If \(x, y \in \mathbb{R}\), what is the minimum value of 

\[
B(x, y) = x^2 + 2xy + 2y^2 + 4y + 2x - 2017
\]

and for what values of \(x\) and \(y\) is it achieved?

**Solution:**

We observe that

\[
B(x, y) = x^2 + 2xy + 2y^2 + 4y + 2x - 2017
= (x^2 + y^2 + 1 + 2xy + 2y + 2x) + (y^2 + 2y + 1) - 2019
= (x + y + 1)^2 + (y + 1)^2 - 2019
\geq -2019,
\]

where the equality is achieved when

\[
\begin{align*}
x + y + 1 &= 0 \\
y + 1 &= 0
\end{align*}
\]

which is achieved when \(y = -1\) and \(x = 0\).

Thus the minimum value of \(B\) is \(B(0, -1) = -2019\).