Case Study Proposal
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Introduction:
A Hotel company has just purchased a plot of land that is 50m by 35m to build and open a new hotel in downtown Montreal. Due to height restrictions in Montreal the hotel will have 35 floors above ground and 3 floors below. An operations research team has been hired to work with the architects and project manager to decide the layout of the hotel. Their responsibility is to decide the amount and types of rooms, recreational facilities, and amenities that will be included in the company's new hotel. The company and investors for this new hotel have asked to maximize the profit that can made from the hotel assuming that on average it will be filled to a capacity that will be determined using market analysis. The hotel will occupy the entire lot and will have a rectangular prism shape, the rooms inside will all be rectangular, and each room of the same type will be identical. The operation of the hotel is predicted to last as long as the building is standing(no lack in demand for hotel rooms) so costs due to construction are not a concern, the company and its investors simply want to maximize their future earnings.

Problem:
Organize the interior of the hotel in order to maximize the profit of the hotel when it is operational.

Data Available:
-The spacial requirements in meters of the different types of rooms.
-Options for amenities and entertainment in the hotel such as restaurants/bars , an indoor swimming pool, gym, sauna, business/computer center, library, valet parking. The spacial and other requirements will also be given.
-The cost(maintenance and space in hotel) and benefit(increase in room rates) of including each type of amenity and rooms available.
-The hotel will need to retain a staff to manage and clean the hotel as well as help the hotel guests. The cumulative staff salary will contribute to the operational costs of the hotel and the amount of staff that will be hired depends on the variety of rooms and amenities that are present in the hotel.
-Fixed maintenance costs of hotel for common areas (lobby, laundry room, garage, roof).
-Minimum and maximum requirement for each type of room.

Constraints:
-Size constraint: the all rooms and amenities included must fit into hotel.
-The hotel must have a distribution of different rooms.(Must have some of each more specifically a there will be a maximum amount and minimum amount of each type of room in the hotel.)
-The hotel must be able to house a certain amount of people during peak business periods of the year (minimum housing requirement).
-There will also be a maximum housing limit for safety reasons.
- Arrangement constraints. Rooms will have constraints on their possible surroundings.(Ex. Certain types of rooms cannot be directly next to or on the same floor as of noisy entertainment options such as restaurants, pools, or the gym.)
-There must be a certain amount of space on each floor dedicated to cleaning and maintenance supplies for the floor, as well space for 2 sets of stairs and 2 elevators whose space requirement will be given.

-There must be a parking lot capable of holding 30% of the guests cars. The capacity of the underground floor that is dedicated to the parking lot will be given, falling to provide for 30% of filled hotel, the hotel will be forced to rent additional parking spaces.

-One of the underground floors must be reserved for hotel operations (laundry room, storage, etc).

-Staff constraints. There must a certain amount of various staff (manager, cleaning, technicians, and general staff) per room made in the hotel(as well as type per room. A pool or gym will require more time to clean than a room). In addition there will be a limit to the total staff employed to limit cost of benefits (which each worker gets) to the company.