

Brief Description of the Drawings

A preferred embodiment of this invention is described hereinafter, by way of example only, with reference to the drawings, in which:

- a. Figure 1 is a front view of a AI based laser light pest repellent (L2PR) apparatus in a popsicle shape self-contained apparatus suspended from a building structure in accordance with a first embodiment of this invention;
- b. Figure 2 is a section across the front view (see through) of the L2PR apparatus as shown in Figure 1 with second embodiment of the steel support stem and the third embodiment of functional components inside the apparatus;
- c. Figure 3 is a side view of the L2PR apparatus as shown in Figure 1 & Figure 2;
- d. Figure 4 is a section across the front view (see through) of the L2PR apparatus as shown in Figure 3 with second embodiment of the steel support stem and the third embodiment of functional components inside the apparatus; and
- e. Figure 5 is a plan view of the turret base with the demonstrative angle of view of the CCTV camera and projection angle of the high-level laser gun/s.
- f. Figure 6 is a plan view of the turret body with the demonstrative angle of view of the and projection angle of the low-level laser gun/s.
- g. Figure 7: Section view of Area of Protection with single apparatus (Bounding Box illustrated)
- h. Figure 8: Plan view of Area of Protection (Camera lined to center of Bounding Box illustrated)
- i. Figure 9: Plan view of Area of Protection (Camera lined to edge of Bounding Box illustrated)
- j. Figure 10: Section view of Area of Protection with two Apparatus (Bounding Box illustrated)
- k. Figure 11: Plan view of Area of Protection with 2 apparatus (Bounding Box illustrated)
- l. Figure 12: Section view of Area of Protection with Spot Target area (close distance illustrated)
- m. Figure 13: Plan view of Area of Protection with Spot Target area (close distance target area illustrated)
- n. Figure 14 Section view of Area of Protection with Spot Target area (intermediate distance illustrated)
- o. Figure 15 Plan view of Area of Protection with Spot Target area (intermediate distance illustrated)
- p. Figure 16 Section view of Area of Protection with Spot Target area (Yonder distance illustrated)
- q. Figure 17 Plan view of Area of Protection with Spot Target area (Yonder distance illustrated)
- r. Figure 18 High level laser beam projection

Drawings

Figure 1: Front elevation of apparatus

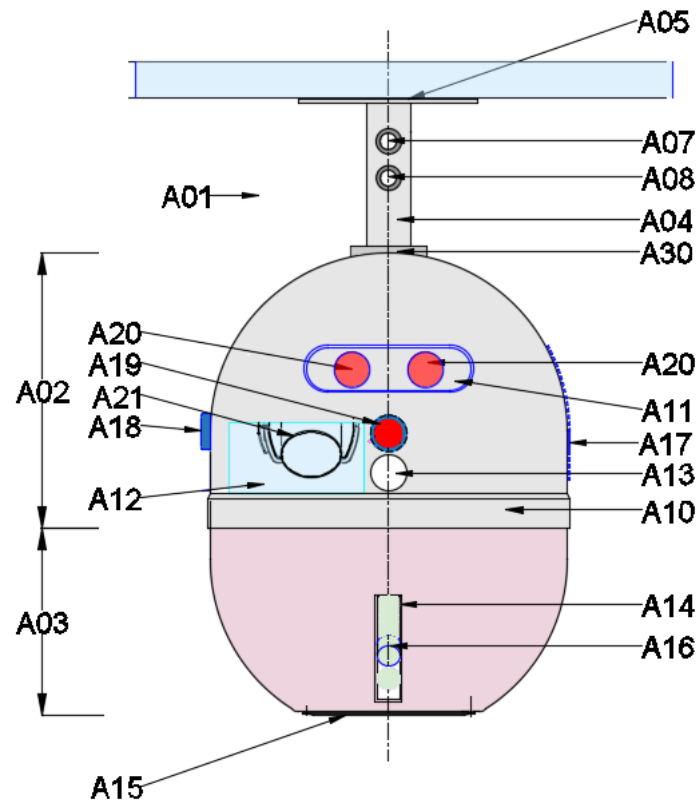


Figure 2: Section (exposed) view across front elevation of apparatus

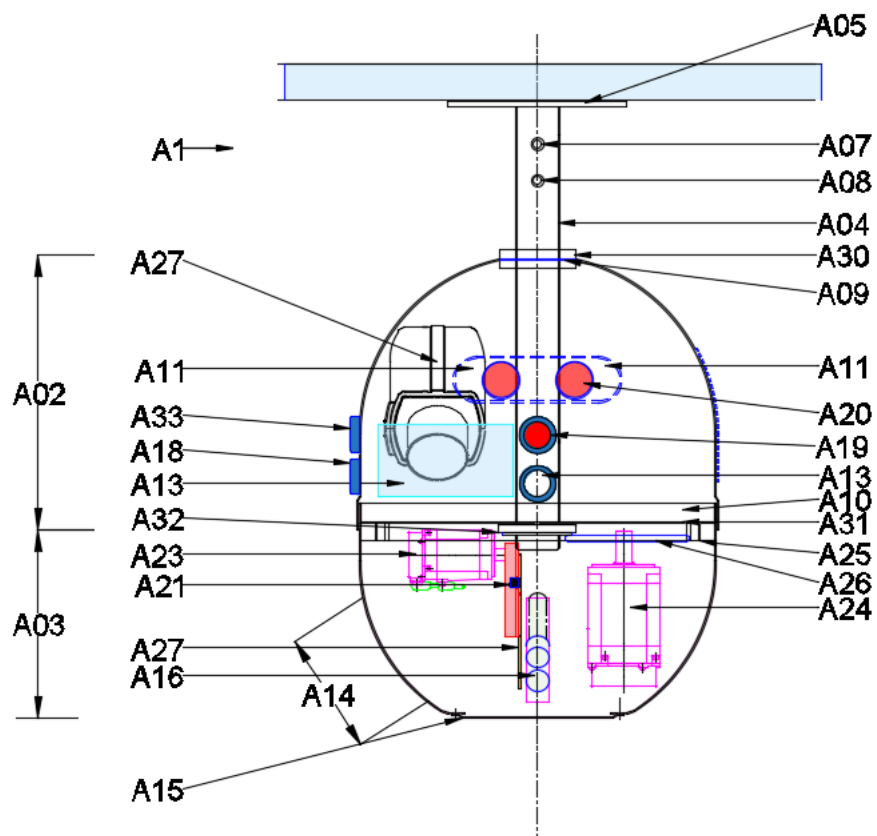


Figure 3: Side elevation of apparatus

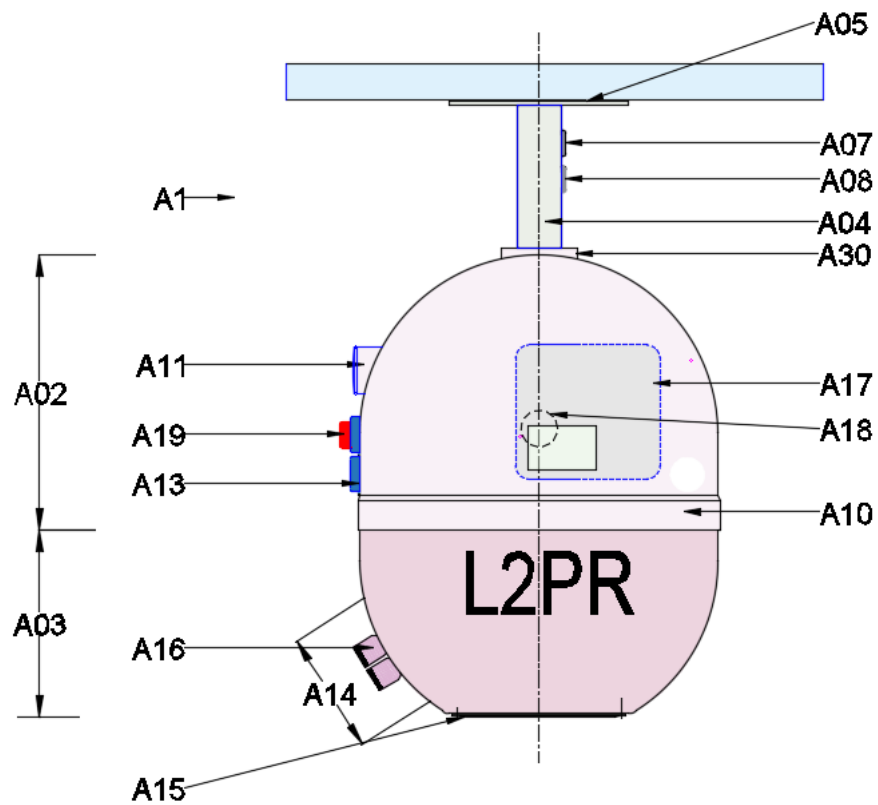


Figure 4: Section (exposed) view across side elevation of apparatus

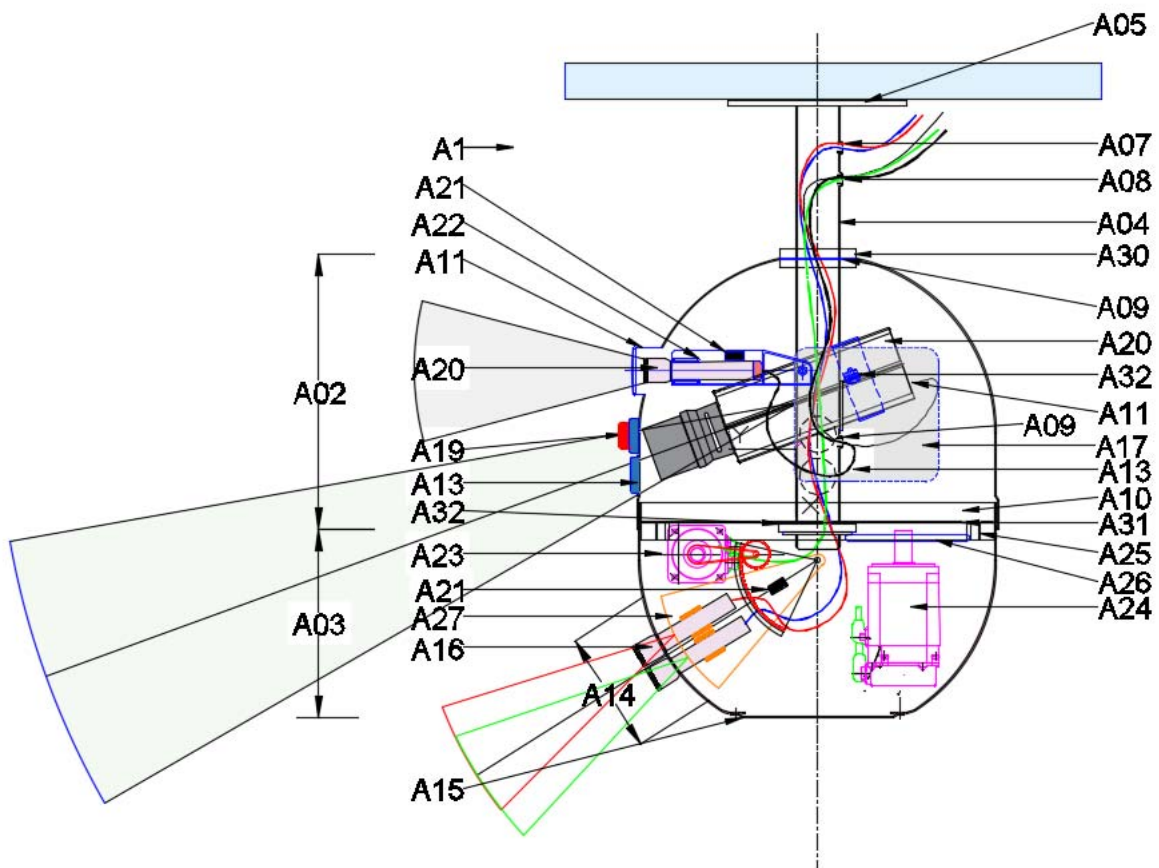


Figure 5: Sectional (exposed) pan view of apparatus across turret base

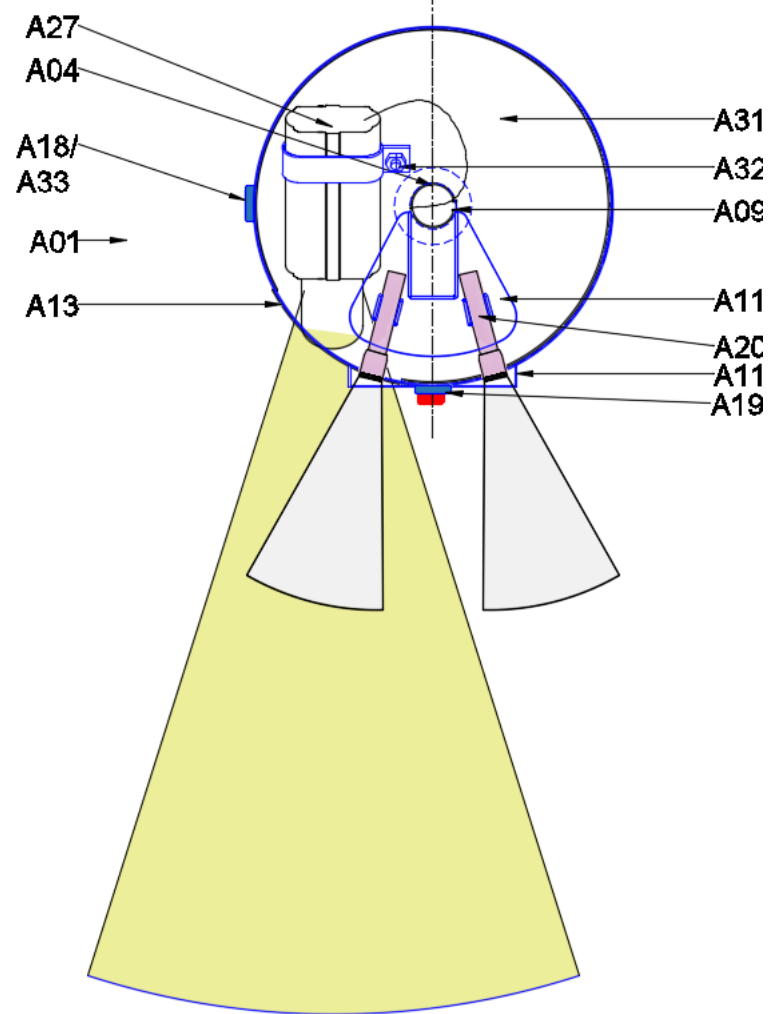
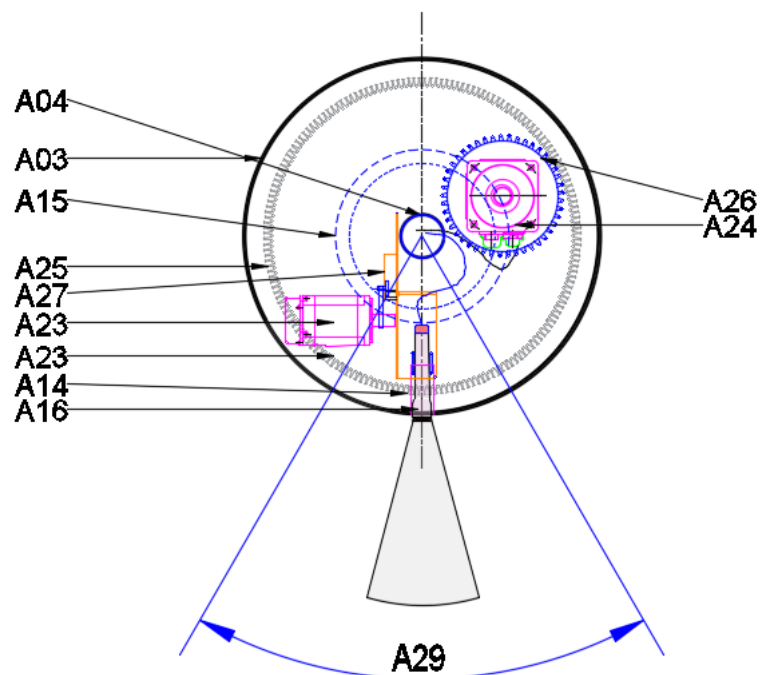


Figure 6: Sectional (exposed) pan view of apparatus across turret



The CCTV surveillance camera deployed in the apparatus is a fixed type IP based camera used primarily to protect low level area below the apparatus. If the Area of Protection required is small, e.g. 30m distance x 8m wide, a single apparatus may be sufficient to protect the area. The area of protection can be calibrated by angle of view, sensor size and focus length. It is provided the blind spot area is adequately addressed by high human activities or lack of food. To deter bird, a fixed type laser gun pinon mounted with the target area matching the bounding box of the CCTV camera. Upon detection of a bird within the area of protection, the lower level laser gun is activated for 5 seconds, and the vibration chip on the gun would create an erratic laser beam trial to confuse the bird and instil a sense of fear. Figure 7 to Figure 9 below demonstrate the coverage of a single apparatus but the vulnerability of such an installation is the coverage of the camera limited by it's field of view which can be overcome with another apparatus placed at opposed diagonal position that will counter each other's deficiencies. See Figure 10 below.

Figure 7: Section view of Area of Protection with single apparatus (Bounding Box illustrated)

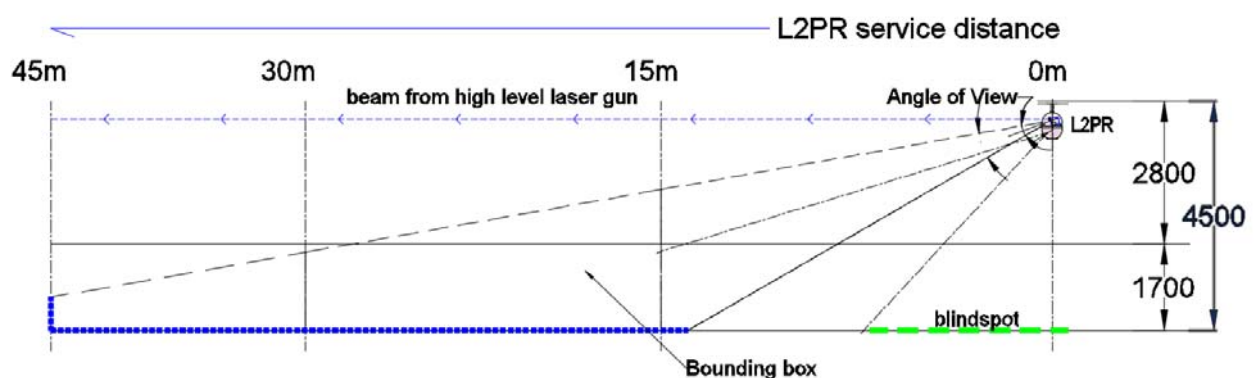


Figure 8: Plan view of Area of Protection (Camera lined to center of Bounding Box illustrated)

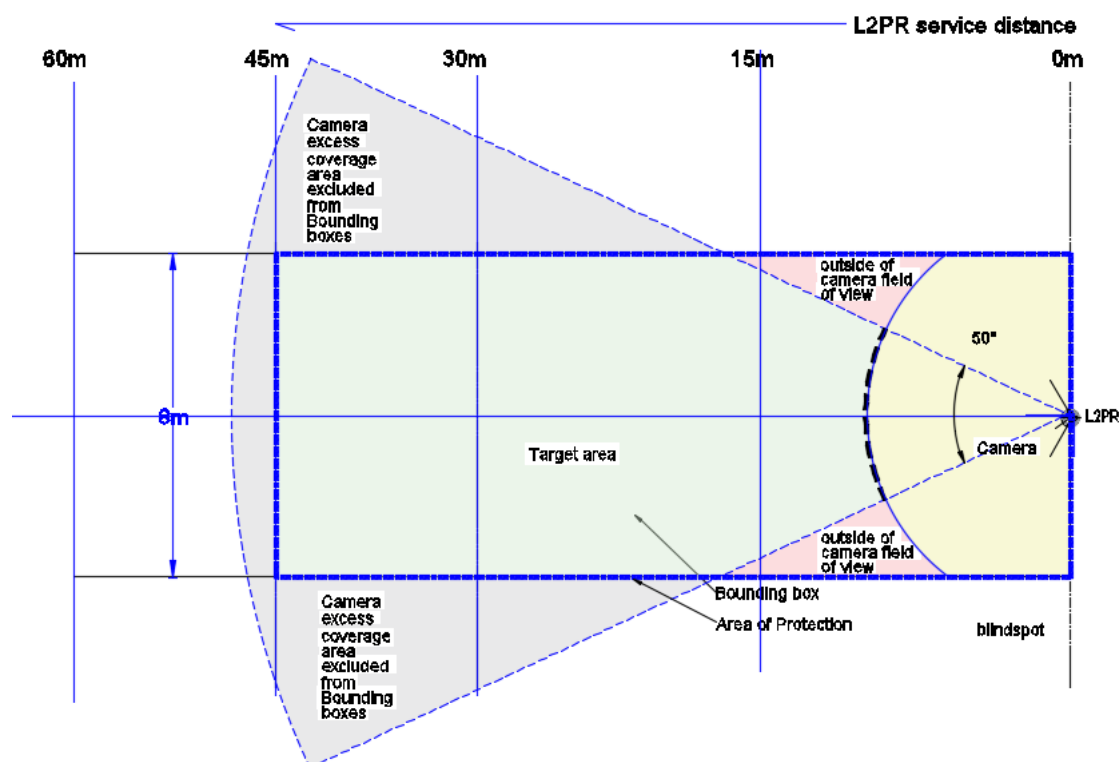
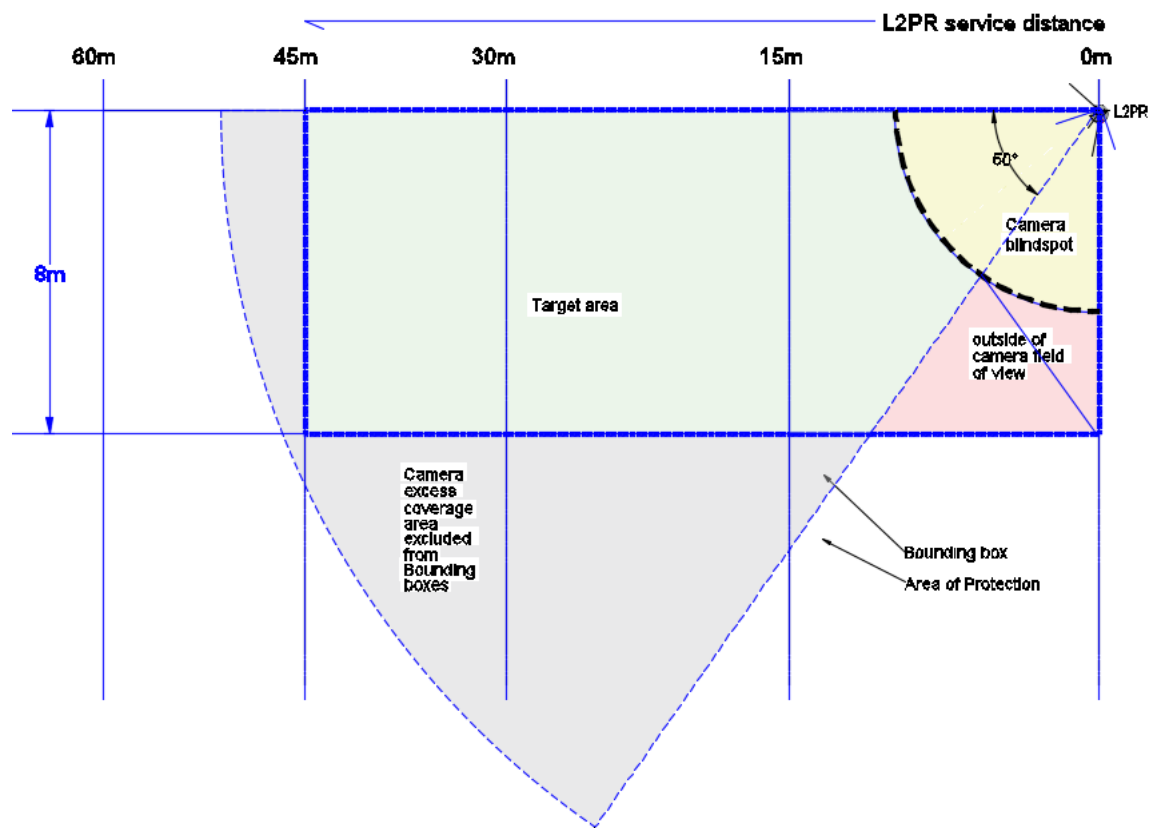


Figure 9: Plan view of Area of Protection (Camera lined to edge of Bounding Box illustrated)



The bounding box may be formed by external walls to the structure. Surveillance of human/ birds at the camera excess area based on theoretical angle may be excluded from design consideration as the camera view are blocked by the wall. Only the target area within the bounding box is considered for AI analytic.

Similarly, with a fixed laser gun configuration, the blind spot below the laser gun area of coverage will be protected by coverage from apparatus at opposite side of the bounding box.

Figure 10: Section view of Area of Protection with two apparatus (Bounding Box illustrated)

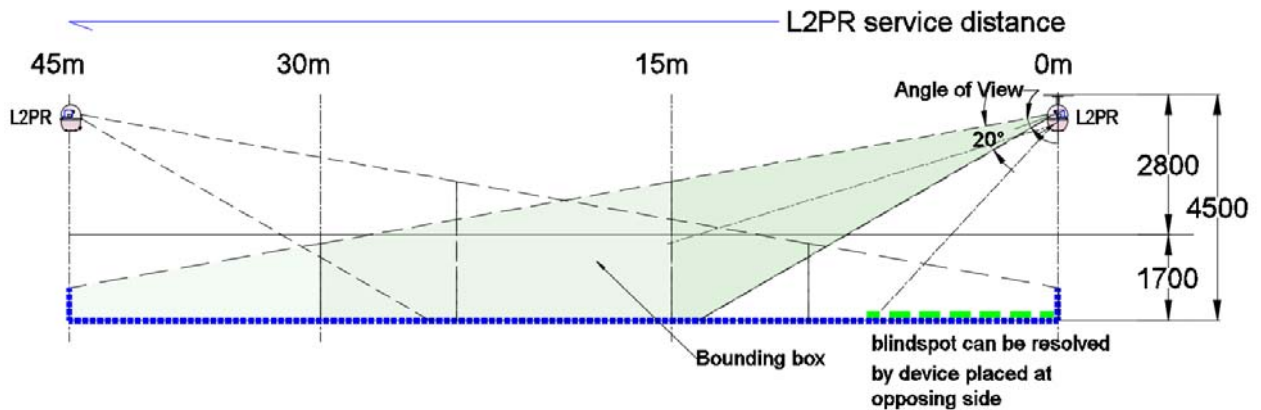
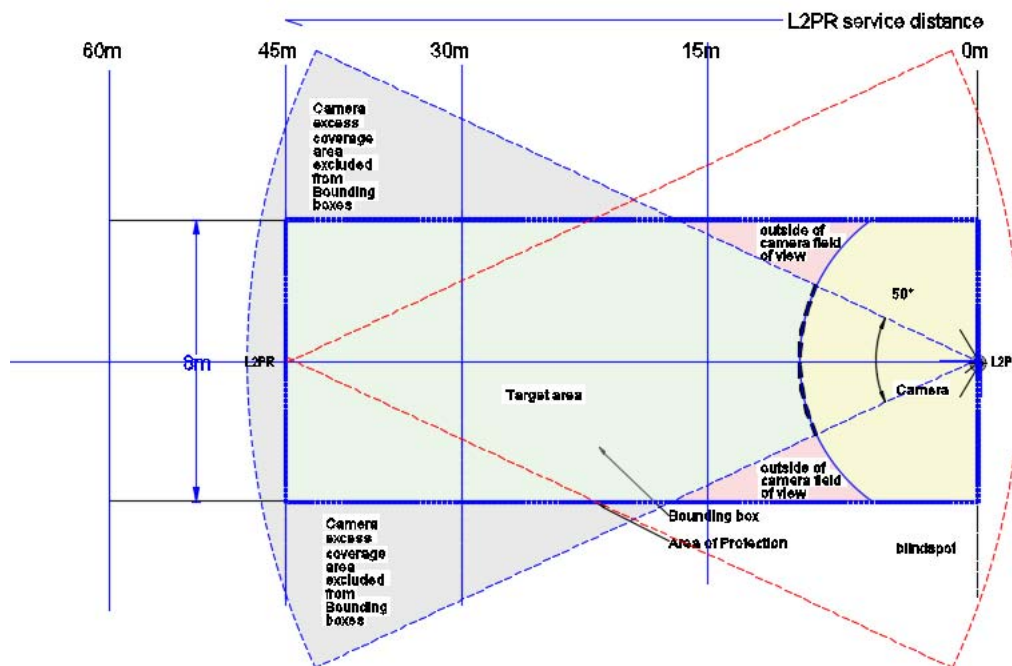
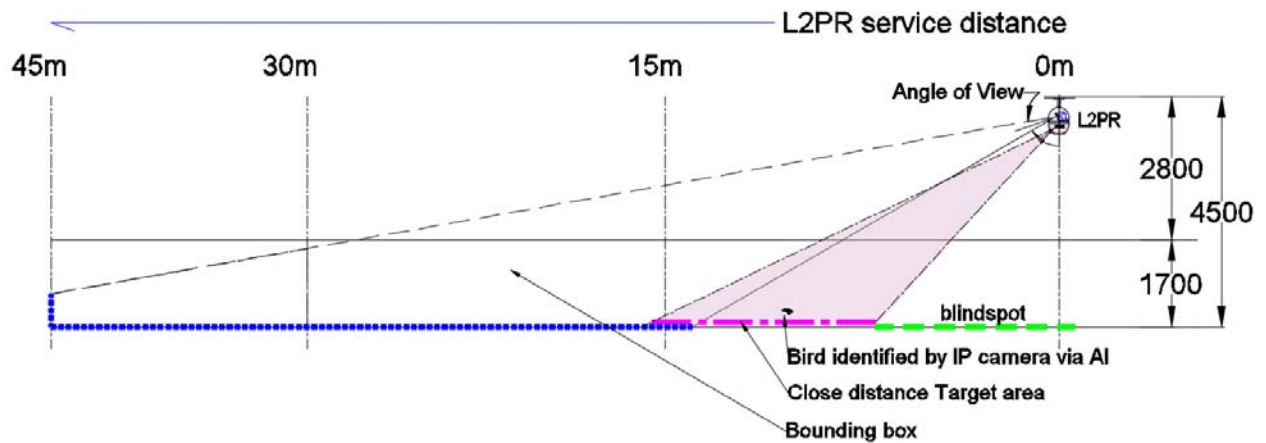


Figure 11: Plan view of Area of Protection with 2 apparatus (Bounding Box illustrated)



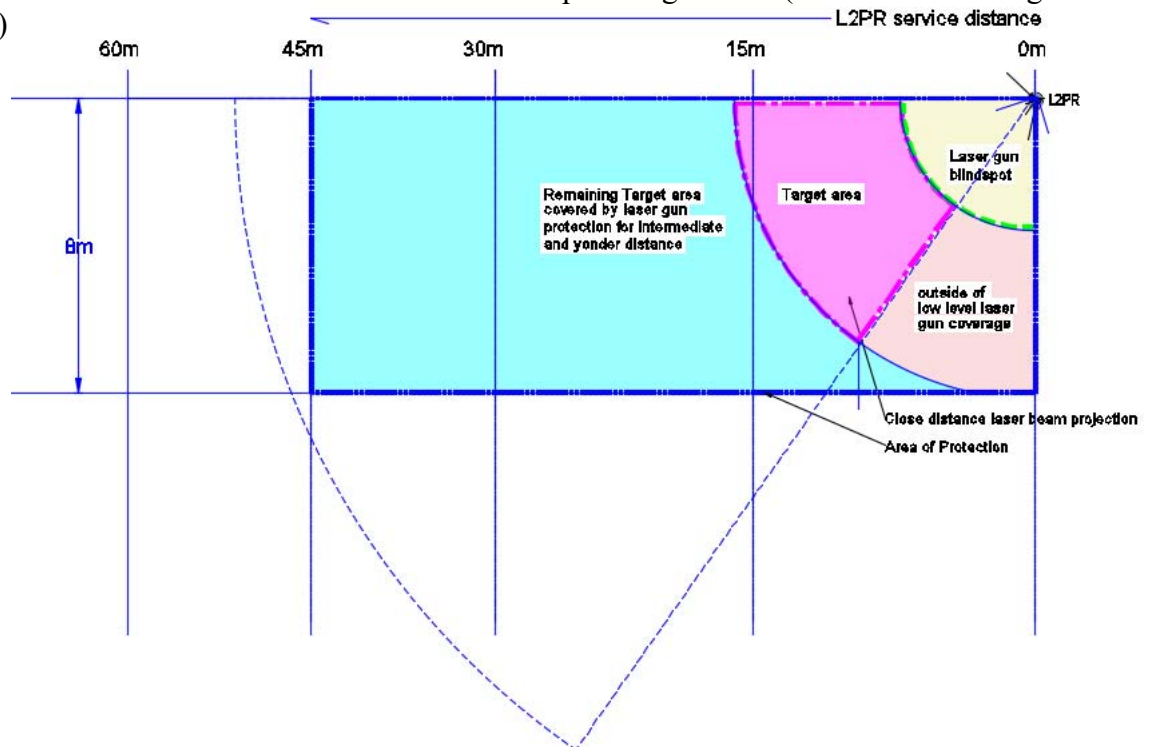
A center lined configuration for apparatus is generally preferred to allow a butterfly shaped coverage of the bounding area, as the area outside the bounding area may consist of working spaces like hawker's stall. Efficient protection against birds due to the high walls may not be possible but optional protection against any fire outbreak from these areas into the bounding box can be provided through AI analytic of flame structure and colour and smoke development flowing out of the affected stall.

Figure 12: Section view of Area of Protection with Spot Target area (close distance illustrated)



When the area of Protection is much larger than bounding box of the apparatus, a simultaneous laser beam projection may not be possible or desired. To overcome this, a pre-Engineered approach is used to overcome these limitations such a blind spot through collective arrangement of apparatus for a holistic coverage of the Target area to match the area of Protection. Blind spots can be addressed using apparatus from opposite direction to overlap the target area covered by the lower level Laser gun. In such instance where there may be high level of human activities, the target area is reduced by capping the lens of the laser gun so that a limited application of laser light beam projection is used. The low-level laser gun will not be of a fixed pinion mount but instead provided with dual servo motor designed to operate in both x-axis (horizontally) and y-axis (vertically) guided by the location of the classifier (bird).

Figure 13: Plan view of Area of Protection with Spot Target area (close distance target area illustrated)



Through appropriation of spot target area, any effect or concern of the laser gun beam projection acting and / affecting humans can be ameliorated even though the projection duration is merely 7 ± 2 seconds, each time at intermediate of no more than 10 seconds delay assuming the first launch of laser beam may not have fully deterred the birds, the consideration provided in this case is merely to reinforce the repellent.

Figure 14 Section view of Area of Protection with Spot Target area (intermediate distance illustrated)

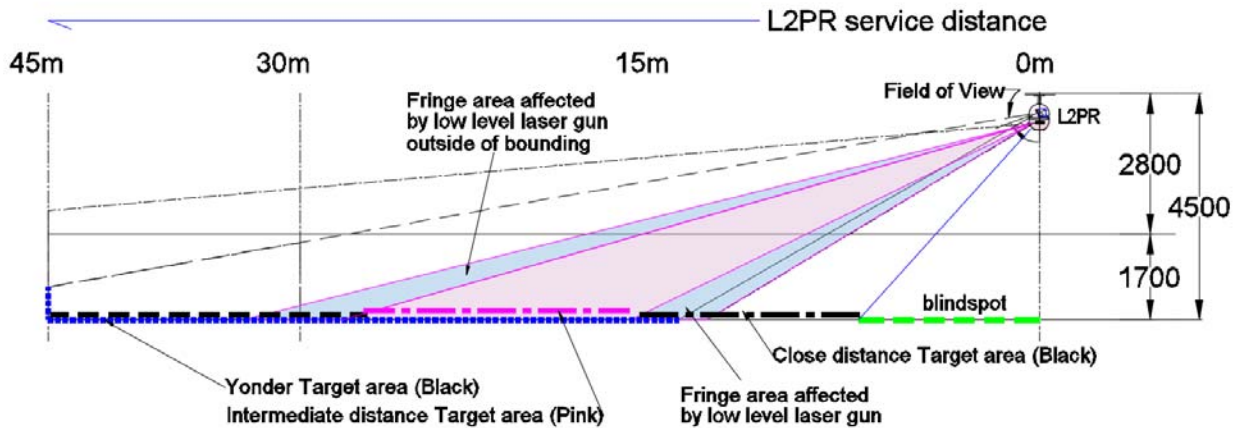
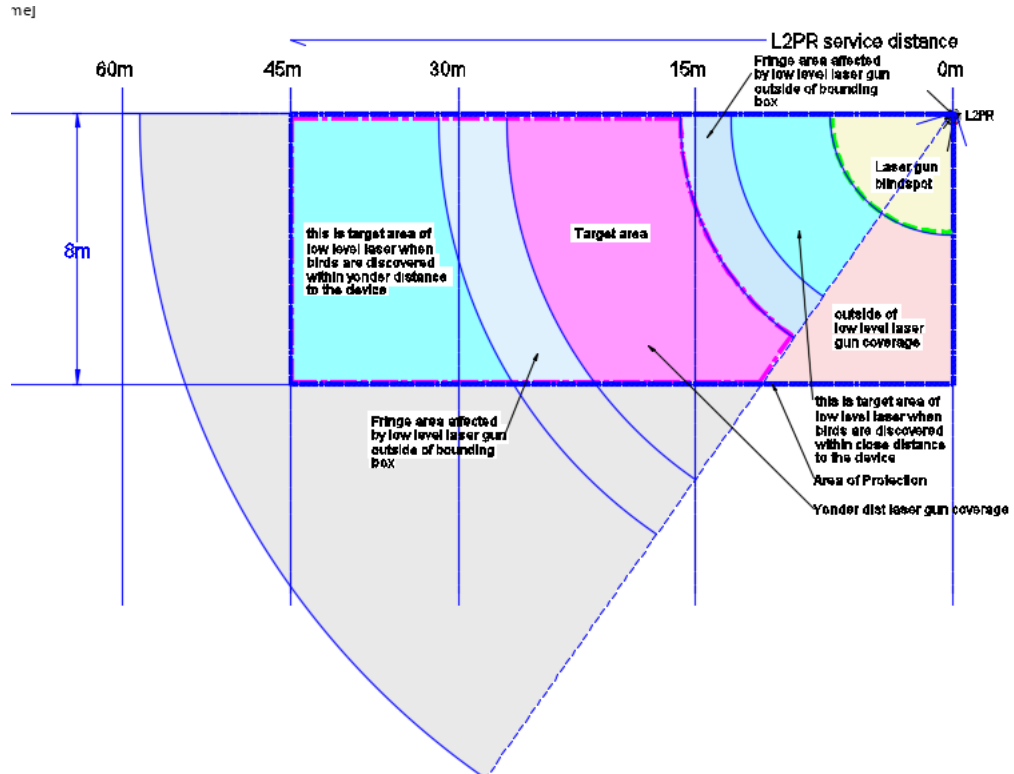


Illustration for Figure 14 & Figure 15 demonstrate spot target area at intermediate area between both close distance and yonder distance. It is expected that the light beam projected by the apparatus will result in spot target area defined by core projection beam and fringe area which has weaker beam intensity, due to the distance of apparatus from target area. In such instance, the light projection is fulfilled when the laser gun which is fitted to a vertical axis pinion moves from the idle position (close distance target area) to the intermediate distance target area using a servo motor. The servo motor may move gradually from idle mode to the specific location before activating the laser gun or allowing the laser gun to be activate then move the laser gun to position. During duration of laser gun activation, the vibration chip on the gun/s shall also be activated.

Figure 15 Plan view of Area of Protection with Spot Target area (intermediate distance illustrated)

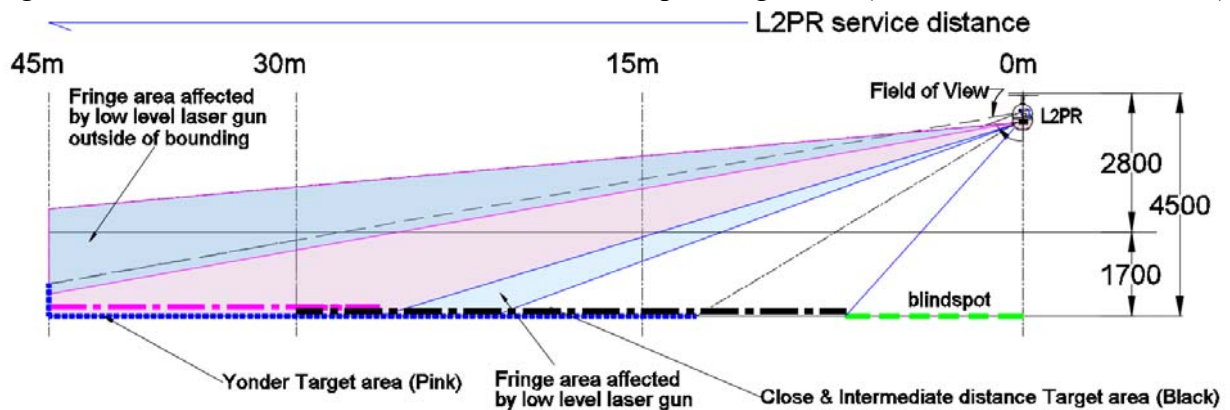


The requirement to implement various location for laser beam projection will be pre-Engineered according to site situation and tested before commissioning the system. There the L2PD service

distance is small, intermediate distance target area may be dispensed and the area provided with both yonder distance and close distance target area or just the latter.

The illustration in these drawings to demonstrate 3 zone approach is for explanatory purposes and does not constitute the final design for any configuration. The pre-Engineered approach will ensure that intermediate distance target area should eclipse other target area to ensure there is no design gap between each itinerary steps of the proposed target area.

Figure 16 Section view of Area of Protection with Spot Target area (Yonder distance illustrated)



The pre-Engineered approach for the Yonder distance target area will be an overlap between the last intermediate target area and projecting beyond the edge of the bounding box will ensure that the entire bounding box will be fully protected. See Figure 16 & Figure 17.

Figure 17 Plan view of Area of Protection with Spot Target area (Yonder distance illustrated)

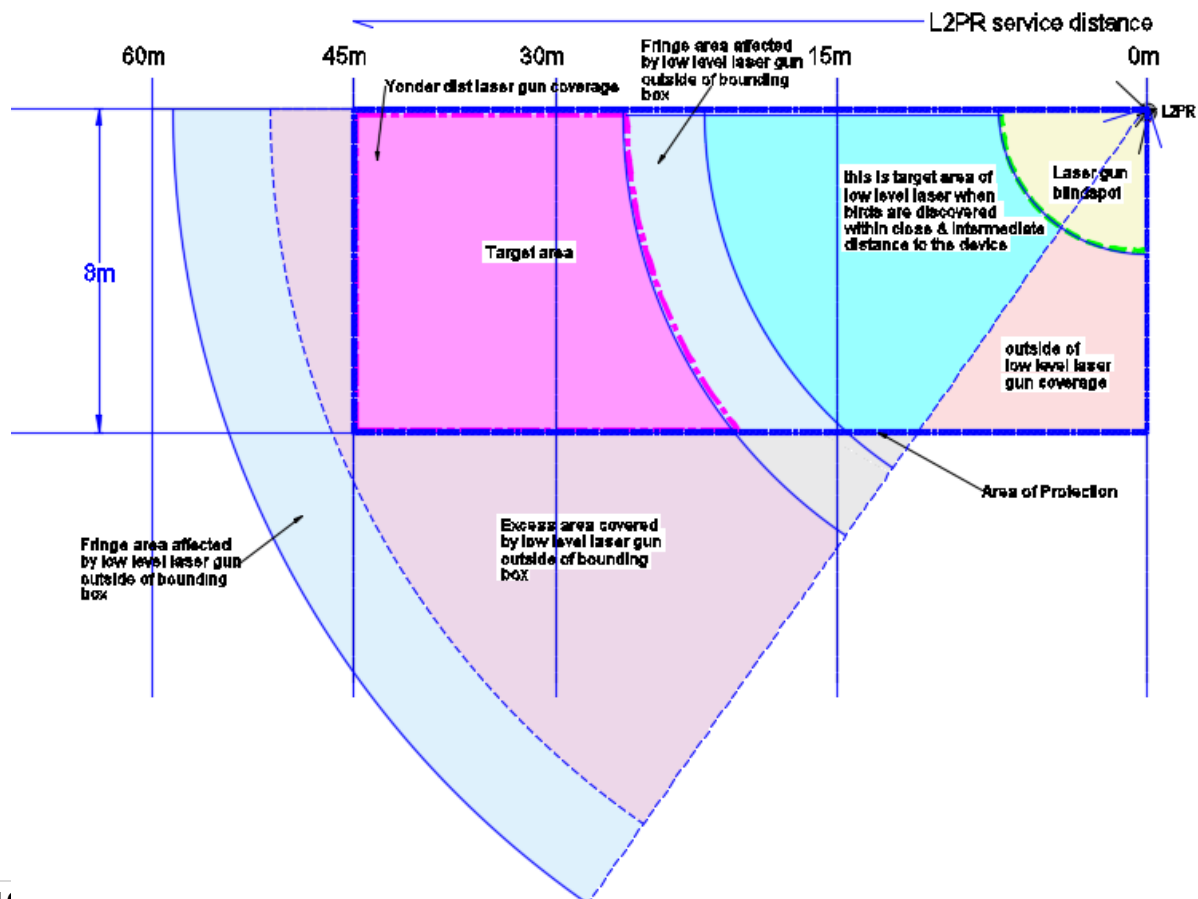
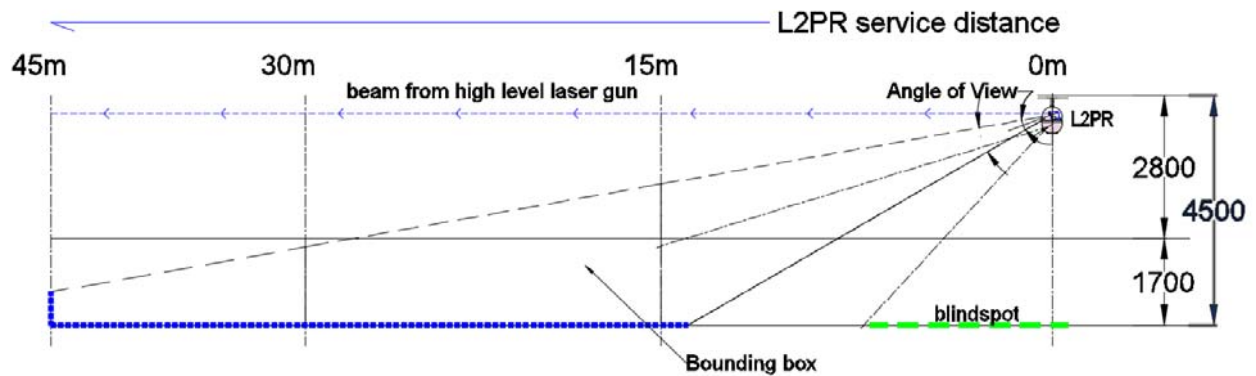


Figure 18 High level laser beam projection



The operating principle for protection of high-level space is not complicated and rely on AI analytic of specific sound from the bird designated as “scout’s command”. For Mynah birds, this involve a high pitch shriek across a few seconds to inform other scavenging bird of their group to target their spoils.

The means of detection is dependent on noise cancelling condensing microphone placed at the front of the apparatus. Once the noise is matched by the apparatus, high level laser guns are activated projecting into multiple laterally orientated laser beams towards the upper structure of the Building. The position of the laser guns are static based on fixed pinion mechanism with the aggregate coverage of both high level laser guns matching the field of view of the CCTV camera. Both laser guns are also armed with vibration chips designed to distort the light beams to confuse the scout bird.