

*Pocket Guide for Aerial Drones*



# CONFINED Tests and Scenarios



*Test Director*

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Science and Technology Directorate  
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*Website*

RobotTestMethods.nist.gov



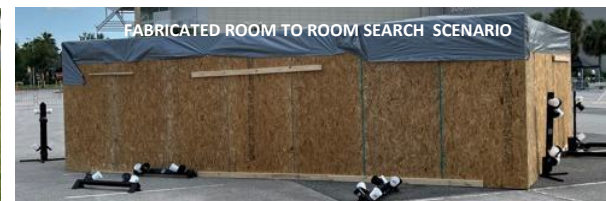
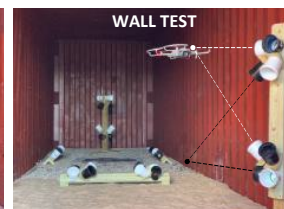
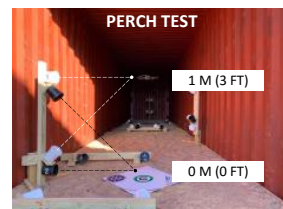
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Version 2023C

## Confined Tests and Scorable Scenarios

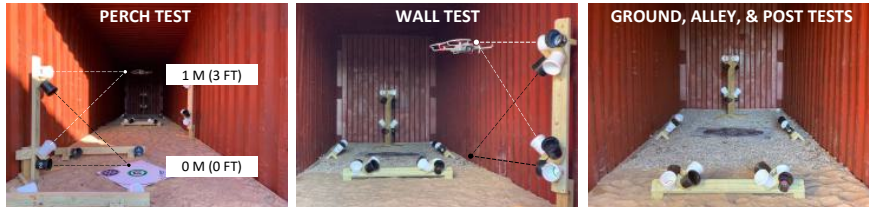
Indoors/Outdoors, Lighted/Dark, GPS/No GPS



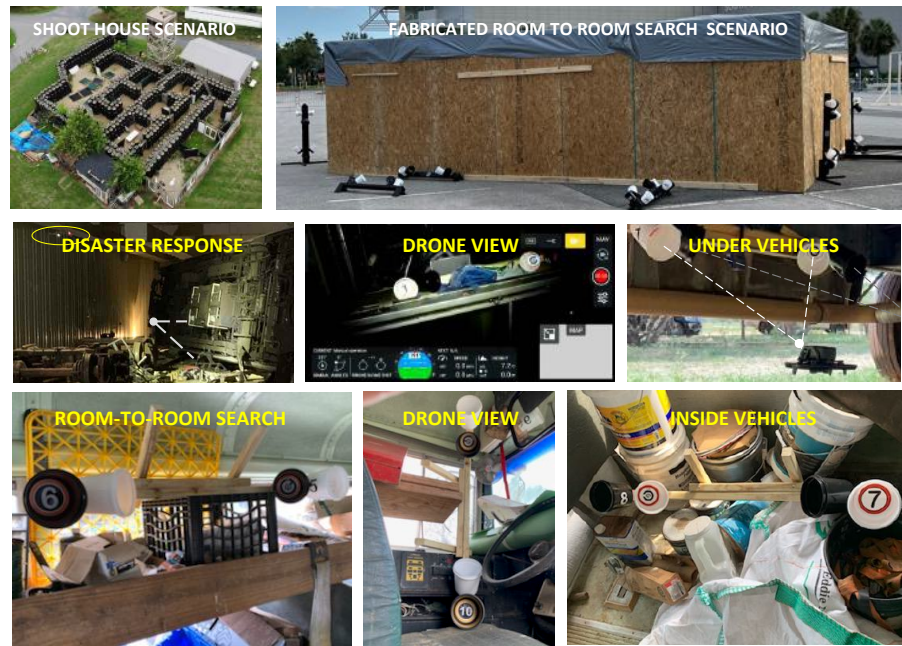


# Confined Tests and Scorable Scenarios

Evaluate safety, capabilities, and proficiency



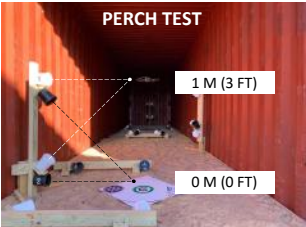
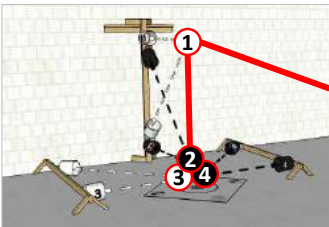
The Confined tests and scorable scenarios enable remote pilots to perform safe and repeatable flight paths indoors room-to-room or in any confined space to inspect objects from very close proximity. There are 5 different tests that guide remote pilots through various standoff positions, orientations, and perches at about 1 m (3 ft) from objects. These tests can be performed indoors to control lighting, weather, and access to GPS or outdoors as appropriate.



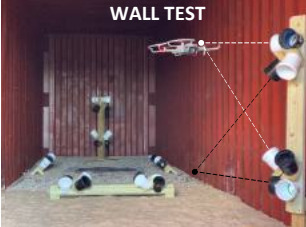
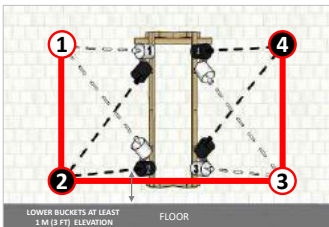
# Bucket Alignments Define Flight Paths

Designated altitudes, positions, and orientations

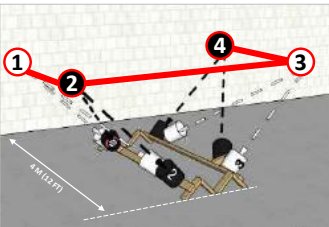
**PERCH**  
PAY 6



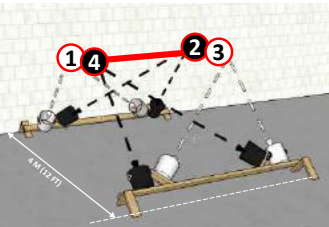
**WALL**  
PAY 7



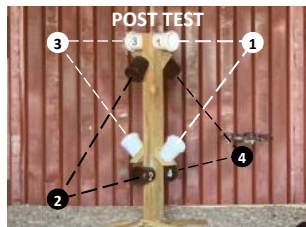
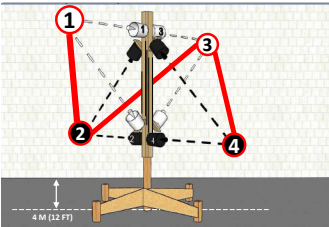
**GROUND**  
PAY 8



**ALLEY**  
PAY 9



**POST**  
PAY 10



# Metrics to Track Over Time

Measure System Capabilities and Pilot Proficiency

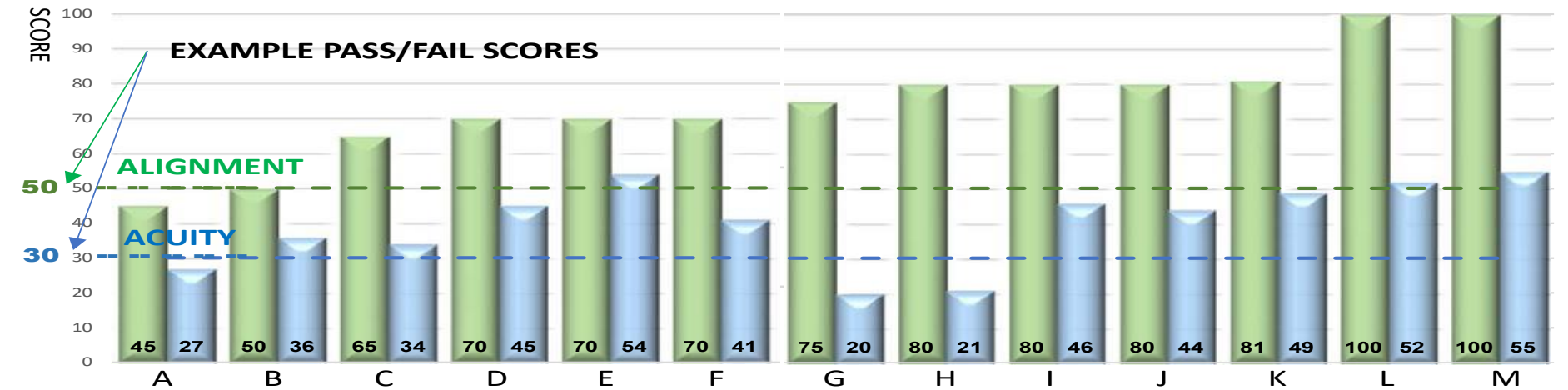
**Completeness:** Align with every bucket in the sequence and land accurately according to the procedure. The objective is scoring ALL points possible for your aircraft without making mistakes.

**Score:** For complete trials, track your scores over time. The average of your last five trials is an excellent measure of your proficiency on the aircraft and interface used.

**Efficiency (Optional):** For complete trials with maximum scores for a particular aircraft, the elapsed time can help identify the most efficient systems and techniques. Time limited trials can be used across multiple tests to maintain a schedule and similarly fatigue novices and experts.

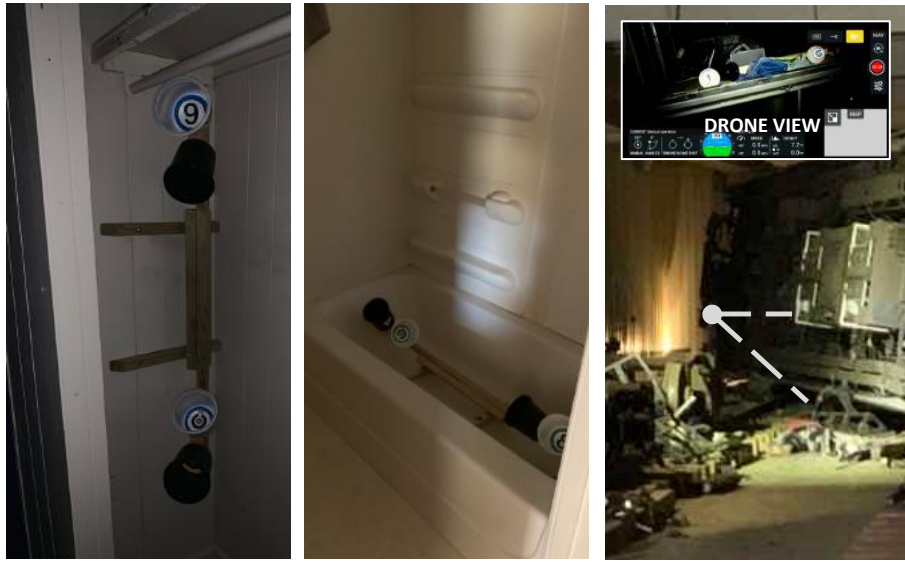
# Separate Scores: ALIGNMENT and ACUITY

Track and Compare Scores Using the Same Drone



# Indoor and Outdoor Scenarios

Evaluate using repeatable search/inspect tasks



The WALL and ALLEY test shown embedded in a room-to-room search scenario closet and bath tub. The pairs of of white and black buckets require exposure control to discern details. Also shown is a more complex overturned subway rail car disaster. All such scenarios get embedded with scoring tasks totaling 100 points.

# Scoring Alignment Points

Capture images of alignment rings to verify

## ALIGN WITH BUCKETS TO CAPTURE IMAGES

10 ALIGNMENT RINGS TOTAL 50 POINTS



CAPTURE IMAGES OF THE INSCRIBED RINGS AND PERCH ACCURATELY.

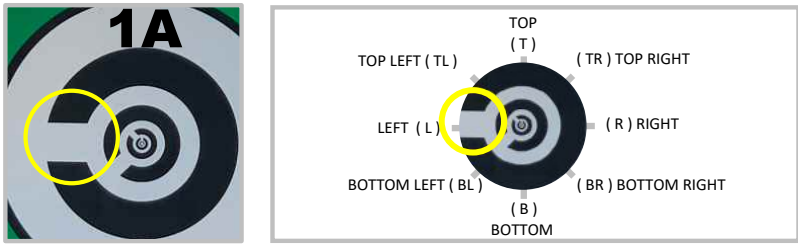
- First align with each PERPENDICULAR BUCKET to capture a SINGLE ALIGNMENT IMAGE of the inscribed ring.
- Score captured images with
  - UNBROKEN RINGS (5 points)
  - BROKEN RINGS (1 point)
  - NO RINGS (0 points, strike through line)
- Accurate landings are not scored.
- Verification of captured alignment images can be during the trial when obvious or after the trial to eliminate discussions during the trial. Images can also be stored for documentation.

# Scoring Acuity Points

Identify increasingly small visual acuity targets

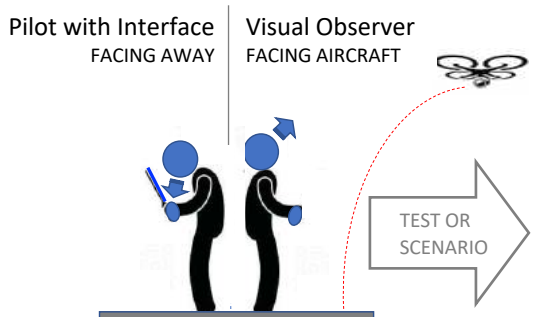
## ALIGN THEN CONTROL ZOOM AND EXPOSURE

10 ACUITY TARGETS TOTAL 50 POINTS



REPORT GAP DIRECTIONS RELATIVE TO THE BUCKET NUMBER (TOP)

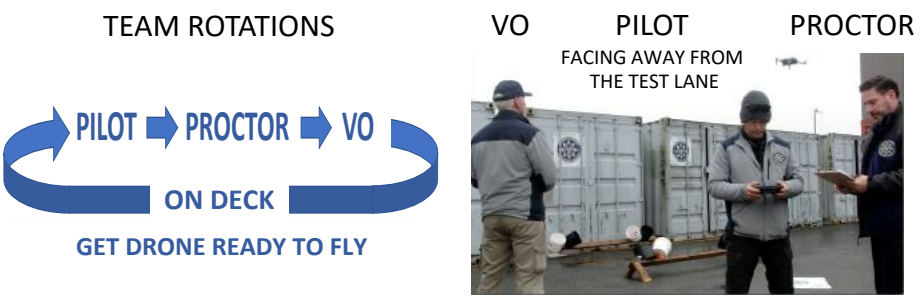
- Then align with each ANGLED BUCKET to IDENTIFY ACUITY TARGETS using camera zoom and exposure controls.
- Call out as many of the Concentric C gap directions as possible (1 pt each).
- Fly facing away from the test lane or scenario with a Visual Observer to evaluate flying interface only as if beyond visual line of sight.





# Teams Rotate Through Each Role

Each Pilot flies a 5-minute trial with help from others.  
A 3-4 person team completes all 5 tests in 2 hours.



Four person teams always have one person getting their aircraft ready to launch right after the previous lands.  
Three person teams work too, but require some time between each rotation to prepare the next aircraft.

## PILOT

- Maintain control of the aircraft.
- Call out each intention of movement before doing so.
- Call out each bucket alignment and acuity target gap.

## PROCTOR

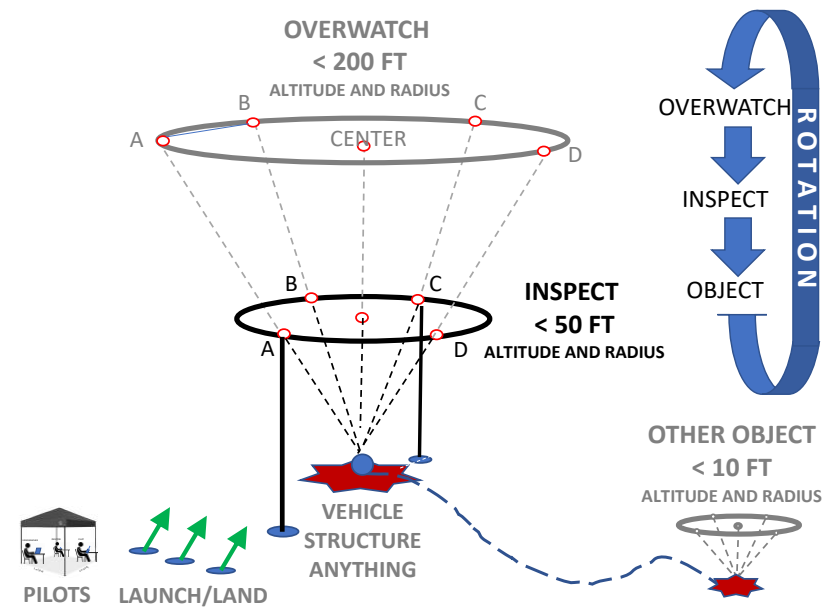
- Fill in the form header.
- Read the test procedures to the Pilot.
- Confirm, record, and attest to scoring after the trial.

## VISUAL OBSERVER (VO)

- Maintain sight with the aircraft and surroundings.
- Repeat the Pilot's intention of movement to confirm.
- Call out corrections and warnings as necessary.

# Teams Sequence Through Scenarios

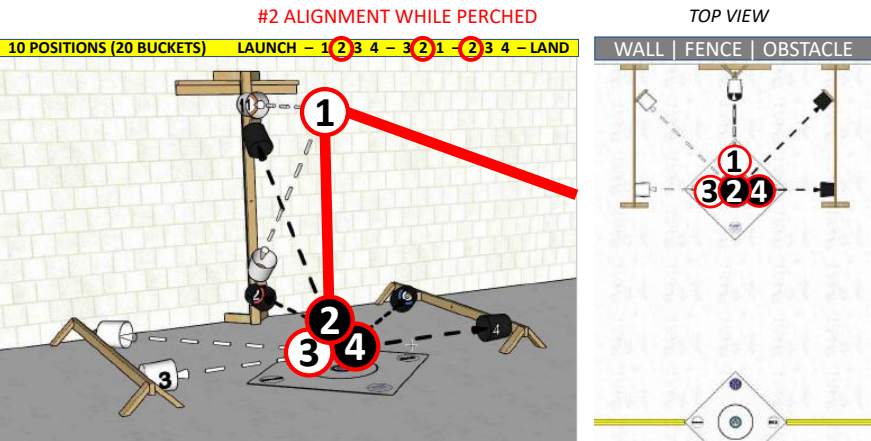
Each Pilot flies a 15-minute scenario, sequencing through 3 objectives for 5 minutes each.



- This scenario mechanization enables embedded bucket scoring tasks to be performed similarly by all participating Pilots. So the results are comparable within the same scenario layout. Additional tactics can be overlayed onto these scenarios at your facility.
- Up to 3 teams concurrently fly different scenario objectives from safe distances and altitudes apart.
- Teams move as necessary to maintain sight lines with their aircraft and communications with other teams. The overwatch team leads communications.
- Scenarios restart every 20 minutes with a different rotation of Pilot, Proctor, and VO.

Perch (PAY 6)

Confined Test Lane



- Fly near the ground and perch within 1 m (3 ft) of a wall or obstacle in front of the aircraft with ground obstacles on both sides.
- Inspect vertical and horizontal object features upward, downward, leftward and rightward.
- BUCKET #2 MUST BE ALIGNED WHILE PERCHED**, but all others can be aligned/identified either while perched or hovering as if inspecting underbody objects of interest.

SCORING

Alignment Points in Perpendicular Buckets (50 Total):

Align with each perpendicular bucket to CAPTURE A SINGLE IMAGE OF THE ALIGNMENT RING for scoring during or after the trial.

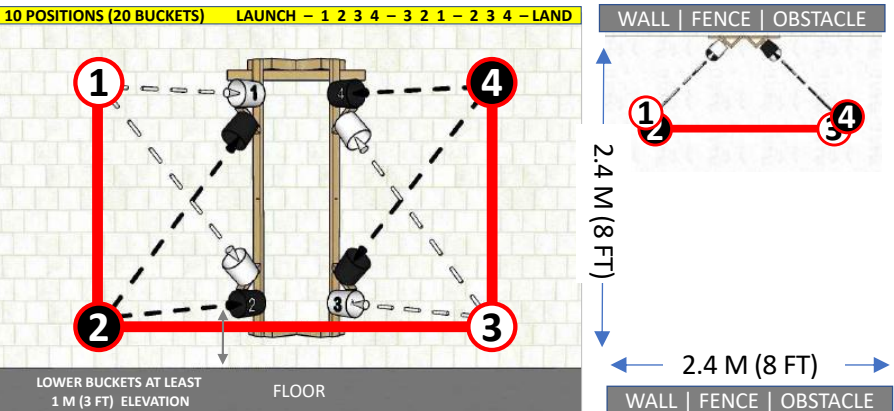
Acuity Points in Angled Buckets (50 Total):

Align with each angled bucket to IDENTIFY ACUITY GAPS through the pilot interface. Images are optional for documentation but use the answer key for scoring..

| CONFINED   PERCH         |                                               | BUCKETS | ALIGNMENT                      | ACUITY                        |
|--------------------------|-----------------------------------------------|---------|--------------------------------|-------------------------------|
| START TIMER              |                                               | NUMBER  | IMAGE POINTS<br>(5 OR 1 POINT) | CIRCLE GAPS<br>(1 POINT EACH) |
| 1                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 1       | 5 1 0                          |                               |
| 2                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 1A      |                                | TR B TR L BR                  |
| 3                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 2       | 5 1 0                          | WHILE PERCHED                 |
| 4                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 2A      |                                | L BR T TL R                   |
| 5                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 3       | 5 1 0                          |                               |
| 6                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 3A      |                                | BR T TL R BL                  |
| 7                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 4       | 5 1 0                          |                               |
| 8                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 4A      |                                | T BL B TR L                   |
| 9                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 3       | 5 1 0                          |                               |
| 10                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 3A      |                                | BR T TL R BL                  |
| 11                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 2       | 5 1 0                          | WHILE PERCHED                 |
| 12                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 2A      |                                | L BR T TL R                   |
| 13                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 1       | 5 1 0                          |                               |
| 14                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 1A      | - - -                          | TR B TR L BR                  |
| 15                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 2       | 5 1 0                          | WHILE PERCHED                 |
| 16                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 2A      |                                | L BR T TL R                   |
| 17                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 3       | 5 1 0                          |                               |
| 18                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 3A      |                                | BR T TL R BL                  |
| 19                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 4       | 5 1 0                          |                               |
| 20                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 4A      |                                | T BL B TR L                   |
| ELAPSED TIME:<br>(MM:SS) |                                               | SCORES  | /50                            | /50                           |

# Wall (PAY 7)

## Confined Test Lane



- Place the Wall apparatus in a 2.4m (8 ft) cubic space with ceiling (or shipping container) with the vertical tasks at 1m (3ft) and 2m (6 ft) elevations.
- Fly within 1 m (3 ft) to perform the alignments with the wall at 45 degrees from forward of the aircraft.
- Inspect vertical objects upward and downward.

### SCORING

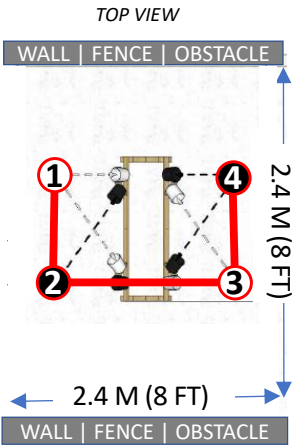
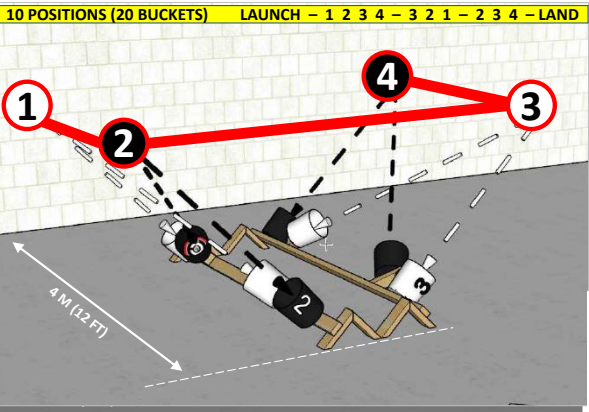
**Alignment Points in Perpendicular Buckets (50 Total):**  
Align with each perpendicular bucket to CAPTURE A SINGLE IMAGE OF THE ALIGNMENT RING for scoring during or after the trial.

**Acuity Points in Angled Buckets (50 Total):**  
Align with each angled bucket to IDENTIFY ACUITY GAPS through the pilot interface. Images are optional for documentation but use the answer key for scoring.

| CONFINED   WALL          |                                               | BUCKETS | ALIGNMENT                      | ACUITY                        |    |    |    |    |
|--------------------------|-----------------------------------------------|---------|--------------------------------|-------------------------------|----|----|----|----|
| START TIMER              |                                               | NUMBER  | IMAGE POINTS<br>(5 OR 1 POINT) | CIRCLE GAPS<br>(1 POINT EACH) |    |    |    |    |
| 1                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 1       | 5 1 0                          |                               |    |    |    |    |
| 2                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 1A      |                                | TR                            | B  | TR | L  | BR |
| 3                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 2       | 5 1 0                          |                               |    |    |    |    |
| 4                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 2A      |                                | L                             | BR | T  | TL | R  |
| 5                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 3       | 5 1 0                          |                               |    |    |    |    |
| 6                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 3A      | - - -                          | BR                            | T  | TL | R  | BL |
| 7                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 4       | 5 1 0                          |                               |    |    |    |    |
| 8                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 4A      |                                | T                             | BL | B  | TR | L  |
| 9                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 3       | 5 1 0                          |                               |    |    |    |    |
| 10                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 3A      | - - -                          | BR                            | T  | TL | R  | BL |
| 11                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 2       | 5 1 0                          |                               |    |    |    |    |
| 12                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 2A      |                                | L                             | BR | T  | TL | R  |
| 13                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 1       | 5 1 0                          |                               |    |    |    |    |
| 14                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 1A      |                                | TR                            | B  | TR | L  | BR |
| 15                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 2       | 5 1 0                          |                               |    |    |    |    |
| 16                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 2A      |                                | L                             | BR | T  | TL | R  |
| 17                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 3       | 5 1 0                          |                               |    |    |    |    |
| 18                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 3A      |                                | BR                            | T  | TL | R  | BL |
| 19                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 4       | 5 1 0                          |                               |    |    |    |    |
| 20                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 4A      |                                | T                             | BL | B  | TR | L  |
| ELAPSED TIME:<br>(MM:SS) |                                               | SCORES  | /50                            | /50                           |    |    |    |    |

# Ground (PAY 8)

## Confined Test Lane



- Place the Ground apparatus in a 2.4m (8 ft) cubic space with ceiling (or shipping container) with the horizontal tasks centered between the side walls.
- Fly within 1 m (3 ft) to perform the alignments with the walls at 90 degrees from forward of the aircraft.
- Inspect horizontal objects leftward and rightward.

### SCORING

#### Alignment Points in Perpendicular Buckets (50 Total):

Align with each perpendicular bucket to CAPTURE A SINGLE IMAGE OF THE ALIGNMENT RING for scoring during or after the trial.

#### Acuity Points in Angled Buckets (50 Total):

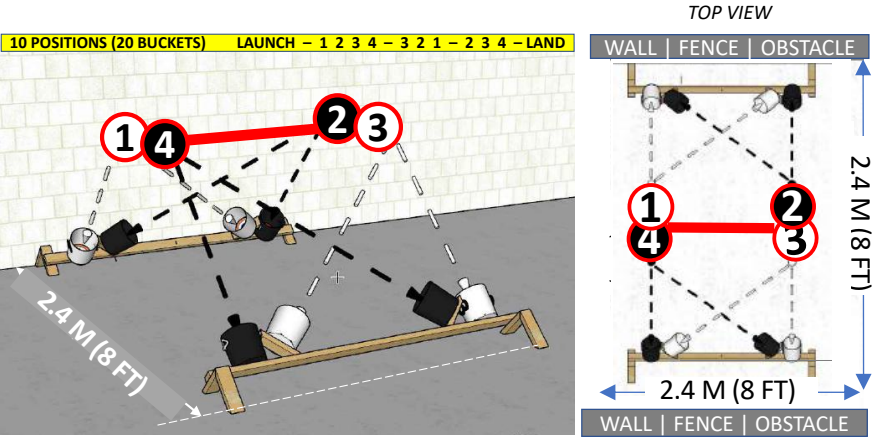
Align with each angled bucket to IDENTIFY ACUITY GAPS through the pilot interface. Images are optional for documentation but use the answer key for scoring.

| CONFINED   GROUND        |                                               | BUCKETS | ALIGNMENT                      | ACUITY                        |
|--------------------------|-----------------------------------------------|---------|--------------------------------|-------------------------------|
| START TIMER              |                                               | NUMBER  | IMAGE POINTS<br>(5 OR 1 POINT) | CIRCLE GAPS<br>(1 POINT EACH) |
| 1                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 1       | 5 1 0                          |                               |
| 2                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 1A      |                                | TR B TR L BR                  |
| 3                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 2       | 5 1 0                          |                               |
| 4                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 2A      |                                | L BR T TL R                   |
| 5                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 3       | 5 1 0                          |                               |
| 6                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 3A      |                                | BR T TL R BL                  |
| 7                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 4       | 5 1 0                          |                               |
| 8                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 4A      |                                | T BL B TR L                   |
| 9                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 3       | 5 1 0                          |                               |
| 10                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 3A      |                                | BR T TL R BL                  |
| 11                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 2       | 5 1 0                          |                               |
| 12                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 2A      |                                | L BR T TL R                   |
| 13                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 1       | 5 1 0                          |                               |
| 14                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 1A      | - - -                          | TR B TR L BR                  |
| 15                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 2       | 5 1 0                          |                               |
| 16                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 2A      |                                | L BR T TL R                   |
| 17                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 3       | 5 1 0                          |                               |
| 18                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 3A      |                                | BR T TL R BL                  |
| 19                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 4       | 5 1 0                          |                               |
| 20                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 4A      |                                | T BL B TR L                   |
| ELAPSED TIME:<br>(MM:SS) |                                               | SCORES  | /50                            | /50                           |



# Alley (PAY 9)

## Confined Test Lane



- Place the Alley apparatus in a 2.4m (8 ft) cubic space with ceiling (or shipping container) with the horizontal tasks centered along opposing side walls.
- Fly within 1 m (3 ft) to perform the alignments with the walls in front of the aircraft (0 degrees) and behind the aircraft (180 degrees).
- Inspect horizontal objects leftward and rightward.

### SCORING

#### Alignment Points in Perpendicular Buckets (50 Total):

Align with each perpendicular bucket to CAPTURE A SINGLE IMAGE OF THE ALIGNMENT RING for scoring during or after the trial.

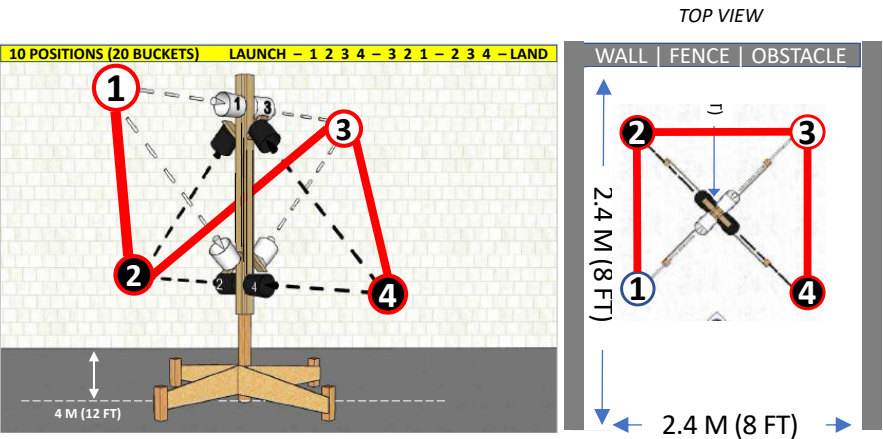
#### Acuity Points in Angled Buckets (50 Total):

Align with each angled bucket to IDENTIFY ACUITY GAPS through the pilot interface. Images are optional for documentation but use the answer key for scoring.

| CONFINED   ALLEY         |                                               | BUCKETS | ALIGNMENT                      | ACUITY                        |
|--------------------------|-----------------------------------------------|---------|--------------------------------|-------------------------------|
| START TIMER              |                                               | NUMBER  | IMAGE POINTS<br>(5 OR 1 POINT) | CIRCLE GAPS<br>(1 POINT EACH) |
| 1                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 1       | 5 1 0                          |                               |
| 2                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 1A      |                                | TR B TR L BR                  |
| 3                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 2       | 5 1 0                          |                               |
| 4                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 2A      |                                | L BR T TL R                   |
| 5                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 3       | 5 1 0                          |                               |
| 6                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 3A      | - - -                          | BR T TL R BL                  |
| 7                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 4       | 5 1 0                          |                               |
| 8                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 4A      |                                | T BL B TR L                   |
| 9                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 3       | 5 1 0                          |                               |
| 10                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 3A      | - - -                          | BR T TL R BL                  |
| 11                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 2       | 5 1 0                          |                               |
| 12                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 2A      |                                | L BR T TL R                   |
| 13                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 1       | 5 1 0                          |                               |
| 14                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 1A      | - - -                          | TR B TR L BR                  |
| 15                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 2       | 5 1 0                          |                               |
| 16                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 2A      |                                | L BR T TL R                   |
| 17                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 3       | 5 1 0                          |                               |
| 18                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 3A      |                                | BR T TL R BL                  |
| 19                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 4       | 5 1 0                          |                               |
| 20                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 4A      |                                | T BL B TR L                   |
| ELAPSED TIME:<br>(MM:SS) |                                               | SCORES  | /50                            | /50                           |

# Post (PAY 10)

## Confined Test Lane



- Center the Post apparatus in a 2.4m (8 ft) cubic space or shipping container with the vertical task elevations at 1m (3ft) and 2m (6 ft) above the ground.
- Fly within 1 m (3 ft) of the post to inspect vertical object features upward and downward.
- Pass between the post and walls throughout.

### SCORING

**Alignment Points in Perpendicular Buckets (50 Total):**  
Align with each perpendicular bucket to CAPTURE A SINGLE IMAGE OF THE ALIGNMENT RING for scoring during or after the trial.

**Acuity Points in Angled Buckets (50 Total):**  
Align with each angled bucket to IDENTIFY ACUITY GAPS through the pilot interface. Images are optional for documentation but use the answer key for scoring.

| CONFINED   POST          |                                               | BUCKETS | ALIGNMENT                      | ACUITY                        |
|--------------------------|-----------------------------------------------|---------|--------------------------------|-------------------------------|
| START TIMER              |                                               | NUMBER  | IMAGE POINTS<br>(5 OR 1 POINT) | CIRCLE GAPS<br>(1 POINT EACH) |
| 1                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 1       | 5 1 0                          |                               |
| 2                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 1A      |                                | TR B TR L BR                  |
| 3                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 2       | 5 1 0                          |                               |
| 4                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 2A      |                                | L BR T TL R                   |
| 5                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 3       | 5 1 0                          |                               |
| 6                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 3A      | - - -                          | BR T TL R BL                  |
| 7                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 4       | 5 1 0                          |                               |
| 8                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 4A      |                                | T BL B TR L                   |
| 9                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 3       | 5 1 0                          |                               |
| 10                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 3A      | - - -                          | BR T TL R BL                  |
| 11                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 2       | 5 1 0                          |                               |
| 12                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 2A      |                                | L BR T TL R                   |
| 13                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 1       | 5 1 0                          |                               |
| 14                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 1A      | - - -                          | TR B TR L BR                  |
| 15                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 2       | 5 1 0                          |                               |
| 16                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 2A      |                                | L BR T TL R                   |
| 17                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 3       | 5 1 0                          |                               |
| 18                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 3A      |                                | BR T TL R BL                  |
| 19                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 4       | 5 1 0                          |                               |
| 20                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 4A      |                                | T BL B TR L                   |
| ELAPSED TIME:<br>(MM:SS) |                                               | SCORES  | /50                            | /50                           |

# Confined Vehicle Inspection Scenarios

Day and Night Trials

USE SETS OF 5 “INLINE” DUAL BUCKET RAILS  
DISTRIBUTED THROUGHOUT THE SCENARIO



| CONFINED   VEHICLE       |                                               | BUCKETS | ALIGNMENT                      | ACUITY                        |    |    |    |    |
|--------------------------|-----------------------------------------------|---------|--------------------------------|-------------------------------|----|----|----|----|
| START TIMER              |                                               | NUMBER  | IMAGE POINTS<br>(5 OR 1 POINT) | CIRCLE GAPS<br>(1 POINT EACH) |    |    |    |    |
| 1                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 1       | 5 1 0                          |                               |    |    |    |    |
| 2                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 1A      |                                | TR                            | B  | TR | L  | BR |
| 3                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 2       | 5 1 0                          |                               |    |    |    |    |
| 4                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 2A      |                                | L                             | BR | T  | TL | R  |
| 5                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 3       | 5 1 0                          |                               |    |    |    |    |
| 6                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 3A      | - - -                          | BR                            | T  | TL | R  | BL |
| 7                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 4       | 5 1 0                          |                               |    |    |    |    |
| 8                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 4A      |                                | T                             | BL | B  | TR | L  |
| 9                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 5       | 5 1 0                          |                               |    |    |    |    |
| 10                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 5A      |                                | BL                            | R  | TL | L  | BL |
| 11                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 6       | 5 1 0                          |                               |    |    |    |    |
| 12                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 6A      |                                | TR                            | B  | TR | L  | BR |
| 13                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 7       | 5 1 0                          |                               |    |    |    |    |
| 14                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 7A      |                                | L                             | BR | T  | TL | R  |
| 15                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 8       | 5 1 0                          |                               |    |    |    |    |
| 16                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 8A      |                                | BR                            | T  | TL | R  | BL |
| 17                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 9       | 5 1 0                          |                               |    |    |    |    |
| 18                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 9A      |                                | T                             | BL | B  | TR | L  |
| 19                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 10      | 5 1 0                          |                               |    |    |    |    |
| 20                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 10A     |                                | BL                            | R  | TL | L  | BL |
| ELAPSED TIME:<br>(MM:SS) |                                               | SCORES  | /50                            | /50                           |    |    |    |    |



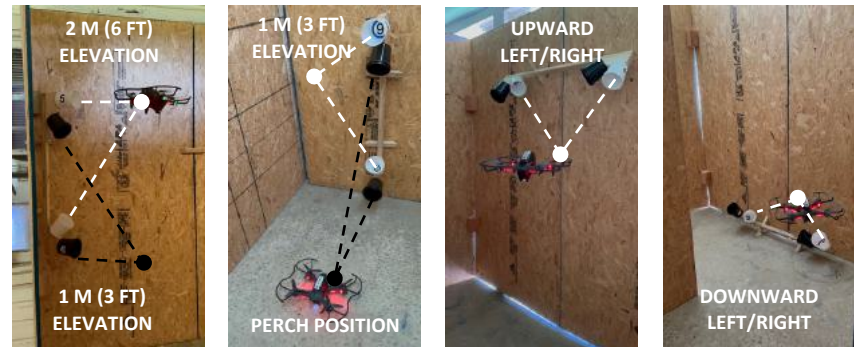
# Confined Room-to-Room Labyrinth

Search tasks with 1 m (3ft) minimum clearances

## USE SETS OF 5 “INLINE” DUAL BUCKET RAILS HORIZONTALS FOR LEFTWARD/RIGHTWARD INSPECTIONS



## VERTICALS FOR UPWARD/DOWNWARD INSPECTIONS



- Fabricated room-to-room search scenario with inspect tasks that can be replicated to track and compare scores.
- Self-standing plywood corner walls define 1.2m (4 ft) switchback hallways with a blackout tarp ceiling over top at 2.4m (8ft). Fits inside a 6m (20ft) shipping container.
- Square access “windows” measuring 1m (3ft) square provide entry/exit and interior high/low pass throughs.

| CONFINED   SEARCH        |                                               | BUCKETS | ALIGNMENT                      | ACUITY                        |     |    |    |    |
|--------------------------|-----------------------------------------------|---------|--------------------------------|-------------------------------|-----|----|----|----|
| START TIMER              |                                               | NUMBER  | IMAGE POINTS<br>(5 OR 1 POINT) | CIRCLE GAPS<br>(1 POINT EACH) |     |    |    |    |
| 1                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 1       | 5    1    0                    |                               |     |    |    |    |
| 2                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 1A      | -            -                 | TR                            | B   | TR | L  | BR |
| 3                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 2       | 5    1    0                    |                               |     |    |    |    |
| 4                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 2A      |                                | L                             | BR  | T  | TL | R  |
| 5                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 3       | 5    1    0                    |                               |     |    |    |    |
| 6                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 3A      | -        -        -            | BR                            | T   | TL | R  | BL |
| 7                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 4       | 5    1    0                    |                               |     |    |    |    |
| 8                        | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 4A      |                                | T                             | BL  | B  | TR | L  |
| 9                        | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 5       | 5    1    0                    |                               |     |    |    |    |
| 10                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 5A      |                                | BL                            | R   | TL | L  | BL |
| 11                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 6       | 5    1    0                    |                               |     |    |    |    |
| 12                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 6A      |                                | TR                            | B   | TR | L  | BR |
| 13                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 7       | 5    1    0                    |                               |     |    |    |    |
| 14                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 7A      | -            -                 | L                             | BR  | T  | TL | R  |
| 15                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 8       | 5    1    0                    |                               |     |    |    |    |
| 16                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 8A      |                                | BR                            | T   | TL | R  | BL |
| 17                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 9       | 5    1    0                    |                               |     |    |    |    |
| 18                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 9A      |                                | T                             | BL  | B  | TR | L  |
| 19                       | PERPENDICULAR BUCKET: ALIGN AND CAPTURE IMAGE | 10      | 5    1    0                    |                               |     |    |    |    |
| 20                       | ANGLED BUCKET: CALL OUT ACUITY GAP DIRECTIONS | 10A     |                                | BL                            | R   | TL | L  | BL |
| ELAPSED TIME:<br>(MM:SS) |                                               | SCORES  | /50                            |                               | /50 |    |    |    |