Total Time of the route: 0 seconds
3678
3679 Total Distance of all routes: 0 ft
3680 Total Fuel remaining of all routes: 287700
3681 Total Time of all routes: 0 seconds
3682 The best fitness obtained in the current generation
    is: 5446
3683 Candidate 1: [83, 14, 15, 48, 5, 5446, 5]
3684 Candidate 2: [118, 14, 15, 4, 30, 50000000, 3]
3685 Candidate 1: [83, 14, 14, 48, 5, 5446, 5]
3686 Candidate 2: [105, 14, 15, 44, 45, 5008650, 3]
3687 Father before deletion: [83, 14, 15, 48, 5, 5446, 5]
```

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3687 ]
3688 Mother before deletion: [83, 14, 14, 48, 5, 5446, 5
    ]
3689 Father after deletion: [83, 14, 15, 48, 5, 5]
3690 Mother after deletion: [83, 14, 14, 48, 5, 5]
3691 010100110000111000001111001100000000010100000101
3692 010100110000111000001110001100000000010100000101
3693 Offspring1 after mutation:
    010100110000111000001110001100000000010100000101
3694 Offspring2 after mutation:
    010100110000111000001111001100000000010100000101
3695 48 48
3696 [83, 14, 14, 48, 5, 5]
3697 [83, 14, 15, 48, 5, 5]
3698 Candidate 1: [74, 15, 15, 31, 12, 5447, 5]
3699 Candidate 2: [27, 14, 14, 36, 35, 16002695, 5]
3700 Candidate 1: [74, 15, 15, 50, 12, 5447, 5]
3701 Candidate 2: [51, 15, 15, 28, 8, 50000000, 3]
3702 Father before deletion: [74, 15, 15, 31, 12, 5447,
    5]
3703 Mother before deletion: [74, 15, 15, 50, 12, 5447,
    5]
3704 Father after deletion: [74, 15, 15, 31, 12, 5]
3705 Mother after deletion: [74, 15, 15, 50, 12, 5]
3706 010010100000111100001111000111110000110000000101
3707 010010100000111100001111001100100000110000000101
3708 Offspring1 after mutation:
    0100101000001111000011110001100100000110000000101
3709 Offspring2 after mutation:
    010010100000111100001111000100100000110000000101
3710 48 48
3711 [74, 15, 15, 50, 12, 5]
3712 [74, 15, 15, 18, 12, 5]
3713 Candidate 1: [85, 14, 15, 19, 23, 5507, 5]
3714 Candidate 2: [110, 14, 14, 34, 49, 50000000, 3]
3715 Candidate 1: [85, 14, 15, 19, 23, 5507, 5]
3716 Candidate 2: [83, 14, 15, 48, 5, 5446, 5]
3717 Father before deletion: [85, 14, 15, 19, 23, 5507,
    5]
3718 Mother before deletion: [83, 14, 15, 48, 5, 5446, 5
    ]
```

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3719 Father after deletion: [85, 14, 15, 19, 23, 5]
3720 Mother after deletion: [83, 14, 15, 48, 5, 5]
3721 010101010000111000001111000100110001011100000101
3722 010100110000111000001111001100000000010100000101
3723 Offspring1 after mutation:
    01010101000011100000111100110000000010100000101
3724 Offspring2 after mutation:
    010100110000111000001111000100110001011100000101
3725 48 48
3726 [85, 14, 15, 48, 5, 5]
3727 [83, 14, 15, 19, 23, 5]
3728 Candidate 1: [25, 14, 14, 11, 36, 6535, 5]
3729 Candidate 2: [122, 15, 15, 23, 27, 50000000, 3]
3730 Candidate 1: [73, 15, 15, 36, 11, 5005669, 3]
3731 Candidate 2: [73, 15, 15, 36, 11, 5005669, 3]
3732 Father before deletion: [25, 14, 14, 11, 36, 6535,
    5]
3733 Mother before deletion: [73, 15, 15, 36, 11,
    5005669, 3]
3734 Father after deletion: [25, 14, 14, 11, 36, 5]
3735 Mother after deletion: [73, 15, 15, 36, 11, 3]
3736 000110010000111000001110000010110010010000000101
3737 010010010000111100001111001001000000101100000011
3738 Offspring1 after mutation:
    000110010000111100001111001001000010010000000101
3739 Offspring2 after mutation:
    010010010000111000001110000010110000101100000011
3740 48 48
3741 [25, 15, 15, 36, 36, 5]
3742 [73, 14, 14, 11, 11, 3]
3743 Candidate 1: [73, 15, 15, 36, 11, 5005669, 3]
3744 Candidate 2: [5, 14, 15, 16, 41, 50000000, 4]
3745 Candidate 1: [73, 15, 15, 36, 11, 5005669, 3]
3746 Candidate 2: [83, 14, 15, 28, 5, 15003229, 5]
3747 Father before deletion: [73, 15, 15, 36, 11,
    5005669, 3]
3748 Mother before deletion: [73, 15, 15, 36, 11,
    5005669, 3]
3749 Father after deletion: [73, 15, 15, 36, 11, 3]
3750 Mother after deletion: [73, 15, 15, 36, 11, 3]
3751 010010010000111100001111001001000000101100000011

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3752 010010010000111100001111001001000000101100000011
3753 Offspring1 after mutation:
    010010010000111100001111001001000000101100000011
3754 Offspring2 after mutation:
    010010010000111100001111001001000000101100000011
3755 48 48
3756 [73, 15, 15, 36, 11, 3]
3757 [73, 15, 15, 36, 11, 3]
3758 Candidate 1: [4, 15, 14, 18, 41, 5006295, 3]
3759 Candidate 2: [46, 15, 15, 18, 6, 50000000, 2]
3760 Candidate 1: [75, 15, 15, 37, 7, 5006441, 3]
3761 Candidate 2: [8, 15, 15, 45, 19, 5008201, 3]
3762 Father before deletion: [4, 15, 14, 18, 41, 5006295
    , 3]
3763 Mother before deletion: [75, 15, 15, 37, 7, 5006441
    , 3]
3764 Father after deletion: [4, 15, 14, 18, 41, 3]
3765 Mother after deletion: [75, 15, 15, 37, 7, 3]
3766 000001000000111100001110000100100010100100000011
3767 010010110000111100001111001001010000011100000011
3768 Offspring1 after mutation:
    000001110000111100001110000100100010100100000011
3769 Offspring2 after mutation:
    01001000000111100001111001001010000011100000011
3770 48 48
3771 [7, 15, 14, 18, 41, 3]
3772 [72, 15, 15, 37, 7, 3]
3773 Candidate 1: [115, 14, 14, 3, 30, 5007096, 3]
3774 Candidate 2: [48, 15, 14, 36, 21, 50000000, 5]
3775 Candidate 1: [115, 14, 14, 3, 30, 5007096, 3]
3776 Candidate 2: [138, 15, 14, 10, 3, 50000000, 5]
3777 Father before deletion: [115, 14, 14, 3, 30,
    5007096, 3]
3778 Mother before deletion: [115, 14, 14, 3, 30,
    5007096, 3]
3779 Father after deletion: [115, 14, 14, 3, 30, 3]
3780 Mother after deletion: [115, 14, 14, 3, 30, 3]
3781 011100110000111000001110000000110001111000000011
3782 011100110000111000001110000000110001111000000011
3783 Offspring1 after mutation:
    011100110000111000001110000000110001111000000011

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3784 Offspring2 after mutation:
0111001100001110000011100000011000111100000011

3785 48 48
3786 [115, 14, 14, 3, 30, 3]
3787 [115, 14, 14, 3, 30, 3]
3788 Candidate 1: [20, 14, 14, 6, 44, 5007908, 3]
3789 Candidate 2: [133, 14, 15, 13, 9, 50000000, 4]
3790 Candidate 1: [8, 15, 15, 45, 19, 5008201, 3]
3791 Candidate 2: [4, 15, 14, 18, 41, 5006295, 3]
3792 Father before deletion: [20, 14, 14, 6, 44, 5007908
, 3]
3793 Mother before deletion: [4, 15, 14, 18, 41, 5006295
, 3]
3794 Father after deletion: [20, 14, 14, 6, 44, 3]
3795 Mother after deletion: [4, 15, 14, 18, 41, 3]
3796 00010100000011100000111000000110001011000000011
3797 000001000000111100001110000100100010100100000011
3798 Offspring1 after mutation:
00010100000011100000111000000110001011000000011
3799 Offspring2 after mutation:
000001000000111100001110000100100010100100000011
3800 48 48
3801 [20, 14, 14, 6, 44, 3]
3802 [4, 15, 14, 18, 41, 3]
3803 Candidate 1: [105, 14, 15, 44, 45, 5008650, 3]
3804 Candidate 2: [115, 14, 14, 3, 30, 5007096, 3]
3805 Candidate 1: [24, 14, 15, 2, 32, 7006057, 3]
3806 Candidate 2: [14, 15, 15, 11, 28, 50000000, 4]
3807 Father before deletion: [115, 14, 14, 3, 30,
5007096, 3]
3808 Mother before deletion: [24, 14, 15, 2, 32, 7006057
, 3]
3809 Father after deletion: [115, 14, 14, 3, 30, 3]
3810 Mother after deletion: [24, 14, 15, 2, 32, 3]
3811 01110011000011100000111000000011000111100000011
3812 00011000000011100000111100000010001000000000011
3813 Offspring1 after mutation:
01110011000011100000111100000011000111100000011
3814 Offspring2 after mutation:
00011000000011100000111000000010001000000000011
3815 48 48

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3816 [115, 14, 15, 3, 30, 3]
3817 [24, 14, 14, 2, 32, 3]
3818 Candidate 1: [83, 14, 15, 28, 5, 15003229, 5]
3819 Candidate 2: [31, 14, 14, 49, 24, 50000000, 2]
3820 Candidate 1: [87, 14, 14, 15, 23, 15004294, 5]
3821 Candidate 2: [69, 15, 14, 17, 26, 16001408, 5]
3822 Father before deletion: [83, 14, 15, 28, 5,
    15003229, 5]
3823 Mother before deletion: [87, 14, 14, 15, 23,
    15004294, 5]
3824 Father after deletion: [83, 14, 15, 28, 5, 5]
3825 Mother after deletion: [87, 14, 14, 15, 23, 5]
3826 010100110000111000001111000111000000010100000101
3827 010101110000111000001110000011110001011100000101
3828 Offspring1 after mutation:
    010100110000111000001111000111000000010100000101
3829 Offspring2 after mutation:
    010101110000111000001110000011110001011100000101
3830 48 48
3831 [83, 14, 15, 28, 5, 5]
3832 [87, 14, 14, 15, 23, 5]
3833 Candidate 1: [4, 15, 14, 32, 11, 15005357, 5]
3834 Candidate 2: [64, 14, 15, 27, 42, 50000000, 3]
3835 Candidate 1: [69, 14, 14, 17, 26, 16001408, 5]
3836 Candidate 2: [19, 14, 15, 4, 35, 50000000, 4]
3837 Father before deletion: [4, 15, 14, 32, 11,
    15005357, 5]
3838 Mother before deletion: [69, 14, 14, 17, 26,
    16001408, 5]
3839 Father after deletion: [4, 15, 14, 32, 11, 5]
3840 Mother after deletion: [69, 14, 14, 17, 26, 5]
3841 000001000000111100001110001000000000101100000101
3842 010001010000111000001110000100010001101000000101
3843 Offspring1 after mutation:
    00000100000011110000111000100000000101100000101
3844 Offspring2 after mutation:
    010001010000111000001110000100010001101000000101
3845 48 48
3846 [4, 15, 14, 32, 11, 5]
3847 [69, 14, 14, 17, 26, 5]
3848 Candidate 1: [79, 14, 14, 31, 12, 16001408, 5]

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3849 Candidate 2: [74, 15, 15, 50, 12, 5447, 5]
3850 Candidate 1: [69, 15, 14, 17, 26, 16001408, 5]
3851 Candidate 2: [99, 14, 14, 15, 45, 50000000, 4]
3852 Father before deletion: [74, 15, 15, 50, 12, 5447,
    5]
3853 Mother before deletion: [69, 15, 14, 17, 26,
    16001408, 5]
3854 Father after deletion: [74, 15, 15, 50, 12, 5]
3855 Mother after deletion: [69, 15, 14, 17, 26, 5]
3856 010010100000111100001111001100100000110000000101
3857 0100010100001111000011110000100010001101000000101
3858 Offspring1 after mutation:
    0100110100001111000011110000100010000110000000101
3859 Offspring2 after mutation:
    010000100000111100001111001100100001101000000101
3860 48 48
3861 [77, 15, 14, 17, 12, 5]
3862 [66, 15, 15, 50, 26, 5]
3863 Candidate 1: [27, 14, 14, 36, 35, 16002695, 5]
3864 Candidate 2: [25, 14, 14, 11, 36, 6535, 5]
3865 Candidate 1: [66, 15, 14, 40, 10, 16002790, 5]
3866 Candidate 2: [24, 14, 15, 2, 32, 7006057, 3]
3867 Father before deletion: [25, 14, 14, 11, 36, 6535,
    5]
3868 Mother before deletion: [24, 14, 15, 2, 32, 7006057
    , 3]
3869 Father after deletion: [25, 14, 14, 11, 36, 5]
3870 Mother after deletion: [24, 14, 15, 2, 32, 3]
3871 000110010000111000001110000010110010010000000101
3872 00011000000011100000111100000010001000000000011
3873 Offspring1 after mutation:
    000110010000111000001111000000100010010000000101
3874 Offspring2 after mutation:
    00011000000011100000111000001011001000000000011
3875 48 48
3876 [25, 14, 15, 2, 36, 5]
3877 [24, 14, 14, 11, 32, 3]
3878 Candidate 1: [88, 14, 14, 7, 20, 50000000, 2]
3879 Candidate 2: [121, 14, 15, 5, 3, 50000000, 3]
3880 Candidate 1: [102, 15, 15, 25, 31, 50000000, 4]
3881 Candidate 2: [62, 15, 14, 32, 29, 50000000, 5]

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3882 Father before deletion: [88, 14, 14, 7, 20,
50000000, 2]
3883 Mother before deletion: [102, 15, 15, 25, 31,
50000000, 4]
3884 Father after deletion: [88, 14, 14, 7, 20, 2]
3885 Mother after deletion: [102, 15, 15, 25, 31, 4]
3886 01011000000011100000111000001110001010000000010
3887 011001100000111100001111000110010001111100000100
3888 Offspring1 after mutation:
010111100000111100001111000110010001010000000010
3889 Offspring2 after mutation:
01100000000011100000111000001110001111100000100
3890 48 48
3891 [94, 15, 15, 25, 20, 2]
3892 [96, 14, 14, 7, 31, 4]
3893 Candidate 1: [118, 14, 15, 4, 30, 50000000, 3]
3894 Candidate 2: [115, 14, 14, 3, 30, 5007096, 3]
3895 Candidate 1: [26, 14, 15, 47, 25, 50000000, 4]
3896 Candidate 2: [73, 15, 15, 36, 11, 5005669, 3]
3897 Father before deletion: [115, 14, 14, 3, 30,
5007096, 3]
3898 Mother before deletion: [73, 15, 15, 36, 11,
5005669, 3]
3899 Father after deletion: [115, 14, 14, 3, 30, 3]
3900 Mother after deletion: [73, 15, 15, 36, 11, 3]
3901 011100110000111000001110000000110001111000000011
3902 010010010000111100001111001001000000101100000011
3903 Offspring1 after mutation:
011100110000111100001111001001000000101100000011
3904 Offspring2 after mutation:
010010010000111000001110000000110001111000000011
3905 48 48
3906 [115, 15, 15, 36, 11, 3]
3907 [73, 14, 14, 3, 30, 3]
3908 Candidate 1: [5, 14, 15, 16, 41, 50000000, 4]
3909 Candidate 2: [85, 14, 15, 19, 23, 5507, 5]
3910 Candidate 1: [59, 14, 15, 2, 33, 50000000, 4]
3911 Candidate 2: [73, 15, 15, 36, 11, 5005669, 3]
3912 Father before deletion: [85, 14, 15, 19, 23, 5507,
5]
3913 Mother before deletion: [73, 15, 15, 36, 11,

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3913 5005669, 3]
3914 Father after deletion: [85, 14, 15, 19, 23, 5]
3915 Mother after deletion: [73, 15, 15, 36, 11, 3]
3916 01010101000011100001111000100110001011100000101
3917 010010010000111100001111001001000000101100000011
3918 Offspring1 after mutation:
    010101010000111100001111001001000000101100000101
3919 Offspring2 after mutation:
    010010010000111000001111000100110001011100000011
3920 48 48
3921 [85, 15, 15, 36, 11, 5]
3922 [73, 14, 15, 19, 23, 3]
3923 Candidate 1: [138, 15, 14, 10, 3, 50000000, 5]
3924 Candidate 2: [37, 15, 15, 8, 16, 50000000, 4]
3925 Candidate 1: [14, 15, 15, 11, 28, 50000000, 4]
3926 Candidate 2: [102, 15, 15, 25, 31, 50000000, 4]
3927 Father before deletion: [138, 15, 14, 10, 3,
    50000000, 5]
3928 Mother before deletion: [14, 15, 15, 11, 28,
    50000000, 4]
3929 Father after deletion: [138, 15, 14, 10, 3, 5]
3930 Mother after deletion: [14, 15, 15, 11, 28, 4]
3931 100010100000111100001110000010100000001100000101
3932 000011100000111100001111000010110001110000000100
3933 Offspring1 after mutation:
    100010100000111100001111000010110001110000000101
3934 Offspring2 after mutation:
    000011100000111100001110000010100000001100000100
3935 48 48
3936 [138, 15, 15, 11, 28, 5]
3937 [14, 15, 14, 10, 3, 4]
3938 Candidate 1: [39, 15, 15, 9, 48, 50000000, 4]
3939 Candidate 2: [20, 14, 14, 6, 44, 5007908, 3]
3940 Candidate 1: [121, 14, 15, 5, 3, 50000000, 3]
3941 Candidate 2: [71, 15, 15, 15, 13, 50000000, 2]
3942 Father before deletion: [20, 14, 14, 6, 44, 5007908
    , 3]
3943 Mother before deletion: [121, 14, 15, 5, 3,
    50000000, 3]
3944 Father after deletion: [20, 14, 14, 6, 44, 3]
3945 Mother after deletion: [121, 14, 15, 5, 3, 3]
```

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3946 000101000000111000001110000001100010110000000011
3947 011110010000111000001111000001010000001100000011
3948 Offspring1 after mutation:
    000101000000111000001110000001100010110000000011
3949 Offspring2 after mutation:
    011110010000111000001111000001010000001100000011
3950 48 48
3951 [20, 14, 14, 6, 44, 3]
3952 [121, 14, 15, 5, 3, 3]
3953 Candidate 1: [71, 15, 15, 15, 13, 50000000, 2]
3954 Candidate 2: [75, 15, 15, 37, 7, 5006441, 3]
3955 Candidate 1: [95, 15, 14, 49, 50, 50000000, 4]
3956 Candidate 2: [39, 15, 15, 9, 48, 50000000, 4]
3957 Father before deletion: [75, 15, 15, 37, 7, 5006441
    , 3]
3958 Mother before deletion: [95, 15, 14, 49, 50,
    50000000, 4]
3959 Father after deletion: [75, 15, 15, 37, 7, 3]
3960 Mother after deletion: [95, 15, 14, 49, 50, 4]
3961 010010110000111100001111001001010000011100000011
3962 010111110000111100001110001100010011001000000100
3963 Offspring1 after mutation:
    010010110000111100001110001100010011001000000011
3964 Offspring2 after mutation:
    010111110000111100001111001001010000011100000100
3965 48 48
3966 [75, 15, 14, 49, 50, 3]
3967 [95, 15, 15, 37, 7, 4]
3968 Candidate 1: [56, 15, 14, 21, 48, 50000000, 2]
3969 Candidate 2: [139, 14, 14, 38, 17, 50000000, 3]
3970 Candidate 1: [111, 14, 14, 21, 38, 50000000, 2]
3971 Candidate 2: [82, 14, 15, 47, 43, 50000000, 4]
3972 Father before deletion: [56, 15, 14, 21, 48,
    50000000, 2]
3973 Mother before deletion: [111, 14, 14, 21, 38,
    50000000, 2]
3974 Father after deletion: [56, 15, 14, 21, 48, 2]
3975 Mother after deletion: [111, 14, 14, 21, 38, 2]
3976 001110000000111100001110000101010011000000000010
3977 011011110000111000001110000101010010011000000010
3978 Offspring1 after mutation:

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3978 001110000000111100001110000101010010010000000010
3979 Offspring2 after mutation:
    01101111000011100001110000101010011001000000010
3980 48 48
3981 [56, 15, 14, 21, 36, 2]
3982 [111, 14, 14, 21, 50, 2]
3983 Candidate 1: [122, 15, 15, 23, 27, 50000000, 3]
3984 Candidate 2: [126, 15, 15, 41, 22, 50000000, 2]
3985 Candidate 1: [46, 15, 15, 18, 6, 50000000, 2]
3986 Candidate 2: [88, 14, 14, 7, 20, 50000000, 2]
3987 Father before deletion: [122, 15, 15, 23, 27,
    50000000, 3]
3988 Mother before deletion: [46, 15, 15, 18, 6,
    50000000, 2]
3989 Father after deletion: [122, 15, 15, 23, 27, 3]
3990 Mother after deletion: [46, 15, 15, 18, 6, 2]
3991 011110100000111100001111000101110001101100000011
3992 001011100000111100001111000100100000011000000010
3993 Offspring1 after mutation:
    011110100000111100001111000100100000101100000011
3994 Offspring2 after mutation:
    001011100000111100001111000101110001011000000010
3995 48 48
3996 [122, 15, 15, 18, 11, 3]
3997 [46, 15, 15, 23, 22, 2]
3998 Candidate 1: [133, 14, 15, 13, 9, 50000000, 4]
3999 Candidate 2: [111, 14, 14, 21, 38, 50000000, 2]
4000 Candidate 1: [19, 14, 15, 4, 35, 50000000, 4]
4001 Candidate 2: [135, 14, 14, 30, 5, 50000000, 3]
4002 Father before deletion: [133, 14, 15, 13, 9,
    50000000, 4]
4003 Mother before deletion: [19, 14, 15, 4, 35,
    50000000, 4]
4004 Father after deletion: [133, 14, 15, 13, 9, 4]
4005 Mother after deletion: [19, 14, 15, 4, 35, 4]
4006 100001010000111000001111000011010000100100000100
4007 000100110000111000001111000001000010001100000100
4008 Offspring1 after mutation:
    100001010000111000001111000011010000100100000100
4009 Offspring2 after mutation:
    000100110000111000001111000001000010001100000100
```

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4010 48 48
4011 [133, 14, 15, 13, 9, 4]
4012 [19, 14, 15, 4, 35, 4]
4013 Candidate 1: [116, 15, 15, 25, 46, 50000000, 3]
4014 Candidate 2: [59, 14, 15, 2, 33, 50000000, 4]
4015 Candidate 1: [64, 14, 15, 27, 42, 50000000, 3]
4016 Candidate 2: [56, 15, 14, 21, 48, 50000000, 2]
4017 Father before deletion: [116, 15, 15, 25, 46,
    50000000, 3]
4018 Mother before deletion: [64, 14, 15, 27, 42,
    50000000, 3]
4019 Father after deletion: [116, 15, 15, 25, 46, 3]
4020 Mother after deletion: [64, 14, 15, 27, 42, 3]
4021 01110100000111100001111000110010010111000000011
4022 010000000000111000001111000110110010101000000011
4023 Offspring1 after mutation:
    0111010000011110000111100011001001011100000011
4024 Offspring2 after mutation:
    010000000000111000001111000110110010101000000011
4025 48 48
4026 [116, 15, 15, 25, 46, 3]
4027 [64, 14, 15, 27, 42, 3]
4028 Candidate 1: [139, 14, 14, 38, 17, 50000000, 3]
4029 Candidate 2: [116, 15, 15, 25, 46, 50000000, 3]
4030 Candidate 1: [135, 14, 14, 30, 5, 50000000, 3]
4031 Candidate 2: [94, 15, 14, 42, 13, 50000000, 3]
4032 Father before deletion: [139, 14, 14, 38, 17,
    50000000, 3]
4033 Mother before deletion: [135, 14, 14, 30, 5,
    50000000, 3]
4034 Father after deletion: [139, 14, 14, 38, 17, 3]
4035 Mother after deletion: [135, 14, 14, 30, 5, 3]
4036 100010110000111000001110001001100001000100000011
4037 100001110000111000001110000111100000010100000011
4038 Offspring1 after mutation:
    100010110000111000001110000111100001000100000011
4039 Offspring2 after mutation:
    100001110000111000001110001001100000010100000011
4040 48 48
4041 [139, 14, 14, 30, 17, 3]
4042 [135, 14, 14, 38, 5, 3]

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4043 Candidate 1: [54, 15, 15, 30, 37, 50000000, 2]
4044 Candidate 2: [69, 14, 14, 17, 26, 16001408, 5]
4045 Candidate 1: [31, 14, 14, 49, 24, 50000000, 2]
4046 Candidate 2: [26, 14, 15, 47, 25, 50000000, 4]
4047 Father before deletion: [69, 14, 14, 17, 26,
    16001408, 5]
4048 Mother before deletion: [31, 14, 14, 49, 24,
    50000000, 2]
4049 Father after deletion: [69, 14, 14, 17, 26, 5]
4050 Mother after deletion: [31, 14, 14, 49, 24, 2]
4051 010001010000111000001110000100010001101000000101
4052 000111110000111000001110001100010001100000000010
4053 Offspring1 after mutation:
    010001010000111000001110000100010001101000000101
4054 Offspring2 after mutation:
    000111110000111000001110001100010001100000000010
4055 48 48
4056 [69, 14, 14, 17, 26, 5]
4057 [31, 14, 14, 49, 24, 2]
4058 Candidate 1: [62, 15, 14, 32, 29, 50000000, 5]
4059 Candidate 2: [13, 15, 14, 18, 41, 50000000, 2]
4060 Candidate 1: [110, 14, 14, 34, 49, 50000000, 3]
4061 Candidate 2: [87, 14, 14, 15, 23, 15004294, 5]
4062 Father before deletion: [62, 15, 14, 32, 29,
    50000000, 5]
4063 Mother before deletion: [87, 14, 14, 15, 23,
    15004294, 5]
4064 Father after deletion: [62, 15, 14, 32, 29, 5]
4065 Mother after deletion: [87, 14, 14, 15, 23, 5]
4066 00111110000011110000111000100000001110100000101
4067 010101110000111000001110000011110001011100000101
4068 Offspring1 after mutation:
    001111100000111100001110000011110001011100000101
4069 Offspring2 after mutation:
    01010111000011100000111000100000001110100000101
4070 48 48
4071 [62, 15, 14, 15, 23, 5]
4072 [87, 14, 14, 32, 29, 5]
4073 Candidate 1: [51, 15, 15, 28, 8, 50000000, 3]
4074 Candidate 2: [4, 15, 14, 32, 11, 15005357, 5]
4075 Candidate 1: [82, 14, 15, 47, 43, 50000000, 4]

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4076 Candidate 2: [54, 15, 15, 30, 37, 50000000, 2]
4077 Father before deletion: [4, 15, 14, 32, 11,
    15005357, 5]
4078 Mother before deletion: [82, 14, 15, 47, 43,
    50000000, 4]
4079 Father after deletion: [4, 15, 14, 32, 11, 5]
4080 Mother after deletion: [82, 14, 15, 47, 43, 4]
4081 00000100000011110000111000100000000101100000101
4082 010100100000111000001111001011110010101100000100
4083 Offspring1 after mutation:
    000001000000111000001111001011110010101100000101
4084 Offspring2 after mutation:
    01010010000011110000111000100000000101100000100
4085 48 48
4086 [4, 14, 15, 47, 43, 5]
4087 [82, 15, 14, 32, 11, 4]
4088 Candidate 1: [48, 15, 14, 36, 21, 50000000, 5]
4089 Candidate 2: [85, 14, 15, 19, 23, 5507, 5]
4090 Candidate 1: [37, 15, 15, 8, 16, 50000000, 4]
4091 Candidate 2: [79, 14, 14, 31, 12, 16001408, 5]
4092 Father before deletion: [85, 14, 15, 19, 23, 5507,
    5]
4093 Mother before deletion: [79, 14, 14, 31, 12,
    16001408, 5]
4094 Father after deletion: [85, 14, 15, 19, 23, 5]
4095 Mother after deletion: [79, 14, 14, 31, 12, 5]
4096 010101010000111000001111000100110001011100000101
4097 010011110000111000001110000111110000110000000101
4098 Offspring1 after mutation:
    010101010000111000001110000100110001011100000101
4099 Offspring2 after mutation:
    010011110000111000001111000111110000110000000101
4100 48 48
4101 [85, 14, 14, 19, 23, 5]
4102 [79, 14, 15, 31, 12, 5]
4103 5
4104 Start point is: 5
4105 16
4106 31
4107 (4.92, 4.29) (7.37, 3.27)
4108 14 15
```

```
4109 The travel time for UGV from depot B to NW UGV stop  
      is: 3888  
4110 The UGV travel time between two UGV stops is: 3851  
4111 17400688.5  
4112 End node is [24]  
4113 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,  
      15, 16, 17, 18, 19, 20, 21, 22, 23]  
4114 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37  
      , 38, 39, 40, 41, 42, 43, 44, 45, 46, 47]  
4115 Objective: 5446  
4116 Dropped nodes: 1 2 4 5 6 7 8 9 10 11 13 14 15 16 17  
      18 19 20 21 22  
4117 48  
4118 48  
4119 48  
4120 48  
4121 48  
4122 48  
4123 48  
4124 48  
4125 48  
4126 48  
4127 48  
4128 48  
4129 48  
4130 48  
4131 48  
4132 48  
4133 48  
4134 48  
4135 48  
4136 48  
4137 48  
4138 48  
4139 48  
4140 48  
4141 48  
4142 48  
4143 48  
4144 Route for vehicle 0:  
4145 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
```

```

4145 Distance(0) -> 30 Fuel(166878) Time(610,670) Slack(
    0) FuelSlack(0,0) Distance(20137) -> 3 Fuel(46056)
    Time(1220,1400) Slack(776) FuelSlack(147858,193914
    ) Distance(40274) -> 25 Fuel(139842) Time(2742,3071
    ) Slack(0) FuelSlack(0,0) Distance(64917) -> 26
    Fuel(124476) Time(2819,3268) Slack(0) FuelSlack(0,0
    ) Distance(67478) -> 27 Fuel(108804) Time(2898,3420
    ) Slack(0) FuelSlack(0,0) Distance(70090) -> 28
    Fuel(93438) Time(3017,3497) Slack(0) FuelSlack(0,0
    ) Distance(72651) -> 29 Fuel(77766) Time(3216,3576
    ) Slack(0) FuelSlack(0,0) Distance(75263) -> 31
    Fuel(46722) Time(3492,3732) Slack(0) FuelSlack(0,0
    ) Distance(80437) -> 32 Fuel(31050) Time(3691,3811
    ) Slack(0) FuelSlack(0,0) Distance(83049) -> 12
    Fuel(15684) Time(3888,3888) Slack(874) FuelSlack(
        139770,139770) Distance(85610) -> 47 Fuel(163614)
        Time(5388,5388) Slack(0) FuelSlack(0,0) Distance(
            106291) -> 46 Fuel(155322) Time(5429,5429) Slack(0
            ) FuelSlack(0,0) Distance(107673) -> 45 Fuel(146676
            ) Time(5472,5472) Slack(0) FuelSlack(0,0) Distance(
                109114) -> 44 Fuel(138384) Time(5513,5513) Slack(0
                ) FuelSlack(0,0) Distance(110496) -> 43 Fuel(129780
                ) Time(5556,5556) Slack(0) FuelSlack(0,0) Distance(
                    111930) -> 42 Fuel(121488) Time(5597,5597) Slack(0
                    ) FuelSlack(0,0) Distance(113312) -> 41 Fuel(112842
                    ) Time(5640,5640) Slack(0) FuelSlack(0,0) Distance(
                        114753) -> 40 Fuel(104550) Time(5681,5681) Slack(0
                        ) FuelSlack(0,0) Distance(116135) -> 39 Fuel(95946
                        ) Time(5724,5724) Slack(0) FuelSlack(0,0) Distance(
                            117569) -> 38 Fuel(87654) Time(5765,5765) Slack(0
                            ) FuelSlack(0,0) Distance(118951) -> 37 Fuel(79008)
                            Time(5808,5808) Slack(0) FuelSlack(0,0) Distance(
                                120392) -> 36 Fuel(70716) Time(5849,5849) Slack(0
                                ) FuelSlack(0,0) Distance(121774) -> 35 Fuel(62112)
                                Time(5892,5892) Slack(0) FuelSlack(0,0) Distance(
                                    123208) -> 34 Fuel(53820) Time(5933,5933) Slack(0
                                    ) FuelSlack(0,0) Distance(124590) -> 33 Fuel(45486)
                                    Time(5975,5975) Slack(0) FuelSlack(0,0) Distance(
                                        125979) -> 23 Fuel(36882) Time(6018,6018) Slack(806
                                        ) FuelSlack(36882,287700) Distance(127413) -> 24
                                        Fuel(287700) Time(8424,8424) Distance(180213)

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4146 Distance of the route: 180213 ft
4147 Remaining Fuel of the route: 287700
4148 Total Time of the route: 8424 seconds
4149
4150 Total Distance of all routes: 180213 ft
4151 Total Fuel remaining of all routes: 287700
4152 Total Time of all routes: 8424 seconds
4153 5
4154 Start point is: 5
4155 16
4156 31
4157 (4.92, 4.29) (7.37, 3.27)
4158 14 14
4159 The travel time for UGV from depot B to NW UGV stop
      is: 3888
4160 The UGV travel time between two UGV stops is: 4060
4161 17863728.0
4162 End node is [24]
4163 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
4164 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39, 40, 41, 42, 43, 44, 45, 46, 47]
4165 Objective: 5446
4166 Dropped nodes: 1 2 4 5 6 7 8 9 10 11 13 14 15 16 17
      18 19 20 21 22
4167 48
4168 48
4169 48
4170 48
4171 48
4172 48
4173 48
4174 48
4175 48
4176 48
4177 48
4178 48
4179 48
4180 48
4181 48
4182 48
```

```
4183 48
4184 48
4185 48
4186 48
4187 48
4188 48
4189 48
4190 48
4191 48
4192 48
4193 48
4194 Route for vehicle 0:
4195 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 30 Fuel(166878) Time(610,670) Slack(
        0) FuelSlack(0,0) Distance(20137) -> 3 Fuel(46056)
        Time(1220,1400) Slack(776) FuelSlack(147858,193914
    ) Distance(40274) -> 25 Fuel(139842) Time(2742,3071
    ) Slack(0) FuelSlack(0,0) Distance(64917) -> 26
        Fuel(124476) Time(2819,3268) Slack(0) FuelSlack(0,0
    ) Distance(67478) -> 27 Fuel(108804) Time(2898,3420
    ) Slack(0) FuelSlack(0,0) Distance(70090) -> 28
        Fuel(93438) Time(3017,3497) Slack(0) FuelSlack(0,0
    ) Distance(72651) -> 29 Fuel(77766) Time(3216,3576
    ) Slack(0) FuelSlack(0,0) Distance(75263) -> 31
        Fuel(46722) Time(3492,3732) Slack(0) FuelSlack(0,0
    ) Distance(80437) -> 32 Fuel(31050) Time(3691,3811
    ) Slack(0) FuelSlack(0,0) Distance(83049) -> 12
        Fuel(15684) Time(3888,3888) Slack(874) FuelSlack(
            139770,139770) Distance(85610) -> 47 Fuel(163614)
            Time(5388,5388) Slack(0) FuelSlack(0,0) Distance(
                106291) -> 46 Fuel(155322) Time(5429,5429) Slack(0
            ) FuelSlack(0,0) Distance(107673) -> 45 Fuel(146676
            ) Time(5472,5472) Slack(0) FuelSlack(0,0) Distance(
                109114) -> 44 Fuel(138384) Time(5513,5513) Slack(0
            ) FuelSlack(0,0) Distance(110496) -> 43 Fuel(129780
            ) Time(5556,5556) Slack(0) FuelSlack(0,0) Distance(
                111930) -> 42 Fuel(121488) Time(5597,5597) Slack(0
            ) FuelSlack(0,0) Distance(113312) -> 41 Fuel(112842
            ) Time(5640,5640) Slack(0) FuelSlack(0,0) Distance(
                114753) -> 40 Fuel(104550) Time(5681,5681) Slack(0
            ) FuelSlack(0,0) Distance(116135) -> 39 Fuel(95946
```

```

4195 ) Time(5724,5724) Slack(0) FuelSlack(0,0) Distance(
    117569) -> 38 Fuel(87654) Time(5765,5765) Slack(0)
    FuelSlack(0,0) Distance(118951) -> 37 Fuel(79008)
    Time(5808,5808) Slack(0) FuelSlack(0,0) Distance(
    120392) -> 36 Fuel(70716) Time(5849,5849) Slack(0)
    FuelSlack(0,0) Distance(121774) -> 35 Fuel(62112)
    Time(5892,5892) Slack(0) FuelSlack(0,0) Distance(
    123208) -> 34 Fuel(53820) Time(5933,5933) Slack(0)
    FuelSlack(0,0) Distance(124590) -> 33 Fuel(45486)
    Time(5975,5975) Slack(0) FuelSlack(0,0) Distance(
    125979) -> 23 Fuel(36882) Time(6018,6018) Slack(806
) FuelSlack(36882,287700) Distance(127413) -> 24
    Fuel(287700) Time(8424,8424) Distance(180213)
4196 Distance of the route: 180213 ft
4197 Remaining Fuel of the route: 287700
4198 Total Time of the route: 8424 seconds
4199
4200 Total Distance of all routes: 180213 ft
4201 Total Fuel remaining of all routes: 287700
4202 Total Time of all routes: 8424 seconds
4203 5
4204 Start point is: 5
4205 16
4206 31
4207 (5.04, 4.76) (7.06, 3.02)
4208 15 15
4209 The travel time for UGV from depot B to NW UGV stop
    is: 3798
4210 The UGV travel time between two UGV stops is: 3879
4211 17336076.0
4212 End node is [24]
4213 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
4214 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44, 45, 46]
4215 Objective: 5447
4216 Dropped nodes: 1 2 3 5 6 7 8 9 10 11 13 14 15 16 17
    18 19 20 21 23
4217 47
4218 47
4219 47

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4220 47
4221 47
4222 47
4223 47
4224 47
4225 47
4226 47
4227 47
4228 47
4229 47
4230 47
4231 47
4232 47
4233 47
4234 47
4235 47
4236 47
4237 47
4238 47
4239 47
4240 47
4241 47
4242 47
4243 Route for vehicle 0:
4244 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 30 Fuel(166878) Time(610,670) Slack(
    0) FuelSlack(0,0) Distance(20137) -> 4 Fuel(46056)
    Time(1220,1400) Slack(776) FuelSlack(147858,193914
    ) Distance(40274) -> 25 Fuel(139842) Time(2742,3071
    ) Slack(0) FuelSlack(0,0) Distance(64917) -> 26
    Fuel(124476) Time(2819,3268) Slack(0) FuelSlack(0,0
    ) Distance(67478) -> 27 Fuel(108804) Time(2927,3407
    ) Slack(0) FuelSlack(0,0) Distance(70090) -> 28
    Fuel(93438) Time(3124,3484) Slack(0) FuelSlack(0,0
    ) Distance(72651) -> 29 Fuel(77766) Time(3323,3563
    ) Slack(0) FuelSlack(0,0) Distance(75263) -> 31
    Fuel(46722) Time(3599,3719) Slack(0) FuelSlack(0,0
    ) Distance(80437) -> 12 Fuel(31050) Time(3798,3798
    ) Slack(825) FuelSlack(170508,170508) Distance(
    83049) -> 46 Fuel(148242) Time(5327,5327) Slack(0)
    FuelSlack(0,0) Distance(106292) -> 45 Fuel(139950)
```

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4244 Time(5368,5368) Slack(0) FuelSlack(0,0) Distance(
    107674) -> 44 Fuel(131304) Time(5411,5411) Slack(0
) FuelSlack(0,0) Distance(109115) -> 43 Fuel(123012
) Time(5452,5452) Slack(0) FuelSlack(0,0) Distance(
    110497) -> 42 Fuel(114408) Time(5495,5495) Slack(0
) FuelSlack(0,0) Distance(111931) -> 41 Fuel(106116
) Time(5536,5536) Slack(0) FuelSlack(0,0) Distance(
    113313) -> 40 Fuel(97470) Time(5579,5579) Slack(0
) FuelSlack(0,0) Distance(114754) -> 39 Fuel(89178)
Time(5620,5620) Slack(0) FuelSlack(0,0) Distance(
    116136) -> 38 Fuel(80574) Time(5663,5663) Slack(0
) FuelSlack(0,0) Distance(117570) -> 37 Fuel(72282)
Time(5704,5704) Slack(0) FuelSlack(0,0) Distance(
    118952) -> 36 Fuel(63636) Time(5747,5747) Slack(0
) FuelSlack(0,0) Distance(120393) -> 35 Fuel(55344)
Time(5788,5788) Slack(0) FuelSlack(0,0) Distance(
    121775) -> 34 Fuel(46740) Time(5831,5831) Slack(0
) FuelSlack(0,0) Distance(123209) -> 33 Fuel(38448)
Time(5872,5872) Slack(0) FuelSlack(0,0) Distance(
    124591) -> 32 Fuel(30114) Time(5914,5914) Slack(0
) FuelSlack(0,0) Distance(125980) -> 22 Fuel(21510)
Time(5957,5957) Slack(855) FuelSlack(21510,287700)
Distance(127414) -> 24 Fuel(287700) Time(8412,8412
) Distance(180214)

4245 Distance of the route: 180214 ft
4246 Remaining Fuel of the route: 287700
4247 Total Time of the route: 8412 seconds
4248
4249 Total Distance of all routes: 180214 ft
4250 Total Fuel remaining of all routes: 287700
4251 Total Time of all routes: 8412 seconds
4252 5
4253 Start point is: 5
4254 16
4255 31
4256 (5.04, 4.76) (7.06, 3.02)
4257 15 15
4258 The travel time for UGV from depot B to NW UGV stop
    is: 3798
4259 The UGV travel time between two UGV stops is: 3879
4260 17564076.0

```

```
4261 End node is [24]
4262 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
4263 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39, 40, 41, 42, 43, 44, 45, 46]
4264 Objective: 5447
4265 Dropped nodes: 1 2 3 5 6 7 8 9 10 11 13 14 15 16 17
      18 19 20 21 23
4266 47
4267 47
4268 47
4269 47
4270 47
4271 47
4272 47
4273 47
4274 47
4275 47
4276 47
4277 47
4278 47
4279 47
4280 47
4281 47
4282 47
4283 47
4284 47
4285 47
4286 47
4287 47
4288 47
4289 47
4290 47
4291 47
4292 Route for vehicle 0:
4293 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
      Distance(0) -> 30 Fuel(166878) Time(610,670) Slack(
      0) FuelSlack(0,0) Distance(20137) -> 4 Fuel(46056)
      Time(1220,1400) Slack(776) FuelSlack(147858,193914
      ) Distance(40274) -> 25 Fuel(139842) Time(2742,3071
      ) Slack(0) FuelSlack(0,0) Distance(64917) -> 26
```

```

4293 Fuel(124476) Time(2819,3268) Slack(0) FuelSlack(0,0
) Distance(67478) -> 27 Fuel(108804) Time(2927,3407
) Slack(0) FuelSlack(0,0) Distance(70090) -> 28
Fuel(93438) Time(3124,3484) Slack(0) FuelSlack(0,0
) Distance(72651) -> 29 Fuel(77766) Time(3323,3563
) Slack(0) FuelSlack(0,0) Distance(75263) -> 31
Fuel(46722) Time(3599,3719) Slack(0) FuelSlack(0,0
) Distance(80437) -> 12 Fuel(31050) Time(3798,3798
) Slack(825) FuelSlack(170508,170508) Distance(
83049) -> 46 Fuel(148242) Time(5327,5327) Slack(0)
FuelSlack(0,0) Distance(106292) -> 45 Fuel(139950)
Time(5368,5368) Slack(0) FuelSlack(0,0) Distance(
107674) -> 44 Fuel(131304) Time(5411,5411) Slack(0)
) FuelSlack(0,0) Distance(109115) -> 43 Fuel(123012
) Time(5452,5452) Slack(0) FuelSlack(0,0) Distance(
110497) -> 42 Fuel(114408) Time(5495,5495) Slack(0
) FuelSlack(0,0) Distance(111931) -> 41 Fuel(106116
) Time(5536,5536) Slack(0) FuelSlack(0,0) Distance(
113313) -> 40 Fuel(97470) Time(5579,5579) Slack(0)
FuelSlack(0,0) Distance(114754) -> 39 Fuel(89178)
Time(5620,5620) Slack(0) FuelSlack(0,0) Distance(
116136) -> 38 Fuel(80574) Time(5663,5663) Slack(0)
FuelSlack(0,0) Distance(117570) -> 37 Fuel(72282)
Time(5704,5704) Slack(0) FuelSlack(0,0) Distance(
118952) -> 36 Fuel(63636) Time(5747,5747) Slack(0)
FuelSlack(0,0) Distance(120393) -> 35 Fuel(55344)
Time(5788,5788) Slack(0) FuelSlack(0,0) Distance(
121775) -> 34 Fuel(46740) Time(5831,5831) Slack(0)
FuelSlack(0,0) Distance(123209) -> 33 Fuel(38448)
Time(5872,5872) Slack(0) FuelSlack(0,0) Distance(
124591) -> 32 Fuel(30114) Time(5914,5914) Slack(0)
FuelSlack(0,0) Distance(125980) -> 22 Fuel(21510)
Time(5957,5957) Slack(855) FuelSlack(21510,287700)
Distance(127414) -> 24 Fuel(287700) Time(8412,8412
) Distance(180214)

4294 Distance of the route: 180214 ft
4295 Remaining Fuel of the route: 287700
4296 Total Time of the route: 8412 seconds
4297
4298 Total Distance of all routes: 180214 ft
4299 Total Fuel remaining of all routes: 287700

```

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4300 Total Time of all routes: 8412 seconds
4301 5
4302 Start point is: 5
4303 16
4304 31
4305 (4.92, 4.29) (7.37, 3.27)
4306 14 14
4307 The travel time for UGV from depot B to NW UGV stop
    is: 3888
4308 The UGV travel time between two UGV stops is: 4060
4309 17863728.0
4310 End node is [24]
4311 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
4312 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44, 45, 46, 47]
4313 Objective: 5446
4314 Dropped nodes: 1 2 4 5 6 7 8 9 10 11 13 14 15 16 17
    18 19 20 21 22
4315 48
4316 48
4317 48
4318 48
4319 48
4320 48
4321 48
4322 48
4323 48
4324 48
4325 48
4326 48
4327 48
4328 48
4329 48
4330 48
4331 48
4332 48
4333 48
4334 48
4335 48
4336 48
```

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4337 48
4338 48
4339 48
4340 48
4341 48
4342 Route for vehicle 0:
4343 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
  Distance(0) -> 30 Fuel(166878) Time(610,670) Slack(
  0) FuelSlack(0,0) Distance(20137) -> 3 Fuel(46056)
  Time(1220,1400) Slack(776) FuelSlack(147858,193914
  ) Distance(40274) -> 25 Fuel(139842) Time(2742,3071
  ) Slack(0) FuelSlack(0,0) Distance(64917) -> 26
  Fuel(124476) Time(2819,3268) Slack(0) FuelSlack(0,0
  ) Distance(67478) -> 27 Fuel(108804) Time(2898,3420
  ) Slack(0) FuelSlack(0,0) Distance(70090) -> 28
  Fuel(93438) Time(3017,3497) Slack(0) FuelSlack(0,0
  ) Distance(72651) -> 29 Fuel(77766) Time(3216,3576
  ) Slack(0) FuelSlack(0,0) Distance(75263) -> 31
  Fuel(46722) Time(3492,3732) Slack(0) FuelSlack(0,0
  ) Distance(80437) -> 32 Fuel(31050) Time(3691,3811
  ) Slack(0) FuelSlack(0,0) Distance(83049) -> 12
  Fuel(15684) Time(3888,3888) Slack(874) FuelSlack(
  139770,139770) Distance(85610) -> 47 Fuel(163614)
  Time(5388,5388) Slack(0) FuelSlack(0,0) Distance(
  106291) -> 46 Fuel(155322) Time(5429,5429) Slack(0
  ) FuelSlack(0,0) Distance(107673) -> 45 Fuel(146676
  ) Time(5472,5472) Slack(0) FuelSlack(0,0) Distance(
  109114) -> 44 Fuel(138384) Time(5513,5513) Slack(0
  ) FuelSlack(0,0) Distance(110496) -> 43 Fuel(129780
  ) Time(5556,5556) Slack(0) FuelSlack(0,0) Distance(
  111930) -> 42 Fuel(121488) Time(5597,5597) Slack(0
  ) FuelSlack(0,0) Distance(113312) -> 41 Fuel(112842
  ) Time(5640,5640) Slack(0) FuelSlack(0,0) Distance(
  114753) -> 40 Fuel(104550) Time(5681,5681) Slack(0
  ) FuelSlack(0,0) Distance(116135) -> 39 Fuel(95946
  ) Time(5724,5724) Slack(0) FuelSlack(0,0) Distance(
  117569) -> 38 Fuel(87654) Time(5765,5765) Slack(0
  ) FuelSlack(0,0) Distance(118951) -> 37 Fuel(79008)
  Time(5808,5808) Slack(0) FuelSlack(0,0) Distance(
  120392) -> 36 Fuel(70716) Time(5849,5849) Slack(0
  ) FuelSlack(0,0) Distance(121774) -> 35 Fuel(62112)

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4343 Time(5892,5892) Slack(0) FuelSlack(0,0) Distance(
    123208) -> 34 Fuel(53820) Time(5933,5933) Slack(0)
    FuelSlack(0,0) Distance(124590) -> 33 Fuel(45486)
    Time(5975,5975) Slack(0) FuelSlack(0,0) Distance(
    125979) -> 23 Fuel(36882) Time(6018,6018) Slack(806
    ) FuelSlack(36882,287700) Distance(127413) -> 24
    Fuel(287700) Time(8424,8424) Distance(180213)
4344 Distance of the route: 180213 ft
4345 Remaining Fuel of the route: 287700
4346 Total Time of the route: 8424 seconds
4347
4348 Total Distance of all routes: 180213 ft
4349 Total Fuel remaining of all routes: 287700
4350 Total Time of all routes: 8424 seconds
4351 5
4352 Start point is: 5
4353 16
4354 31
4355 (4.92, 4.29) (7.37, 3.27)
4356 14 15
4357 The travel time for UGV from depot B to NW UGV stop
    is: 3888
4358 The UGV travel time between two UGV stops is: 3851
4359 17400688.5
4360 End node is [24]
4361 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
4362 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44, 45, 46, 47]
4363 Objective: 5446
4364 Dropped nodes: 1 2 4 5 6 7 8 9 10 11 13 14 15 16 17
    18 19 20 21 22
4365 48
4366 48
4367 48
4368 48
4369 48
4370 48
4371 48
4372 48
4373 48
```

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4374 48
4375 48
4376 48
4377 48
4378 48
4379 48
4380 48
4381 48
4382 48
4383 48
4384 48
4385 48
4386 48
4387 48
4388 48
4389 48
4390 48
4391 48
4392 Route for vehicle 0:
4393 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 30 Fuel(166878) Time(610,670) Slack(
    0) FuelSlack(0,0) Distance(20137) -> 3 Fuel(46056)
    Time(1220,1400) Slack(776) FuelSlack(147858,193914
    ) Distance(40274) -> 25 Fuel(139842) Time(2742,3071
    ) Slack(0) FuelSlack(0,0) Distance(64917) -> 26
    Fuel(124476) Time(2819,3268) Slack(0) FuelSlack(0,0
    ) Distance(67478) -> 27 Fuel(108804) Time(2898,3420
    ) Slack(0) FuelSlack(0,0) Distance(70090) -> 28
    Fuel(93438) Time(3017,3497) Slack(0) FuelSlack(0,0
    ) Distance(72651) -> 29 Fuel(77766) Time(3216,3576
    ) Slack(0) FuelSlack(0,0) Distance(75263) -> 31
    Fuel(46722) Time(3492,3732) Slack(0) FuelSlack(0,0
    ) Distance(80437) -> 32 Fuel(31050) Time(3691,3811
    ) Slack(0) FuelSlack(0,0) Distance(83049) -> 12
    Fuel(15684) Time(3888,3888) Slack(874) FuelSlack(
    139770,139770) Distance(85610) -> 47 Fuel(163614)
    Time(5388,5388) Slack(0) FuelSlack(0,0) Distance(
    106291) -> 46 Fuel(155322) Time(5429,5429) Slack(0
    ) FuelSlack(0,0) Distance(107673) -> 45 Fuel(146676
    ) Time(5472,5472) Slack(0) FuelSlack(0,0) Distance(
    109114) -> 44 Fuel(138384) Time(5513,5513) Slack(0
```

```

4393 ) FuelSlack(0,0) Distance(110496) -> 43 Fuel(129780
      ) Time(5556,5556) Slack(0) FuelSlack(0,0) Distance(
      111930) -> 42 Fuel(121488) Time(5597,5597) Slack(0
      ) FuelSlack(0,0) Distance(113312) -> 41 Fuel(112842
      ) Time(5640,5640) Slack(0) FuelSlack(0,0) Distance(
      114753) -> 40 Fuel(104550) Time(5681,5681) Slack(0
      ) FuelSlack(0,0) Distance(116135) -> 39 Fuel(95946
      ) Time(5724,5724) Slack(0) FuelSlack(0,0) Distance(
      117569) -> 38 Fuel(87654) Time(5765,5765) Slack(0
      FuelSlack(0,0) Distance(118951) -> 37 Fuel(79008)
      Time(5808,5808) Slack(0) FuelSlack(0,0) Distance(
      120392) -> 36 Fuel(70716) Time(5849,5849) Slack(0
      FuelSlack(0,0) Distance(121774) -> 35 Fuel(62112)
      Time(5892,5892) Slack(0) FuelSlack(0,0) Distance(
      123208) -> 34 Fuel(53820) Time(5933,5933) Slack(0
      FuelSlack(0,0) Distance(124590) -> 33 Fuel(45486)
      Time(5975,5975) Slack(0) FuelSlack(0,0) Distance(
      125979) -> 23 Fuel(36882) Time(6018,6018) Slack(806
      ) FuelSlack(36882,287700) Distance(127413) -> 24
      Fuel(287700) Time(8424,8424) Distance(180213)
4394 Distance of the route: 180213 ft
4395 Remaining Fuel of the route: 287700
4396 Total Time of the route: 8424 seconds
4397
4398 Total Distance of all routes: 180213 ft
4399 Total Fuel remaining of all routes: 287700
4400 Total Time of all routes: 8424 seconds
4401 5
4402 Start point is: 5
4403 16
4404 31
4405 (5.04, 4.76) (7.06, 3.02)
4406 15 15
4407 The travel time for UGV from depot B to NW UGV stop
      is: 3798
4408 The UGV travel time between two UGV stops is: 3879
4409 17564076.0
4410 End node is [24]
4411 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
4412 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37]

```

```
4412 , 38, 39, 40, 41, 42, 43, 44, 45, 46]
4413 Objective: 5447
4414 Dropped nodes: 1 2 3 5 6 7 8 9 10 11 13 14 15 16 17
        18 19 20 21 23
4415 47
4416 47
4417 47
4418 47
4419 47
4420 47
4421 47
4422 47
4423 47
4424 47
4425 47
4426 47
4427 47
4428 47
4429 47
4430 47
4431 47
4432 47
4433 47
4434 47
4435 47
4436 47
4437 47
4438 47
4439 47
4440 47
4441 Route for vehicle 0:
4442 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 30 Fuel(166878) Time(610,670) Slack(
    0) FuelSlack(0,0) Distance(20137) -> 4 Fuel(46056)
    Time(1220,1400) Slack(776) FuelSlack(147858,193914
    ) Distance(40274) -> 25 Fuel(139842) Time(2742,3071
    ) Slack(0) FuelSlack(0,0) Distance(64917) -> 26
    Fuel(124476) Time(2819,3268) Slack(0) FuelSlack(0,0
    ) Distance(67478) -> 27 Fuel(108804) Time(2927,3407
    ) Slack(0) FuelSlack(0,0) Distance(70090) -> 28
    Fuel(93438) Time(3124,3484) Slack(0) FuelSlack(0,0
```

```
4442 ) Distance(72651) -> 29 Fuel(77766) Time(3323,3563
      ) Slack(0) FuelSlack(0,0) Distance(75263) -> 31
      Fuel(46722) Time(3599,3719) Slack(0) FuelSlack(0,0)
      ) Distance(80437) -> 12 Fuel(31050) Time(3798,3798
      ) Slack(825) FuelSlack(170508,170508) Distance(
      83049) -> 46 Fuel(148242) Time(5327,5327) Slack(0)
      FuelSlack(0,0) Distance(106292) -> 45 Fuel(139950)
      Time(5368,5368) Slack(0) FuelSlack(0,0) Distance(
      107674) -> 44 Fuel(131304) Time(5411,5411) Slack(0)
      ) FuelSlack(0,0) Distance(109115) -> 43 Fuel(123012
      ) Time(5452,5452) Slack(0) FuelSlack(0,0) Distance(
      110497) -> 42 Fuel(114408) Time(5495,5495) Slack(0
      ) FuelSlack(0,0) Distance(111931) -> 41 Fuel(106116
      ) Time(5536,5536) Slack(0) FuelSlack(0,0) Distance(
      113313) -> 40 Fuel(97470) Time(5579,5579) Slack(0)
      FuelSlack(0,0) Distance(114754) -> 39 Fuel(89178)
      Time(5620,5620) Slack(0) FuelSlack(0,0) Distance(
      116136) -> 38 Fuel(80574) Time(5663,5663) Slack(0)
      FuelSlack(0,0) Distance(117570) -> 37 Fuel(72282)
      Time(5704,5704) Slack(0) FuelSlack(0,0) Distance(
      118952) -> 36 Fuel(63636) Time(5747,5747) Slack(0)
      FuelSlack(0,0) Distance(120393) -> 35 Fuel(55344)
      Time(5788,5788) Slack(0) FuelSlack(0,0) Distance(
      121775) -> 34 Fuel(46740) Time(5831,5831) Slack(0)
      FuelSlack(0,0) Distance(123209) -> 33 Fuel(38448)
      Time(5872,5872) Slack(0) FuelSlack(0,0) Distance(
      124591) -> 32 Fuel(30114) Time(5914,5914) Slack(0)
      FuelSlack(0,0) Distance(125980) -> 22 Fuel(21510)
      Time(5957,5957) Slack(855) FuelSlack(21510,287700)
      Distance(127414) -> 24 Fuel(287700) Time(8412,8412
      ) Distance(180214)

4443 Distance of the route: 180214 ft
4444 Remaining Fuel of the route: 287700
4445 Total Time of the route: 8412 seconds
4446
4447 Total Distance of all routes: 180214 ft
4448 Total Fuel remaining of all routes: 287700
4449 Total Time of all routes: 8412 seconds
4450 5
4451 Start point is: 5
4452 16
```

```
4453 31
4454 (5.04, 4.76) (7.06, 3.02)
4455 15 15
4456 The travel time for UGV from depot B to NW UGV stop
      is: 3798
4457 The UGV travel time between two UGV stops is: 3879
4458 17180076.0
4459 End node is [24]
4460 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
4461 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39, 40, 41, 42, 43, 44, 45, 46]
4462 Objective: 5447
4463 Dropped nodes: 1 2 3 5 6 7 8 9 10 11 13 14 15 16 17
      18 19 20 21 23
4464 47
4465 47
4466 47
4467 47
4468 47
4469 47
4470 47
4471 47
4472 47
4473 47
4474 47
4475 47
4476 47
4477 47
4478 47
4479 47
4480 47
4481 47
4482 47
4483 47
4484 47
4485 47
4486 47
4487 47
4488 47
4489 47
```

```

4490 Route for vehicle 0:
4491 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 30 Fuel(166878) Time(610,670) Slack(
    0) FuelSlack(0,0) Distance(20137) -> 4 Fuel(46056)
    Time(1220,1400) Slack(776) FuelSlack(147858,193914
    ) Distance(40274) -> 25 Fuel(139842) Time(2742,3071
    ) Slack(0) FuelSlack(0,0) Distance(64917) -> 26
    Fuel(124476) Time(2819,3268) Slack(0) FuelSlack(0,0
    ) Distance(67478) -> 27 Fuel(108804) Time(2927,3407
    ) Slack(0) FuelSlack(0,0) Distance(70090) -> 28
    Fuel(93438) Time(3124,3484) Slack(0) FuelSlack(0,0
    ) Distance(72651) -> 29 Fuel(77766) Time(3323,3563
    ) Slack(0) FuelSlack(0,0) Distance(75263) -> 31
    Fuel(46722) Time(3599,3719) Slack(0) FuelSlack(0,0
    ) Distance(80437) -> 12 Fuel(31050) Time(3798,3798
    ) Slack(825) FuelSlack(170508,170508) Distance(
    83049) -> 46 Fuel(148242) Time(5327,5327) Slack(0)
    FuelSlack(0,0) Distance(106292) -> 45 Fuel(139950)
    Time(5368,5368) Slack(0) FuelSlack(0,0) Distance(
    107674) -> 44 Fuel(131304) Time(5411,5411) Slack(0
    ) FuelSlack(0,0) Distance(109115) -> 43 Fuel(123012
    ) Time(5452,5452) Slack(0) FuelSlack(0,0) Distance(
    110497) -> 42 Fuel(114408) Time(5495,5495) Slack(0
    ) FuelSlack(0,0) Distance(111931) -> 41 Fuel(106116
    ) Time(5536,5536) Slack(0) FuelSlack(0,0) Distance(
    113313) -> 40 Fuel(97470) Time(5579,5579) Slack(0)
    FuelSlack(0,0) Distance(114754) -> 39 Fuel(89178)
    Time(5620,5620) Slack(0) FuelSlack(0,0) Distance(
    116136) -> 38 Fuel(80574) Time(5663,5663) Slack(0)
    FuelSlack(0,0) Distance(117570) -> 37 Fuel(72282)
    Time(5704,5704) Slack(0) FuelSlack(0,0) Distance(
    118952) -> 36 Fuel(63636) Time(5747,5747) Slack(0)
    FuelSlack(0,0) Distance(120393) -> 35 Fuel(55344)
    Time(5788,5788) Slack(0) FuelSlack(0,0) Distance(
    121775) -> 34 Fuel(46740) Time(5831,5831) Slack(0)
    FuelSlack(0,0) Distance(123209) -> 33 Fuel(38448)
    Time(5872,5872) Slack(0) FuelSlack(0,0) Distance(
    124591) -> 32 Fuel(30114) Time(5914,5914) Slack(0)
    FuelSlack(0,0) Distance(125980) -> 22 Fuel(21510)
    Time(5957,5957) Slack(855) FuelSlack(21510,287700)
    Distance(127414) -> 24 Fuel(287700) Time(8412,8412

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4491 ) Distance(180214)
4492 Distance of the route: 180214 ft
4493 Remaining Fuel of the route: 287700
4494 Total Time of the route: 8412 seconds
4495
4496 Total Distance of all routes: 180214 ft
4497 Total Fuel remaining of all routes: 287700
4498 Total Time of all routes: 8412 seconds
4499 5
4500 Start point is: 5
4501 16
4502 31
4503 (5.16, 5.24) (7.37, 3.27)
4504 14 15
4505 The travel time for UGV from depot B to NW UGV stop
    is: 4257
4506 The UGV travel time between two UGV stops is: 4196
4507 18982555.5
4508 End node is [24]
4509 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
4510 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44, 45]
4511 Objective: 5507
4512 Dropped nodes: 1 3 4 5 6 7 8 9 10 11 13 14 15 16 17
    18 19 21 22 23
4513 46
4514 46
4515 46
4516 46
4517 46
4518 46
4519 46
4520 46
4521 46
4522 46
4523 46
4524 46
4525 46
4526 46
4527 46
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4528 46
4529 46
4530 46
4531 46
4532 46
4533 46
4534 46
4535 46
4536 46
4537 46
4538 Route for vehicle 0:
4539 0 Fuel(253693) Time(58,58) Slack(60) FuelSlack(0,0)
) Distance(0) -> 28 Fuel(126859) Time(758,758)
Slack(120) FuelSlack(0,0) Distance(21139) -> 2 Fuel
(25) Time(1518,1518) Slack(925) FuelSlack(147858,
147883) Distance(42278) -> 25 Fuel(139842) Time(
3189,3189) Slack(120) FuelSlack(0,0) Distance(66921
) -> 26 Fuel(124476) Time(3386,3386) Slack(120)
FuelSlack(0,0) Distance(69482) -> 27 Fuel(108804)
Time(3585,3585) Slack(120) FuelSlack(0,0) Distance(
72094) -> 29 Fuel(77760) Time(3861,3861) Slack(120
) FuelSlack(0,0) Distance(77268) -> 30 Fuel(62088)
Time(4060,4060) Slack(120) FuelSlack(0,0) Distance(
79880) -> 12 Fuel(46722) Time(4257,4257) Slack(774
) FuelSlack(201852,201852) Distance(82441) -> 45
Fuel(132570) Time(5814,5814) Slack(0) FuelSlack(0,0
) Distance(108296) -> 44 Fuel(124278) Time(5855,
5855) Slack(0) FuelSlack(0,0) Distance(109678) ->
43 Fuel(115632) Time(5898,5898) Slack(0) FuelSlack(
0,0) Distance(111119) -> 42 Fuel(107340) Time(5939,
5939) Slack(0) FuelSlack(0,0) Distance(112501) ->
41 Fuel(98736) Time(5982,5982) Slack(0) FuelSlack(0
,0) Distance(113935) -> 40 Fuel(90444) Time(6023,
6023) Slack(0) FuelSlack(0,0) Distance(115317) ->
39 Fuel(81798) Time(6066,6066) Slack(0) FuelSlack(0
,0) Distance(116758) -> 38 Fuel(73506) Time(6107,
6107) Slack(0) FuelSlack(0,0) Distance(118140) ->
37 Fuel(64902) Time(6150,6150) Slack(0) FuelSlack(0
,0) Distance(119574) -> 36 Fuel(56610) Time(6191,
6191) Slack(0) FuelSlack(0,0) Distance(120956) ->
35 Fuel(47964) Time(6234,6234) Slack(0) FuelSlack(0
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4539 ,0) Distance(122397) -> 34 Fuel(39672) Time(6275,
6275) Slack(0) FuelSlack(0,0) Distance(123779) ->
33 Fuel(31068) Time(6318,6318) Slack(0) FuelSlack(0
,0) Distance(125213) -> 32 Fuel(22776) Time(6359,
6359) Slack(0) FuelSlack(0,0) Distance(126595) ->
31 Fuel(14442) Time(6401,6401) Slack(0) FuelSlack(0
,0) Distance(127984) -> 20 Fuel(5838) Time(6444,
6444) Slack(906) FuelSlack(5838,287700) Distance(
129418) -> 24 Fuel(287700) Time(8950,8950) Distance
(182218)
4540 Distance of the route: 182218 ft
4541 Remaining Fuel of the route: 287700
4542 Total Time of the route: 8950 seconds
4543
4544 Total Distance of all routes: 182218 ft
4545 Total Fuel remaining of all routes: 287700
4546 Total Time of all routes: 8950 seconds
4547 5
4548 Start point is: 5
4549 16
4550 31
4551 (4.92, 4.29) (7.37, 3.27)
4552 14 15
4553 The travel time for UGV from depot B to NW UGV stop
is: 3888
4554 The UGV travel time between two UGV stops is: 3851
4555 17268688.5
4556 End node is [24]
4557 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
15, 16, 17, 18, 19, 20, 21, 22, 23]
4558 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47]
4559 Objective: 15003229
4560 Dropped nodes: 1 3 4 5 6 7 8 9 10 12 13 14 15 16 17
18 19 20 21 22 23 33 34 35 36 37 38 39 40 41 42 43
44 45 46 47
4561 48
4562 48
4563 48
4564 48
4565 48
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4566 48
4567 48
4568 48
4569 48
4570 48
4571 48
4572 Route for vehicle 0:
4573 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 30 Fuel(166878) Time(610,670) Slack(
    0) FuelSlack(0,0) Distance(20137) -> 2 Fuel(46056)
    Time(1220,1400) Slack(776) FuelSlack(147858,193914
    ) Distance(40274) -> 25 Fuel(139842) Time(2742,3071
    ) Slack(0) FuelSlack(0,0) Distance(64917) -> 26
    Fuel(124476) Time(2819,3268) Slack(0) FuelSlack(0,0
    ) Distance(67478) -> 27 Fuel(108804) Time(2898,3420
    ) Slack(0) FuelSlack(0,0) Distance(70090) -> 28
    Fuel(93438) Time(3017,3497) Slack(0) FuelSlack(0,0
    ) Distance(72651) -> 29 Fuel(77766) Time(3216,3576
    ) Slack(0) FuelSlack(0,0) Distance(75263) -> 31
    Fuel(46722) Time(3492,3732) Slack(0) FuelSlack(0,0
    ) Distance(80437) -> 32 Fuel(31050) Time(3691,3811
    ) Slack(0) FuelSlack(0,0) Distance(83049) -> 11
    Fuel(15684) Time(3888,3888) Slack(874) FuelSlack(
    15684,287700) Distance(85610) -> 24 Fuel(287700)
    Time(5401,5401) Distance(106719)
4574 Distance of the route: 106719 ft
4575 Remaining Fuel of the route: 287700
4576 Total Time of the route: 5401 seconds
4577
4578 Total Distance of all routes: 106719 ft
4579 Total Fuel remaining of all routes: 287700
4580 Total Time of all routes: 5401 seconds
4581 5
4582 Start point is: 5
4583 16
4584 31
4585 (7.68, 3.53) (5.16, 5.24)
4586 15 15
4587 The travel time for UGV from depot B to NW UGV stop
    is: 559
4588 The UGV travel time between two UGV stops is: 4340
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4589 18468363.0
4590 End node is [24]
4591 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
4592 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44, 45]
4593 Objective: 15005413
4594 Dropped nodes: 2 4 5 6 8 9 10 11 12 14 15 16 17 18
    19 20 21 22 23 31 32 33 34 35 36 37 38 39 40 41 42
    43 44 45
4595 46
4596 46
4597 46
4598 46
4599 46
4600 46
4601 46
4602 46
4603 46
4604 46
4605 46
4606 Route for vehicle 0:
4607 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 30 Fuel(166878) Time(610,610) Slack(
        0) FuelSlack(0,0) Distance(20137) -> 7 Fuel(64164)
        Time(1128,1128) Slack(718) FuelSlack(175079,175151
    ) Distance(37256) -> 29 Fuel(176713) Time(2406,2406
    ) Slack(0) FuelSlack(0,0) Distance(55754) -> 1 Fuel
        (53846) Time(3026,3026) Slack(751) FuelSlack(180680
    ,180680) Distance(76232) -> 28 Fuel(160866) Time(
        4417,4417) Slack(0) FuelSlack(0,0) Distance(97371
    ) -> 3 Fuel(34032) Time(5057,5057) Slack(815)
        FuelSlack(181890,181890) Distance(118510) -> 25
        Fuel(139842) Time(6618,6618) Slack(0) FuelSlack(0,0
    ) Distance(143153) -> 26 Fuel(124476) Time(6695,
        6695) Slack(0) FuelSlack(0,0) Distance(145714) ->
        27 Fuel(108804) Time(6774,6774) Slack(0) FuelSlack(
            0,0) Distance(148326) -> 13 Fuel(46722) Time(7087,
            7087) Slack(774) FuelSlack(46722,287700) Distance(
                158673) -> 24 Fuel(287700) Time(8471,8471) Distance
                (178815)
```

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4608 Distance of the route: 178815 ft
4609 Remaining Fuel of the route: 287700
4610 Total Time of the route: 8471 seconds
4611
4612 Total Distance of all routes: 178815 ft
4613 Total Fuel remaining of all routes: 287700
4614 Total Time of all routes: 8471 seconds
4615 3
4616 Start point is: 3
4617 16
4618 16
4619 (4.92, 4.29) (7.06, 3.02)
4620 14 14
4621 The travel time for UGV from depot B to NW UGV stop
      is: 3015
4622 The UGV travel time between two UGV stops is: 3909
4623 ****
      ***
4624 UGV route goes infeasible although UAV has a
      solution
4625 ****
      ***
4626 38490237.0
4627 End node is [18]
4628 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
4629 [25, 26, 27, 28, 29, 30, 31, 32]
4630 Objective: 2005468
4631 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 12 13 14 15 17
      31 32
4632 33
4633 33
4634 33
4635 33
4636 33
4637 33
4638 33
4639 33
4640 33
4641 33
4642 33
```

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4643 33
4644 33
4645 33
4646 33
4647 Route for vehicle 0:
4648 0 Fuel(287700) Time(1537,1537) Slack(0) FuelSlack(0,0) Distance(0) -> 27 Fuel(148566) Time(2239,2299) Slack(0) FuelSlack(0,0) Distance(23189) -> 28 Fuel(135750) Time(2303,2483) Slack(0) FuelSlack(0,0) Distance(25325) -> 29 Fuel(123378) Time(2365,2665) Slack(0) FuelSlack(0,0) Distance(27387) -> 30 Fuel(110760) Time(2428,2848) Slack(0) FuelSlack(0,0) Distance(29490) -> 6 Fuel(3684) Time(3071,3508) Slack(913) FuelSlack(15366,19050) Distance(47336) -> 26 Fuel(272334) Time(4073,4510) Slack(0) FuelSlack(0,0) Distance(49897) -> 16 Fuel(52716) Time(5302,5739) Slack(755) FuelSlack(52716,92172) Distance(86500) -> 19 Fuel(287700) Time(7657,8094) Slack(0) FuelSlack(0,0) Distance(139306) -> 20 Fuel(272334) Time(7854,8291) Slack(0) FuelSlack(0,0) Distance(141867) -> 21 Fuel(256662) Time(8053,8490) Slack(0) FuelSlack(0,0) Distance(144479) -> 22 Fuel(241296) Time(8250,8687) Slack(0) FuelSlack(0,0) Distance(147040) -> 23 Fuel(225624) Time(8449,8809) Slack(0) FuelSlack(0,0) Distance(149652) -> 24 Fuel(209952) Time(8648,8888) Slack(0) FuelSlack(0,0) Distance(152264) -> 25 Fuel(194586) Time(8845,8965) Slack(0) FuelSlack(0,0) Distance(154825) -> 18 Fuel(39456) Time(9748,9748) Distance(180680)
4649 Distance of the route: 180680 ft
4650 Remaining Fuel of the route: 39456
4651 Total Time of the route: 9748 seconds
4652
4653 Total Distance of all routes: 180680 ft
4654 Total Fuel remaining of all routes: 39456
4655 Total Time of all routes: 9748 seconds
4656 3
4657 Start point is: 3
4658 16
4659 16
4660 (4.92, 4.29) (7.06, 3.02)
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4661 15 15
4662 The travel time for UGV from depot B to NW UGV stop
      is: 2916
4663 The UGV travel time between two UGV stops is: 3710
4664 ****
      ***
4665 UGV route goes infeasible although UAV has a
      solution
4666 ****
      ***
4667 40349949.0
4668 End node is [18]
4669 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
4670 [25, 26, 27, 28, 29, 30, 31, 32]
4671 Objective: 5669
4672 Dropped nodes: 2 3 4 5 6 7 8 9 11 12 13 14 16 17
4673 33
4674 33
4675 33
4676 33
4677 33
4678 33
4679 33
4680 33
4681 33
4682 33
4683 33
4684 33
4685 33
4686 33
4687 33
4688 33
4689 33
4690 33
4691 Route for vehicle 0:
4692 0 Fuel(287700) Time(1537,1537) Slack(45) FuelSlack(
      0,0) Distance(0) -> 25 Fuel(132570) Time(2365,2380
      ) Slack(105) FuelSlack(0,0) Distance(25855) -> 24
      Fuel(117204) Time(2562,2577) Slack(105) FuelSlack(0
      ,0) Distance(28416) -> 1 Fuel(70794) Time(2916,2931
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4692 ) Slack(697) FuelSlack(15366,86160) Distance(36151
      ) -> 26 Fuel(272334) Time(3690,3933) Slack(0)
      FuelSlack(0,0) Distance(38712) -> 15 Fuel(52716)
      Time(4799,5162) Slack(755) FuelSlack(52716,54624)
      Distance(75315) -> 23 Fuel(287700) Time(6868,7231)
      Slack(0) FuelSlack(0,0) Distance(118687) -> 22 Fuel
      (272028) Time(6947,7430) Slack(0) FuelSlack(0,0)
      Distance(121299) -> 21 Fuel(256662) Time(7024,7627
      ) Slack(0) FuelSlack(0,0) Distance(123860) -> 20
      Fuel(240990) Time(7125,7826) Slack(0) FuelSlack(0,0
      ) Distance(126472) -> 19 Fuel(225624) Time(7322,
      8023) Slack(0) FuelSlack(0,0) Distance(129033) ->
      32 Fuel(77766) Time(8188,8889) Slack(0) FuelSlack(0
      ,0) Distance(153676) -> 31 Fuel(65148) Time(8371,
      8978) Slack(0) FuelSlack(0,0) Distance(155779) ->
      30 Fuel(52332) Time(8555,9042) Slack(0) FuelSlack(0
      ,0) Distance(157915) -> 29 Fuel(39714) Time(8738,
      9105) Slack(0) FuelSlack(0,0) Distance(160018) ->
      28 Fuel(27342) Time(8920,9167) Slack(0) FuelSlack(0
      ,0) Distance(162080) -> 27 Fuel(14526) Time(9104,
      9231) Slack(0) FuelSlack(0,0) Distance(164216) ->
      10 Fuel(1908) Time(9287,9294) Slack(918) FuelSlack(
      0,287700) Distance(166319) -> 18 Fuel(287700) Time(
      10850,10850) Distance(187405)

4693 Distance of the route: 187405 ft
4694 Remaining Fuel of the route: 287700
4695 Total Time of the route: 10850 seconds
4696
4697 Total Distance of all routes: 187405 ft
4698 Total Fuel remaining of all routes: 287700
4699 Total Time of all routes: 10850 seconds
4700 3
4701 Start point is: 3
4702 16
4703 16
4704 (4.92, 4.29) (7.06, 3.02)
4705 15 15
4706 The travel time for UGV from depot B to NW UGV stop
      is: 2916
4707 The UGV travel time between two UGV stops is: 3710
4708 ****

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```
4708 ***
4709 UGV route goes infeasible although UAV has a
      solution
4710 ****
      ***
4711 40349949.0
4712 End node is [18]
4713 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
4714 [25, 26, 27, 28, 29, 30, 31, 32]
4715 Objective: 5669
4716 Dropped nodes: 2 3 4 5 6 7 8 9 11 12 13 14 16 17
4717 33
4718 33
4719 33
4720 33
4721 33
4722 33
4723 33
4724 33
4725 33
4726 33
4727 33
4728 33
4729 33
4730 33
4731 33
4732 33
4733 33
4734 33
4735 Route for vehicle 0:
4736 0 Fuel(287700) Time(1537,1537) Slack(45) FuelSlack(
      0,0) Distance(0) -> 25 Fuel(132570) Time(2365,2380
      ) Slack(105) FuelSlack(0,0) Distance(25855) -> 24
      Fuel(117204) Time(2562,2577) Slack(105) FuelSlack(0
      ,0) Distance(28416) -> 1 Fuel(70794) Time(2916,2931
      ) Slack(697) FuelSlack(15366,86160) Distance(36151
      ) -> 26 Fuel(272334) Time(3690,3933) Slack(0)
      FuelSlack(0,0) Distance(38712) -> 15 Fuel(52716)
      Time(4799,5162) Slack(755) FuelSlack(52716,54624)
      Distance(75315) -> 23 Fuel(287700) Time(6868,7231)
```

```

4736 Slack(0) FuelSlack(0,0) Distance(118687) -> 22 Fuel
    (272028) Time(6947,7430) Slack(0) FuelSlack(0,0)
    Distance(121299) -> 21 Fuel(256662) Time(7024,7627
    ) Slack(0) FuelSlack(0,0) Distance(123860) -> 20
    Fuel(240990) Time(7125,7826) Slack(0) FuelSlack(0,0)
    ) Distance(126472) -> 19 Fuel(225624) Time(7322,
    8023) Slack(0) FuelSlack(0,0) Distance(129033) ->
    32 Fuel(77766) Time(8188,8889) Slack(0) FuelSlack(0
    ,0) Distance(153676) -> 31 Fuel(65148) Time(8371,
    8978) Slack(0) FuelSlack(0,0) Distance(155779) ->
    30 Fuel(52332) Time(8555,9042) Slack(0) FuelSlack(0
    ,0) Distance(157915) -> 29 Fuel(39714) Time(8738,
    9105) Slack(0) FuelSlack(0,0) Distance(160018) ->
    28 Fuel(27342) Time(8920,9167) Slack(0) FuelSlack(0
    ,0) Distance(162080) -> 27 Fuel(14526) Time(9104,
    9231) Slack(0) FuelSlack(0,0) Distance(164216) ->
    10 Fuel(1908) Time(9287,9294) Slack(918) FuelSlack(
    0,287700) Distance(166319) -> 18 Fuel(287700) Time(
    10850,10850) Distance(187405)

4737 Distance of the route: 187405 ft
4738 Remaining Fuel of the route: 287700
4739 Total Time of the route: 10850 seconds
4740
4741 Total Distance of all routes: 187405 ft
4742 Total Fuel remaining of all routes: 287700
4743 Total Time of all routes: 10850 seconds
4744 3
4745 Start point is: 3
4746 16
4747 16
4748 (7.06, 3.02) (5.4, 6.19)
4749 15 14
4750 The travel time for UGV from depot B to NW UGV stop
    is: 2941
4751 The UGV travel time between two UGV stops is: 4648
4752 ****
4753 UGV route goes infeasible although UAV has a
    solution
4754 ****
4755 ***

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4755 48157363.5
4756 End node is [18]
4757 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
4758 [25, 26, 27, 28]
4759 Objective: 6790
4760 Dropped nodes: 2 3 4 5 6 7 8 10 12 14 15 16 17
4761 29
4762 29
4763 29
4764 29
4765 29
4766 29
4767 29
4768 29
4769 29
4770 29
4771 29
4772 29
4773 29
4774 29
4775 29
4776 Route for vehicle 0:
4777 0 Fuel(278257) Time(1596,1596) Slack(60) FuelSlack(
    0,0) Distance(0) -> 26 Fuel(101317) Time(2549,2549
) Slack(120) FuelSlack(0,0) Distance(29490) -> 28
Fuel(75883) Time(2797,2797) Slack(120) FuelSlack(0,
    0) Distance(33729) -> 27 Fuel(63265) Time(2980,2980
) Slack(120) FuelSlack(0,0) Distance(35832) -> 1
Fuel(25) Time(3419,3419) Slack(925) FuelSlack(19901
,19951) Distance(46372) -> 24 Fuel(267799) Time(
    4472,4472) Slack(120) FuelSlack(0,0) Distance(50611
) -> 13 Fuel(25) Time(5944,5944) Slack(925)
FuelSlack(48521,48571) Distance(95240) -> 23 Fuel(
    239179) Time(8159,8159) Slack(120) FuelSlack(0,0)
Distance(137812) -> 25 Fuel(213991) Time(8406,8406
) Slack(120) FuelSlack(0,0) Distance(142010) -> 19
Fuel(62107) Time(9293,9293) Slack(120) FuelSlack(0,
    0) Distance(167324) -> 20 Fuel(46741) Time(9490,
9490) Slack(120) FuelSlack(0,0) Distance(169885
) -> 9 Fuel(25) Time(9845,9845) Slack(925)
```

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4777 FuelSlack(272003,272053) Distance(177671) -> 22
    Fuel(15697) Time(10849,10849) Slack(120) FuelSlack(
    0,0) Distance(180283) -> 11 Fuel(25) Time(11048,
    11048) Slack(925) FuelSlack(0,70513) Distance(
    182895) -> 21 Fuel(287700) Time(12129,12129) Slack(
    120) FuelSlack(0,0) Distance(188069) -> 18 Fuel(
    70488) Time(13346,13346) Distance(224271)
4778 Distance of the route: 224271 ft
4779 Remaining Fuel of the route: 70488
4780 Total Time of the route: 13346 seconds
4781
4782 Total Distance of all routes: 224271 ft
4783 Total Fuel remaining of all routes: 70488
4784 Total Time of all routes: 13346 seconds
4785 3
4786 Start point is: 3
4787 16
4788 16
4789 (4.8, 3.81) (7.06, 3.02)
4790 15 15
4791 The travel time for UGV from depot B to NW UGV stop
    is: 2740
4792 The UGV travel time between two UGV stops is: 3534
4793 ****
4794 UGV route goes infeasible although UAV has a
    solution
4795 ****
4796 38355447.0
4797 End node is [18]
4798 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
4799 []
4800 Objective: 5554
4801 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 13 14 15 16
4802 25
4803 25
4804 25
4805 25
4806 25
```

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4807 25
4808 25
4809 25
4810 25
4811 25
4812 Route for vehicle 0:
4813 0 Fuel(287700) Time(1537,1537) Slack(0) FuelSlack(0,0) Distance(0) -> 19 Fuel(148566) Time(2239,2299) Slack(21) FuelSlack(0,0) Distance(23189) -> 6 Fuel(65370) Time(2740,2839) Slack(714) FuelSlack(0,85296) Distance(37055) -> 20 Fuel(287700) Time(3916,4226) Slack(0) FuelSlack(0,0) Distance(52333) -> 17 Fuel(19926) Time(5370,5698) Slack(861) FuelSlack(162368,231768) Distance(96962) -> 24 Fuel(125332) Time(7895,8223) Slack(0) FuelSlack(0,0) Distance(149762) -> 23 Fuel(112714) Time(8078,8406) Slack(0) FuelSlack(0,0) Distance(151865) -> 22 Fuel(99898) Time(8262,8590) Slack(0) FuelSlack(0,0) Distance(154001) -> 21 Fuel(87280) Time(8445,8724) Slack(0) FuelSlack(0,0) Distance(156104) -> 12 Fuel(49474) Time(8755,8914) Slack(766) FuelSlack(0,287700) Distance(162405) -> 18 Fuel(287700) Time(10318,10318) Distance(183491)
4814 Distance of the route: 183491 ft
4815 Remaining Fuel of the route: 287700
4816 Total Time of the route: 10318 seconds
4817
4818 Total Distance of all routes: 183491 ft
4819 Total Fuel remaining of all routes: 287700
4820 Total Time of all routes: 10318 seconds
4821 3
4822 Start point is: 3
4823 16
4824 16
4825 (5.16, 5.24) (8.29, 4.03)
4826 14 14
4827 The travel time for UGV from depot B to NW UGV stop is: 3385
4828 The UGV travel time between two UGV stops is: 4882
4829 ****
***
```

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4830 UGV route goes infeasible although UAV has a
      solution
4831 ****
      ***
4832 47373462.0
4833 End node is [18]
4834 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
4835 [25, 26]
4836 Objective: 7096
4837 Dropped nodes: 2 3 4 5 6 7 8 9 10 11 13 14 15 16
4838 27
4839 27
4840 27
4841 27
4842 27
4843 27
4844 27
4845 27
4846 27
4847 27
4848 27
4849 27
4850 Route for vehicle 0:
4851 0 Fuel(287700) Time(1557,1557) Slack(60) FuelSlack(
      0,0) Distance(0) -> 22 Fuel(85854) Time(2636,2636)
      Slack(120) FuelSlack(0,0) Distance(33641) -> 21
      Fuel(70488) Time(2833,2833) Slack(120) FuelSlack(0,
      0) Distance(36202) -> 23 Fuel(39444) Time(3109,3109
      ) Slack(120) FuelSlack(0,0) Distance(41376) -> 1
      Fuel(8400) Time(3385,3385) Slack(898) FuelSlack(
      12375,49723) Distance(46550) -> 24 Fuel(275325)
      Time(4360,4387) Slack(27) FuelSlack(0,0) Distance(
      49111) -> 17 Fuel(28948) Time(5658,5751) Slack(832
      ) FuelSlack(93752,151648) Distance(90174) -> 20
      Fuel(193948) Time(8111,8204) Slack(27) FuelSlack(0,
      0) Distance(140609) -> 26 Fuel(54382) Time(8935,
      9028) Slack(27) FuelSlack(0,0) Distance(163870) ->
      25 Fuel(41764) Time(9118,9211) Slack(27) FuelSlack(
      0,0) Distance(165973) -> 12 Fuel(28948) Time(9302,
      9395) Slack(832) FuelSlack(0,68392) Distance(168109
```

```
4851 ) -> 19 Fuel(287700) Time(10982,11075) Slack(27)
        FuelSlack(0,0) Distance(193038) -> 18 Fuel(39444)
        Time(12355,12355) Distance(234414)
4852 Distance of the route: 234414 ft
4853 Remaining Fuel of the route: 39444
4854 Total Time of the route: 12355 seconds
4855
4856 Total Distance of all routes: 234414 ft
4857 Total Fuel remaining of all routes: 39444
4858 Total Time of all routes: 12355 seconds
4859 3
4860 Start point is: 3
4861 16
4862 16
4863 (5.16, 5.24) (8.29, 4.03)
4864 14 14
4865 The travel time for UGV from depot B to NW UGV stop
      is: 3385
4866 The UGV travel time between two UGV stops is: 4882
4867 ****
      ***
4868 UGV route goes infeasible although UAV has a
      solution
4869 ****
      ***
4870 47373462.0
4871 End node is [18]
4872 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
4873 [25, 26]
4874 Objective: 7096
4875 Dropped nodes: 2 3 4 5 6 7 8 9 10 11 13 14 15 16
4876 27
4877 27
4878 27
4879 27
4880 27
4881 27
4882 27
4883 27
4884 27
```

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4885 27
4886 27
4887 27
4888 Route for vehicle 0:
4889 0 Fuel(287700) Time(1557,1557) Slack(60) FuelSlack(
    0,0) Distance(0) -> 22 Fuel(85854) Time(2636,2636)
    Slack(120) FuelSlack(0,0) Distance(33641) -> 21
    Fuel(70488) Time(2833,2833) Slack(120) FuelSlack(0,
    0) Distance(36202) -> 23 Fuel(39444) Time(3109,3109
    ) Slack(120) FuelSlack(0,0) Distance(41376) -> 1
    Fuel(8400) Time(3385,3385) Slack(898) FuelSlack(
    12375,49723) Distance(46550) -> 24 Fuel(275325)
    Time(4360,4387) Slack(27) FuelSlack(0,0) Distance(
    49111) -> 17 Fuel(28948) Time(5658,5751) Slack(832
    ) FuelSlack(93752,151648) Distance(90174) -> 20
    Fuel(193948) Time(8111,8204) Slack(27) FuelSlack(0,
    0) Distance(140609) -> 26 Fuel(54382) Time(8935,
    9028) Slack(27) FuelSlack(0,0) Distance(163870) ->
    25 Fuel(41764) Time(9118,9211) Slack(27) FuelSlack(
    0,0) Distance(165973) -> 12 Fuel(28948) Time(9302,
    9395) Slack(832) FuelSlack(0,68392) Distance(168109
    ) -> 19 Fuel(287700) Time(10982,11075) Slack(27)
    FuelSlack(0,0) Distance(193038) -> 18 Fuel(39444)
    Time(12355,12355) Distance(234414)
4890 Distance of the route: 234414 ft
4891 Remaining Fuel of the route: 39444
4892 Total Time of the route: 12355 seconds
4893
4894 Total Distance of all routes: 234414 ft
4895 Total Fuel remaining of all routes: 39444
4896 Total Time of all routes: 12355 seconds
4897 3
4898 Start point is: 3
4899 16
4900 16
4901 (7.37, 3.27) (5.76, 7.62)
4902 14 14
4903 The travel time for UGV from depot B to NW UGV stop
    is: 3192
4904 The UGV travel time between two UGV stops is: 5353
4905 *****
```

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4905 ***
4906 UGV route goes infeasible although UAV has a
    solution
4907 ****
    ***
4908 52540182.0
4909 End node is [18]
4910 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
4911 []
4912 Objective: 7908
4913 Dropped nodes: 1 2 3 4 5 7 8 9 10 13 14 15
4914 25
4915 25
4916 25
4917 25
4918 25
4919 25
4920 25
4921 25
4922 25
4923 25
4924 25
4925 25
4926 Route for vehicle 0:
4927 0 Fuel(274969) Time(1552,1552) Slack(60) FuelSlack(
    0,0) Distance(0) -> 22 Fuel(98029) Time(2505,2505)
    Slack(120) FuelSlack(0,0) Distance(29490) -> 24
    Fuel(72595) Time(2753,2753) Slack(120) FuelSlack(0,
    0) Distance(33729) -> 6 Fuel(9355) Time(3192,3192)
    Slack(895) FuelSlack(10571,29281) Distance(44269
    ) -> 20 Fuel(277129) Time(4151,4181) Slack(90)
    FuelSlack(0,0) Distance(46405) -> 17 Fuel(9355)
    Time(5623,5653) Slack(895) FuelSlack(0,158407)
    Distance(91034) -> 23 Fuel(287700) Time(8085,8115)
    Slack(90) FuelSlack(0,0) Distance(141778) -> 12
    Fuel(149052) Time(8905,8935) Slack(445) FuelSlack(
    101881,287700) Distance(164886) -> 19 Fuel(185819)
    Time(9427,9937) Slack(0) FuelSlack(0,0) Distance(
    167447) -> 11 Fuel(170453) Time(9586,10134) Slack(
    377) FuelSlack(0,178421) Distance(170008) -> 21
```

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4927 Fuel(287700) Time(11220,11366) Slack(0) FuelSlack(0  
,0) Distance(193428) -> 16 Fuel(7968) Time(12752,  
12778) Slack(899) FuelSlack(0,287700) Distance(  
240050) -> 18 Fuel(287700) Time(14317,14317)  
Distance(261171)  
4928 Distance of the route: 261171 ft  
4929 Remaining Fuel of the route: 287700  
4930 Total Time of the route: 14317 seconds  
4931  
4932 Total Distance of all routes: 261171 ft  
4933 Total Fuel remaining of all routes: 287700  
4934 Total Time of all routes: 14317 seconds  
4935 3  
4936 Start point is: 3  
4937 16  
4938 16  
4939 (7.06, 3.02) (5.04, 4.76)  
4940 15 14  
4941 The travel time for UGV from depot B to NW UGV stop  
is: 2941  
4942 The UGV travel time between two UGV stops is: 4090  
4943 *****  
***  
4944 UGV route goes infeasible although UAV has a  
solution  
4945 *****  
***  
4946 44448616.5  
4947 End node is [18]  
4948 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,  
15, 16, 17]  
4949 [25, 26, 27, 28, 29, 30, 31]  
4950 Objective: 6295  
4951 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 13 14 15 16  
4952 32  
4953 32  
4954 32  
4955 32  
4956 32  
4957 32  
4958 32
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4959 32
4960 32
4961 32
4962 32
4963 32
4964 32
4965 32
4966 32
4967 32
4968 32
4969 Route for vehicle 0:
4970 0 Fuel(278251) Time(1540,1540) Slack(60) FuelSlack(
    0,0) Distance(0) -> 26 Fuel(139117) Time(2302,2302
) Slack(120) FuelSlack(0,0) Distance(23189) -> 27
Fuel(126301) Time(2486,2486) Slack(120) FuelSlack(0
,0) Distance(25325) -> 31 Fuel(75883) Time(2860,
2860) Slack(120) FuelSlack(0,0) Distance(33728) ->
30 Fuel(63265) Time(3043,3043) Slack(120) FuelSlack
(0,0) Distance(35831) -> 29 Fuel(50449) Time(3227,
3227) Slack(120) FuelSlack(0,0) Distance(37967) ->
28 Fuel(37831) Time(3410,3410) Slack(120) FuelSlack
(0,0) Distance(40070) -> 6 Fuel(25) Time(3720,3720
) Slack(925) FuelSlack(27443,27493) Distance(46371
) -> 23 Fuel(260257) Time(5217,5217) Slack(120)
FuelSlack(0,0) Distance(65265) -> 17 Fuel(25) Time(
6651,6651) Slack(925) FuelSlack(178877,178927)
Distance(108637) -> 19 Fuel(108823) Time(9176,9176
) Slack(120) FuelSlack(0,0) Distance(161443) -> 20
Fuel(93457) Time(9373,9373) Slack(120) FuelSlack(0,
0) Distance(164004) -> 21 Fuel(77785) Time(9572,
9572) Slack(120) FuelSlack(0,0) Distance(166616
) -> 22 Fuel(62419) Time(9769,9769) Slack(120)
FuelSlack(0,0) Distance(169177) -> 24 Fuel(31069)
Time(10047,10047) Slack(120) FuelSlack(0,0)
Distance(174402) -> 12 Fuel(25) Time(10323,10323)
Slack(925) FuelSlack(15672,15697) Distance(179576
) -> 25 Fuel(272028) Time(11327,11327) Slack(120)
FuelSlack(0,0) Distance(182188) -> 18 Fuel(116898)
Time(12230,12230) Distance(208043)
4971 Distance of the route: 208043 ft
4972 Remaining Fuel of the route: 116898
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4973 Total Time of the route: 12230 seconds
4974
4975 Total Distance of all routes: 208043 ft
4976 Total Fuel remaining of all routes: 116898
4977 Total Time of all routes: 12230 seconds
4978 3
4979 Start point is: 3
4980 16
4981 16
4982 (5.16, 5.24) (8.29, 4.03)
4983 14 15
4984 The travel time for UGV from depot B to NW UGV stop
    is: 3385
4985 The UGV travel time between two UGV stops is: 4618
4986 ****
4987 ***  
UGV route goes infeasible although UAV has a
    solution
4988 ****
4989 ***
4990 End node is [18]
4991 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
4992 [25, 26]
4993 Objective: 6559
4994 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 13 14 15 16
4995 27
4996 27
4997 27
4998 27
4999 27
5000 27
5001 27
5002 27
5003 27
5004 27
5005 27
5006 27
5007 Route for vehicle 0:
5008 0 Fuel(279325) Time(1596,1596) Slack(60) FuelSlack(
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5008 0,0) Distance(0) -> 24 Fuel(108829) Time(2517,2517
) Slack(120) FuelSlack(0,0) Distance(28416) -> 21
Fuel(62113) Time(2872,2872) Slack(120) FuelSlack(0,
0) Distance(36202) -> 23 Fuel(31069) Time(3148,3148
) Slack(120) FuelSlack(0,0) Distance(41376) -> 6
Fuel(25) Time(3424,3424) Slack(925) FuelSlack(13391
,13441) Distance(46550) -> 22 Fuel(274309) Time(
4584,4584) Slack(120) FuelSlack(0,0) Distance(54336
) -> 17 Fuel(25) Time(6089,6089) Slack(925)
FuelSlack(107309,107359) Distance(100050) -> 19
Fuel(180391) Time(8614,8614) Slack(120) FuelSlack(0
,0) Distance(152856) -> 20 Fuel(165025) Time(8811,
8811) Slack(120) FuelSlack(0,0) Distance(155417
) -> 26 Fuel(25459) Time(9635,9635) Slack(120)
FuelSlack(0,0) Distance(178678) -> 12 Fuel(25) Time
(9883,9883) Slack(925) FuelSlack(12816,12841)
Distance(182917) -> 25 Fuel(274884) Time(10872,
10872) Slack(120) FuelSlack(0,0) Distance(185053
) -> 18 Fuel(85128) Time(11950,11950) Distance(
216679)

5009 Distance of the route: 216679 ft
5010 Remaining Fuel of the route: 85128
5011 Total Time of the route: 11950 seconds
5012
5013 Total Distance of all routes: 216679 ft
5014 Total Fuel remaining of all routes: 85128
5015 Total Time of all routes: 11950 seconds
5016 3
5017 Start point is: 3
5018 16
5019 16
5020 (7.68, 3.53) (5.04, 4.76)
5021 14 14
5022 The travel time for UGV from depot B to NW UGV stop
is: 3347
5023 The UGV travel time between two UGV stops is: 4395
5024 ****
      ***
5025 UGV route goes infeasible although UAV has a
solution
5026 ****

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5026 ***
5027 44197357.5
5028 End node is [18]
5029 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
5030 [25, 26, 27, 28, 29]
5031 Objective: 2006483
5032 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 13 14 15 17 28
                  29
5033 30
5034 30
5035 30
5036 30
5037 30
5038 30
5039 30
5040 30
5041 30
5042 30
5043 30
5044 30
5045 30
5046 Route for vehicle 0:
5047 0 Fuel(287700) Time(1537,1537) Slack(6) FuelSlack(0
      ,0) Distance(0) -> 25 Fuel(132570) Time(2326,2380)
      Slack(66) FuelSlack(0,0) Distance(25855) -> 27 Fuel
      (26262) Time(2982,3036) Slack(66) FuelSlack(0,0)
      Distance(43573) -> 26 Fuel(13644) Time(3165,3219)
      Slack(66) FuelSlack(0,0) Distance(45676) -> 6 Fuel(
      1272) Time(3347,3401) Slack(920) FuelSlack(0,28740
      ) Distance(47738) -> 23 Fuel(287700) Time(4827,4886
      ) Slack(0) FuelSlack(0,0) Distance(66236) -> 16
      Fuel(27468) Time(6141,6320) Slack(836) FuelSlack(
      53551,206377) Distance(109608) -> 19 Fuel(234149)
      Time(8577,8845) Slack(0) FuelSlack(0,0) Distance(
      162414) -> 20 Fuel(218783) Time(8654,9042) Slack(0
      ) FuelSlack(0,0) Distance(164975) -> 21 Fuel(203111
      ) Time(8747,9241) Slack(0) FuelSlack(0,0) Distance(
      167587) -> 22 Fuel(187745) Time(8944,9438) Slack(0
      ) FuelSlack(0,0) Distance(170148) -> 12 Fuel(125358
      ) Time(9379,9782) Slack(522) FuelSlack(0,242562)
```

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5047 Distance(180546) -> 24 Fuel(287700) Time(10460,
    10580) Slack(0) FuelSlack(0,0) Distance(185720) ->
    18 Fuel(117204) Time(11441,11441) Distance(214136)
5048 Distance of the route: 214136 ft
5049 Remaining Fuel of the route: 117204
5050 Total Time of the route: 11441 seconds
5051
5052 Total Distance of all routes: 214136 ft
5053 Total Fuel remaining of all routes: 117204
5054 Total Time of all routes: 11441 seconds
5055 5
5056 Start point is: 5
5057 16
5058 31
5059 (4.92, 4.29) (7.37, 3.27)
5060 14 15
5061 The travel time for UGV from depot B to NW UGV stop
    is: 3888
5062 The UGV travel time between two UGV stops is: 3851
5063 17160688.5
5064 End node is [24]
5065 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
5066 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44, 45, 46, 47]
5067 Objective: 15003229
5068 Dropped nodes: 1 3 4 5 6 7 8 9 10 12 13 14 15 16 17
    18 19 20 21 22 23 33 34 35 36 37 38 39 40 41 42 43
    44 45 46 47
5069 48
5070 48
5071 48
5072 48
5073 48
5074 48
5075 48
5076 48
5077 48
5078 48
5079 48
5080 Route for vehicle 0:
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5081 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 30 Fuel(166878) Time(610,670) Slack(
    0) FuelSlack(0,0) Distance(20137) -> 2 Fuel(46056)
    Time(1220,1400) Slack(776) FuelSlack(147858,193914
    ) Distance(40274) -> 25 Fuel(139842) Time(2742,3071
    ) Slack(0) FuelSlack(0,0) Distance(64917) -> 26
    Fuel(124476) Time(2819,3268) Slack(0) FuelSlack(0,0
    ) Distance(67478) -> 27 Fuel(108804) Time(2898,3420
    ) Slack(0) FuelSlack(0,0) Distance(70090) -> 28
    Fuel(93438) Time(3017,3497) Slack(0) FuelSlack(0,0
    ) Distance(72651) -> 29 Fuel(77766) Time(3216,3576
    ) Slack(0) FuelSlack(0,0) Distance(75263) -> 31
    Fuel(46722) Time(3492,3732) Slack(0) FuelSlack(0,0
    ) Distance(80437) -> 32 Fuel(31050) Time(3691,3811
    ) Slack(0) FuelSlack(0,0) Distance(83049) -> 11
    Fuel(15684) Time(3888,3888) Slack(874) FuelSlack(
    15684,287700) Distance(85610) -> 24 Fuel(287700)
    Time(5401,5401) Distance(106719)
5082 Distance of the route: 106719 ft
5083 Remaining Fuel of the route: 287700
5084 Total Time of the route: 5401 seconds
5085
5086 Total Distance of all routes: 106719 ft
5087 Total Fuel remaining of all routes: 287700
5088 Total Time of all routes: 5401 seconds
5089 5
5090 Start point is: 5
5091 16
5092 31
5093 (5.4, 6.19) (7.37, 3.27)
5094 14 14
5095 The travel time for UGV from depot B to NW UGV stop
    is: 4627
5096 The UGV travel time between two UGV stops is: 4799
5097 20958237.0
5098 End node is [24]
5099 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
5100 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43]
5101 Objective: 15004294

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5102 Dropped nodes: 3 4 5 6 8 9 10 11 12 13 14 15 16 17  
      18 19 20 21 22 23 29 30 31 32 33 34 35 36 37 38 39  
      40 41 42 43  
5103 44  
5104 44  
5105 44  
5106 44  
5107 44  
5108 44  
5109 44  
5110 44  
5111 Route for vehicle 0:  
5112 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)  
      Distance(0) -> 28 Fuel(160866) Time(640,640) Slack(0)  
      FuelSlack(0,0) Distance(21139) -> 1 Fuel(34032)  
      Time(1280,1280) Slack(815) FuelSlack(166273,166380)  
      ) Distance(42278) -> 27 Fuel(155352) Time(2763,2763)  
      ) Slack(0) FuelSlack(0,0) Distance(64336) -> 2 Fuel  
      (23004) Time(3431,3431) Slack(851) FuelSlack(170862  
      ,170862) Distance(86394) -> 25 Fuel(139842) Time(  
      5028,5028) Slack(0) FuelSlack(0,0) Distance(111037)  
      ) -> 26 Fuel(124476) Time(5105,5105) Slack(0)  
      FuelSlack(0,0) Distance(113598) -> 7 Fuel(77760)  
      Time(5340,5340) Slack(675) FuelSlack(77760,287700)  
      Distance(121384) -> 24 Fuel(287700) Time(6635,6635)  
      ) Distance(141862)  
5113 Distance of the route: 141862 ft  
5114 Remaining Fuel of the route: 287700  
5115 Total Time of the route: 6635 seconds  
5116  
5117 Total Distance of all routes: 141862 ft  
5118 Total Fuel remaining of all routes: 287700  
5119 Total Time of all routes: 6635 seconds  
5120 5  
5121 Start point is: 5  
5122 16  
5123 31  
5124 (7.06, 3.02) (5.04, 4.76)  
5125 15 14  
5126 The travel time for UGV from depot B to NW UGV stop  
      is: 841
```

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5127 The UGV travel time between two UGV stops is: 4090
5128 18262155.0
5129 End node is [24]
5130 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
5131 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39, 40, 41, 42, 43, 44, 45, 46]
5132 Objective: 15005357
5133 Dropped nodes: 1 2 3 6 8 9 10 11 12 14 15 16 17 18
      19 20 21 22 23 32 33 34 35 36 37 38 39 40 41 42 43
      44 45 46
5134 47
5135 47
5136 47
5137 47
5138 47
5139 47
5140 47
5141 47
5142 47
5143 47
5144 47
5145 47
5146 Route for vehicle 0:
5147 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
      Distance(0) -> 31 Fuel(166848) Time(610,610) Slack(
      0) FuelSlack(0,0) Distance(20142) -> 7 Fuel(74280)
      Time(1077,1077) Slack(686) FuelSlack(176230,176466
      ) Distance(35570) -> 30 Fuel(185514) Time(2279,2279
      ) Slack(0) FuelSlack(0,0) Distance(52601) -> 5 Fuel
      (64692) Time(2889,2889) Slack(717) FuelSlack(187559
      ,187559) Distance(72738) -> 29 Fuel(164833) Time(
      4226,4226) Slack(0) FuelSlack(0,0) Distance(93216
      ) -> 4 Fuel(41966) Time(4846,4846) Slack(790)
      FuelSlack(189824,189824) Distance(113694) -> 25
      Fuel(139842) Time(6382,6382) Slack(0) FuelSlack(0,0
      ) Distance(138337) -> 26 Fuel(124476) Time(6459,
      6459) Slack(0) FuelSlack(0,0) Distance(140898) ->
      27 Fuel(108804) Time(6538,6538) Slack(0) FuelSlack(
      0,0) Distance(143510) -> 28 Fuel(93438) Time(6615,
      6615) Slack(0) FuelSlack(0,0) Distance(146071) ->
```

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5147 13 Fuel(31051) Time(6930,6930) Slack(825) FuelSlack
    (31051,287700) Distance(156469) -> 24 Fuel(287700)
    Time(8375,8375) Distance(176936)
5148 Distance of the route: 176936 ft
5149 Remaining Fuel of the route: 287700
5150 Total Time of the route: 8375 seconds
5151
5152 Total Distance of all routes: 176936 ft
5153 Total Fuel remaining of all routes: 287700
5154 Total Time of all routes: 8375 seconds
5155 5
5156 Start point is: 5
5157 16
5158 31
5159 (8.91, 4.54) (5.64, 7.14)
5160 14 14
5161 The travel time for UGV from depot B to NW UGV stop
    is: 0
5162 The UGV travel time between two UGV stops is: 5923
5163 22657707.0
5164 End node is [24]
5165 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
5166 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41]
5167 Objective: 16001408
5168 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 12 13 14 15 16
    17 18 19 20 21 22 23 25 27 28 29 30 31 32 33 34 35
    36 37 38 39 40 41
5169 42
5170 42
5171 42
5172 Route for vehicle 0:
5173 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 26 Fuel(148134) Time(704,704) Slack(
    0) FuelSlack(0,0) Distance(23261) -> 6 Fuel(8568)
    Time(1408,1408) Slack(897) FuelSlack(8423,287700)
    Distance(46522) -> 24 Fuel(287700) Time(2305,2305)
    Distance(46522)
5174 Distance of the route: 46522 ft
5175 Remaining Fuel of the route: 287700

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5176 Total Time of the route: 2305 seconds
5177
5178 Total Distance of all routes: 46522 ft
5179 Total Fuel remaining of all routes: 287700
5180 Total Time of all routes: 2305 seconds
5181 5
5182 Start point is: 5
5183 16
5184 31
5185 (5.4, 6.19) (7.06, 3.02)
5186 15 14
5187 The travel time for UGV from depot B to NW UGV stop
      is: 4319
5188 The UGV travel time between two UGV stops is: 4648
5189 20026071.0
5190 End node is [24]
5191 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
5192 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39, 40, 41, 42, 43]
5193 Objective: 15004522
5194 Dropped nodes: 3 4 5 6 8 9 10 11 12 13 14 15 16 17
      18 19 20 21 22 23 29 30 31 32 33 34 35 36 37 38 39
      40 41 42 43
5195 44
5196 44
5197 44
5198 44
5199 44
5200 44
5201 44
5202 44
5203 Route for vehicle 0:
5204 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
      Distance(0) -> 26 Fuel(148134) Time(704,704) Slack(
      0) FuelSlack(0,0) Distance(23261) -> 2 Fuel(8568)
      Time(1408,1408) Slack(897) FuelSlack(140771,140916
      ) Distance(46522) -> 27 Fuel(155352) Time(2973,2973
      ) Slack(0) FuelSlack(0,0) Distance(68580) -> 1 Fuel
      (23004) Time(3641,3641) Slack(851) FuelSlack(149838
      ,149838) Distance(90638) -> 28 Fuel(160866) Time(
```

```
5204 5132,5132) Slack(0) FuelSlack(0,0) Distance(111777
    ) -> 7 Fuel(145194) Time(5211,5211) Slack(458)
    FuelSlack(207276,207276) Distance(114389) -> 25
    Fuel(225618) Time(5982,5982) Slack(0) FuelSlack(0,0
    ) Distance(124736) -> 24 Fuel(77760) Time(6728,6728
    ) Distance(149379)
5205 Distance of the route: 149379 ft
5206 Remaining Fuel of the route: 77760
5207 Total Time of the route: 6728 seconds
5208
5209 Total Distance of all routes: 149379 ft
5210 Total Fuel remaining of all routes: 77760
5211 Total Time of all routes: 6728 seconds
5212 5
5213 Start point is: 5
5214 16
5215 31
5216 (8.91, 4.54) (5.28, 5.71)
5217 15 15
5218 The travel time for UGV from depot B to NW UGV stop
    is: 0
5219 The UGV travel time between two UGV stops is: 5069
5220 19269633.0
5221 End node is [24]
5222 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
5223 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44]
5224 Objective: 16002790
5225 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 13 14 15 16 17
    18 19 20 21 22 23 25 30 31 32 33 34 35 36 37 38 39
    40 41 42 43 44
5226 45
5227 45
5228 45
5229 45
5230 45
5231 45
5232 45
5233 Route for vehicle 0:
5234 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
```

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5234 Distance(0) -> 29 Fuel(164833) Time(620,620) Slack(0)
    FuelSlack(0,0) Distance(20478) -> 28 Fuel(149161)
    ) Time(699,699) Slack(0) FuelSlack(0,0) Distance(
    23090) -> 12 Fuel(22327) Time(1339,1339) Slack(853
    ) FuelSlack(154455,154675) Distance(44229) -> 27
    Fuel(155352) Time(2860,2860) Slack(0) FuelSlack(0,0
    ) Distance(66287) -> 26 Fuel(139680) Time(2939,2939
    ) Slack(0) FuelSlack(0,0) Distance(68899) -> 6 Fuel
    (114) Time(3643,3643) Slack(924) FuelSlack(114,
    287700) Distance(92160) -> 24 Fuel(287700) Time(
    4567,4567) Distance(92160)
5235 Distance of the route: 92160 ft
5236 Remaining Fuel of the route: 287700
5237 Total Time of the route: 4567 seconds
5238
5239 Total Distance of all routes: 92160 ft
5240 Total Fuel remaining of all routes: 287700
5241 Total Time of all routes: 4567 seconds
5242 5
5243 Start point is: 5
5244 16
5245 31
5246 (7.68, 3.53) (5.16, 5.24)
5247 14 15
5248 The travel time for UGV from depot B to NW UGV stop
    is: 599
5249 The UGV travel time between two UGV stops is: 4340
5250 18237603.0
5251 End node is [24]
5252 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
5253 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44, 45]
5254 Objective: 6687
5255 Dropped nodes: 1 2 3 4 7 8 9 10 11 12 13 14 15 16
    17 19 20 21 22
5256 46
5257 46
5258 46
5259 46
5260 46
```

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5261 46
5262 46
5263 46
5264 46
5265 46
5266 46
5267 46
5268 46
5269 46
5270 46
5271 46
5272 46
5273 46
5274 46
5275 46
5276 46
5277 46
5278 46
5279 46
5280 46
5281 46
5282 Route for vehicle 0:
5283 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 30 Fuel(166878) Time(610,610) Slack(
        0) FuelSlack(0,0) Distance(20137) -> 6 Fuel(46056)
        Time(1220,1220) Slack(776) FuelSlack(168921,168923
    ) Distance(40274) -> 29 Fuel(164833) Time(2616,2616
    ) Slack(0) FuelSlack(0,0) Distance(60752) -> 5 Fuel
        (41966) Time(3236,3236) Slack(790) FuelSlack(189824
        ,189824) Distance(81230) -> 25 Fuel(139842) Time(
        4772,4772) Slack(0) FuelSlack(0,0) Distance(105873
    ) -> 26 Fuel(124476) Time(4849,4849) Slack(0)
        FuelSlack(0,0) Distance(108434) -> 27 Fuel(108804)
        Time(4928,4928) Slack(0) FuelSlack(0,0) Distance(
        111046) -> 28 Fuel(93438) Time(5005,5005) Slack(0)
        FuelSlack(0,0) Distance(113607) -> 18 Fuel(46722)
        Time(5240,5240) Slack(774) FuelSlack(201852,201852
    ) Distance(121393) -> 45 Fuel(132570) Time(6797,
        6797) Slack(0) FuelSlack(0,0) Distance(147248) ->
        44 Fuel(124278) Time(6838,6838) Slack(0) FuelSlack(
        0,0) Distance(148630) -> 43 Fuel(115632) Time(6881,
```

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5283 6881) Slack(0) FuelSlack(0,0) Distance(150071) ->
    42 Fuel(107340) Time(6922,6922) Slack(0) FuelSlack(
    0,0) Distance(151453) -> 41 Fuel(98736) Time(6965,
    6965) Slack(0) FuelSlack(0,0) Distance(152887) ->
    40 Fuel(90444) Time(7006,7006) Slack(0) FuelSlack(0
    ,0) Distance(154269) -> 39 Fuel(81798) Time(7049,
    7049) Slack(0) FuelSlack(0,0) Distance(155710) ->
    38 Fuel(73506) Time(7090,7090) Slack(0) FuelSlack(0
    ,0) Distance(157092) -> 37 Fuel(64902) Time(7133,
    7133) Slack(0) FuelSlack(0,0) Distance(158526) ->
    36 Fuel(56610) Time(7174,7174) Slack(0) FuelSlack(0
    ,0) Distance(159908) -> 35 Fuel(47964) Time(7217,
    7217) Slack(0) FuelSlack(0,0) Distance(161349) ->
    34 Fuel(39672) Time(7258,7258) Slack(0) FuelSlack(0
    ,0) Distance(162731) -> 33 Fuel(31068) Time(7301,
    7301) Slack(0) FuelSlack(0,0) Distance(164165) ->
    32 Fuel(22776) Time(7342,7342) Slack(0) FuelSlack(0
    ,0) Distance(165547) -> 31 Fuel(14442) Time(7384,
    7384) Slack(0) FuelSlack(0,0) Distance(166936) ->
    23 Fuel(5838) Time(7427,7427) Slack(906) FuelSlack(
    5838,287700) Distance(168370) -> 24 Fuel(287700)
    Time(9933,9933) Distance(221170)

5284 Distance of the route: 221170 ft
5285 Remaining Fuel of the route: 287700
5286 Total Time of the route: 9933 seconds
5287
5288 Total Distance of all routes: 221170 ft
5289 Total Fuel remaining of all routes: 287700
5290 Total Time of all routes: 9933 seconds
5291 3
5292 Start point is: 3
5293 16
5294 16
5295 (7.68, 3.53) (5.04, 4.76)
5296 14 14
5297 The travel time for UGV from depot B to NW UGV stop
    is: 3347
5298 The UGV travel time between two UGV stops is: 4395
5299 ****
      ***
5300 UGV route goes infeasible although UAV has a

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```
5300 solution
5301 ****
      ***
5302 45501727.5
5303 End node is [18]
5304 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
5305 [25, 26, 27, 28, 29]
5306 Objective: 2006483
5307 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 13 14 15 17 28
      29
5308 30
5309 30
5310 30
5311 30
5312 30
5313 30
5314 30
5315 30
5316 30
5317 30
5318 30
5319 30
5320 30
5321 Route for vehicle 0:
5322 0 Fuel(286453) Time(1583,1583) Slack(60) FuelSlack(
      0,0) Distance(0) -> 25 Fuel(131323) Time(2426,2426
      ) Slack(120) FuelSlack(0,0) Distance(25855) -> 27
      Fuel(25015) Time(3082,3082) Slack(120) FuelSlack(0,
      0) Distance(43573) -> 26 Fuel(12397) Time(3265,3265
      ) Slack(120) FuelSlack(0,0) Distance(45676) -> 6
      Fuel(25) Time(3447,3447) Slack(925) FuelSlack(27443
      ,27493) Distance(47738) -> 23 Fuel(260257) Time(
      4932,4932) Slack(120) FuelSlack(0,0) Distance(66236
      ) -> 16 Fuel(25) Time(6366,6366) Slack(925)
      FuelSlack(178884,178934) Distance(109608) -> 19
      Fuel(108816) Time(8891,8891) Slack(120) FuelSlack(0
      ,0) Distance(162414) -> 20 Fuel(93450) Time(9088,
      9088) Slack(120) FuelSlack(0,0) Distance(164975
      ) -> 21 Fuel(77778) Time(9287,9287) Slack(120)
      FuelSlack(0,0) Distance(167587) -> 22 Fuel(62412)
```

```
5322 Time(9484,9484) Slack(120) FuelSlack(0,0) Distance(
    170148) -> 12 Fuel(25) Time(9919,9919) Slack(925)
    FuelSlack(0,117229) Distance(180546) -> 24 Fuel(
    287700) Time(11000,11000) Slack(120) FuelSlack(0,0
    ) Distance(185720) -> 18 Fuel(117204) Time(11981,
    11981) Distance(214136)
5323 Distance of the route: 214136 ft
5324 Remaining Fuel of the route: 117204
5325 Total Time of the route: 11981 seconds
5326
5327 Total Distance of all routes: 214136 ft
5328 Total Fuel remaining of all routes: 117204
5329 Total Time of all routes: 11981 seconds
5330 2
5331 Start point is: 2
5332 16
5333 16
5334 (5.04, 4.76) (7.68, 3.53)
5335 15 15
5336 The travel time for UGV from depot B to NW UGV stop
    is: 2956
5337 The UGV travel time between two UGV stops is: 4164
5338 21124210.5
5339 End node is [24]
5340 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
5341 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35]
5342 Objective: 11000000
5343 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35
5344 36
5345 Route for vehicle 0:
5346 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
5347 Distance of the route: 0 ft
5348 Remaining Fuel of the route: 287700
5349 Total Time of the route: 0 seconds
5350
5351 Total Distance of all routes: 0 ft
```

```
5352 Total Fuel remaining of all routes: 287700
5353 Total Time of all routes: 0 seconds
5354 4
5355 Start point is: 4
5356 31
5357 16
5358 (5.28, 5.71) (7.68, 3.53)
5359 14 14
5360 The travel time for UGV from depot B to NW UGV stop
    is: 924
5361 The UGV travel time between two UGV stops is: 4765
5362 11008426.5
5363 End node is [24]
5364 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
5365 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43]
5366 Objective: 19000000
5367 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42 43
5368 44
5369 Route for vehicle 0:
5370 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
5371 Distance of the route: 0 ft
5372 Remaining Fuel of the route: 287700
5373 Total Time of the route: 0 seconds
5374
5375 Total Distance of all routes: 0 ft
5376 Total Fuel remaining of all routes: 287700
5377 Total Time of all routes: 0 seconds
5378 3
5379 Start point is: 3
5380 16
5381 16
5382 (5.16, 5.24) (8.29, 4.03)
5383 15 15
5384 The travel time for UGV from depot B to NW UGV stop
    is: 3261
```

```
5385 The UGV travel time between two UGV stops is: 4618
5386 ****
5387 ***  
5387 UGV route goes infeasible although UAV has a
      solution
5388 ****
5389 ***
5389 47149318.5
5390 End node is [18]
5391 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
5392 [25, 26]
5393 Objective: 6534
5394 Dropped nodes: 3 4 5 6 7 8 9 10 12 13 14 15 16
5395 27
5396 27
5397 27
5398 27
5399 27
5400 27
5401 27
5402 27
5403 27
5404 27
5405 27
5406 27
5407 27
5408 Route for vehicle 0:
5409 0 Fuel(287700) Time(1552,1552) Slack(60) FuelSlack(
      0,0) Distance(0) -> 21 Fuel(70488) Time(2709,2709)
      Slack(120) FuelSlack(0,0) Distance(36202) -> 22
      Fuel(55122) Time(2906,2906) Slack(120) FuelSlack(0,
      0) Distance(38763) -> 2 Fuel(8406) Time(3261,3261)
      Slack(898) FuelSlack(228769,280740) Distance(46549
      ) -> 24 Fuel(58931) Time(4236,4263) Slack(0)
      FuelSlack(0,0) Distance(49110) -> 1 Fuel(43565)
      Time(4320,4460) Slack(785) FuelSlack(0,71033)
      Distance(51671) -> 23 Fuel(287700) Time(5401,5541)
      Slack(0) FuelSlack(0,0) Distance(56845) -> 17 Fuel(
      27468) Time(6835,6975) Slack(836) FuelSlack(67917,
      126510) Distance(100217) -> 20 Fuel(219783) Time(
```

```
5409 9288,9428) Slack(0) FuelSlack(0,0) Distance(150652
) -> 19 Fuel(204417) Time(9485,9625) Slack(0)
FuelSlack(0,0) Distance(153213) -> 26 Fuel(56559)
Time(10351,10491) Slack(0) FuelSlack(0,0) Distance(
177856) -> 11 Fuel(31125) Time(10599,10699) Slack(
825) FuelSlack(12816,43941) Distance(182095) -> 25
Fuel(274884) Time(11588,11688) Slack(20) FuelSlack(
0,0) Distance(184231) -> 18 Fuel(85128) Time(12666,
12666) Distance(215857)
5410 Distance of the route: 215857 ft
5411 Remaining Fuel of the route: 85128
5412 Total Time of the route: 12666 seconds
5413
5414 Total Distance of all routes: 215857 ft
5415 Total Fuel remaining of all routes: 85128
5416 Total Time of all routes: 12666 seconds
5417 3
5418 Start point is: 3
5419 16
5420 16
5421 (4.92, 4.29) (7.06, 3.02)
5422 14 14
5423 The travel time for UGV from depot B to NW UGV stop
is: 3015
5424 The UGV travel time between two UGV stops is: 3909
5425 ****
***
```

5426 UGV route goes infeasible although UAV has a solution

```
5427 ****
***
```

5428 40084467.0

5429 End node is [18]

5430 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
15, 16, 17]

5431 [25, 26, 27, 28, 29, 30, 31, 32]

5432 Objective: 6025

5433 Dropped nodes: 2 3 4 5 6 7 8 9 10 12 13 14 15 16

5434 33

5435 33

5436 33

```
5437 33
5438 33
5439 33
5440 33
5441 33
5442 33
5443 33
5444 33
5445 33
5446 33
5447 33
5448 33
5449 33
5450 33
5451 33
5452 Route for vehicle 0:
5453 0 Fuel(287700) Time(1537,1537) Slack(0) FuelSlack(0,0) Distance(0) -> 27 Fuel(148566) Time(2239,2299) Slack(0) FuelSlack(0,0) Distance(23189) -> 24 Fuel(46788) Time(2753,2933) Slack(0) FuelSlack(0,0) Distance(40152) -> 25 Fuel(31422) Time(2830,3039) Slack(0) FuelSlack(0,0) Distance(42713) -> 1 Fuel(378) Time(3015,3195) Slack(923) FuelSlack(15366,15744) Distance(47887) -> 26 Fuel(272334) Time(4015,4197) Slack(0) FuelSlack(0,0) Distance(50448) -> 17 Fuel(52716) Time(5124,5345) Slack(755) FuelSlack(52716,54624) Distance(87051) -> 23 Fuel(287700) Time(7193,7414) Slack(0) FuelSlack(0,0) Distance(130423) -> 22 Fuel(272028) Time(7272,7493) Slack(0) FuelSlack(0,0) Distance(133035) -> 21 Fuel(256662) Time(7349,7570) Slack(0) FuelSlack(0,0) Distance(135596) -> 20 Fuel(240990) Time(7428,7649) Slack(0) FuelSlack(0,0) Distance(138208) -> 19 Fuel(225624) Time(7505,7726) Slack(0) FuelSlack(0,0) Distance(140769) -> 32 Fuel(77766) Time(8251,8472) Slack(0) FuelSlack(0,0) Distance(165412) -> 31 Fuel(65148) Time(8314,8535) Slack(0) FuelSlack(0,0) Distance(167515) -> 30 Fuel(52332) Time(8378,8599) Slack(0) FuelSlack(0,0) Distance(169651) -> 29 Fuel(39714) Time(8441,8662) Slack(0) FuelSlack(0,0) Distance(171754) -> 28 Fuel(27342) Time(8597,8724) Slack(0)
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```
5453 FuelSlack(0,0) Distance(173816) -> 11 Fuel(1908)
    Time(8845,8852) Slack(918) FuelSlack(0,287700)
    Distance(178055) -> 18 Fuel(287700) Time(10408,
    10408) Distance(199141)
5454 Distance of the route: 199141 ft
5455 Remaining Fuel of the route: 287700
5456 Total Time of the route: 10408 seconds
5457
5458 Total Distance of all routes: 199141 ft
5459 Total Fuel remaining of all routes: 287700
5460 Total Time of all routes: 10408 seconds
5461 5
5462 Start point is: 5
5463 16
5464 31
5465 (5.16, 5.24) (7.37, 3.27)
5466 15 15
5467 The travel time for UGV from depot B to NW UGV stop
    is: 3974
5468 The UGV travel time between two UGV stops is: 4196
5469 18172794.0
5470 End node is [24]
5471 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
5472 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44, 45]
5473 Objective: 5447
5474 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 13 14 15 16 17
    18 19 20 21 22
5475 46
5476 46
5477 46
5478 46
5479 46
5480 46
5481 46
5482 46
5483 46
5484 46
5485 46
5486 46
```

```
5487 46
5488 46
5489 46
5490 46
5491 46
5492 46
5493 46
5494 46
5495 46
5496 46
5497 46
5498 46
5499 46
5500 Route for vehicle 0:
5501 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 30 Fuel(166878) Time(610,670) Slack(0)
    FuelSlack(0,0) Distance(20137) -> 6 Fuel(46056)
    Time(1235,1400) Slack(776) FuelSlack(147858,193914)
    ) Distance(40274) -> 25 Fuel(139842) Time(2906,3071
    ) Slack(0) FuelSlack(0,0) Distance(64917) -> 26
    Fuel(124476) Time(3103,3268) Slack(0) FuelSlack(0,0
    ) Distance(67478) -> 27 Fuel(108804) Time(3302,3467
    ) Slack(0) FuelSlack(0,0) Distance(70090) -> 28
    Fuel(93438) Time(3499,3664) Slack(0) FuelSlack(0,0
    ) Distance(72651) -> 29 Fuel(77766) Time(3698,3818
    ) Slack(0) FuelSlack(0,0) Distance(75263) -> 12
    Fuel(46722) Time(3974,3974) Slack(774) FuelSlack(
    201852,201852) Distance(80437) -> 45 Fuel(132570)
    Time(5531,5531) Slack(0) FuelSlack(0,0) Distance(
    106292) -> 44 Fuel(124278) Time(5572,5572) Slack(0
    ) FuelSlack(0,0) Distance(107674) -> 43 Fuel(115632
    ) Time(5615,5615) Slack(0) FuelSlack(0,0) Distance(
    109115) -> 42 Fuel(107340) Time(5656,5656) Slack(0
    ) FuelSlack(0,0) Distance(110497) -> 41 Fuel(98736
    ) Time(5699,5699) Slack(0) FuelSlack(0,0) Distance(
    111931) -> 40 Fuel(90444) Time(5740,5740) Slack(0)
    FuelSlack(0,0) Distance(113313) -> 39 Fuel(81798)
    Time(5783,5783) Slack(0) FuelSlack(0,0) Distance(
    114754) -> 38 Fuel(73506) Time(5824,5824) Slack(0)
    FuelSlack(0,0) Distance(116136) -> 37 Fuel(64902)
    Time(5867,5867) Slack(0) FuelSlack(0,0) Distance(
```

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5501 117570) -> 36 Fuel(56610) Time(5908,5908) Slack(0)
  FuelSlack(0,0) Distance(118952) -> 35 Fuel(47964)
  Time(5951,5951) Slack(0) FuelSlack(0,0) Distance(
  120393) -> 34 Fuel(39672) Time(5992,5992) Slack(0)
  FuelSlack(0,0) Distance(121775) -> 33 Fuel(31068)
  Time(6035,6035) Slack(0) FuelSlack(0,0) Distance(
  123209) -> 32 Fuel(22776) Time(6076,6076) Slack(0)
  FuelSlack(0,0) Distance(124591) -> 31 Fuel(14442)
  Time(6118,6118) Slack(0) FuelSlack(0,0) Distance(
  125980) -> 23 Fuel(5838) Time(6161,6161) Slack(906
) FuelSlack(5838,287700) Distance(127414) -> 24
  Fuel(287700) Time(8667,8667) Distance(180214)
5502 Distance of the route: 180214 ft
5503 Remaining Fuel of the route: 287700
5504 Total Time of the route: 8667 seconds
5505
5506 Total Distance of all routes: 180214 ft
5507 Total Fuel remaining of all routes: 287700
5508 Total Time of all routes: 8667 seconds
5509 3
5510 Start point is: 3
5511 16
5512 16
5513 (4.92, 4.29) (7.06, 3.02)
5514 14 15
5515 The travel time for UGV from depot B to NW UGV stop
  is: 3015
5516 The UGV travel time between two UGV stops is: 3710
5517 ****
  ***
5518 UGV route goes infeasible although UAV has a
  solution
5519 ****
  ***
5520 40285518.0
5521 End node is [18]
5522 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
  15, 16, 17]
5523 [25, 26, 27, 28, 29, 30, 31, 32]
5524 Objective: 6255
5525 Dropped nodes: 1 2 3 4 7 8 9 10 11 13 14 15 16

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5526 33
5527 33
5528 33
5529 33
5530 33
5531 33
5532 33
5533 33
5534 33
5535 33
5536 33
5537 33
5538 33
5539 33
5540 33
5541 33
5542 33
5543 33
5544 33
5545 Route for vehicle 0:
5546 0 Fuel(287700) Time(1537,1537) Slack(14) FuelSlack(
    0,0) Distance(0) -> 27 Fuel(148566) Time(2253,2299
    ) Slack(74) FuelSlack(0,0) Distance(23189) -> 28
    Fuel(135750) Time(2437,2483) Slack(74) FuelSlack(0,
    0) Distance(25325) -> 6 Fuel(45060) Time(3015,3024
    ) Slack(780) FuelSlack(57377,60426) Distance(40440
    ) -> 26 Fuel(272334) Time(3872,3881) Slack(0)
    FuelSlack(0,0) Distance(43001) -> 5 Fuel(256968)
    Time(3949,3958) Slack(98) FuelSlack(256968,259909)
    Distance(45562) -> 24 Fuel(287700) Time(4281,4290)
    Slack(0) FuelSlack(0,0) Distance(53297) -> 25 Fuel(
    272334) Time(4358,4367) Slack(0) FuelSlack(0,0)
    Distance(55858) -> 17 Fuel(39354) Time(5534,5543)
    Slack(798) FuelSlack(36413,41262) Distance(94688
    ) -> 23 Fuel(287700) Time(7646,7655) Slack(0)
    FuelSlack(0,0) Distance(138060) -> 22 Fuel(272028)
    Time(7725,7734) Slack(0) FuelSlack(0,0) Distance(
    140672) -> 21 Fuel(256662) Time(7802,7811) Slack(0
    ) FuelSlack(0,0) Distance(143233) -> 20 Fuel(240990
    ) Time(7881,7890) Slack(0) FuelSlack(0,0) Distance(
    145845) -> 19 Fuel(225624) Time(7958,7967) Slack(0
```

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5546 ) FuelSlack(0,0) Distance(148406) -> 32 Fuel(77766
      ) Time(8704,8713) Slack(0) FuelSlack(0,0) Distance(
      173049) -> 31 Fuel(65148) Time(8767,8776) Slack(0)
      FuelSlack(0,0) Distance(175152) -> 30 Fuel(52332)
      Time(8831,8840) Slack(0) FuelSlack(0,0) Distance(
      177288) -> 29 Fuel(39714) Time(8894,8903) Slack(0)
      FuelSlack(0,0) Distance(179391) -> 12 Fuel(1908)
      Time(9086,9093) Slack(918) FuelSlack(0,287700)
      Distance(185692) -> 18 Fuel(287700) Time(10649,
      10649) Distance(206778)
5547 Distance of the route: 206778 ft
5548 Remaining Fuel of the route: 287700
5549 Total Time of the route: 10649 seconds
5550
5551 Total Distance of all routes: 206778 ft
5552 Total Fuel remaining of all routes: 287700
5553 Total Time of all routes: 10649 seconds
5554 5
5555 Start point is: 5
5556 16
5557 31
5558 (5.52, 6.66) (8.91, 4.54)
5559 15 15
5560 The travel time for UGV from depot B to NW UGV stop
      is: 4488
5561 The UGV travel time between two UGV stops is: 5414
5562 20354328.0
5563 End node is [24]
5564 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
5565 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39]
5566 Objective: 15000000
5567 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
      16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
      34 35 36 37 38 39
5568 40
5569 Route for vehicle 0:
5570 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
      Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
      )

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5571 Distance of the route: 0 ft
5572 Remaining Fuel of the route: 287700
5573 Total Time of the route: 0 seconds
5574
5575 Total Distance of all routes: 0 ft
5576 Total Fuel remaining of all routes: 287700
5577 Total Time of all routes: 0 seconds
5578 4
5579 Start point is: 4
5580 31
5581 16
5582 (7.37, 3.27) (5.04, 4.76)
5583 15 14
5584 The travel time for UGV from depot B to NW UGV stop
    is: 4304
5585 The UGV travel time between two UGV stops is: 4241
5586 17035894.5
5587 End node is [24]
5588 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
5589 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44]
5590 Objective: 20000000
5591 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42 43 44
5592 45
5593 Route for vehicle 0:
5594 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
5595 Distance of the route: 0 ft
5596 Remaining Fuel of the route: 287700
5597 Total Time of the route: 0 seconds
5598
5599 Total Distance of all routes: 0 ft
5600 Total Fuel remaining of all routes: 287700
5601 Total Time of all routes: 0 seconds
5602 3
5603 Start point is: 3
5604 16
```

```
5605 16
5606 (7.37, 3.27) (5.76, 7.62)
5607 14 14
5608 The travel time for UGV from depot B to NW UGV stop
      is: 3192
5609 The UGV travel time between two UGV stops is: 5353
5610 ****
      ***
5611 UGV route goes infeasible although UAV has a
      solution
5612 ****
      ***
5613 52540182.0
5614 End node is [18]
5615 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
5616 []
5617 Objective: 7908
5618 Dropped nodes: 1 2 3 4 5 7 8 9 10 13 14 15
5619 25
5620 25
5621 25
5622 25
5623 25
5624 25
5625 25
5626 25
5627 25
5628 25
5629 25
5630 25
5631 Route for vehicle 0:
5632 0 Fuel(274969) Time(1552,1552) Slack(60) FuelSlack(
      0,0) Distance(0) -> 22 Fuel(98029) Time(2505,2505)
      Slack(120) FuelSlack(0,0) Distance(29490) -> 24
      Fuel(72595) Time(2753,2753) Slack(120) FuelSlack(0,
      0) Distance(33729) -> 6 Fuel(9355) Time(3192,3192)
      Slack(895) FuelSlack(10571,29281) Distance(44269
      ) -> 20 Fuel(277129) Time(4151,4181) Slack(90)
      FuelSlack(0,0) Distance(46405) -> 17 Fuel(9355)
      Time(5623,5653) Slack(895) FuelSlack(0,158407)
```

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5632 Distance(91034) -> 23 Fuel(287700) Time(8085,8115)
    Slack(90) FuelSlack(0,0) Distance(141778) -> 12
    Fuel(149052) Time(8905,8935) Slack(445) FuelSlack(
    101881,287700) Distance(164886) -> 19 Fuel(185819)
    Time(9427,9937) Slack(0) FuelSlack(0,0) Distance(
    167447) -> 11 Fuel(170453) Time(9586,10134) Slack(
    377) FuelSlack(0,178421) Distance(170008) -> 21
    Fuel(287700) Time(11220,11366) Slack(0) FuelSlack(0
    ,0) Distance(193428) -> 16 Fuel(7968) Time(12752,
    12778) Slack(899) FuelSlack(0,287700) Distance(
    240050) -> 18 Fuel(287700) Time(14317,14317)
    Distance(261171)

5633 Distance of the route: 261171 ft
5634 Remaining Fuel of the route: 287700
5635 Total Time of the route: 14317 seconds
5636
5637 Total Distance of all routes: 261171 ft
5638 Total Fuel remaining of all routes: 287700
5639 Total Time of all routes: 14317 seconds
5640 3
5641 Start point is: 3
5642 16
5643 16
5644 (5.88, 8.09) (8.29, 4.03)
5645 14 15
5646 The travel time for UGV from depot B to NW UGV stop
    is: 4493
5647 The UGV travel time between two UGV stops is: 5653
5648 ****
      ***
5649 UGV route goes infeasible although UAV has a
    solution
5650 ****
      ***
5651 51763675.5
5652 End node is [18]
5653 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
5654 []
5655 ****No solution found*****
5656 3

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```
5657 Start point is: 3
5658 16
5659 16
5660 (5.16, 5.24) (7.06, 3.02)
5661 15 14
5662 The travel time for UGV from depot B to NW UGV stop
      is: 3261
5663 The UGV travel time between two UGV stops is: 4278
5664 ****
      ***
5665 UGV route goes infeasible although UAV has a
      solution
5666 ****
      ***
5667 52153362.0
5668 End node is [18]
5669 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
5670 [25, 26, 27, 28, 29, 30]
5671 Objective: 7267
5672 Dropped nodes: 4 5 6 7 8 9 11 12 13 15 16 17
5673 31
5674 31
5675 31
5676 31
5677 31
5678 31
5679 31
5680 31
5681 31
5682 31
5683 31
5684 31
5685 31
5686 31
5687 31
5688 31
5689 31
5690 31
5691 Route for vehicle 0:
5692 0 Fuel(283273) Time(1591,1591) Slack(60) FuelSlack(
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5692 0,0) Distance(0) -> 25 Fuel(144139) Time(2353,2353
) Slack(120) FuelSlack(0,0) Distance(23189) -> 28
Fuel(106333) Time(2663,2663) Slack(120) FuelSlack(0
,0) Distance(29490) -> 1 Fuel(25) Time(3319,3319)
Slack(925) FuelSlack(272309,272359) Distance(47208
) -> 24 Fuel(15391) Time(4321,4321) Slack(120)
FuelSlack(0,0) Distance(49769) -> 3 Fuel(25) Time(
4518,4518) Slack(925) FuelSlack(256631,256681)
Distance(52330) -> 23 Fuel(31069) Time(5599,5599)
Slack(120) FuelSlack(0,0) Distance(57504) -> 2 Fuel
(25) Time(5875,5875) Slack(925) FuelSlack(13391,
13441) Distance(62678) -> 22 Fuel(274309) Time(7035
,7035) Slack(120) FuelSlack(0,0) Distance(70464
) -> 14 Fuel(25) Time(8540,8540) Slack(925)
FuelSlack(37991,38041) Distance(116178) -> 19 Fuel(
249709) Time(11065,11065) Slack(120) FuelSlack(0,0
) Distance(168984) -> 20 Fuel(234343) Time(11262,
11262) Slack(120) FuelSlack(0,0) Distance(171545
) -> 21 Fuel(218671) Time(11461,11461) Slack(120)
FuelSlack(0,0) Distance(174157) -> 29 Fuel(88495)
Time(12238,12238) Slack(120) FuelSlack(0,0)
Distance(195853) -> 30 Fuel(75877) Time(12421,12421
) Slack(120) FuelSlack(0,0) Distance(197956) -> 27
Fuel(37831) Time(12733,12733) Slack(120) FuelSlack(
0,0) Distance(204297) -> 10 Fuel(25) Time(13043,
13043) Slack(925) FuelSlack(25434,25459) Distance(
210598) -> 26 Fuel(262266) Time(14096,14096) Slack(
120) FuelSlack(0,0) Distance(214837) -> 18 Fuel(
110316) Time(14983,14983) Distance(240162)

5693 Distance of the route: 240162 ft
5694 Remaining Fuel of the route: 110316
5695 Total Time of the route: 14983 seconds
5696
5697 Total Distance of all routes: 240162 ft
5698 Total Fuel remaining of all routes: 110316
5699 Total Time of all routes: 14983 seconds
5700 4
5701 Start point is: 4
5702 31
5703 16
5704 (5.16, 5.24) (7.68, 3.53)

```

```
5705 15 15
5706 The travel time for UGV from depot B to NW UGV stop
      is: 1034
5707 The UGV travel time between two UGV stops is: 4340
5708 10382544.0
5709 End node is [24]
5710 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
5711 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39, 40, 41, 42, 43]
5712 Objective: 19000000
5713 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
      16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
      34 35 36 37 38 39 40 41 42 43
5714 44
5715 Route for vehicle 0:
5716 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
      Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
      )
5717 Distance of the route: 0 ft
5718 Remaining Fuel of the route: 287700
5719 Total Time of the route: 0 seconds
5720
5721 Total Distance of all routes: 0 ft
5722 Total Fuel remaining of all routes: 287700
5723 Total Time of all routes: 0 seconds
5724 2
5725 Start point is: 2
5726 16
5727 16
5728 (8.6, 4.29) (5.28, 5.71)
5729 15 14
5730 The travel time for UGV from depot B to NW UGV stop
      is: 3516
5731 The UGV travel time between two UGV stops is: 5214
5732 ****
      ***
5733 UGV route goes infeasible although UAV has a
      solution
5734 ****
      ***
```

```
5735 25588435.5
5736 End node is [24]
5737 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
5738 [25, 26, 27, 28, 29, 30]
5739 Objective: 6000000
5740 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
      16 17 18 19 20 21 22 23 25 26 27 28 29 30
5741 31
5742 Route for vehicle 0:
5743 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
      Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
      )
5744 Distance of the route: 0 ft
5745 Remaining Fuel of the route: 287700
5746 Total Time of the route: 0 seconds
5747
5748 Total Distance of all routes: 0 ft
5749 Total Fuel remaining of all routes: 287700
5750 Total Time of all routes: 0 seconds
5751 2
5752 Start point is: 2
5753 16
5754 16
5755 (5.88, 8.09) (7.98, 3.78)
5756 14 14
5757 The travel time for UGV from depot B to NW UGV stop
      is: 4465
5758 The UGV travel time between two UGV stops is: 5840
5759 ****
      ***
5760 UGV route goes infeasible although UAV has a
      solution
5761 ****
      ***
5762 29307882.0
5763 End node is [24]
5764 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
5765 [25, 26, 27]
5766 Objective: 3000000
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5767 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15  
      16 17 18 19 20 21 22 23 25 26 27  
5768 28  
5769 Route for vehicle 0:  
5770 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)  
      Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0  
      )  
5771 Distance of the route: 0 ft  
5772 Remaining Fuel of the route: 287700  
5773 Total Time of the route: 0 seconds  
5774  
5775 Total Distance of all routes: 0 ft  
5776 Total Fuel remaining of all routes: 287700  
5777 Total Time of all routes: 0 seconds  
5778 3  
5779 Start point is: 3  
5780 16  
5781 16  
5782 (4.8, 3.81) (8.6, 4.29)  
5783 15 15  
5784 The travel time for UGV from depot B to NW UGV stop  
      is: 2740  
5785 The UGV travel time between two UGV stops is: 4238  
5786 *****  
      ***  
5787 UGV route goes infeasible although UAV has a  
      solution  
5788 *****  
      ***  
5789 40860633.0  
5790 End node is [18]  
5791 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,  
      15, 16, 17]  
5792 []  
5793 *****No solution found*****  
5794 2  
5795 Start point is: 2  
5796 16  
5797 16  
5798 (8.29, 4.03) (5.28, 5.71)  
5799 15 15
```

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5800 The travel time for UGV from depot B to NW UGV stop  
      is: 3375  
5801 The UGV travel time between two UGV stops is: 4787  
5802 23884723.5  
5803 End node is [24]  
5804 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,  
      15, 16, 17, 18, 19, 20, 21, 22, 23]  
5805 [25, 26, 27, 28, 29, 30, 31]  
5806 Objective: 7000000  
5807 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15  
      16 17 18 19 20 21 22 23 25 26 27 28 29 30 31  
5808 32  
5809 Route for vehicle 0:  
5810 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)  
      Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0  
      )  
5811 Distance of the route: 0 ft  
5812 Remaining Fuel of the route: 287700  
5813 Total Time of the route: 0 seconds  
5814  
5815 Total Distance of all routes: 0 ft  
5816 Total Fuel remaining of all routes: 287700  
5817 Total Time of all routes: 0 seconds  
5818 4  
5819 Start point is: 4  
5820 31  
5821 16  
5822 (4.92, 4.29) (8.91, 4.54)  
5823 14 15  
5824 The travel time for UGV from depot B to NW UGV stop  
      is: 1478  
5825 The UGV travel time between two UGV stops is: 4555  
5826 11578558.5  
5827 End node is [24]  
5828 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,  
      15, 16, 17, 18, 19, 20, 21, 22, 23]  
5829 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37  
      , 38, 39]  
5830 Objective: 15000000  
5831 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15  
      16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
```

```
5831 34 35 36 37 38 39
5832 40
5833 Route for vehicle 0:
5834 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
)
5835 Distance of the route: 0 ft
5836 Remaining Fuel of the route: 287700
5837 Total Time of the route: 0 seconds
5838
5839 Total Distance of all routes: 0 ft
5840 Total Fuel remaining of all routes: 287700
5841 Total Time of all routes: 0 seconds
5842 4
5843 Start point is: 4
5844 31
5845 16
5846 (7.37, 3.27) (5.64, 7.14)
5847 14 15
5848 The travel time for UGV from depot B to NW UGV stop
    is: 4612
5849 The UGV travel time between two UGV stops is: 4886
5850 19459266.0
5851 End node is [24]
5852 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
5853 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44]
5854 Objective: 20000000
5855 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42 43 44
5856 45
5857 Route for vehicle 0:
5858 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0)
)
5859 Distance of the route: 0 ft
5860 Remaining Fuel of the route: 287700
5861 Total Time of the route: 0 seconds
5862
```

```
5863 Total Distance of all routes: 0 ft
5864 Total Fuel remaining of all routes: 287700
5865 Total Time of all routes: 0 seconds
5866 3
5867 Start point is: 3
5868 16
5869 16
5870 (5.28, 5.71) (8.29, 4.03)
5871 15 15
5872 The travel time for UGV from depot B to NW UGV stop
    is: 3430
5873 The UGV travel time between two UGV stops is: 4787
5874 ****
***  
5875 UGV route goes infeasible although UAV has a
    solution
5876 ****
***  
5877 52125316.5
5878 End node is [18]
5879 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17]
5880 [25]
5881 *****No solution found*****
5882 3
5883 Start point is: 3
5884 16
5885 16
5886 (8.91, 4.54) (5.04, 4.76)
5887 14 15
5888 The travel time for UGV from depot B to NW UGV stop
    is: 3946
5889 The UGV travel time between two UGV stops is: 4724
5890 ****
***  
5891 UGV route goes infeasible although UAV has a
    solution
5892 ****
***  
5893 53135955.0
5894 End node is [18]
```

```
5895 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
5896 [25]
5897 *****No solution found*****
5898 3
5899 Start point is: 3
5900 16
5901 16
5902 (5.64, 7.14) (8.91, 4.54)
5903 14 14
5904 The travel time for UGV from depot B to NW UGV stop
      is: 4124
5905 The UGV travel time between two UGV stops is: 5923
5906 ****
***  
5907 UGV route goes infeasible although UAV has a
      solution
5908 ****
***  
5909 57956527.5
5910 End node is [18]
5911 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
5912 []
5913 *****No solution found*****
5914 3
5915 Start point is: 3
5916 16
5917 16
5918 (5.16, 5.24) (8.91, 4.54)
5919 14 14
5920 The travel time for UGV from depot B to NW UGV stop
      is: 3385
5921 The UGV travel time between two UGV stops is: 5183
5922 ****
***  
5923 UGV route goes infeasible although UAV has a
      solution
5924 ****
***  
5925 50823358.5
```

```
5926 End node is [18]
5927 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17]
5928 []
5929 *****No solution found*****
5930 5
5931 Start point is: 5
5932 16
5933 31
5934 (8.91, 4.54) (5.64, 7.14)
5935 14 14
5936 The travel time for UGV from depot B to NW UGV stop
      is: 0
5937 The UGV travel time between two UGV stops is: 5923
5938 22657707.0
5939 End node is [24]
5940 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
5941 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39, 40, 41]
5942 Objective: 16001408
5943 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 12 13 14 15 16
      17 18 19 20 21 22 23 25 27 28 29 30 31 32 33 34 35
      36 37 38 39 40 41
5944 42
5945 42
5946 42
5947 Route for vehicle 0:
5948 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
      Distance(0) -> 26 Fuel(148134) Time(704,704) Slack(
      0) FuelSlack(0,0) Distance(23261) -> 6 Fuel(8568)
      Time(1408,1408) Slack(897) FuelSlack(8423,287700)
      Distance(46522) -> 24 Fuel(287700) Time(2305,2305)
      Distance(46522)
5949 Distance of the route: 46522 ft
5950 Remaining Fuel of the route: 287700
5951 Total Time of the route: 2305 seconds
5952
5953 Total Distance of all routes: 46522 ft
5954 Total Fuel remaining of all routes: 287700
5955 Total Time of all routes: 2305 seconds
```

```
5956 2
5957 Start point is: 2
5958 16
5959 16
5960 (7.68, 3.53) (5.88, 8.09)
5961 14 14
5962 The travel time for UGV from depot B to NW UGV stop
    is: 3318
5963 The UGV travel time between two UGV stops is: 5693
5964 ****
***  
5965 UGV route goes infeasible although UAV has a
    solution
5966 ****
***  
5967 28678309.5
5968 End node is [24]
5969 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
5970 [25, 26, 27, 28]
5971 Objective: 4000000
5972 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28
5973 29
5974 Route for vehicle 0:
5975 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
5976 Distance of the route: 0 ft
5977 Remaining Fuel of the route: 287700
5978 Total Time of the route: 0 seconds
5979
5980 Total Distance of all routes: 0 ft
5981 Total Fuel remaining of all routes: 287700
5982 Total Time of all routes: 0 seconds
5983 5
5984 Start point is: 5
5985 16
5986 31
5987 (8.91, 4.54) (4.8, 3.81)
5988 15 14
```

```
5989 The travel time for UGV from depot B to NW UGV stop  
      is: 0  
5990 The UGV travel time between two UGV stops is: 4625  
5991 8651134.5  
5992 End node is [24]  
5993 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,  
      15, 16, 17, 18, 19, 20, 21, 22, 23]  
5994 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37  
      , 38, 39]  
5995 Objective: 15000000  
5996 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15  
      16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33  
      34 35 36 37 38 39  
5997 40  
5998 Route for vehicle 0:  
5999 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)  
      Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0  
      )  
6000 Distance of the route: 0 ft  
6001 Remaining Fuel of the route: 287700  
6002 Total Time of the route: 0 seconds  
6003  
6004 Total Distance of all routes: 0 ft  
6005 Total Fuel remaining of all routes: 287700  
6006 Total Time of all routes: 0 seconds  
6007 5  
6008 Start point is: 5  
6009 16  
6010 31  
6011 (5.4, 6.19) (7.37, 3.27)  
6012 14 14  
6013 The travel time for UGV from depot B to NW UGV stop  
      is: 4627  
6014 The UGV travel time between two UGV stops is: 4799  
6015 21234237.0  
6016 End node is [24]  
6017 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,  
      15, 16, 17, 18, 19, 20, 21, 22, 23]  
6018 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37  
      , 38, 39, 40, 41, 42, 43]  
6019 Objective: 15004294
```

```

6020 Dropped nodes: 1 2 3 4 7 8 9 10 11 13 14 15 16 17
      18 19 20 21 22 23 29 30 31 32 33 34 35 36 37 38 39
      40 41 42 43
6021 44
6022 44
6023 44
6024 44
6025 44
6026 44
6027 44
6028 44
6029 Route for vehicle 0:
6030 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
      Distance(0) -> 28 Fuel(160866) Time(640,640) Slack(
      0) FuelSlack(0,0) Distance(21139) -> 6 Fuel(34032)
      Time(1280,1280) Slack(815) FuelSlack(166273,166380
      ) Distance(42278) -> 27 Fuel(155352) Time(2763,2763
      ) Slack(0) FuelSlack(0,0) Distance(64336) -> 5 Fuel
      (23004) Time(3431,3431) Slack(851) FuelSlack(170862
      ,170862) Distance(86394) -> 25 Fuel(139842) Time(
      5028,5028) Slack(0) FuelSlack(0,0) Distance(111037
      ) -> 26 Fuel(124476) Time(5105,5105) Slack(0)
      FuelSlack(0,0) Distance(113598) -> 12 Fuel(77760)
      Time(5340,5340) Slack(675) FuelSlack(77760,287700)
      Distance(121384) -> 24 Fuel(287700) Time(6635,6635
      ) Distance(141862)
6031 Distance of the route: 141862 ft
6032 Remaining Fuel of the route: 287700
6033 Total Time of the route: 6635 seconds
6034
6035 Total Distance of all routes: 141862 ft
6036 Total Fuel remaining of all routes: 287700
6037 Total Time of all routes: 6635 seconds
6038 5
6039 Start point is: 5
6040 16
6041 31
6042 (7.06, 3.02) (5.04, 4.76)
6043 14 15
6044 The travel time for UGV from depot B to NW UGV stop
      is: 901

```

```
6045 The UGV travel time between two UGV stops is: 3879
6046 18157074.0
6047 End node is [24]
6048 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
6049 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39, 40, 41, 42, 43, 44, 45, 46]
6050 Objective: 7480
6051 Dropped nodes: 1 3 4 5 6 8 9 10 11 13 14 15 16 18
      19 20 21 22
6052 47
6053 47
6054 47
6055 47
6056 47
6057 47
6058 47
6059 47
6060 47
6061 47
6062 47
6063 47
6064 47
6065 47
6066 47
6067 47
6068 47
6069 47
6070 47
6071 47
6072 47
6073 47
6074 47
6075 47
6076 47
6077 47
6078 47
6079 47
6080 Route for vehicle 0:
6081 0 Fuel(262068) Time(0,0) Slack(0) FuelSlack(0,0)
      Distance(0) -> 29 Fuel(139201) Time(620,680) Slack(
```

```

6081 37) FuelSlack(0,0) Distance(20478) -> 7 Fuel(25838
) Time(1289,1372) Slack(842) FuelSlack(92568,118406
) Distance(39372) -> 31 Fuel(195132) Time(2681,2764
) Slack(37) FuelSlack(0,0) Distance(54800) -> 12
Fuel(102564) Time(3268,3351) Slack(595) FuelSlack(
204750,204750) Distance(70228) -> 30 Fuel(185514)
Time(4379,4462) Slack(37) FuelSlack(0,0) Distance(
87259) -> 2 Fuel(64692) Time(5109,5192) Slack(717)
FuelSlack(212550,212550) Distance(107396) -> 25
Fuel(139842) Time(6572,6655) Slack(37) FuelSlack(0,
0) Distance(132039) -> 26 Fuel(124476) Time(6769,
6852) Slack(37) FuelSlack(0,0) Distance(134600) ->
27 Fuel(108804) Time(6968,7051) Slack(37) FuelSlack
(0,0) Distance(137212) -> 28 Fuel(93438) Time(7165,
7248) Slack(37) FuelSlack(0,0) Distance(139773) ->
17 Fuel(31051) Time(7600,7600) Slack(825) FuelSlack
(170509,170509) Distance(150171) -> 46 Fuel(148242
) Time(9129,9129) Slack(0) FuelSlack(0,0) Distance(
173414) -> 45 Fuel(139950) Time(9170,9170) Slack(0
) FuelSlack(0,0) Distance(174796) -> 44 Fuel(131304
) Time(9213,9213) Slack(0) FuelSlack(0,0) Distance(
176237) -> 43 Fuel(123012) Time(9254,9254) Slack(0
) FuelSlack(0,0) Distance(177619) -> 42 Fuel(114408
) Time(9297,9297) Slack(0) FuelSlack(0,0) Distance(
179053) -> 41 Fuel(106116) Time(9338,9338) Slack(0
) FuelSlack(0,0) Distance(180435) -> 40 Fuel(97470
) Time(9381,9381) Slack(0) FuelSlack(0,0) Distance(
181876) -> 39 Fuel(89178) Time(9422,9422) Slack(0
) FuelSlack(0,0) Distance(183258) -> 38 Fuel(80574)
Time(9465,9465) Slack(0) FuelSlack(0,0) Distance(
184692) -> 37 Fuel(72282) Time(9506,9506) Slack(0
) FuelSlack(0,0) Distance(186074) -> 36 Fuel(63636)
Time(9549,9549) Slack(0) FuelSlack(0,0) Distance(
187515) -> 35 Fuel(55344) Time(9590,9590) Slack(0
) FuelSlack(0,0) Distance(188897) -> 34 Fuel(46740)
Time(9633,9633) Slack(0) FuelSlack(0,0) Distance(
190331) -> 33 Fuel(38448) Time(9674,9674) Slack(0
) FuelSlack(0,0) Distance(191713) -> 32 Fuel(30114)
Time(9716,9716) Slack(0) FuelSlack(0,0) Distance(
193102) -> 23 Fuel(21510) Time(9759,9759) Slack(855
) FuelSlack(21510,287700) Distance(194536) -> 24

```

```
6081 Fuel(287700) Time(12214,12214) Distance(247336)
6082 Distance of the route: 247336 ft
6083 Remaining Fuel of the route: 287700
6084 Total Time of the route: 12214 seconds
6085
6086 Total Distance of all routes: 247336 ft
6087 Total Fuel remaining of all routes: 287700
6088 Total Time of all routes: 12214 seconds
6089 4
6090 Start point is: 4
6091 31
6092 16
6093 (4.8, 3.81) (7.37, 3.27)
6094 15 14
6095 The travel time for UGV from depot B to NW UGV stop
    is: 1552
6096 The UGV travel time between two UGV stops is: 3871
6097 10479103.5
6098 End node is [24]
6099 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
6100 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41, 42, 43, 44]
6101 Objective: 20000000
6102 Dropped nodes: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    16 17 18 19 20 21 22 23 25 26 27 28 29 30 31 32 33
    34 35 36 37 38 39 40 41 42 43 44
6103 45
6104 Route for vehicle 0:
6105 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 24 Fuel(287700) Time(0,0) Distance(0
    )
6106 Distance of the route: 0 ft
6107 Remaining Fuel of the route: 287700
6108 Total Time of the route: 0 seconds
6109
6110 Total Distance of all routes: 0 ft
6111 Total Fuel remaining of all routes: 287700
6112 Total Time of all routes: 0 seconds
6113 5
6114 Start point is: 5
```

```
6115 16
6116 31
6117 (5.16, 5.24) (7.37, 3.27)
6118 14 14
6119 The travel time for UGV from depot B to NW UGV stop
      is: 4257
6120 The UGV travel time between two UGV stops is: 4429
6121 19366767.0
6122 End node is [24]
6123 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
      15, 16, 17, 18, 19, 20, 21, 22, 23]
6124 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
      , 38, 39, 40, 41, 42, 43, 44, 45]
6125 Objective: 5507
6126 Dropped nodes: 1 3 4 5 6 7 8 9 10 11 13 14 15 16 17
      18 19 21 22 23
6127 46
6128 46
6129 46
6130 46
6131 46
6132 46
6133 46
6134 46
6135 46
6136 46
6137 46
6138 46
6139 46
6140 46
6141 46
6142 46
6143 46
6144 46
6145 46
6146 46
6147 46
6148 46
6149 46
6150 46
6151 46
```

```

6152 Route for vehicle 0:
6153 0 Fuel(253693) Time(58,58) Slack(60) FuelSlack(0,0)
) Distance(0) -> 28 Fuel(126859) Time(758,758)
Slack(120) FuelSlack(0,0) Distance(21139) -> 2 Fuel
(25) Time(1518,1518) Slack(925) FuelSlack(147858,
147883) Distance(42278) -> 25 Fuel(139842) Time(
3189,3189) Slack(120) FuelSlack(0,0) Distance(66921
) -> 26 Fuel(124476) Time(3386,3386) Slack(120)
FuelSlack(0,0) Distance(69482) -> 27 Fuel(108804)
Time(3585,3585) Slack(120) FuelSlack(0,0) Distance(
72094) -> 29 Fuel(77760) Time(3861,3861) Slack(120
) FuelSlack(0,0) Distance(77268) -> 30 Fuel(62088)
Time(4060,4060) Slack(120) FuelSlack(0,0) Distance(
79880) -> 12 Fuel(46722) Time(4257,4257) Slack(774
) FuelSlack(201852,201852) Distance(82441) -> 45
Fuel(132570) Time(5814,5814) Slack(0) FuelSlack(0,0
) Distance(108296) -> 44 Fuel(124278) Time(5855,
5855) Slack(0) FuelSlack(0,0) Distance(109678) ->
43 Fuel(115632) Time(5898,5898) Slack(0) FuelSlack(
0,0) Distance(111119) -> 42 Fuel(107340) Time(5939,
5939) Slack(0) FuelSlack(0,0) Distance(112501) ->
41 Fuel(98736) Time(5982,5982) Slack(0) FuelSlack(0
,0) Distance(113935) -> 40 Fuel(90444) Time(6023,
6023) Slack(0) FuelSlack(0,0) Distance(115317) ->
39 Fuel(81798) Time(6066,6066) Slack(0) FuelSlack(0
,0) Distance(116758) -> 38 Fuel(73506) Time(6107,
6107) Slack(0) FuelSlack(0,0) Distance(118140) ->
37 Fuel(64902) Time(6150,6150) Slack(0) FuelSlack(0
,0) Distance(119574) -> 36 Fuel(56610) Time(6191,
6191) Slack(0) FuelSlack(0,0) Distance(120956) ->
35 Fuel(47964) Time(6234,6234) Slack(0) FuelSlack(0
,0) Distance(122397) -> 34 Fuel(39672) Time(6275,
6275) Slack(0) FuelSlack(0,0) Distance(123779) ->
33 Fuel(31068) Time(6318,6318) Slack(0) FuelSlack(0
,0) Distance(125213) -> 32 Fuel(22776) Time(6359,
6359) Slack(0) FuelSlack(0,0) Distance(126595) ->
31 Fuel(14442) Time(6401,6401) Slack(0) FuelSlack(0
,0) Distance(127984) -> 20 Fuel(5838) Time(6444,
6444) Slack(906) FuelSlack(5838,287700) Distance(
129418) -> 24 Fuel(287700) Time(8950,8950) Distance
(182218)

```

```
6154 Distance of the route: 182218 ft
6155 Remaining Fuel of the route: 287700
6156 Total Time of the route: 8950 seconds
6157
6158 Total Distance of all routes: 182218 ft
6159 Total Fuel remaining of all routes: 287700
6160 Total Time of all routes: 8950 seconds
6161 5
6162 Start point is: 5
6163 16
6164 31
6165 (5.64, 7.14) (7.06, 3.02)
6166 14 15
6167 The travel time for UGV from depot B to NW UGV stop
    is: 4997
6168 The UGV travel time between two UGV stops is: 4745
6169 22044013.5
6170 End node is [24]
6171 [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14,
    15, 16, 17, 18, 19, 20, 21, 22, 23]
6172 [25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37
    , 38, 39, 40, 41]
6173 Objective: 16001408
6174 Dropped nodes: 1 2 3 4 5 7 8 9 10 11 12 13 14 15 16
    17 18 19 20 21 22 23 25 27 28 29 30 31 32 33 34 35
    36 37 38 39 40 41
6175 42
6176 42
6177 42
6178 Route for vehicle 0:
6179 0 Fuel(287700) Time(0,0) Slack(0) FuelSlack(0,0)
    Distance(0) -> 26 Fuel(148134) Time(704,704) Slack(
    0) FuelSlack(0,0) Distance(23261) -> 6 Fuel(8568)
    Time(1408,1408) Slack(897) FuelSlack(8423,287700)
    Distance(46522) -> 24 Fuel(287700) Time(2305,2305)
    Distance(46522)
6180 Distance of the route: 46522 ft
6181 Remaining Fuel of the route: 287700
6182 Total Time of the route: 2305 seconds
6183
6184 Total Distance of all routes: 46522 ft
```

```
6185 Total Fuel remaining of all routes: 287700
6186 Total Time of all routes: 2305 seconds
6187 The best fitness obtained in the current generation
    is: 5446
6188
6189 Process finished with exit code 0
6190
```