Mini Course Overview

This course is a miniaturized version of the 2021 SeaPerch Challenge mission course. This course:

- Is low cost ($20 for the practice version and $35 for the competition version)
- Uses standard PVC pipe and fittings
- Can be used in small, shallow pools
- Includes the same general tasks and skills as the full-size mission course

This course is designed for:

- **Teams** as a practice course
- **Schools and clubs** for skill building, practice, and small competitions
- **Regional competitions** that need a smaller course

The course has two variations, a mini competition course and a mini practice course.
- The mini practice course is intended as a practice or skill building course consisting of Task 1 and Task 2. These tasks require agility in ROV operation as the driver must maneuver to open the Gate Latch and rotate or remove the Active Mine Arming Device.
- The mini competition course includes all tasks from the full-size competition course.
- Both courses include the same support structure for Task 1: The Active Mine and Task 2: Gate Latch.

![Mini Competition Course](image1)

**TASK 1:** The Active Mine

**TASK 2:** The Disposal Vault (Gate Latch)

**TASK 3:** Garbage Patch Floating Frame

**TASK 4:** Sunken Waste

![Mini Practice Mini Course](image2)

**TASK 1:** The Active Mine

**TASK 2:** The Disposal Vault (optional)

**Base**
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Mini Practice Course Components

**Needed components:**
- Mini Practice Course Base (page X)
- Active Mine Arming Device (page X)
- Gate Latch Assembly (page X)
- The Active Mine & Gate Latch Support Structure (page X)

Mini Competition Course Components

This course will also work as a practice course but is larger and costs more than the mini practice course.

**Needed components:**
- Mini Competition Course Base (page X)
- Garbage Patch Floating Frame (page X)
- Active Mine Arming Device (page X)
- Gate Latch Assembly (page X)
- The Active Mine & Gate Latch Support Structure (page X)

**Alternatives:**
- Instead of fixing the Garbage Patch floating frame, build the upper frame and tie it to weights or lane dividers.
- Utilize a separate structure for the Garbage Patch Floating Frame.
## Mini Practice Course: Bill of Materials & Pipe Cutting Guide

### Mini Practice Course Bill of Materials (Build List)

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Base</strong></td>
<td></td>
</tr>
<tr>
<td>1/2&quot; Sch 40 PVC Elbow</td>
<td>3</td>
</tr>
<tr>
<td>1/2&quot; Sch 40 PVC Tee</td>
<td>1</td>
</tr>
<tr>
<td>1/2&quot; Sch 40 PVC Cross</td>
<td>1</td>
</tr>
<tr>
<td>1/2&quot; Sch 40 PVC Pipe x 1.5&quot; Lg</td>
<td>1</td>
</tr>
<tr>
<td>1/2&quot; Sch 40 PVC Pipe x 10&quot; Lg</td>
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</tr>
<tr>
<td>1/2&quot; Sch 40 PVC Pipe x 12&quot; Lg</td>
<td>6</td>
</tr>
<tr>
<td><strong>Weights - as required (note 1)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Active Mine Arming Device</strong></td>
<td></td>
</tr>
<tr>
<td>3/4&quot; Sch 40 PVC Cross</td>
<td>1</td>
</tr>
<tr>
<td><strong>Gate Latch</strong></td>
<td></td>
</tr>
<tr>
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<td>1</td>
</tr>
<tr>
<td>3/4&quot; Sch 40 PVC Cross</td>
<td>1</td>
</tr>
<tr>
<td>3/4&quot; x 1/2&quot; Sch 40 PVC Reducer Bushing (see note 3)</td>
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</tr>
<tr>
<td>1/2&quot; Sch 40 PVC Pipe x 3.5&quot; Lg</td>
<td>1</td>
</tr>
<tr>
<td>1/2&quot; Sch 40 PVC Pipe x 4&quot; Lg</td>
<td>1</td>
</tr>
<tr>
<td>Pool Noodle - 2.5&quot; Outside Diameter x 1.75&quot; Lg</td>
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</tr>
<tr>
<td><strong>Active Mine and Gate Latch Support Structure</strong></td>
<td></td>
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<tr>
<td>1/2&quot; Sch 40 PVC Elbow</td>
<td>6</td>
</tr>
<tr>
<td>1/2&quot; Sch 40 PVC Tee</td>
<td>1</td>
</tr>
<tr>
<td>1/2&quot; Sch 40 PVC Cross</td>
<td>1</td>
</tr>
<tr>
<td>1/2&quot; Sch 40 PVC Coupling</td>
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</tr>
<tr>
<td>1/2&quot; Sch 40 PVC Pipe x 1.5&quot; Lg</td>
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</tr>
<tr>
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</tr>
<tr>
<td>1/2&quot; Sch 40 PVC Pipe x 3.5&quot; Lg</td>
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<td>1/2&quot; Sch 40 PVC Pipe x 4&quot; Lg</td>
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</tr>
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<td>1/2&quot; Sch 40 PVC Pipe x 8&quot; Lg</td>
<td>2</td>
</tr>
<tr>
<td>1/2&quot; Sch 40 PVC Pipe x 10&quot; Lg</td>
<td>1</td>
</tr>
</tbody>
</table>

### Notes:

1. The structure must be weighted down with rebar, bricks, dive weights or other suitable weights. If rebar is used, use two to four 1/2 dia. X 1' long pieces.
2. Securing all pipe joints using screws is recommended but may not be necessary depending on the application of the course. Recommended screws are #8 x 1/2" Lg stainless steel self tapping flanged hex head screws.
3. The 3/4" x 1/2" Sch 40 PVC Reducer Bushing is available in two styles, either style is acceptable.

![Reducing Bushing - Plain flange type](image1)
![Reducing Bushing - Flat flange type](image2)

### Pipe Cutting List

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Length</th>
<th>Qty</th>
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</thead>
<tbody>
<tr>
<td>1/2&quot; Sch 40 PVC Pipe</td>
<td>1.5&quot;</td>
<td>3</td>
</tr>
<tr>
<td>&quot;</td>
<td>2&quot;</td>
<td>1</td>
</tr>
<tr>
<td>&quot;</td>
<td>3.5&quot;</td>
<td>4</td>
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<tr>
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<td>8&quot;</td>
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<td>&quot;</td>
<td>10&quot;</td>
<td>2</td>
</tr>
<tr>
<td>&quot;</td>
<td>12&quot;</td>
<td>6</td>
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</tbody>
</table>

### Pipe Cutting Guide

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<thead>
<tr>
<th>Length</th>
<th>Qty</th>
<th>Leftover</th>
</tr>
</thead>
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</tr>
<tr>
<td>6&quot;</td>
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</tr>
<tr>
<td>4&quot;</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12&quot;</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

--- Leftover ---

Updated Aug. 2020
Mini Practice Course: Overall Dimensions
Notes:
1. The structure must be weighted down with rebar, bricks, dive weights or other suitable weights. If rebar is used, use two to four 1/2 dia. X 1' long pieces.
2. Securing all pipe joints using screws is recommended but may not be necessary depending on the application of the course. Recommended screws are #8 x 1/2" Lg stainless steel self tapping flanged hex head screws.
3. The 3/4" x 1/2" Sch 40 PVC Reducer Bushing is available in two styles, either style is acceptable.
4. A 1" x 1/2" Reducing Bushing and a 1" Coupling may be substituted for the 1" x 1/2" Reducing Coupling if the Reducing Coupling is not available.
## Pipe Cutting List

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Length</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot; Sch 40 PVC Pipe</td>
<td>1.5&quot;</td>
<td>6</td>
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<tr>
<td></td>
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<td>4</td>
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<td></td>
<td>3.5&quot;</td>
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</tr>
<tr>
<td>1&quot; Sch 40 PVC Pipe</td>
<td>12&quot;</td>
<td>2</td>
</tr>
</tbody>
</table>

## Pipe Cutting Guide

<table>
<thead>
<tr>
<th>Length</th>
<th>3&quot;</th>
<th>4&quot;</th>
<th>5&quot;</th>
<th>6&quot;</th>
<th>8&quot;</th>
<th>10&quot;</th>
<th>12&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>10'</td>
<td><img src="image" alt="Pipe Cutting Guide" /></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The floating frame is loosely attached to the course structure using a telescopic type pipe joint consisting of 1" PVC pipes attached to the floating frame that slide over 1/2" PVC vertical pipes attached to the course frame.

### Pool Depth Range and Pipe Length

<table>
<thead>
<tr>
<th>Pool Depth Range</th>
<th>Pipe Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.5” – 30.5”</td>
<td>18”</td>
</tr>
<tr>
<td>26.5” – 36.5”</td>
<td>24”</td>
</tr>
<tr>
<td>34.5” – 44.5”</td>
<td>32”</td>
</tr>
</tbody>
</table>
Mini Competition Course: Depth Illustrations

Standard Depth Illustration

Minimum water depth for 10" long task structure support pipe

10" Long Pipe
Increase as appropriate for deeper pools

Minimum recommended pool depth

2" Long Pipe

Minimum Depth Illustration

15"

21"

10" Long Pipe
Increase as appropriate for deeper pools

Minimum recommended pool depth

2" Long Pipe

Minimum Depth Illustration

15"

21"
Components for Both Mini Practice & Competition Courses

Task 1: The Active Mine & Task 2: The Disposal Vault (Gate Latch)

Includes the following:

1. Active Mine Arming Device
2. Gate Latch Assembly
3. The Active Mine and Gate Latch Support Structure

Tasks 1: Active Mine & Task 2: Disposal Vault (Gate Latch) Finished Assembly
Task 1: Active Mine Task Overview

Active Mine Arming Device being disarmed, removed and deposited in disposal area

Active Mine in armed position

Active Mine in disarmed position

Figure – Active Mine Task Illustration
Task 2: The Disposal Vault (Gate Latch) Task Overview

The Gate Latch swivels (counterclockwise only) when pushed by the ROV.

The Gate Latch will float upward due to buoyancy provided by the pool noodle.

The pool noodle length may need to be adjusted to provide optimal buoyancy to allow the gate latch to rise when unlatched and to sink when a canister is hung on the latch.

The Gate Latch descends when a canister is hung on the latch.

Gate Latch Task Illustration
Assembly Step 1 - Exploded View

Assemble the pipes and fittings as shown. Press the pipes into the fittings as far as they will go. A rubber mallet may be needed to assure the pipes are completely seated into the sockets.
Task 1 & Task 2: Support Structure Assembly Step 2

Assembly Step 2 - Exploded View

Assembly from Step 1

Assembly Step 2 Completed
Task 1 & Task 2: Support Structure Assembly Step 3

Apply .75” wide bright colored tape to one of the 1/2” elbows and the 3/4” tee as shown. Alternately the stripe could be painted.

Active Mine Arming Device - Visual Alignment Indicator Stripe
Task 1 & Task 2: Support Structure Assembly Step 4

Assembly from Step 3

Assembly Step 4 - Exploded View

Completed Support Structure Assembly
Task 1 & Task 2: Gate Latch Assembly

Elbow and pipe can be painted using suitable bright-colored waterproof paint.

Pool Noodle, 1.75” Long
It is best to cut the pool noodles long, test the buoyancy, and then cut small slices from the end of the pool noodle until proper buoyancy is achieved.

Gate Latch Assembly - Exploded View

Completed Gate Latch
Task 1 & Task 2: Final Assembly

Slide Gate Latch over 10” long upright pipe and install pipe coupling on end of pipe

Completed Active Mine and Gate Latch Task Assembly
Mini Practice Course: Base Assembly

Notes:
1. Drill .25” diameter drain holes in the three elbows. This allows air to escape and the frame to fill with water quicker when submerged.
2. Screw pipe joints together as required.
3. The base must be weighted down with rebar, bricks, dive weights or other suitable weights.

Completed Mini Practice Course

10” Long
(Pipe length as required for pool depth.)

12” Long
(X 6)

1.5” Long

Completed Mini Practice Course Base Assembly Exploded View

Updated Aug. 2020
**Mini Competition Course: Base Assembly**

**Notes:**
1. Drill .25” diameter drain holes in the four corner elbows. This allows air to escape and the frame to fill with water quicker when submerged.
2. Screw pipe joints together as required.
3. The structure must be weighted down with rebar, bricks, dive weights or other suitable weights.

---

**Mini Competition Course Base - Exploded View**

**Completed Mini Competition Course**

24” Long  
(Pipe length as required for pool depth.)  
See table on page 9.
Mini Competition Course Task 3: Garbage Patch Floating Frame Details

The Garbage Patch frame will naturally float on the surface of the water with only coarse adjustments to the support pipe lengths.

The length of the floatation (pool noodles) may need to be adjusted to assure the frame floats on the water surface.

Garbage Patch Floating Frame Optimal Surface Height

Frame pipes should be slightly below the surface of the water.
Drill .25” diameter drain holes in the four corner elbows. This allows air to escape and the frame to fill with water quicker when submerged.
Mini Competition Course: Garbage Patch Frame Construction (Step 2)

Screw pipe joints together as required.

Assembly from Step 1

**Completed Garbage Patch Frame**

**Garbage Patch Frame Assembly**
(Step 2 - Exploded View)

**Alternative construction**
if 1” x 1/2” reducing bushings are not available

- 1” x 1/2” Reducing Bushing (X 2)
- 1” Coupling

- 1/2” Pipe x 1.5” Long (X 2)
- 1” x 1/2” Reducing Coupling (X 2)

- 1” Pipe X 12” Long (X 2)

Screw pipe joints together as required.