**Significant Findings:**

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**Hartford (EJ) to West Hartford (non-EJ):**

* The PM2.5 levels are significantly higher in Hartford, particularly at Hartford City Mission, which shows the most substantial difference compared to Ledyard in West Hartford, while the smallest significant difference is observed between Hartford City Mission and Kingswood Oxford School.
  + PM2.5 Difference Hartford to West Hartford (BiCi Co Park and Ledyard): t-statistic = 84.31069090623208, p-value = 0.0
  + PM2.5 Difference Hartford to West Hartford (BiCi Co and Kingswood Oxford School): t-statistic = 31.617792205459867, p-value = 2.91964850791635e-207
  + PM2.5 Difference Hartford to West Hartford (Hartford City Mission and Ledyard): t-statistic = 91.6984363351183, p-value = 0.0
  + PM2.5 Difference Hartford to West Hartford (Hartford City Mission and Kingswood Oxford School): t-statistic = 25.55164232781414, p-value = 3.173461998092906e-139

West Hartford (Ledyard) to West Hartford (Kingswood Oxford School):

* The t-test results show a T-statistic of -87.664, with a P-value of essentially zero. This indicates a very significant difference in PM2.5 levels between the two sites. The negative sign of the T-statistic suggests that, on average, the PM2.5 levels at the Ledyard sensor are lower than those at the Kingswood Oxford School sensor. In practical terms, it means that the air quality in terms of PM2.5 pollution is consistently different between these two locations within West Hartford, with Ledyard showing lower levels of PM2.5.

Hartford (BiCi Co Park) to Hartford (Hartford City Mission)

* The T-statistic is 9.313 with a P-value of approximately 1.62e-20, which again indicates a highly significant difference in PM2.5 levels between these two sites. The positive T-statistic indicates that, on average, PM2.5 levels at the BiCI Co Park sensor are higher than at the Hartford City Mission sensor. This tells us that there is a notable difference in air quality between these two points in Hartford, with BiCI Co Park experiencing higher levels of PM2.5 pollution.

**By Temporal Columns:**

* The analysis of PM2.5 differences across various temporal categories reveals significant variation in air quality between Hartford and West Hartford. Below are key highlights from the data, with insights into which location exhibits higher PM2.5 levels:
* Weekday Analysis
  + Lower in Hartford: PM2.5 levels are significantly lower in Hartford on Mondays and Sundays at BiCi Co Park and Ledyard, with the largest difference noted on Mondays (t-statistic = -6.65, p-value < 0.0001).
  + Higher in Hartford: On Fridays and Saturdays, PM2.5 levels are significantly higher in Hartford (t-statistic > 4.27, p-value < 0.0001).
* Monthly Trends
  + Lower in Hartford: March exhibits the most substantial decrease in PM2.5 levels, indicating significantly better air quality in Hartford compared to other months (t-statistic = -21.36, p-value near zero).
  + Higher in Hartford: In contrast, December shows a significant increase in PM2.5 levels in Hartford (t-statistic = 8.86, p-value < 0.0001).
* Time of Day and Rush Hour Analysis
  + Lower in Hartford During Midday: PM2.5 levels are significantly lower in Hartford during midday (t-statistic = -7.75, p-value < 0.0001).
  + Higher in Hartford During Morning: Morning times show higher PM2.5 levels in Hartford (t-statistic = 6.64, p-value < 0.0001).
  + Rush hour periods did not show significant differences in PM2.5 levels between the two locations.
* Seasonal Variation
  + Lower in Hartford During Spring: PM2.5 levels are notably lower in Hartford during spring (t-statistic = -34.11, p-value effectively zero), indicating better air quality.
  + Higher in Hartford During Summer and Winter: Both summer and winter seasons show significant increases in PM2.5 levels in Hartford (t-statistics > 7.14, p-values < 0.0001).
* Hourly Fluctuations
  + Lower in Hartford During Late Afternoon: PM2.5 levels are significantly lower in Hartford during the hours from 15:00 to 17:00 (t-statistics ranging from -4.02 to -4.54, very low p-values).
  + Higher in Hartford During Early Morning: The early morning hours (06:00 to 08:00) exhibit higher PM2.5 levels in Hartford, indicating worse air quality (significant positive t-statistics).
* Specific Days of the Month
  + Higher in Hartford on 1st and 2nd: There are significant spikes in PM2.5 levels in Hartford on the 1st and 2nd days of the month (t-statistics > 6.85, p-values < 0.0001).
  + Lower in Hartford on 14th and 18th: Significant reductions in PM2.5 levels are observed in Hartford on the 14th and 18th days of the month (t-statistics < -8.35, p-values near zero).
* This detailed analysis indicates that PM2.5 levels vary significantly between Hartford and West Hartford based on time of day, specific days, months, and seasons. Generally, Hartford experiences higher PM2.5 levels more frequently across various measures, affecting air quality negatively compared to West Hartford during many periods throughout the year.