

OVER, LLC Concepts for Fully Autonomous VTOL Aerial Vehicle (AV) Landing Areas, Parking Structures, Parking Garages, and Helipads

In order for future, fully autonomous VTOL AVs to become a widely accepted and functional form of transportation, they will need to be convenient and easy-to-use for cargo customers, walk-in passengers, and those with physical disabilities. The strategic design and placement of load/unload locations is a primary factor in meeting these goals. In response, OVER LLC has designed a number of operational and infrastructure concepts to facilitate fully autonomous VTOL AV landing, parking, anchoring, powering, loading and unloading, which also provide convenience and ease-of-use. OVER proposes a “standard size” for landing areas and parking garages, which would accommodate any VTOL AV up to a maximum size, regardless of manufacturer. Standard-size parking garages would be contained in various parking structures, as described below.

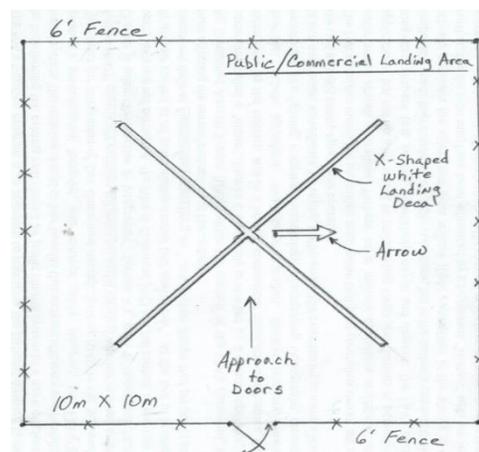
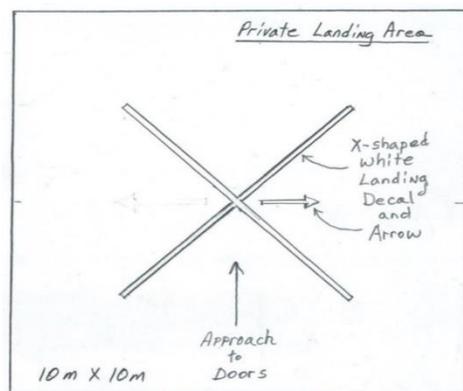
Each VTOL AV and each parking garage would need to contain OVER’s patent-pending Aerial Vehicle Autonomous Anchoring and Powering System (AVAAPS) technology, which will automatically and autonomously anchor and connect electric power to AVs upon landing, and automatically and autonomously un-anchor and disconnect electric power upon takeoff – *without human assistance*. When used with OVER’s Ramp, Platform and Bridgeplate System (RPBS) concept, passengers and cargo customers are afforded level entry/exit capabilities. Both systems are addressed in another concept paper titled “OVER Concepts - AVAAPS and RPBS.pdf”.

The combination of these technologies will enable *mobility for all*, including passengers with wheelchairs, baby strollers, walkers, or rolling luggage, as well as cargo customers using various rolling dollies, bins, and other cargo containers. In our opinion, the implementation of OVER’s AVAAPS and RPBS technologies will be *essential* to providing an effective, efficient, and all-inclusive Autonomous Transportation System (ATS) – now and into the future.

We propose three types of load/unload locations for VTOL AVs: (1) Landing Areas for standard-size AVs, (2) Parking Structures and Parking Garages for standard-size AVs, and (3) Helipads for any size AV, including full-size helicopters. Each type of load/unload location is presented below.

Landing Areas

AV landing areas are simple, hard-surface, uncovered spaces designed to load/unload cargo and passengers. The two primary types of landing areas are “Private” and “Public/Commercial”. Example locations include private driveways and public/commercial parking lots. Each landing area will contain a white reflective X-shape landing target decal and directional arrow, positioned so the AV doors will face the proper angular position (attitude) when landing.

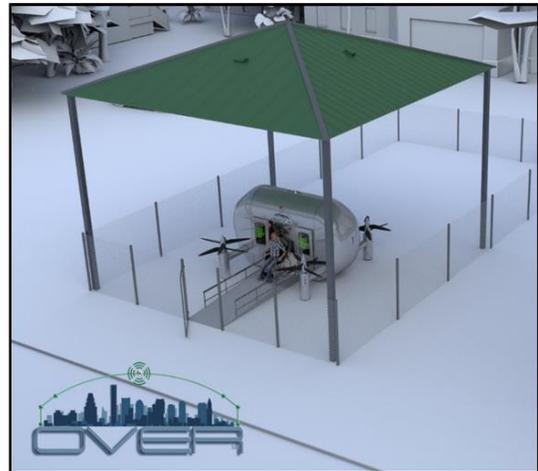


Public and commercial landing areas will normally be surrounded by a 6-foot fence to minimize damage from pebbles and other objects being blown by propeller blast, and keep objects, animals and humans out of the area. (A fence is optional for private landing areas). AV landing areas do not require a painted “H” or other identification like typical helipads, but may. Landing areas will be established on private, public and commercial property, as required, to accommodate additional/new AVs. AVs will ascend and descend vertically, over a landing area. When descending, they will autonomously align the front of the AV to point in the direction of the arrow, which aligns the doors to face the attitude specified in system programming for each landing area.

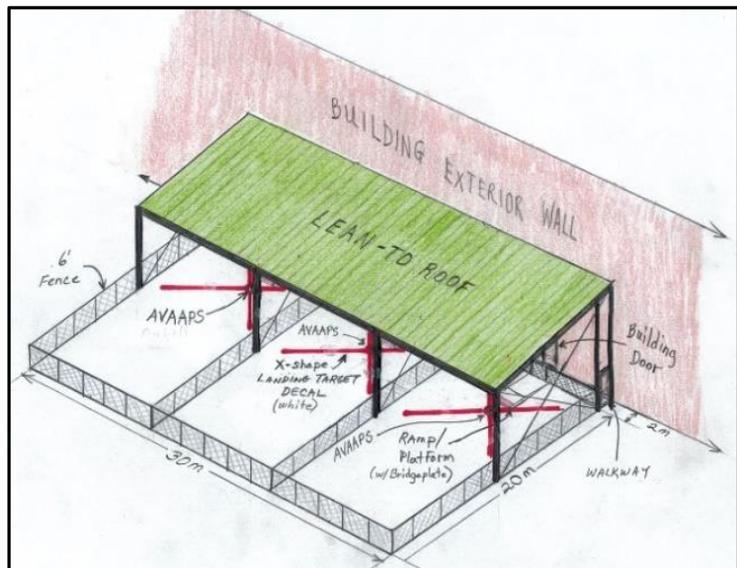
Parking Structures and Parking Garages

Since AVs will need to fly in/out of parking structures and other facilities, a standard size “parking garage” is required that will accommodate the largest “standard size” AV. The proposed size of a standard AV parking garage is 10m (32.8 ft) square x 7m (23 ft) high, resulting in a fly in/out space 10m wide x 7m high. This standard size will accommodate many different types of AVs, from multiple manufacturers, providing sufficient clearance above and below when flying in/out of the parking garage. Although this operational concept allows standard size AVs to enter and park at any standard size parking garage, regardless of manufacturer, establishing a standard size garage/entrance *will limit* the maximum size of future AVs which can enter and use a garage. All parking structures and parking garages are designed to afford cargo and passenger customers with convenient, covered, load/unload capabilities, as described below.

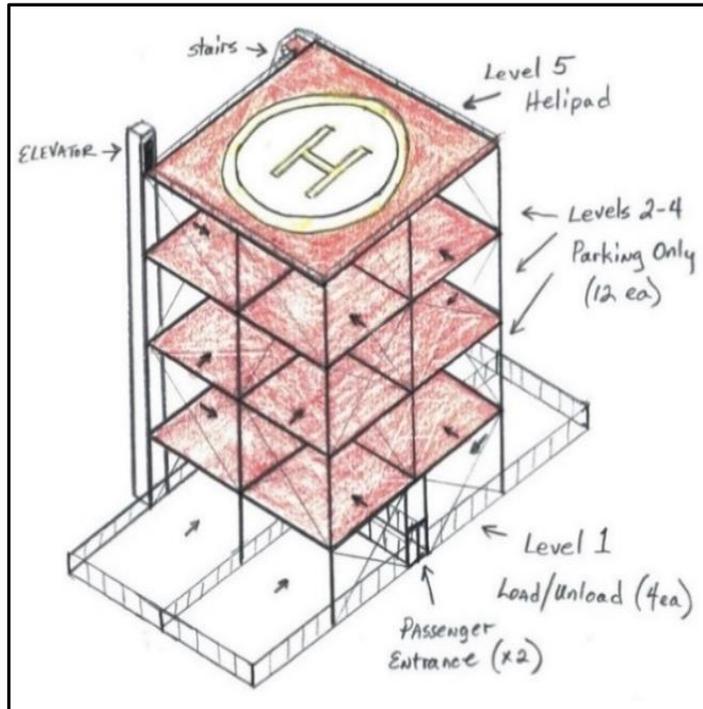
OVER’s proposed, standard size parking garages are contained within *covered, open-air* parking structures of various size and shape. Each parking structure would contain at least one parking garage, but most will contain two or more. The simplest parking garage is contained in a one-story open-air covered structure, as illustrated here. This single parking garage would contain an X-shape landing target decal, the AVAAPS, and the RPBS to provide level entry/exit at the location. The structure is surrounded by a 6-foot fence and provides an additional 10m x 10m fenced space to descend and ascend next to the structure.



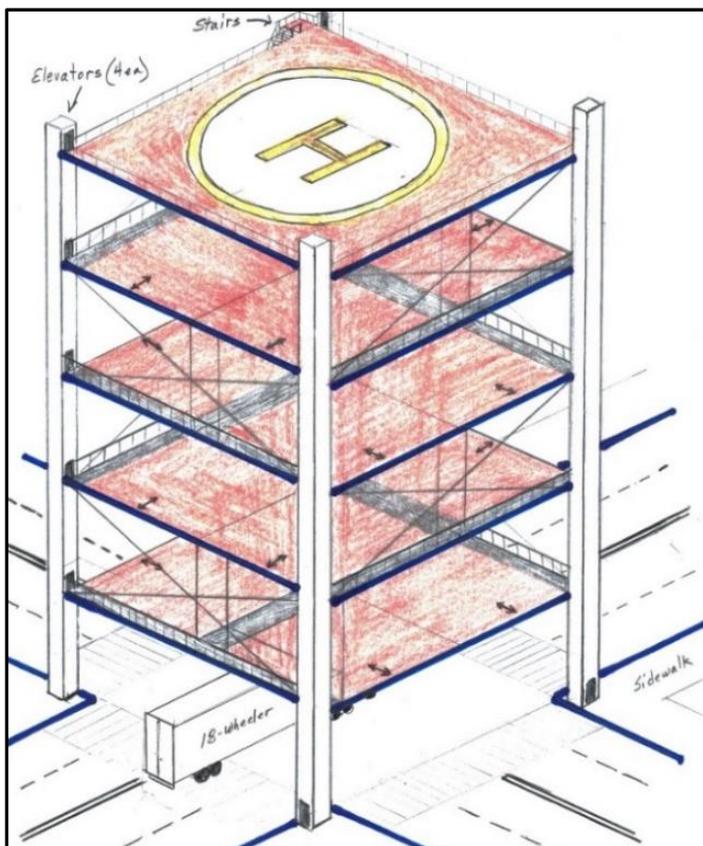
A variation of a one-level parking structure is the “lean-to” concept, illustrated here. Passengers and cargo can load/unload directly to/from a building (e.g. retail store, office building, warehouse, etc.). This type structure provides customers with convenient access to/from the building and protection from weather. This example contains three ground-level parking garages, but other designs may have more or less. Typically, all lean-to parking garages would contain the AVAAPS, and at least one would contain the RPBS.



The standard “*tower*” design, illustrated here, contains one or more ground-level parking garages where customers would load/unload, and one or more levels/floors above for AV “*parking only*”. All ground level, covered parking garages have the X-shape landing target decal and the AVAAPS, and at least one has the RPBS. The elevated *parking-only* garages contain the X-shape landing target decal and the AVAAPS, but no RPBS because customers do not load/unload on these levels. The example illustrated here has a total of 16 standard parking garages consisting of 4 ground-level load/unload garages (Level 1) and 12 elevated parking-only garages (Levels 2-4), plus a helipad on the roof. Helipads provide load/unload space for helicopters and other VTOL AVs too large to safely enter/exit a standard size parking garage. Although shown with a painted “H” in this illustration, helipads may have the X-shape landing target decal instead. Helipads will not contain the AVAAPS or RPBS, because they are uncovered and exposed to weather. Customers would access the helipad level via a single elevator, or alternately by stairs. (Note: All tower-type structures presented in this White Paper could have more or less levels, and more or less parking garages per level, than illustrated).

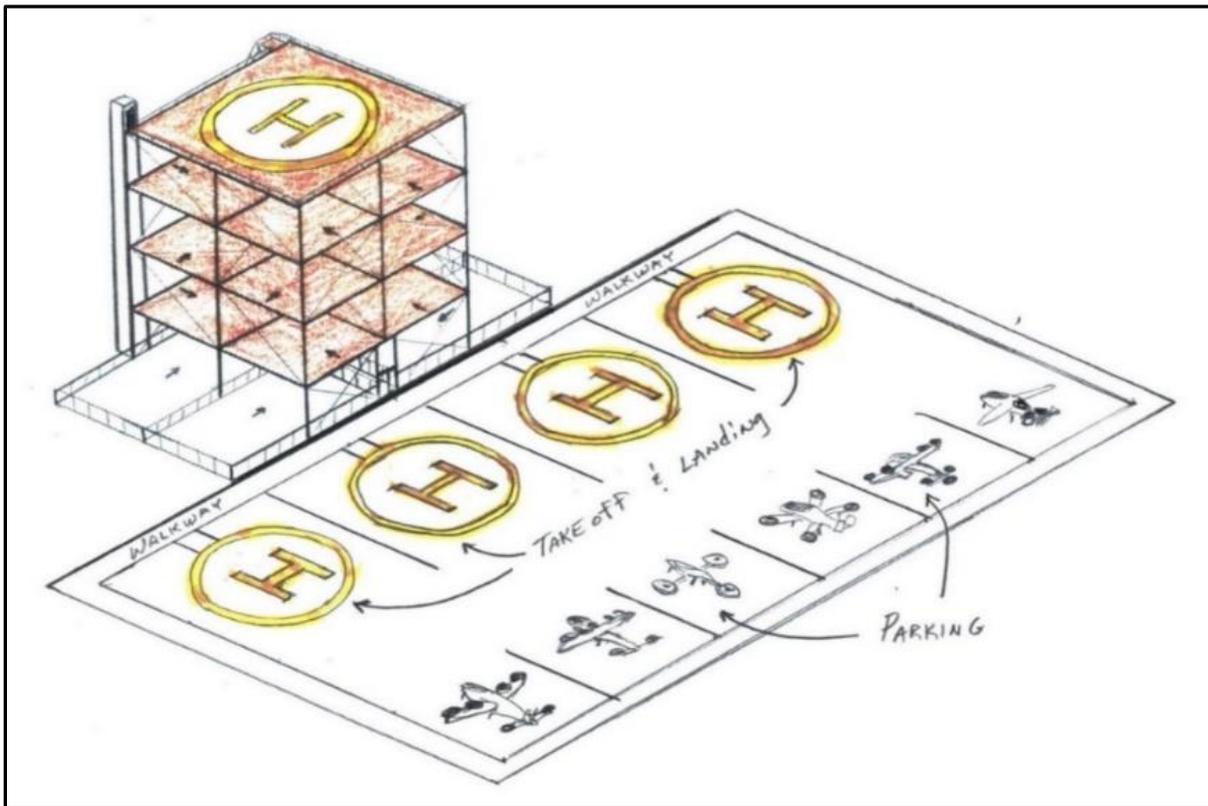


The “*straddle-tower*” parking structure, illustrated here, is specifically designed for busy urban areas, and “straddles” a 2, 3 or 4-lane road or intersection. This example contains 16 parking garages with walkways and load/unload capabilities on *all floors*, including a helipad on the top. These innovative road-straddling urban parking structures provide at least 7m (~23 ft) of clearance for ground traffic to flow underneath the first floor, unimpeded. These structures provide customers easy access to all elevated floors via elevators from both sides of the street, or from all four corners if it straddles an intersection, plus one set of stairs. All parking garages in a straddle-tower structure will contain the X-shape landing target decal and the AVAAPS. At least one parking garage on each floor would contain the RPBS.



Helipads

Helipads provide load/unload capability for virtually any size VTOL AV, regardless of manufacturer. Typically, helipads would be used by AVs which are too large to safely enter a standard AV parking garage, such as traditional helicopters or large winged VTOL AVs. They are usually marked with a circle and a capital letter "H, however, they could just contain the standard X-shape landing target decal instead. Helipads will not contain the AVAAPS or RPBS because they're exposed to rain and other weather. AVs parked at a typical helipad would have to be anchored and powered using traditional, manual methods (e.g. tie-down straps/cables, electric power cables, etc.). An AV parking structure with co-located helipad enables quick transfers between various forms of transportation (Ground Vehicles, standard size AVs, larger AVs, and traditional helicopters). A concept drawing of an OVER-type parking structure co-located with an Uber-type helipad is provided below.



In our opinion, standard size landing areas and parking garages will enable safe, efficient and reliable VTOL AV operations, within a future, national, standardized, networked ATS, regardless of AV manufacturer. The various styles of proposed structures would contain parking garages equipped with the AVAAPS and RPBS technologies, as appropriate, to provide safe autonomous parking, anchoring and power, as well as level entry/exit at select locations for convenient loading and unloading. Therefore, seeing the features and benefits that the AVAAPS and PRBS technologies afford, OVER, LLC is seeking to obtain U.S. government approval and industry acceptance/endorsements, and to eventually establish both the AVAAPS and RPBS technologies as U.S. and international standards.