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Roger Penrose Puts Prints on San Francisco Transit Center

Transbay Transit Center incorporates famed mathematicians design into newly approved façade

San Francisco, Calif. (July 11, 2013) – The Transbay Joint Powers Authority (TJPA) has received approval from Dr. Roger Penrose, the eminent British mathematical physicist, to incorporate his groundbreaking geometrical pattern in the design of the exterior walls of the future Transbay Transit Center (TTC) designed by Pelli Clarke Pelli Architects (PCPA). Dr. Penrose and PCPA are working in tandem to incorporate Dr. Penrose's elegant design, known as the Penrose Rhombus Tiling, in the skin of the TTC. The design is remarkably simple but unique because it can be extended infinitely without repeating itself. The Penrose system is ideal for the perforations in the metal panels that will form the curved exterior of the Transit Center.

Discovered in 1974, the Penrose Rhombus Tiling was heralded by mathematicians and physicists ultimately helping to give birth to the new field of quasicrystals which spawned discoveries in material science and biology. Dr. Penrose's discovery initially yielded designs that were only known to exist in synthetic materials. Patterns similar to Dr. Penrose's design, however, have recently been found in natural materials such as those in meteorites. The rhombus pattern can be elegant and beautiful to the eye. When used at the scale of the new Transit Center, it creates a delicate, lace-like screen that is an ideal contrast to the monumental structure of the Transit Center. PCPA notes that the Penrose pattern on the exterior of the building will symbolize the interconnections among mathematics, science and art which are so deeply ingrained in the rich, technologically advanced culture of the Bay Area.

"We are thrilled to have the opportunity to incorporate Dr. Penrose's mathematical pattern in the flowing design of the new Transbay Transit Center," said Maria Ayerdi-Kaplan, Executive Director of the TJPA. "The addition of Dr. Penrose's pattern to the skin of the Transit Center will provide additional educational opportunities for the public who visit the new station," she said.

The Penrose tiling, with its non-repeating pattern, is well suited to the complex, curved form of the Transit Center exterior. To achieve the undulating sensation of the Transit Center exterior, PCPA has designed multiple metal panels of varying sizes and trapezoidal shapes that require seamless visual transitions from panel to panel—a visual effect that can be achieved only with a non-periodic pattern . The pearlescent white metal skin of the Transit Center will be perforated with the Penrose pattern, letting 35 percent of the wall surface remain open to light and air. The passenger experience from the inside will be one of openness and diffused light.

"I am delighted that the Transbay Transit Center has chosen to employ a non-periodic 5-fold quasi-symmetric mathematical pattern that I discovered in 1974, in order to adorn the exterior skin of their magnificent project, in this most impressive design," said Dr. Roger Penrose. "The existence of such patterns was very unexpected, since they appear to violate the standard symmetry rules of crystallography. Yet they reveal hidden aspects of mathematical structure, some of which had been hinted at earlier in the works of the great 17th Century astronomer Johannes Kepler, and also, to some extent, in ancient Islamic designs," he said.

Sir Roger Penrose is a British mathematical physicist and philosopher. Over the course of his career, Penrose has worked and collaborated with great minds such as Stephen Hawking and M.C. Escher. In 1988, Penrose and Stephen Hawking were both awarded the Wolf Prize for their contributions to the understanding of the universe. Penrose developed the famous "Penrose Triangle" which Escher used in much of his artwork, including his piece *The Waterfall* in 1961. He is currently the Emeritus Rouse Ball Professor of Mathematics at the Mathematical Institute of Oxford as well as an Emeritus Fellow of Wadham College. To learn more about Sir Roger Penrose and the Penrose Rhombus Tiling please visit: <http://www.britannica.com/EBchecked/topic/450252/Sir-Roger-Penrose>

The Transbay Transit Center is scheduled to be complete in the fall of 2017.