

PROJECT INFORMATION

JAV Architects and Engineers has been selected to develop a comprehensive study of the climate conditions for XXX's new multi-use building, located in Cape Town, South Africa. This report will identify the most productive passive strategies that can be utilized to establish a comfortable indoor environment specific to the buildings location.

Questions:

What type of programs will need to be supported by the building? Residential, Commercial, Retail, etc?

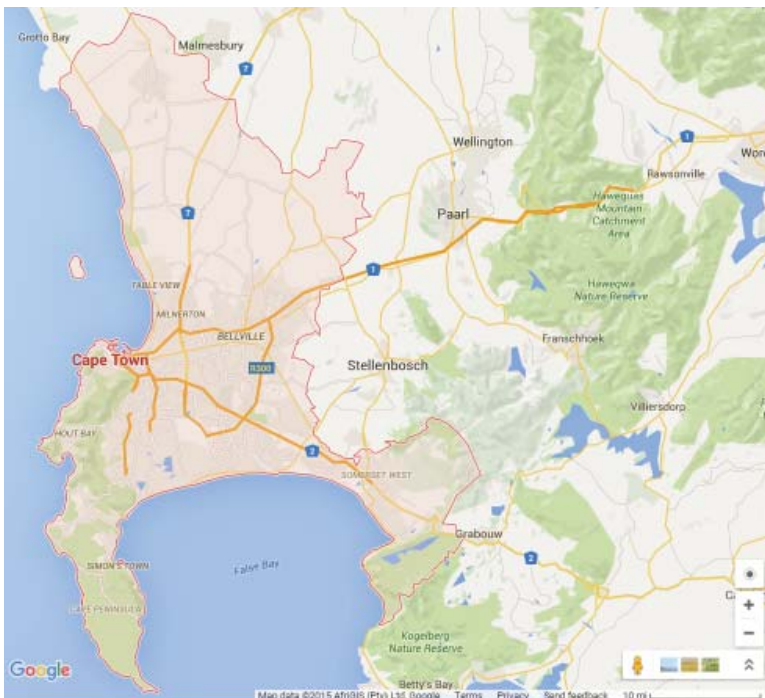
What activities are to be expected?

What is the anticipated occupancy load?

What hours will the various programs be in operation?

Will any spaces be occupied 24/7?

LOCATION Latitude 33.98° South Longitude 18.6° East

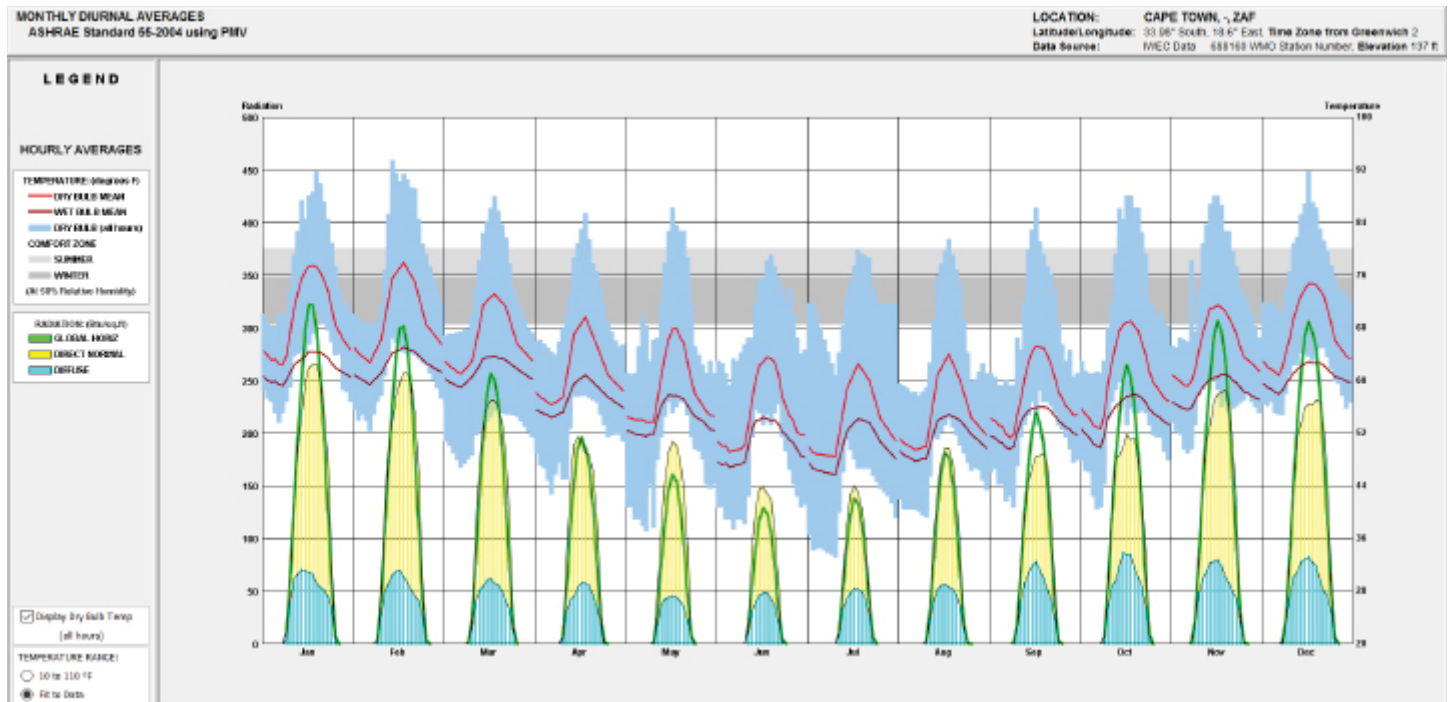


Cape Town is a city located in the Western Cape province of South Africa. It is located on the most southern tip of the African continent, putting it in the southern hemisphere. Cape Town experiences unpredictable wet winters from June to August and drier more pleasant summers from November to March. Shorter swing seasons occur from April to May (Spring) and September to October (Fall). Days are longer with more daylight hours during the summer and shorter during the winter.

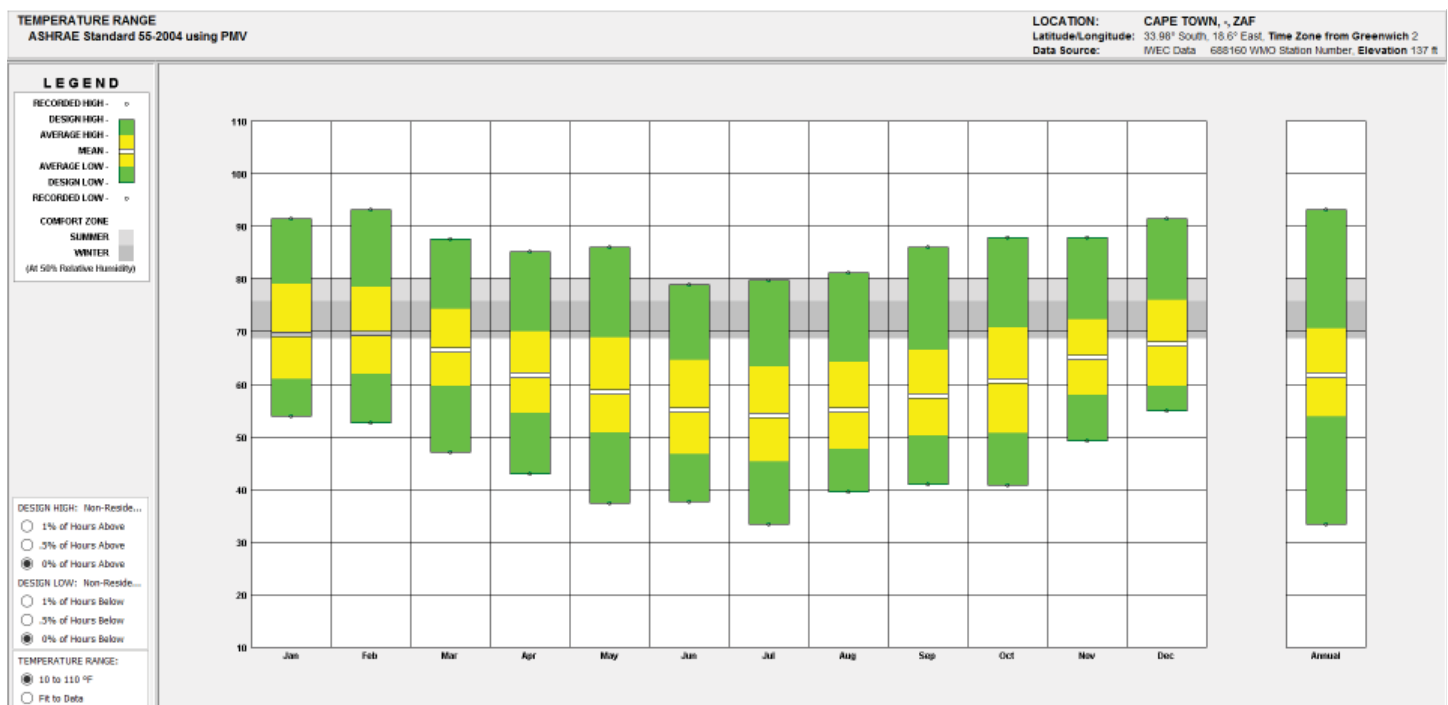
<http://www.worldweatheronline.com/Cape-Town-weather-averages/Western-Cape/ZA.aspx>

Question: Where in Cape Town is the project located?
Due to varying microclimates in the city, we need to know where it is located to generate a proper study.

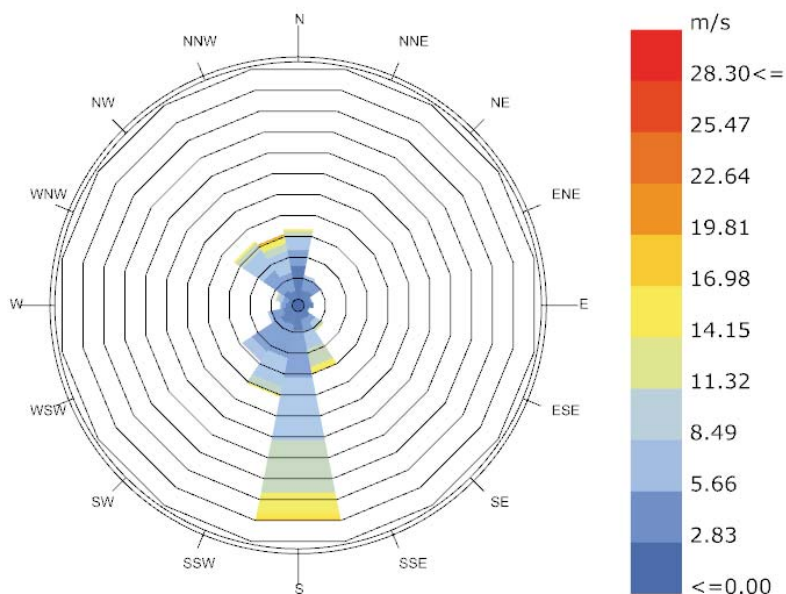
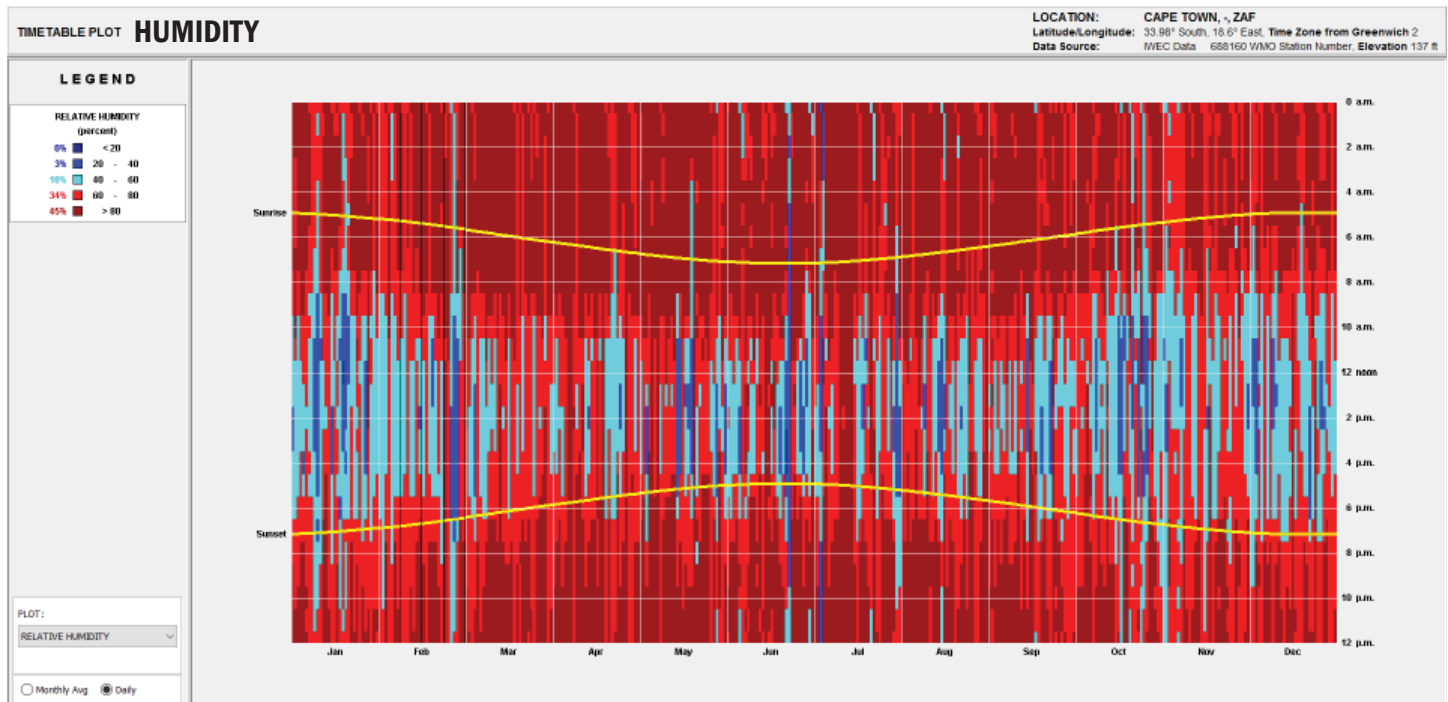
AIR TEMPERATURE



Per the high peaks and deep valley's for average dry-bulb temperature for all hours shown in the chart above, it can be ascertained that the climate in Cape Town experiences high diurnal temperature swings where the night time is much cooler than the day time hours. Furthermore, direct normal irradiance has a significant impact on daytime temperatures, especially during the summer months. The temperature range chart below indicates relatively pleasant weather year round. Winter temperatures rarely make it below freezing and summer temperatures rarely exceed 90°F.



HUMIDITY AND WIND SPEED/DIRECTION

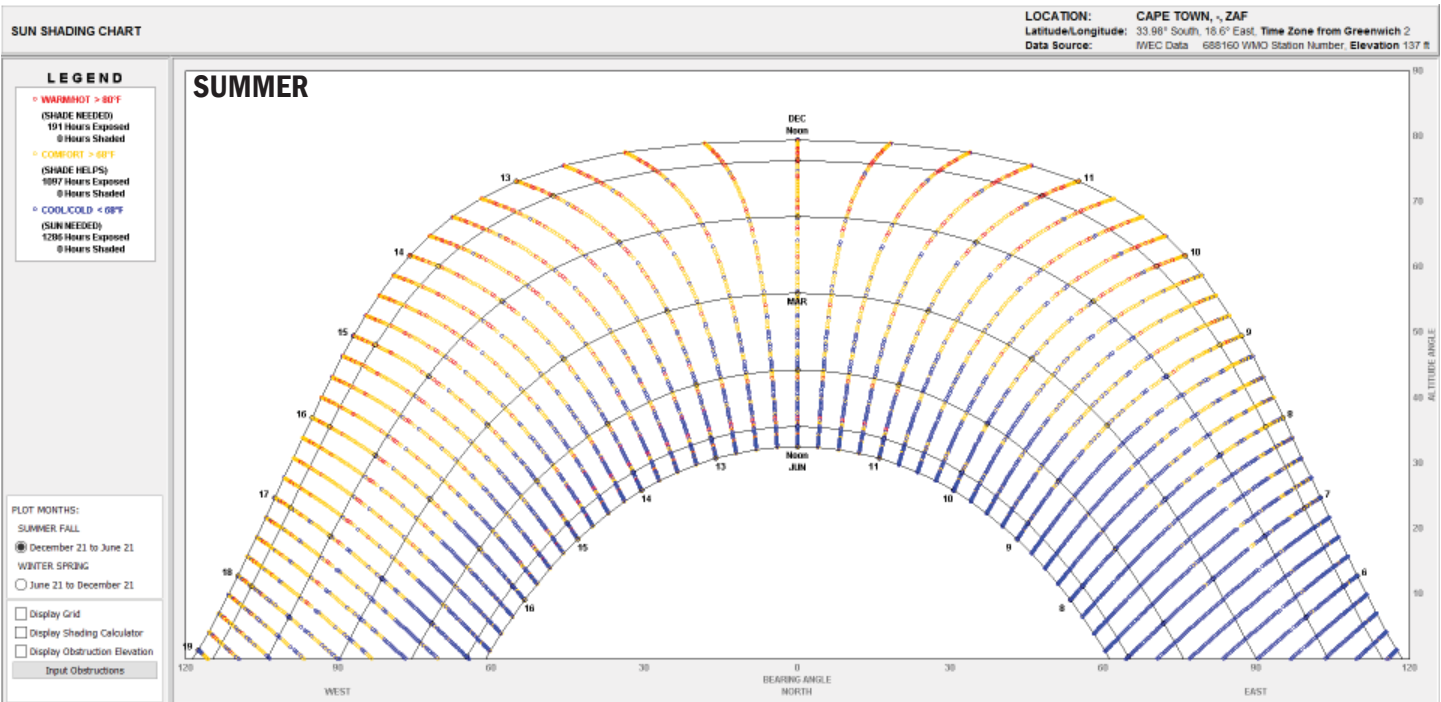
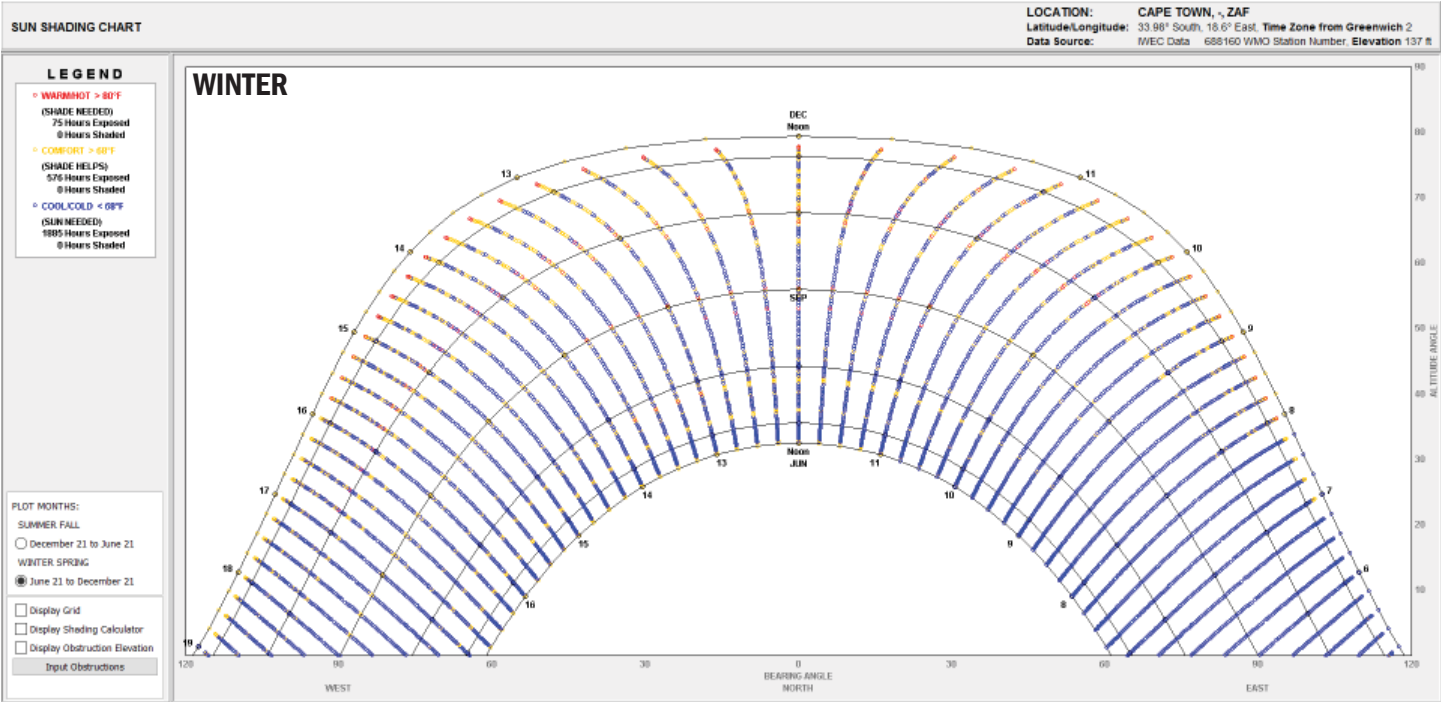


Wind-Rose
CAPE TOWN_ZAF
1 JAN 1:00 - 31 DEC 24:00
Hourly Data: Wind Speed (m/s)
Calm for 10.64% of the time = 932 hours.
Each closed polyline shows frequency of 2.3%. = 203 hours.

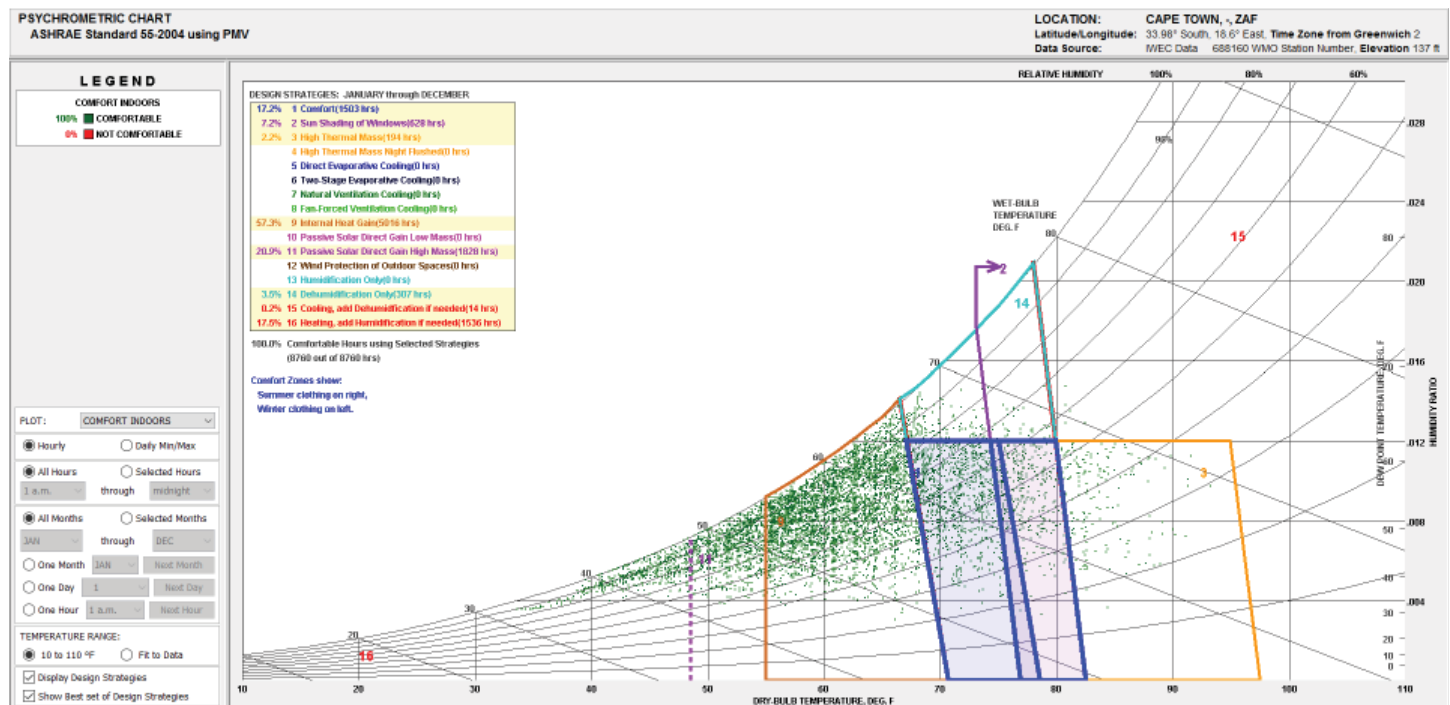
While humidity does exceed 80% for 45% of the year, hours with the highest humidity are occurring in the nighttime hours when the temperature is much cooler. Lower humidity during the daytime is a positive condition as the heat during the day combined with high humidity could result in a very uncomfortable condition. Since humidity is within a comfortable range for most of the year another important factor to consider is wind speed. Due to its location and land configuration, Cape Town is a relatively windy climate for most of the year. Sea breezes from the south dominate the region.

SHADING AND SOLAR RADIATION

Based on yearly solar radiation data, approximately 38% of daylit hours are capable of generating a comfortable temperature with solar heat alone. The remaining 62% would require a secondary method of heating indoor environments.



DESIGN STRATEGIES TO CONSIDER



Based on the data currently available, we can make some general recommendations for the best passive strategies to consider for **a** building planned for construction in Cape Town, South Africa. More detailed analysis taking into account the actual location, building program and occupancy patterns are required to generate a building specific climate analysis.

Since this climate is temperate with high variance between daytime and nighttime temperatures, a building constructed in this area would benefit from thermal mass strategically placed to absorb heat from direct normal irradiance during the day and transfer it to the building during night time hours. Especially in the winter time, where heating the space will need to be maximized as much as possible, Internal heat gains in this climate zone are beneficial, as they will help with alleviate some of the heating demand.