

Exercise 3 (Rev 1)
NATO Combined Support Facility in Romania



Situation:

You have a partially developed requirement to house NATO forces in a support area of the new base in Deveselu, Romania. This is a very remote area and availability of local contractors is already limited by existing high tempo construction ongoing at the base. This new requirement is expected to put upward pressure on costs and schedules in the area. You are the construction manager for this effort.

What you know:

We expect 4 NATO countries to require housing at this facility in addition to US forces. The 12 founding members of NATO are all possible residents. The US commitment is clear. It is less clear for the other countries as will be detailed later.

USA requirement.

Permanent party estimate is 125 people; and, transients 250-375 at any time. (250 people 8 months of the year, 375 people 4 months of the year.) Will need housing and office space for the permanent party. Transients only require housing. Assume 200 SF (square foot) per person office space. 250 SF per person living space for permanent party. 200 SF per person for transients. Estimated housing construction cost is \$120-\$130 per SF, uniformly distributed.

Currency. US State Department estimates currency risk is +5% to +25% per year with a uniform distribution. (Historical exchange rates have shown a 55% range over past 5 years). No currency risk for year 3.



Office space construction is estimated at \$150-\$175 per SF. Construction time is expected to be one year but due to limited contractor availability there is a very real chance it will take two years, with the probability being higher the higher the cost of the construction.

Due to the remoteness of the area we plan to build a gymnasium primarily for US personnel. Estimated cost is \$200-\$250 per SF including equipment. Nominally this is a 10,000 SF facility, but that may be adjusted depending on what other NATO forces arrive. Only 4 of the other countries are apt to use the gymnasium. (Belgium, UK, Canada and Netherlands) Assume a 10% successive increase in SF for each of these countries if they are part of the final mix.

Potential NATO Requirements by Country (low number is permanent party, high number includes transients):

Country	Permanent Personnel	SF	Transient Personnel	SF	Likelihood of showing
UK	300	200	100	150	80%
France	100	200	125	175	70%
Belgium	150	175	50	150	65%
Greece	100	225	25	200	30%
Turkey	300	125	100	100	50%
Canada	200	200	10	175	90%
Netherlands	100	175	50	125	35%
Iceland	75	250	25	200	20%
Italy	400	200	100	150	80%
Luxemburg	100	175	50	125	60%
Portugal	200	150	50	150	70%

In addition to the SF requirement, certain countries have restrictions on what other countries they will cohabitate with in the same complex. The square footage therefore could be in one complex or spread over multiple complexes. Here is the list of who will share a complex with whom.

Country:	Will room with:
US	Any
UK	Any
France	Only Belgium
Belgium	France or Netherlands
Greece	Turkey or Italy
Turkey	Any
Canada	US
Netherlands	Any
Iceland	US, UK only
Italy	Any
Luxemburg	Any
Portugal	UK and no others

Site Preparation:

There is a site preparation fee estimated at \$1M to \$1.5M (uniformly distributed) for each complex constructed. This fee is not included in the SF calculations given above. As you can see if the final mix is US, UK, Italy, Luxemburg and the Netherlands then you can build one barracks complex. Worst case is US, Portugal, Greece, France and any other country. That mix will require four complexes.



The following is a sample calculation for the US only portion of the complex:

Barracks Permanent Party Low	$125\text{PPL} \times 250\text{SF} \times \$120/\text{SF} = \$3.75 \text{ Million US}$
Barracks Permanent Party High	$125\text{PPL} \times 250\text{SF} \times \$130/\text{SF} = \$4.06 \text{ Million US}$
Barracks Transient Party Low	$250\text{PPL} \times 200\text{SF} \times \$120 = \$6 \text{ Million US}$
Barracks Transient Party High	$375\text{PPL} \times 200\text{SF} \times \$130 = \$9.75 \text{ Million US}$
Complex Site Prep Fee	\$1 to \$1.5 Million US
Office space Low	$125\text{PPL} \times 200\text{SF} \times \$150 = \$3.75 \text{ Million}$
Office space High	$125\text{PPL} \times 200\text{SF} \times \$175 = \$4.375 \text{ Million}$

Gymnasium	$10,000 \times \$200 = \2 Million
Low estimate in US dollars	$3.75 + 6 + 1 + 3.75 + 2 = \16.5 Million
High estimate in US dollars	$4.06 + 9.75 + 1.5 + 4.375 + 2 = \19.68 Million
Currency-based schedule risk	5% (1 year low) to 50% (2 year high)
Low estimate converted	$16.5 \times 1.05 = \$17.325 \text{ million}$
High estimate converted	$19.68 \times 1.5 = \$29.52 \text{ Million}$

These, of course, are only the best case and worst case scenarios. It only covers the US portion of the build and does not address confidence level for any of the final answers. Those answers will be resolved by the student using the *Monte Carlo* simulation tool.

Student Assignment:

Each team will be assigned a group of countries and will be tasked with determining total costs for the solution to a 50%, 80% and 99% confidence level.

Questions for the students:

1. Given your mix of countries, how many barracks complexes will you need? Determine the funding required to meet the total project need at a 50%, 80% and 99% confidence level.
2. Considering the schedule related currency risk, you want to finish the project in 1 year as opposed to 2 years. How much of an early completion incentive would you include in the contract if you set it to 50% of the expected value of the currency risk for year 2 of this project?
3. Using internet resources, estimate the monthly cost to house your military personnel on the local economy should the barracks not be completed on time. Assume that France, Belgium and Canada will not send troops if the on base complex is not completed. If any of those countries are in your mix, delete them from the cost analysis. For your project what would you consider an appropriate Liquidated Damages rate for the contract?
4. You get funding at the 80% level. But there is a change. One of the countries will drop out. Not the US, one of the other NATO countries. You don't know which one, so just reduce the SF required for barracks and office space by 20%. However, you just heard there is a special operations facility that is added to the mix. It will be 25% to 50% the size of your barracks complex. The SF cost will be 125% to 150% of the cost of your most expensive building in this project. Given this change, what is the probability you will be able to complete the project given your current funding level? (A 5% range is fine here.)

5. What adjustments would you need to make, if any, to keep the project at the 80% confidence level for the given finding? (Adjust your spreadsheet as needed to cut scope to meet the number.)

Team 1	Team 2	Team 3	Team 4	Team 5	Team 6
US UK France Italy Canada	US Turkey Italy Greece Iceland	US Netherlands UK Canada Portugal	US UK Luxemburg France Turkey	US Iceland Netherlands Belgium France	US Italy Iceland Turkey Netherlands