Hermis

An $O(n^2)$ algorithm: Let $(x_0,y_0),\ldots,(x_n,y_n)$ be the points where $(x_0,y_0)=(0,0)$ is the starting point. We will compute A[i,j] and B[i,j] where A[i,j] is the cost to align with the i first points and end up at (x_i,y_j) and B[i,j] is the cost to align with the i first points and end up at (x_j,y_i). We have

$A[i+1,j]=\min \{ A[i,j]+d[x_i,x_{\{i+1\}}], B[i,i+1]+d[y_i,y_j] \}$
$B[i+1,j]=\min \{ B[i,j]+d[y_i,y_{\{i+1\}}], A[i,i+1]+d[x_i,x_j] \}$

The final answer is $\min_j \{A[n,j],B[j,n]\}$

Time $O(n^2)$