

A New Paradigm for Efficient Land Development

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By Mark Eakle and Koichi Paul Nii Current and historical land development practices produced what is known as Urban Sprawl. It is perhaps the most effective means by which the least number of people destroy the greatest areas of productive land, generate enormous volume of greenhouse gases, and force people to endure extended commutes to urban centers. Urban sprawl was the accepted practice to meet the housing needs of the 20th Century. However, the practice contributed greatly to the current global ecological and climate crisis. This traditional method of land development is clearly an unsustainable practice in a world that faces expanding populations and diminishing non-renewable resources. We propose a new paradigm for land development. This paradigm requires a re-examination of land use. Human occupation of land, from the first agricultural settlements to the current urban, suburban and rural developments, has been two-dimensional. We propose to expand into the third dimension by constructing land in the form of staggered, platforms tiers that increase usable areas for a given footprint. The concept is similar to multi-floor buildings, for a given square footage of land the usable area increases with the number of floors. We call the proposed structure Terraced Structured Land, TSL. TSL is not a building. It is a method to create more land with similar benefits as natural land, support all things on it, create openness, and provide natural elements like sunlight and breeze. Its purpose is to construct substrates upon which architecture and agriculture can take place. TSL is not a statement on any one particular architectural design. TSL is an artificial, expandable land creation. TSL provides a paradigm shift in land occupation. TSL reduces the current land use by all things such as buildings, infrastructure networks, farms and others. They are replaced by exterior activity spaces such as parks and open fields. Foremost, TSL returns much land for all other life. Combined with reduced occupation on natural lands and efficient living style provided by TSL, the balance in nature will begin to restore. TSL will help initiate the reversal to the on-going destruction to global ecology and changes to the climate.

The TSL Concept The philosophical concept of TSL is to provide more surfaces for human use, advancement to "quality-of-life" standard and return much of the presently occupied land to nature on a global scale. We strongly believe TSL will help reverse current destructive trends on global ecology and climate. We will need a second earth by 2050, if we follow the current trend in population growth and the global race to meet the "quality-of-life" standards of the United States. The primary problem is lack of land, and the solution is creating lands. What is land? For us humans, land is a surface on which to support structures, infrastructure networks and farms. In other words, platforms that support all things currently placed on the ground suffice. Humans also require natural elements, sunlight, wind, rain and others. Terraced land can satisfy all the needs. The first platform tier is several feet above ground providing a secure and dry environment as water level rises due to flooding, rise in sea level and damages to levees. Residences and farms are placed on the outer platforms open to natural elements, and all other societal infrastructure is inside the mountain. Life in TSL improves the quality of life and reduces the dependency on carbon- and fossil-based energy. Much of the land unoccupied by humans becomes land for all other life.

Structural Frames of TSL The platforms, girders and columns are trusses. The platforms are spaceframe with a depth of about 6 feet. This allows all infrastructure lines such as sewer, utility and power that are presently undergrounds to be installed within the spaceframe. It provides unobstructed horizontal passages for utility, sewer and power lines because of inherent characteristic of spaceframe. The girders and columns also provide passage within the cross-sectional open area. Each member of the trusses is connected to a joint using alternative construction method. The system reduces the quantity of sequential system in construction permitting many workers, speedy construction and reduction of heavy equipment usage. Also, the system allows for exchanging framing members with new ones. Because TSL is an open frame structure, it accommodates modular systems such as panels for enclosing spaces, solar energy collectors and rainwater harvesting channels. Open frames with minimum surface resist strong winds such as hurricane and typhoon. The structures on the platforms are secured to the top and bottom lands to withstand destructive natural forces.

Multi-functional Supporting System TSL is a structure secured to the ground and complies with codes. Everything placed on the platforms are structurally safe, similar to partitions secured to floors and ceilings of buildings. This condition provides freedom, efficiency and flexibility to space creation that are unseen in current structures. Followings are few advantages of TSL:

- Architectural spaces Foundation is not needed. Partitions and floors can be hung from platform above. Upper floor can be built without lower floor. Studs are not needed for wall constructions. Modular space systems are easy to install. Pathways for private and public vertical transports provided. Foot traffic for storefronts is at all levels.
- "Green" Product Installation
 - Applications are universal instead of singular.
 - Connections to existing grids are kept to a minimum.
 - Supports for mechanisms are integral part of the frame.
 - Rainwater harvesting systems are provided.
 - Drainage systems for differently used water are installed.

Economic Opportunities TSL instigates economic opportunities by providing new life style and space. It provides opportunities in the following fields to name few: Construction, Deconstruction, Land conversion, TSL maintenance, Converted natural land care and, Innovations such as vertical mass-transport systems, private vertical vehicles, sunlight guidance system and space framing panels for the new spaces.

Living in TSL TSL provide lifestyle similar to that on single-family residential lot. Each lot has the benefits of flat lot and hillside lot; flat exterior activity spaces, and unobstructed distant views. There is space for custom three-story houses. The backyard, exposed to all the natural elements, is personally designed landscape. Different from the current residential lot, front yards of TSL lots face airy and large open spaces with 3-dimensional traversing networks

for walking, skating and biking to the adjacent urban core. In the core are moving belts, escalators and multi-route transports that move people to various cultural, medical, educational, commercial and event centers. Public mass transportation run within TSL and connect to a network of other TSL mega-plexes. Life in TSL is independent of cars. They are parked in spaces between ground level and the first platform and are enjoyed for leisure such as driving and traveling. Structured lands are also built in the core of the artificial mountain. They provide additional structural stability. These lands allow stores and facilities to be placed at any level irrelevant of supports below.

Starting Locations and Purpose Where are the best places to build TSLs? Prime candidates are: districts and villages destroyed by natural forces; parts of urban core planned for revitalization; areas of over-extended farmlands; and currently occupied lands slated for reclamation, preservation and species protection. It is not enough to build TSL as a minimal-impact structure to preserve nature. As TSLs are built, structures on emptied adjacent lots are deconstructed and the lots are returned to nature. With expansion of TSLs, more lands become part of nature. Some of the open lands are for human enjoyment but the majority of the lands are for other life. A five-tiered TSL reduces land use by about half. Ten-tiered TSL reduce the usage to about 30%. Taller the TSL, the more structured lands are created, and more lands are returned to nature. TSL provides opportunities for people to reduce their footprint by exchanging natural land for structured land without sacrificing their current comforts and living standards. Throughout the history of human advancement, people actively participated in changes if their conditions were improved, if their beliefs were secured, and if the changes were not forced upon them. TSL is a means, presently just a proposal, for all life on earth. Global participation is needed for the realization of TSL that will reduce unrestricted consumption of scarce and valuable lands and help restore a healthy ecosystem.