

# Executive Guide to Engineering Studies regarding the proposed rezoning for construction of a 12-story building on Patten Parkway and the effects to the Basilica of Sts. Peter and Paul.

## ***“Construction Considerations...”***

- East TN Seismic Zone forcing special construction considerations for a structure over 6 stories with potential damage mechanisms including:
  - **Vibrations** that can cause cosmetic to structural damage.
  - **Soil Settlement/Subsidence** causing differential settlement (uneven sinking).
  - **Water Table Alteration** Dewatering leading to shrinkage and settlement.
  - **Heave** causing soil to swell (heave), lifting parts of the foundation.
- Potential Damage:
  - **Cracked plaster or brickwork** (especially stair-step cracks).
  - **Sticking doors or windows.**
  - **Uneven floors or visible slanting.**
  - **Bowed walls or bulging masonry.**
  - **Cracks and ultimate failure of historic wooden structures** in the roof / ceiling.
  - **Damaged windowpanes or frames.** This alone is a vital consideration with priceless Tiffany made stained glass windows and the US Government supplied Star window behind the Pipe Organ in the sanctuary, and the pipe organ itself.
  - **Foundation collapse.**

## ***“Piling potential damage...”***

- Confirmation that **Impact Pile driving** is the best method with effects:
  - **Energy levels 60,000 ft-lbs.** causing vibration values more than **3.0 in/sec.**
  - The U.S. FTA limits vibration levels to **0.12 in/sec.** for historic structures.
  - At vibration values of **3.0 in/sec.** the **minimum safe distance** is **over 400 ft.**
  - **Pre-drilling to reduce vibration from Impact Pile** will still result in vibration of **0.25 in/sec.** in excess of the 0.12 in/sec. allowable.
  - The soil and substratum (**somewhat unique to the Chattanooga area**) is **stiff and layered**, **which means it can transmit pile driving vibrations directly to the Basilica foundation with little dispersion.**
  - The most likely **high-risk damage areas of the Basilica** are the **Tiffany stained glass windows**, the **historic pipe organ**, the **East Tower** structure, and **foundation upheaval or slip**. **Any** of these failures would be **catastrophic**.

## ***“Shadow Study...”***

- The reduction of natural light caused by the proposed 12-story building will adversely affect the visibility of the Tiffany stained glass windows in the worship area of the Basilica of Sts. Peter and Paul Catholic Church. These significant works of art, created by acclaimed artist Louis Comfort Tiffany, illustrate key events from the lives of the patron saints. ***The loss of this aesthetic is immeasurable.***
- **Historic preservation guidelines** (such as those used by state historic preservation offices and the National Park Service) specifically encourage **retaining original window openings and daylight access.**
- **For the clergy that reside in the Basilica Rectory**, light deprivation can result in lower vitamin D synthesis, which can affect bone health and immune function, as well as **disruption of circadian rhythms**, leading to **sleep issues, fatigue, depression, and metabolic stress.**