# 1 - Introduction

Welcome Engineer,

Poly Bridge is a physics based, bridge building puzzle game. You are tasked with engineering a structure to get vehicles to their destination flags using a variety of materials and tactics. Various obstacles, budget, and material restrictions add an escalating challenge as you work through the Campaign. Share replays of your successes and failures to the Poly Bridge Gallery, Facebook, Reddit, Tumblr, and Twitter.

A Sandbox mode has been included so you can experiment freely in the game without restrictions, and also use it as level editor where you may create your own levels and upload them to the Steam Workshop. There other players can download your level and try to solve it, and also submit replays for you to view in the Steam Workshop Browser. Or you can create art, contraptions, or replicas of real world bridges to share if you prefer.

Don't forget to explore the Steam Workshop even if you're not submitting Sandbox levels yourself; you will find thousands of additional levels made by other players to solve. Good luck and have fun on your Poly Bridge journey. Remember, triangles are your friend, and we're always here to help.

Dry Cactus Team

http://www.drycactus.com
http://steamcommunity.com/app/367450/discussions/
https://www.reddit.com/r/PolyBridge/
support@drycactus.com

# 2 - Campaign and Simulation

## Tutorial
The tutorial teaches you the basics of drawing bridges in Poly Bridge. It is always available to be replayed or introduced to friends by clicking on the mortar board, also known as a graduation cap, located in the top-left corner of the World Map.

## Basics
The main view of Poly Bridge, also known as Build Mode, gives you the tools you need to build bridges and other structures to get vehicles to their destination flags. Select materials from the bottom-left toolbar and draw them by clicking, starting from any joint. Deselect the current material with Right Click.

You can select portions or all of your bridge by Right Click-and-Dragging or with Shift+Click. A window will come up allowing you to Cut, Copy, or Delete the selection by clicking on the icons, or you may use the keyboard shortcuts 'X', 'C', and 'D'/'Del'. If you cut or copy a ghost image will appear of the selection, known as the Clipboard, that you may paste by clicking once it has been lined up. A new window will replace the old, giving you access to the horizontal and vertical Flip commands, also available with the 'F' and 'V' keys. The Clipboard remains intact until you select a new material or dismiss it with Right Click, allowing you to stamp out repeating sections.

You may Undo or Redo your last actions by clicking on their icons, or with the 'Z' and 'Y' keys; this is repeatable. If you want to start over you may Clear all materials by clicking on the Trash Can icon next to the Undo and Redo buttons. A warning dialogue will come up asking if you are sure you want to remove all pieces, you may not undo this action.

Shift+Click or clicking-and-holding on a joint allows you to move all attached struts to that joint. Material length maximums will limit how far the joint may be moved as indicated by a red highlight around the struts unable to move. Turning the grid off allows more freedom in joint movements.

Triangles are one of the strongest shapes, allowing loads to be distributed throughout a structure without collapsing. Equilateral triangles, triangles with all sides the same length, are especially strong. In general, larger triangles are stronger than smaller triangles of the same material.

**Scenarios**
Each level has different limitations based upon the scenario. You may go over budget by up to 50% to pass a level and come back later. From the World Map you may play any level in the Campaign, you are not restricted to playing the levels in order.
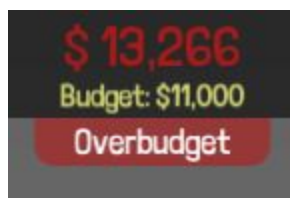


**Reinforced Roads**
You can draw a material on top of an existing Road to reinforce it with Wood and Steel. This will increase the strength of the Road, with Steel-reinforced Road being stronger than Wood. To do this draw the desired material over the road from its two Joints. Connecting Steel over two separate Roads will support them as expected; but this will not increase the strength of the road itself.
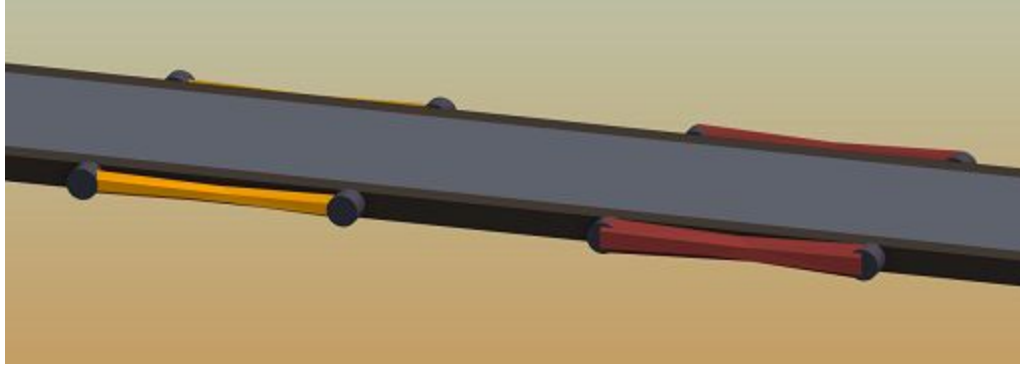
**Boats, Planes, and Hydraulics**

Some levels will have boats and planes that will destroy your bridge, indicated by a red outline in Build Mode. You can either build around them, if possible, or build a hydraulic component into your bridge to move sections out of the way, usually referred to as a Draw Bridge. Boats and planes will come during specific phases, viewable in the Level Info as detailed in the next section.



Hydraulics may be set to expand or contract +/- 50% of their original length. Longer hydraulics will contract or expand more than smaller ones. Split joints allow you to make planned joint

breaks for use with hydraulics. Ensure both sides of the split joint are supported as you intend by zooming in. You may click the highlighted selectors when zoomed in to adjust which side a piece connects to. If a split joint overlaps with another split joint at the end of a hydraulic phase the two split joints will merge, translating stress through the merged joint, and may be split again or held together in a later hydraulic phase. If your bridge is not splitting as expected double check your zoomed in split joint settings.
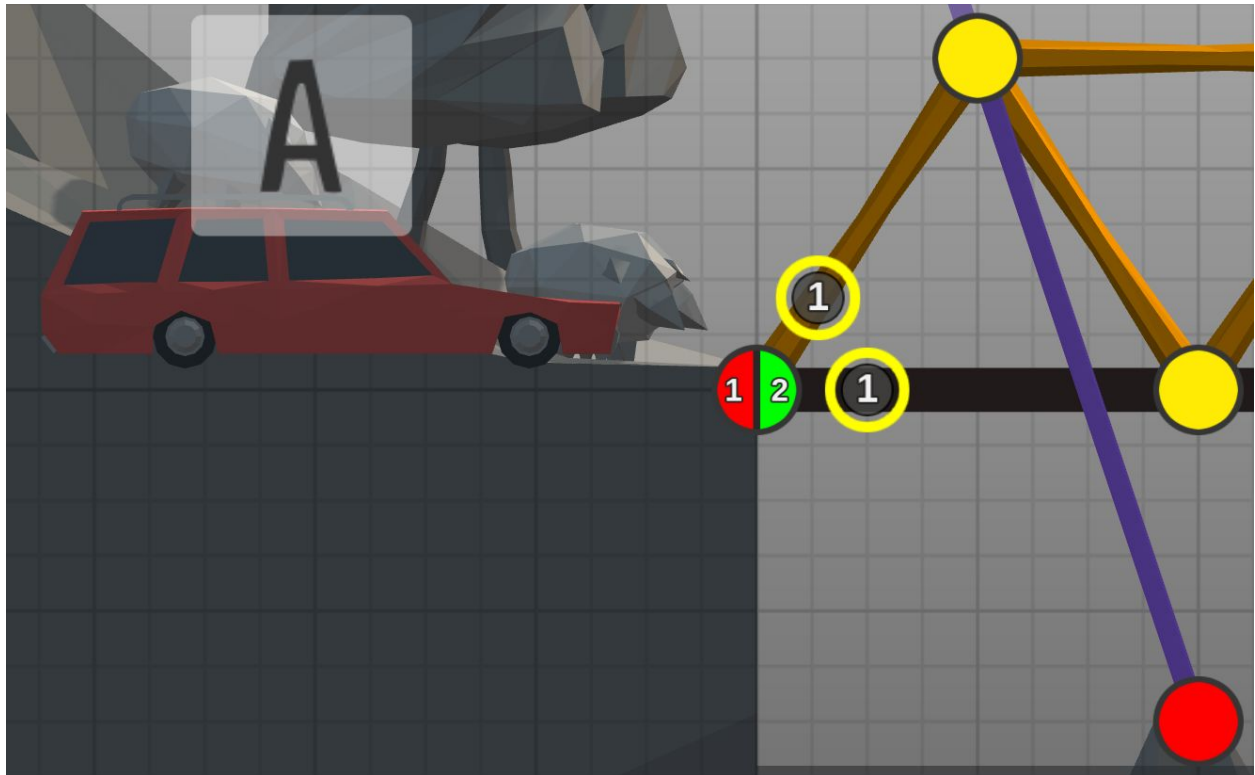


**Level Info**
When loading a level the Level Info will display, including information about the budget, materials, and phases. Each phase is indicated by a letter and the sequence of phases will move from left to right, in general. This can be accessed again by clicking on the info button in the top-left or using the 'I' key. Opening Level Info during simulation will highlight each phase as it takes place.

Checkpoints can be set to trigger another sequence of phases to happen, stop and/or reverse a vehicle's direction. These have a couple special indicators in the Level Info Screen.

-A new line labeled with the checkpoint name indicates a sequence of phases triggered by that checkpoint.
-An arrow circling the checkpoint name indicates the phase when a stopped vehicle will start again.
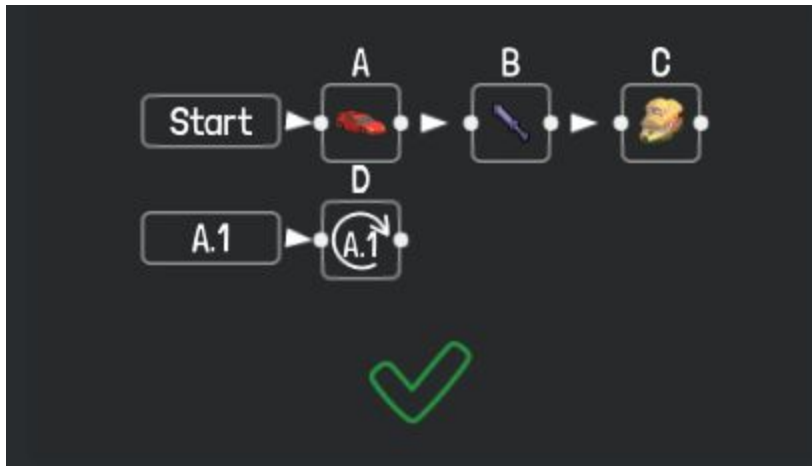
## Simulation

The simulator models your design with gravity in a 3D view. Vehicles attempt to cross your bridge and boats travel down the river in a predetermined order viewable in the Level Info screen. Adjusting the speed modifier adjusts the speed of the simulation; this does not affect speed of vehicles relative to the overall simulation. With stress view activated, using 'T', you can see the live load on your bridge.

## Stress

Stress view will display the live load on your bridge, from Low (Green/White*) to Medium (Yellow/Grey*) to High (Red/Black*), during a simulation. Also, the active stress will display in the toolbar, giving you precise measurements of the maximum amount of stress on your structure at any moment of the simulation.

*Colour blind stress mode, available in Settings, displays stress in Black & White.
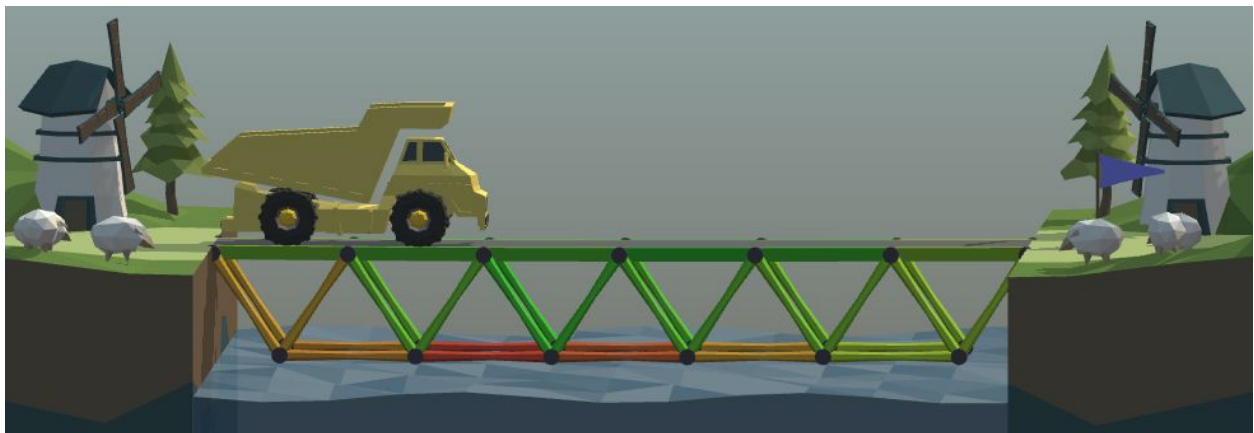


## Histograms and Leaderboards

When you complete a Campaign level successfully you will be presented with the leaderboard and histograms for budget, stress, and material footprint. Compare how well you did to other players and try to improve your score.
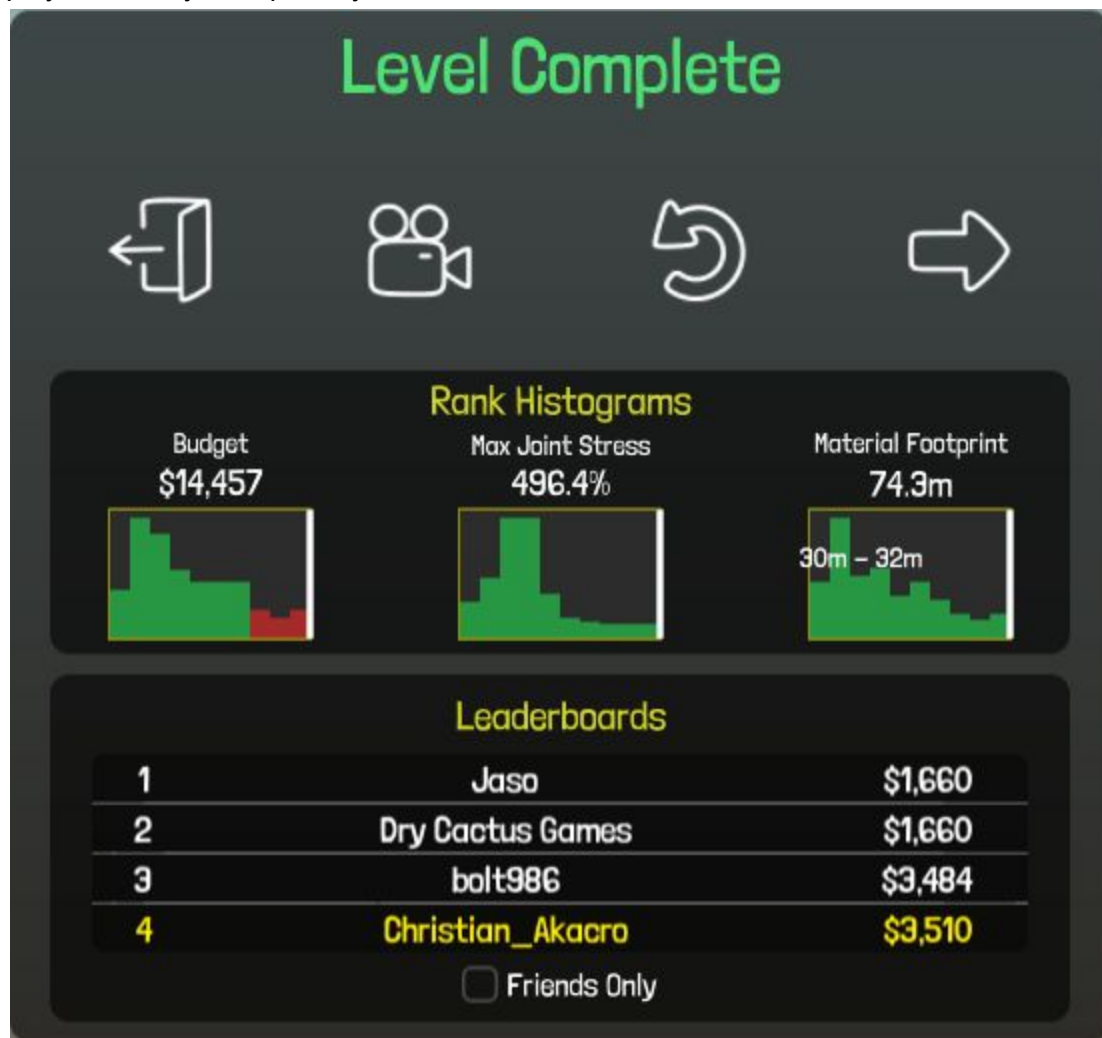


**Checkpoints**
Checkpoints are waypoints that must be collected before reaching the destination flag. They can be set to trigger another sequence of phases to happen, stop and/or reverse a vehicle, or change its speed (Note: vehicle speed changes are absolute, two 20% speed checkpoints will not decrease the speed to 4%). They may also be required to be picked up in order, marked by a '#'. Info about sequence triggers or stop/starting may be viewed in Level Info:
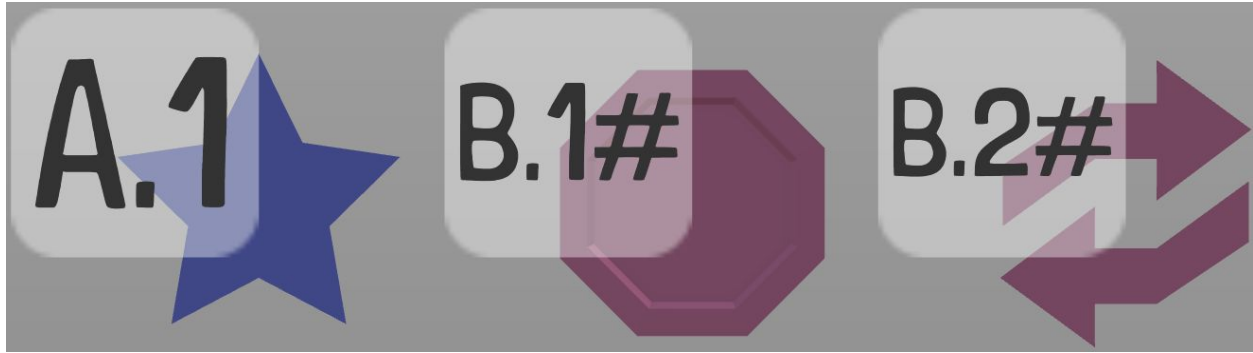
-A new line in Level Info labeled with the checkpoint name indicates a sequence of phases triggered by that checkpoint.
-An arrow circling the checkpoint name in Level Info indicates the phase when a stopped vehicle will start again.
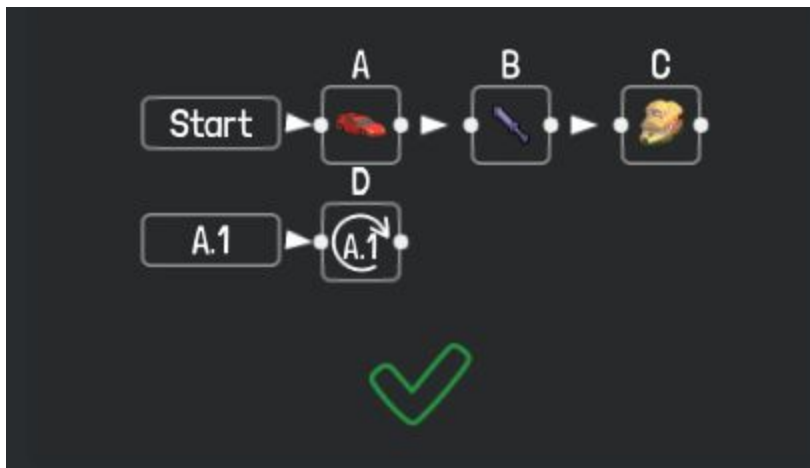


**Camera Controls**
You can rotate the camera during simulation by holding and dragging Ctrl+Click or Middle Mouse Click. Three preset camera views: left, right, and front become available during simulation and may be set by clicking on the binoculars icon. You can also zoom in and out with the Mouse Wheel or using the +/- keys on your keyboard.
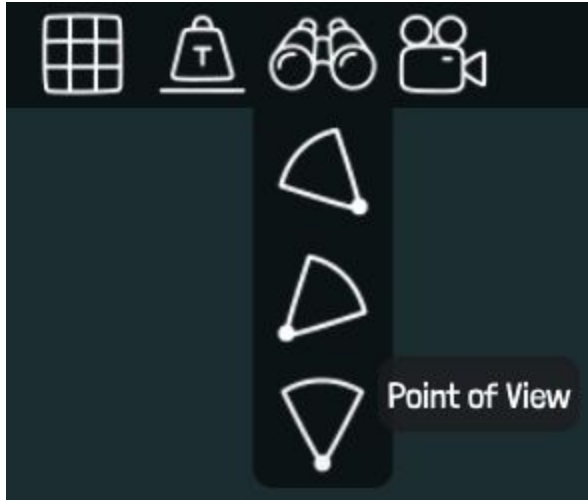
**Line Tracer (Arc Tool)**

The Line Tracer gives you the ability to trace arcs and straight lines easily, which can then be snapped to while placing new Joints and automatically filled-in with a base distance and material of your choice. The basics of drawing and filling the arc tool are explained in detail in Tutorial '5: Suspension', available from the World Map.

Two tangent handles will appear letting you adjust the curve manually. By default they will be locked together, if one moves the other handle will mirror its movement. If you unlock the tangents with the lock button you may move each tangent handle separately, creating asymmetrical arcs. In addition, once the line has been drawn you may adjust the length of material to be filled with the bar above the fill bucket, flip the curve, change the steepness of the arc, or set it to a straight line with the 'Change Shape' tool.

Once a traced line is in place, new Joints will snap onto the curve if it is close enough to the mouse pointer, indicated by a blue dot to preview where the snap will occur.
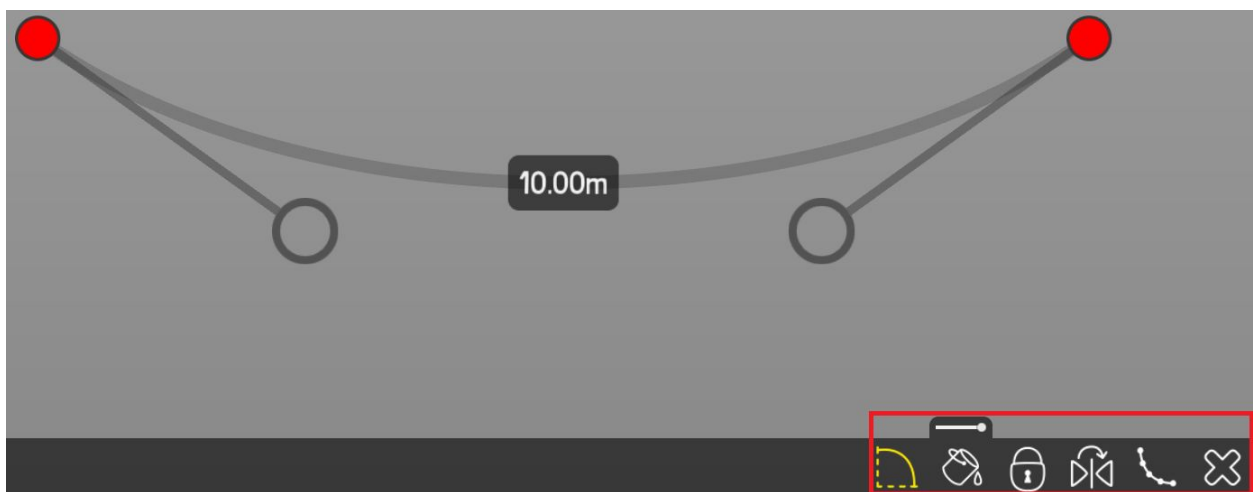


**Hydraulic Controller**

The Hydraulic Controller allows you to determine whether specific hydraulics or split joints will activate during hydraulic phases. Click on a hydraulic phase in the hydraulic controller popup to select and deselect a hydraulic or split joint for that phase.
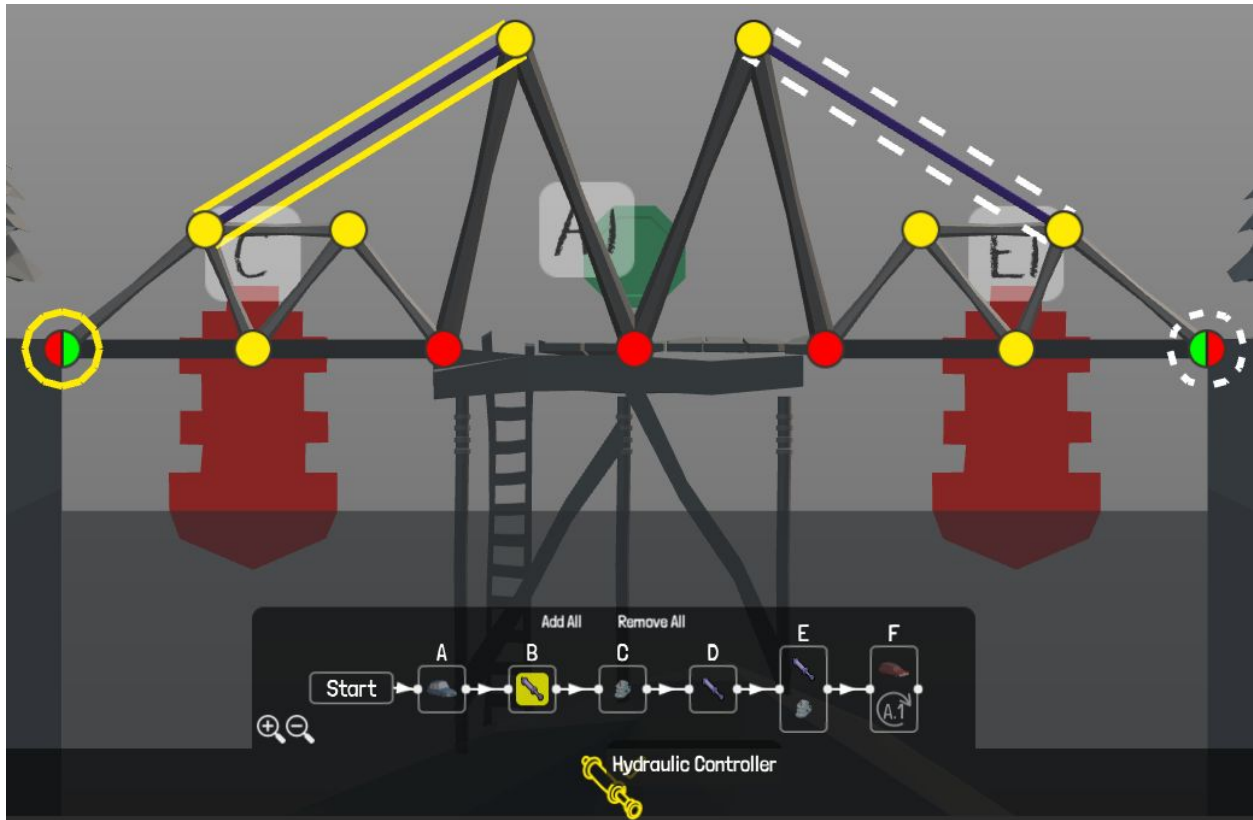


**Quick Access Wheel**
Using Middle Click will bring up the Quick Access Wheel, a fast way of selecting a new building material without using keyboard shortcuts.



**World Map**

The World Map allows you to navigate the various Worlds and displays your progress through the Campaign. Your progress through the Campaign is displayed in the top-centre. Each level is coloured showing its completion status: a white level has not been completed, a yellow level has been completed over budget, a green level has been completed under budget, a blue level has been completed under budget and under 100% stress.



**Cheat Modifiers**
If you complete all levels in a World (Alpine Meadows, Desert Winds, etc) the Unlimited Materials cheat is unlocked and is accessible from the World Map. If you complete them all under budget the Unlimited Budget cheat is unlocked also. Completing a level under budget and under 100% stress is the highest achievement for each level. If you complete the entire campaign this way a secret world will unlock.
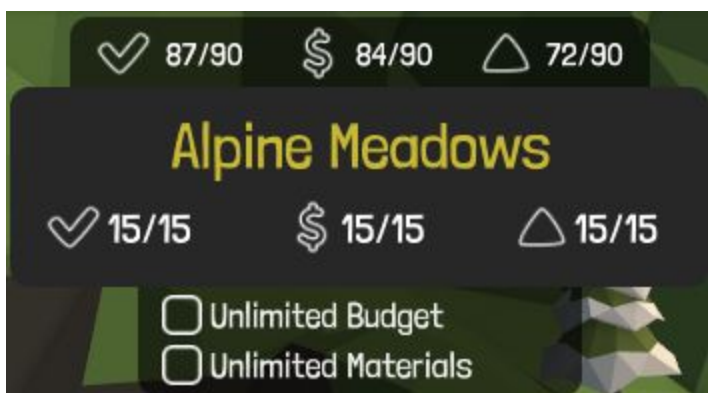
**Keyboard Controls**
Space: Start/Stop simulation
Ctrl+Click: Select area
Shift+Click: Click-and-Drag to move a joint or to pan camera in simulation
Double Click: Create or remove a split joint
J: While hovering over a joint, pressing J creates or removes a split joint
',' Comma: Reduce simulation speed
'.' Period: Increase simulation speed
P: Pauses/Unpauses the simulation
T: Stress on/off
E: Stress on/off
G: Grid on/off
C: Copy selection
X: Cuts selection
F: Flip clipboard horizontal
V: Flip clipboard vertical
D: Delete selection
Del: Delete selection
I: Level Info
Z: Undo last action. Repeatable
Y: Redo last undo. Repeatable
'-' Minus: Zoom out
'+' Plus: Zoom in
Tab: Toggles between Blueprint and Build mode in Sandbox
1: Selects road
2: Selects wood
3: Selects steel
4: Selects hydraulics
5: Selects rope
6: Selects cable

**Mouse Controls**
Left Click: Select or Draw. Click and hold on a Joint to move it
Right Click: Deselect current draw or Select with Right Click-and-Drag
Double Click: Changes a joint to a split-joint, or vice-versa
Middle Click: Brings up the Quick Access Wheel
Mouse Wheel: Zoom in or out

**Video**

Fullscreen: Toggles between fullscreen and windowed mode.

Resolution: Sets the size and detail of the viewable area.

Shadow Quality: Sets the shadow map pixel resolution, higher values mean higher fidelity shadow casting.

Shadow Filter: Sets the shadow sampling count, making the shadow edges softer.

Anti-Aliasing Quality: Anti-aliasing makes hard edges appear smoother.

Rope Dynamics: Adjusts the maximum number of ropes and cables shown with appropriate slack- Off, Five, or Ten.

VSync: Prevents screen tearing, reducing visual artifacts.

Water Physics: Toggles water physics on or off.

Ambient Occlusion: Darken areas of the environment giving more visual depth

* Turning off or reducing the quality of video features can improve performance.

**Audio**

Master Volume: Sets the overall game volume.

SFX Volume: Sets the volume of sound effects like impacts and engine sounds.

Music Volume: Sets the volume of the in-game music.

**Other**

Language: Sets the in-game language.

Mouse Wheel Speed: Adjusts the speed of zooming in and out via the mouse wheel.

Colour-Blind Mode: Stress colours are displayed in Black and White.

Replay Length: Adjust the length of the GIF captured to a maximum of 30 seconds. Defaults to 10 seconds.

Replay Save Path: Set the location to save GIFs locally.

Reset Notifications: Restores all 'Do Not Show Again' notifications.

Delete Campaign Progress: Resets campaign progress and deletes all campaign saves. WARNING! This is not reversible!

**Social**

The Social Settings menu allows you to authorize social media applications so Poly Bridge may post to your social media accounts. You may also deauthorize or change the authorized applications here.


## 4 - Materials and Vehicles

Material Properties
Measurements expressed in metres (m) and PolyNewtons (PN)

**Road**

Provides a surface for your vehicles to drive on.
- Strength: 900PN, +300 if reinforced with Wood, +600 if reinforced with Steel
- Max Length: 2m
- Cost: $200/m

## Wood
The cheapest construction material.
- Strength: 800PN
- Max Length: 2m
- Cost: $180/m

## Steel
Stronger and longer than wood.
- Strength: 2000PN
- Max Length: 4m
- Cost: $450/m

## Hydraulic
Used for draw bridges and other moving structures. Expands or contracts to a specified length.
- Strength: 1800PN
- Max Length: 4m
- Cost: $750/m

## Rope
Ropes do not have any compressive strength, tensile strength only.
- Strength: 1200PN
- Max Length: Unlimited
- Cost: $220/m

## Cable
Cables do not have any compressive strength, tensile strength only.
- Strength: 2200PN
- Max Length: Unlimited
- Cost: $400/m

## 5 - Tips and Tricks

## Static Joints
Red static joints are points to distribute the load of the structure and vehicles as they cross. Since they are immovable, connecting two static joints directly to each other has no effect.
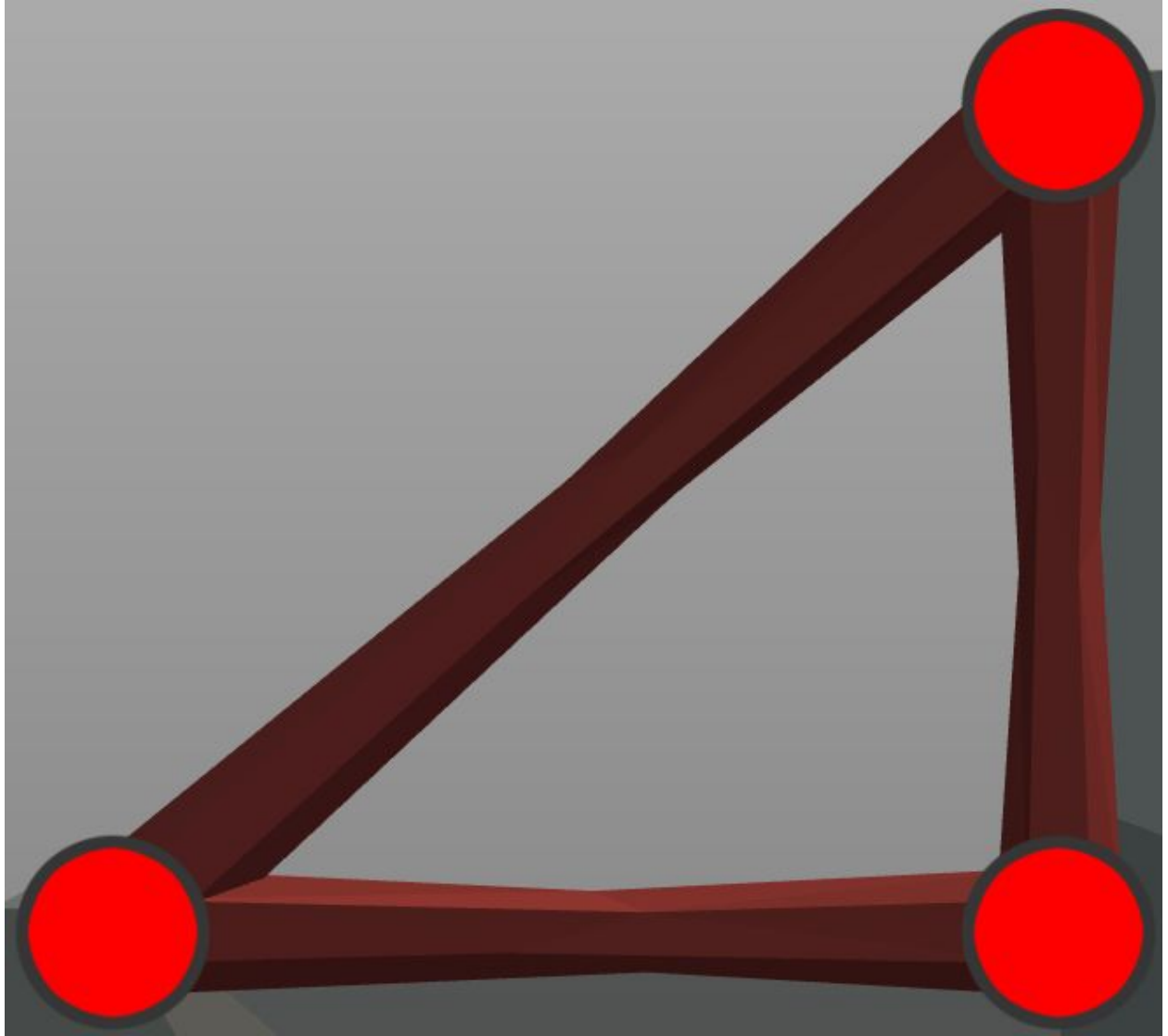
**Triangles and Diamonds**

Triangles are your friend! Triangles are one of the strongest shapes, allowing loads to be distributed throughout a structure without collapsing. Equilateral triangles, triangles with all sides the same length, are especially strong. In general, larger triangles are stronger than smaller triangles of the same material.
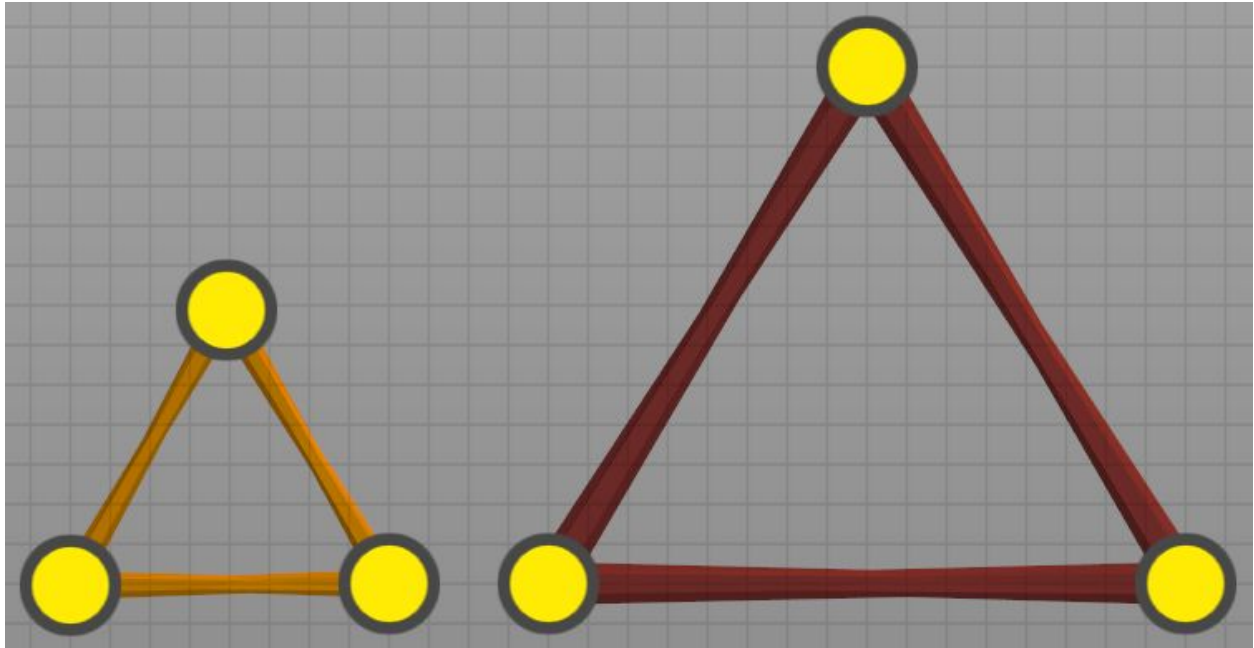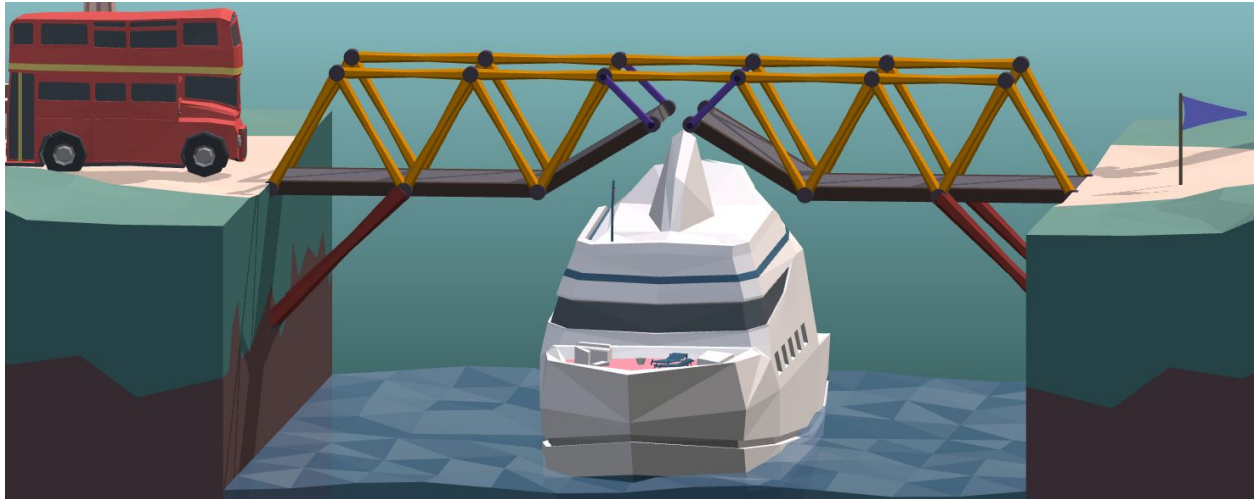
Diamond shapes harness the power of two triangles to form a single support distributing the load for increased strength.
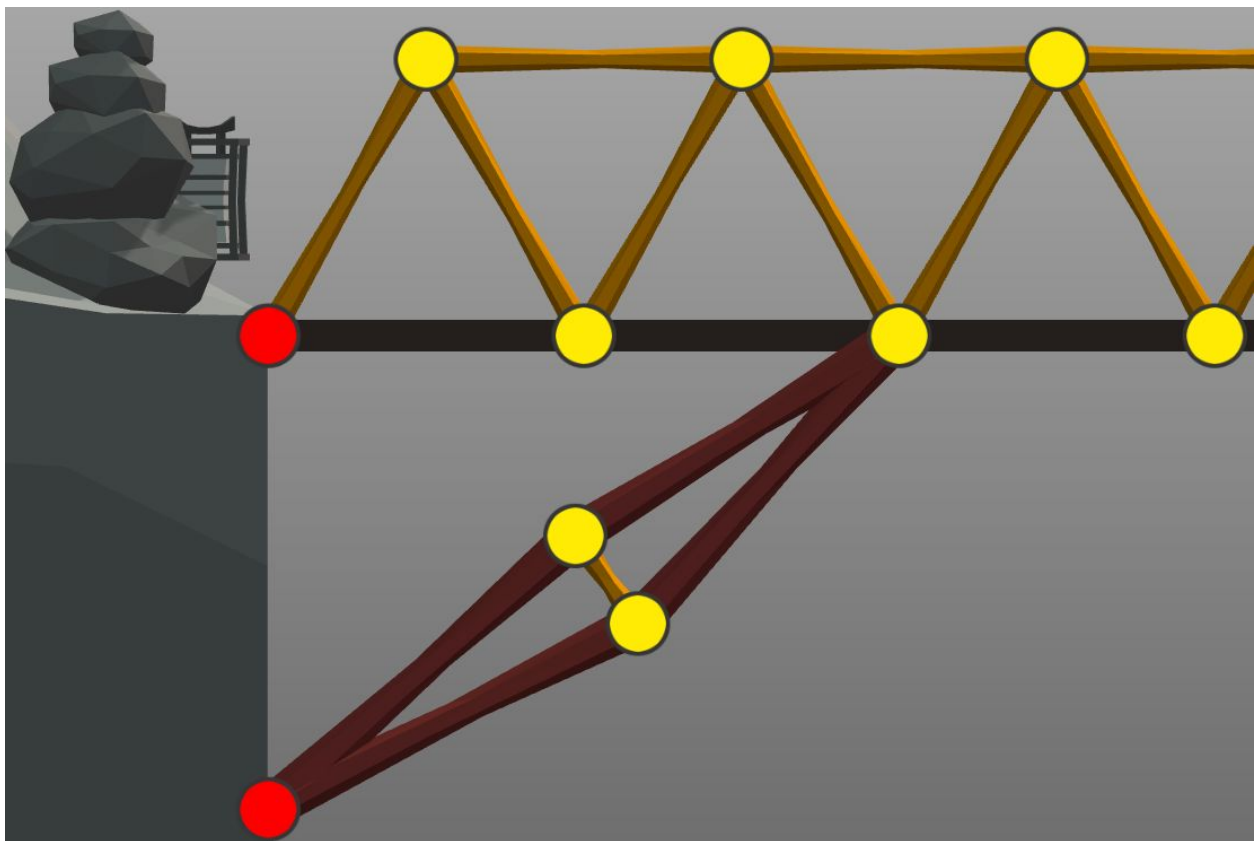
**Pivot Points**

Pivot points can make or break your bridge, literally. Two lengths of material create a pivot point at their joint and can greatly weaken a structure, or be used in a draw bridge.





**Grid**

The grid may be toggled off and on by clicking on the grid icon, or by using the 'G' key. Turning off the grid can be especially helpful for creating minor adjustments on jump levels and ensuring land braces are positioned correctly.

**Land Braces**

Use the terrain to your advantage and create land braces. Terrain, like static joints, is immovable and can be used to rest your structures upon or against. Get closer by turning the grid off and moving joints into position.

## Arches

An arch is a very strong shape that distributes a load evenly across a structure.

## Suspension Bridges

Suspension bridges are a good design to evenly distribute the mass of long bridges onto Static Joints, symmetry becomes more important as structures get larger. The Line Tracing Tool paired with Copy, Flip, and Paste can help you achieve the desired symmetry and shape. While tricky to work with, suspension bridges can span large distances for much cheaper than steel.

**Detecting Weak Points**

Turning stress view on with 'T' allows you to see the live load on your structure during simulation. You can adjust the speed of the simulation with the controls at the top-right of your screen, or with the ',' comma and '.' period keys.
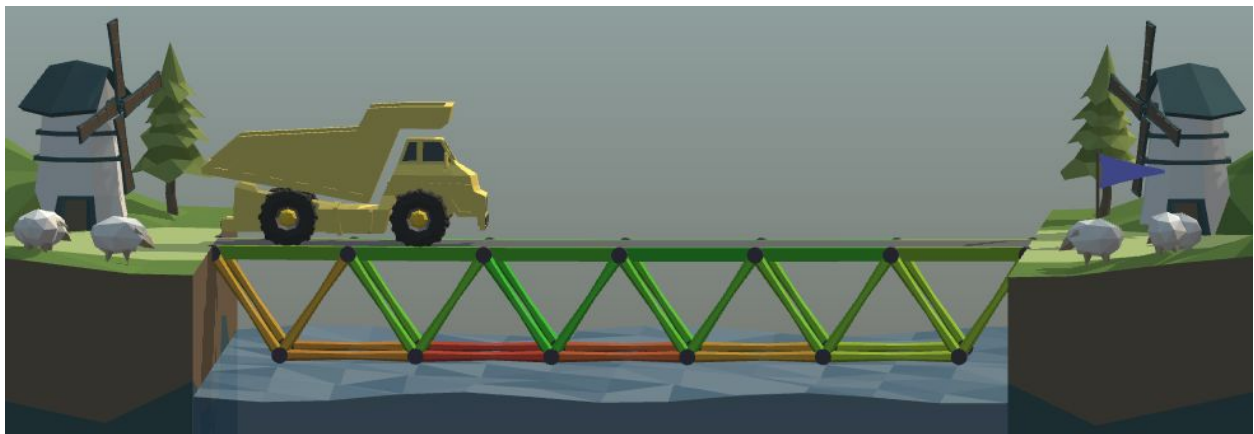


## 6 - Social Media and Replays

**Gallery**

The Gallery is the place where your replays end up when shared from in-game and selecting the gallery as a sharing option. You can access it from the Main Menu or visit the website in your browser of choice; you can find submissions by other players too. Use the dropdowns to view designs for a specific level or world. You may claim or comment on replays here by logging in with your Steam account, if you have the Steam version of the game.

http://gallery.drycactus.com

**Replays**

The GIF creator allows you to capture up to thirty seconds of your simulation, adjustable in Settings. To get a better shot you can reposition the camera with Ctrl+Click or Middle Click during simulation. You can adjust the sliders in the GIF creator to define where the saved GIF

will start and end. Replays are shared to the Online Gallery by default and any Social Media channels which you have enabled. Saves of replays are placed on your desktop in a folder named PolyBridgeGIFs. The location of the save folder may be adjusted in Settings. Tip: Adjust the speed of simulation captured by clicking on the adjust speed icons, or with the ',' comma and '.' period keys. Speed past tedious sections and then slow down to capture the best parts in slow motion.
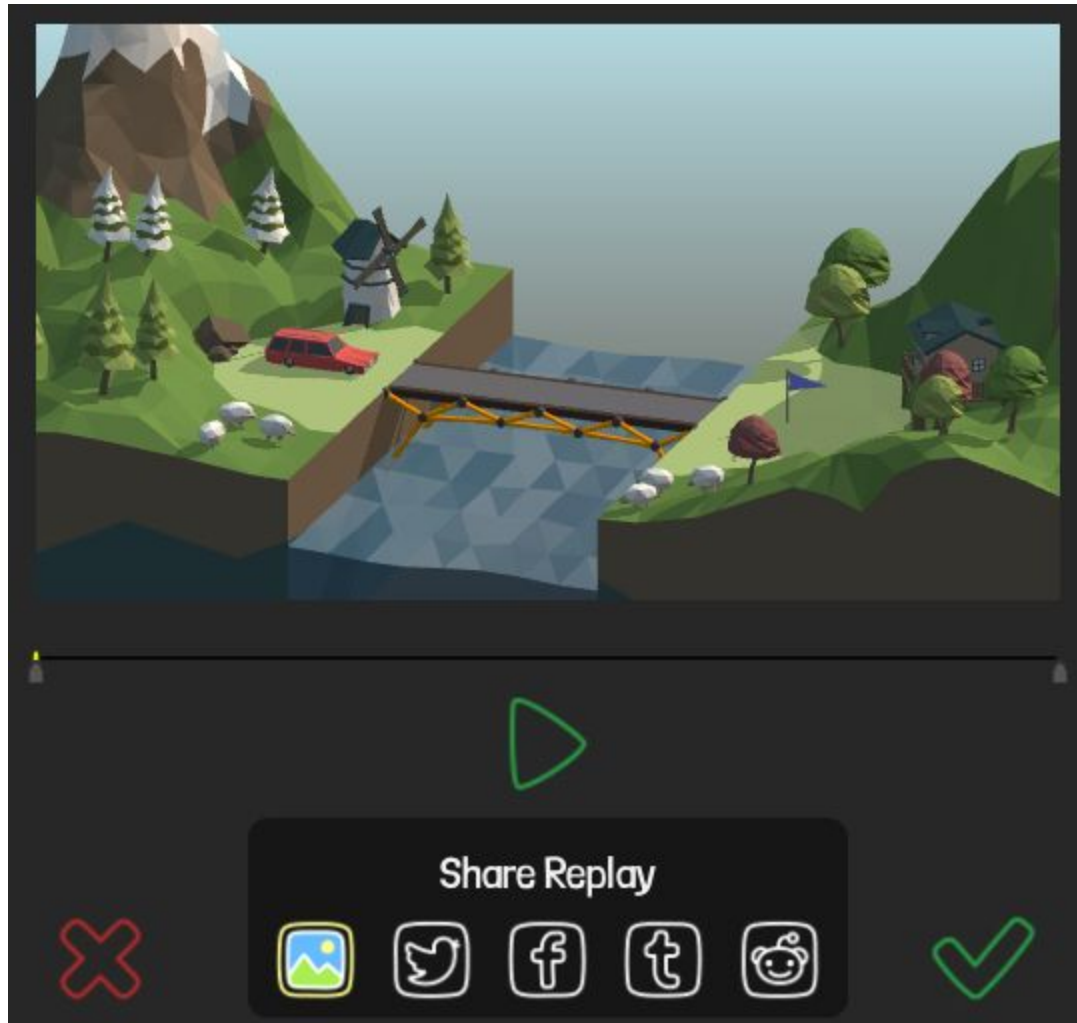


**Social Media**
You can integrate your Twitter, Facebook, Tumblr, and Reddit accounts into Poly Bridge to easily share replays of your solutions to your favorite social media platform. Simply click the movie camera icon and choose to share your replay with social media. You will be prompted to allow Poly Bridge to share from your account. If you'd like to change or deauthorize your account this can be done in Settings. Reddit submissions will be posted to r/PolyBridge.

**Sandbox**

The Sandbox level designer gives you the freedom to create levels of your own design. Share your creations on the Steam Workshop and download levels others have made for endless amounts of bridge building fun. Toggle Autoplay when submitting your level and the solution will load with the level; upload art, replicas of real bridges, and contraptions like ferris wheels and trebuchets for others to load and play.

**Saving**

Saving in Sandbox works a little differently than the Campaign. Each Sandbox map is tied to a single solution. Saving in blueprint or build mode in sandbox will save both the level and solution together. Playing subscribed Steam Workshop levels will allow multiple solution saves just like the Campaign.

**Steam Workshop Browser**

The Workshop browser lets you view and subscribe to player-created levels on the Steam Workshop. Levels you have created in Sandbox will be listed under My Items where you may update your submission. Subscribing to a level downloads the level information; after a few moments a Play button will appear and you may load the level.

With a level selected you may subscribe, rate, comment on, follow an author, and play a level from within Poly Bridge.
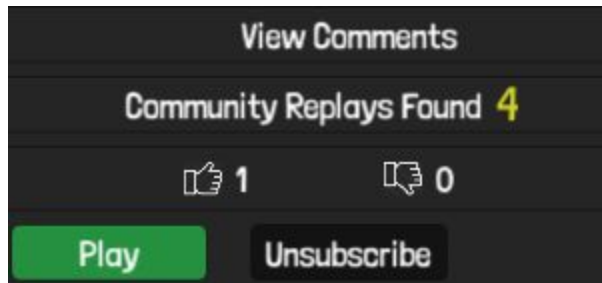
**Workshop Replays**

When an item in the Workshop Browser is selected, you can also see if any replays have been submitted to the Gallery for that level. This is a great tool to see what kind of bridges other players are designing, and especially useful for level designers to see how players are solving (or attempting to solve) their creation.
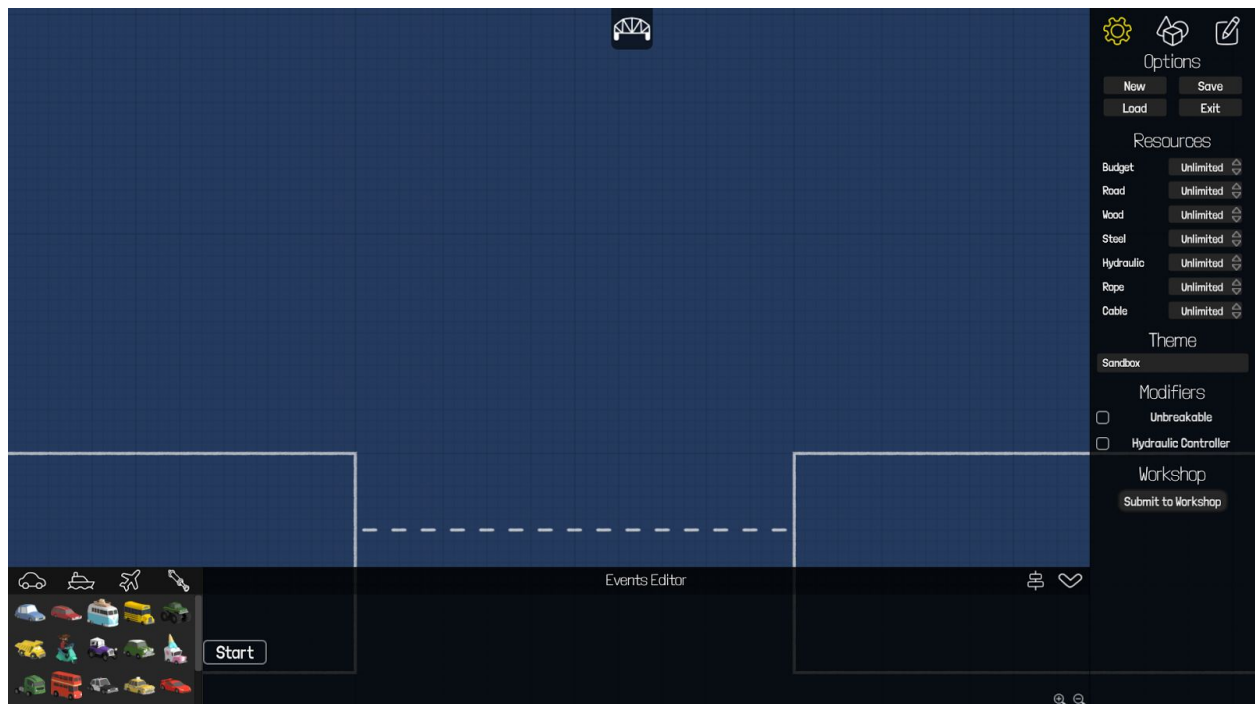
**Blueprint Mode**

Sandbox blueprint mode gives you a blank canvas to make a level of your own design.

Static Joints can be dragged and dropped into the scene, as well as other objects such as under-water rocks, ramps, platforms, and custom objects. Vehicles and other phases (such as Ships and Hydraulic Phases) can be created from the Events menu, by clicking one of the buttons to bring up the relevant options. You can adjust the limitations of the budget, roads, and other materials to increase the challenge.

Terrain may be moved vertically and horizontally by clicking and dragging within its hit area. Most objects have further options which can be brought up by clicking on them.



**Blueprint Tools**

Theme: Change the World Theme of landmasses. (Alpine Meadows, Desert Winds, etc…)

Theme Index: Edit by clicking on a landmass in Blueprint Mode. Changes the layout of the current theme. Note: Vehicles will collide with terrain from non-default Themes.
Hydraulic Controller: Enabling the Hydraulic Controller will allow players to determine whether specific hydraulics or split joints will activate during hydraulic phases.
Unbreakable: If selected all materials will have infinite strength and never break, boats and planes will pass through materials, respecting their unbreakable status.
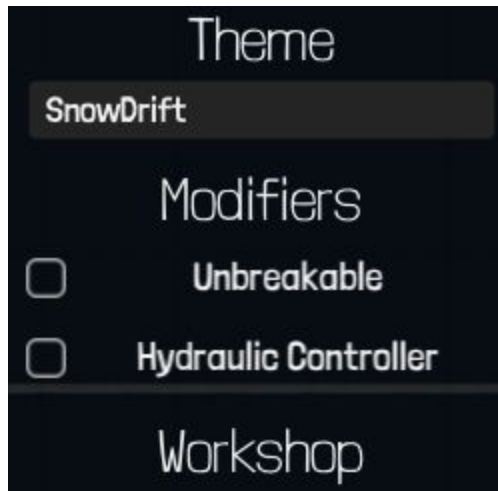


**Edit**
The Edit button in the top-right corner of Blueprint mode allows you to edit the properties of placed objects. Clicking on an object in Blueprint mode opens the Edit menu.
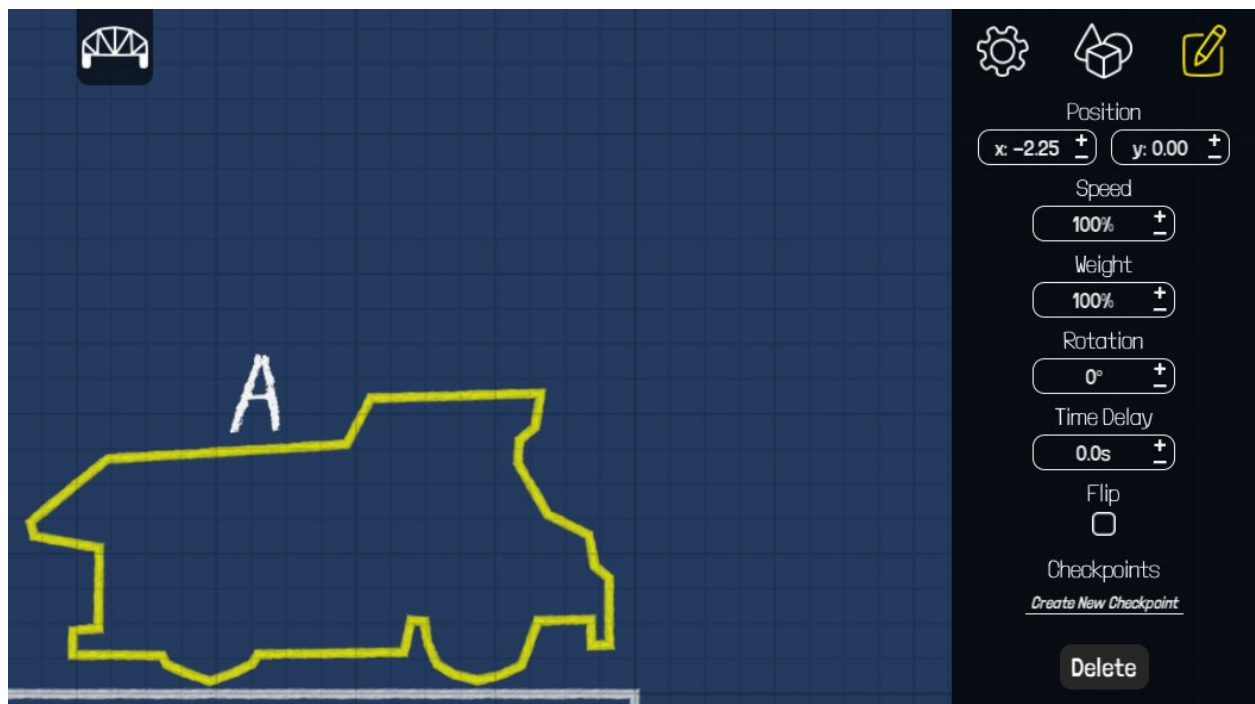
## Custom Objects

Create custom objects in Blueprint mode. Apply Shape determines the number of points, minimum 3, and the radius of the object in metres. Edit Shape allows you to adjust the position of each point. Shift+Click will cause the point to snap to grid while being moved. Ctrl+Click deletes the selected point and redraws a line between the two adjacent points. Enabling Dynamic Shape will allow gravity to influence the object in simulation and will allow you to edit the object's mass. The Collide With Road setting will change whether a custom object will collide with or pass through roads.



## Events Editor

The Events Editor gives you control over the sequence of phases for vehicles, boats, planes, and hydraulics. Drag a vehicle, boat, or plane to the blueprint and a phase will be created in the Events Editor. They may also be dragged into the Events Editor and the object will be placed in the Blueprint. Hydraulic Phases may only be added to the Events Editor. Phases may be dragged into place and vehicle events moved from one phase to another by clicking and dragging on their icon within their current phase.
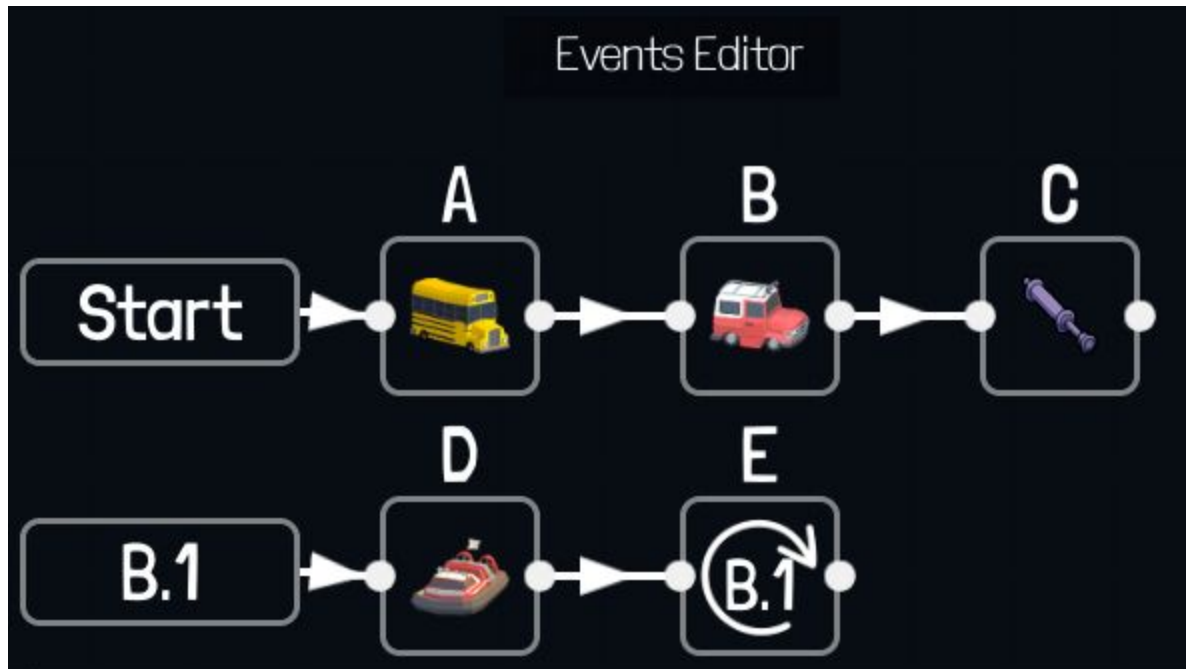
Phase connection points, indicated by white dots on the phase box, allow you to draw lines connecting two phases. The following phase will start when the previous phase completes. If a phase has more than one input phase, all input phases need to complete before the next phase will start in simulation. You may delete these lines by clicking on the arrow and using 'D' or 'DEL'. Checkpoints can add a couple other elements to the Event Editor as detailed below.
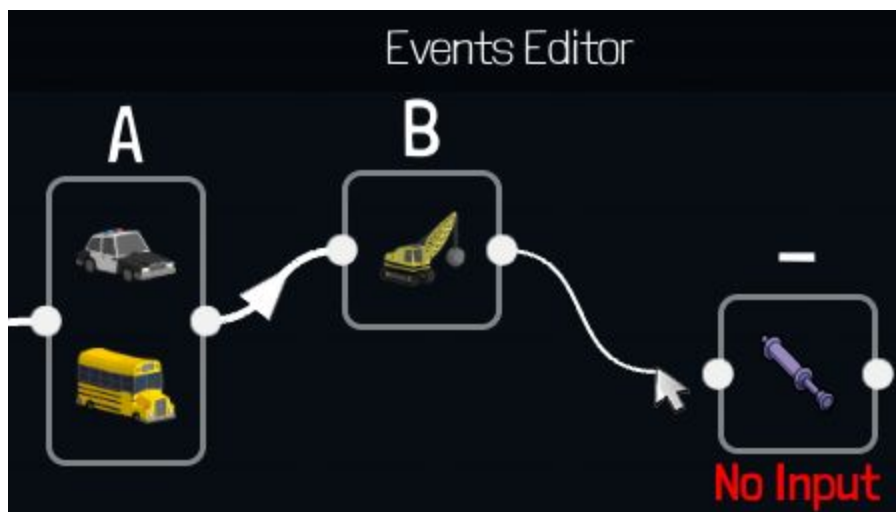


**Creating and Editing Checkpoints**
Checkpoints are waypoints that must be collected before reaching the destination flag. To create a checkpoint click on a vehicle in blueprint mode and select 'Create New Checkpoint'. To edit the properties of a checkpoint click on it in Blueprint mode.
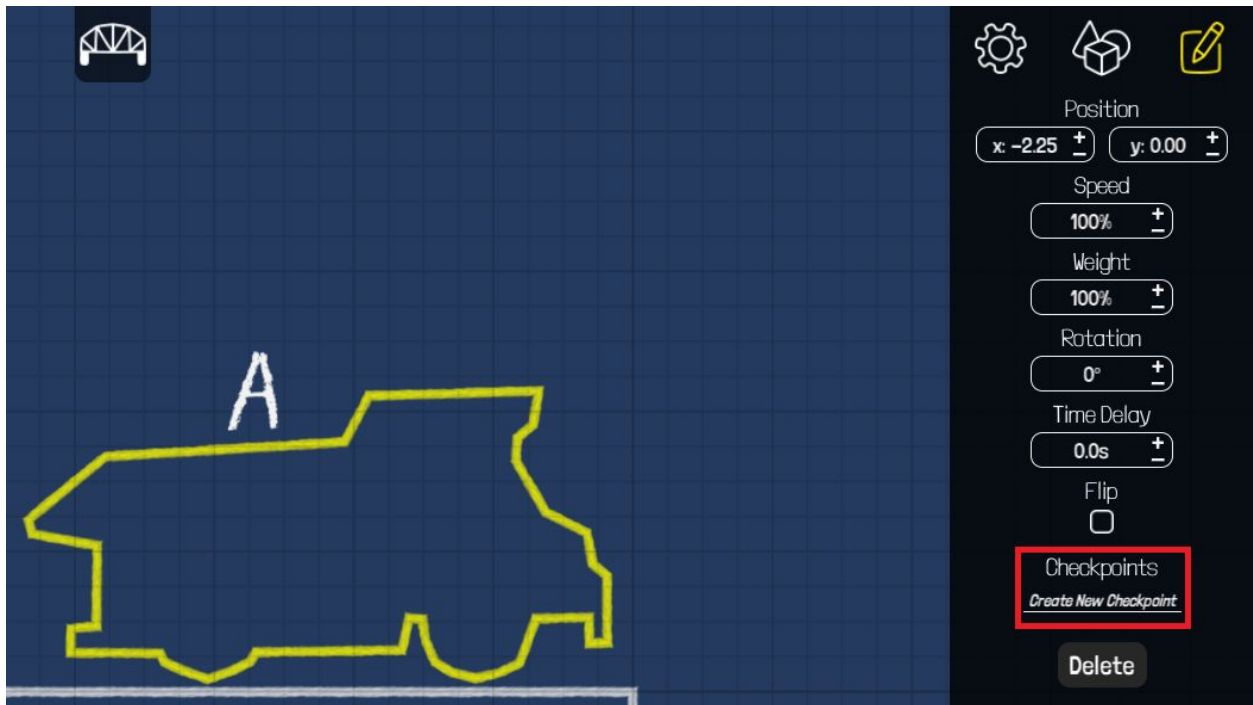
Checkpoints can be set to trigger another sequence of phases to happen, stop and/or reverse a vehicle, or change its speed (Note: vehicle speed changes are absolute, two 20% speed checkpoints will not decrease the speed to 4%). They may also be required to be picked up in order, noted by a '#'.

When editing checkpoints in Sandbox to stop, restart, or trigger a new phase sequence new elements will be added to the Event Editor as detailed below.

checkpoints.png



**Trigger Sequence**
A new line labeled with the checkpoint name will be placed in the Event Editor. Place new phases and connect them to the trigger phase. These phases will trigger when the checkpoint is picked up by the correct vehicle.
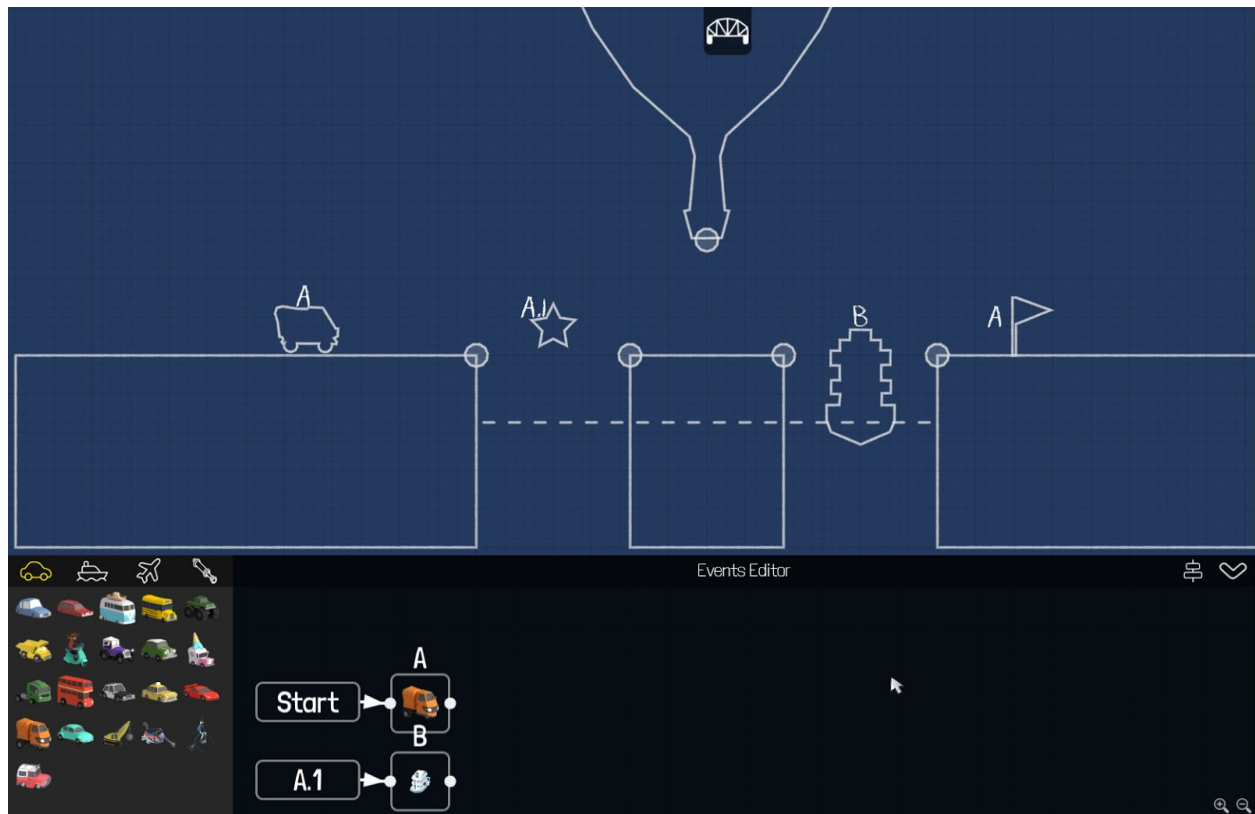
**Stop/Restart and Reverse**

When the 'Stop Vehicle' option is selected a restart phase, marked by an arrow circling the checkpoint name, will be added to the Event Editor and the 'Reverse Vehicle' option will become available. The restart phase is treated like any other phase and may be placed after other phases, or moved to an existing phase, and linked to restart the vehicle later in the level.
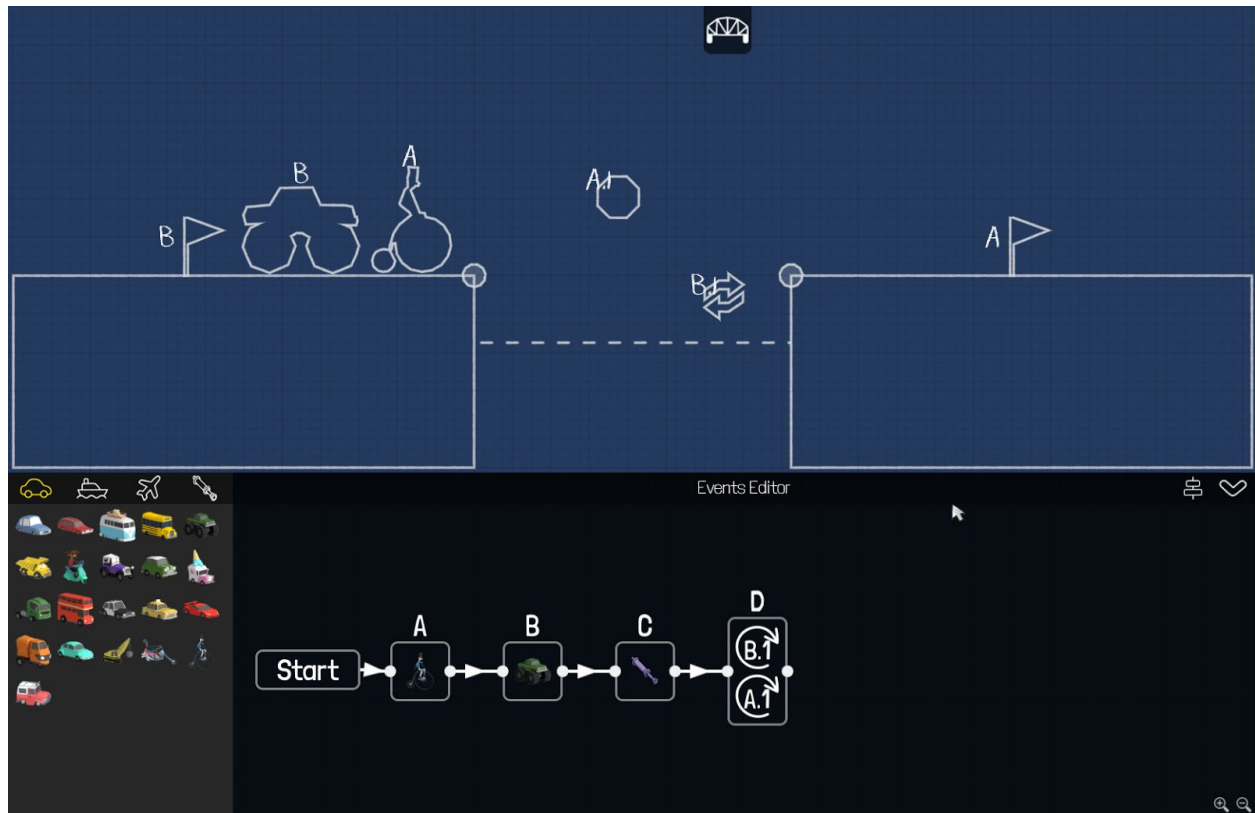
**Build Mode**

In Build Mode you will be presented with the same UI as the campaign. You can easily toggle between Building and Blueprint modes with the Tab key: adding, removing, and adjusting as necessary.
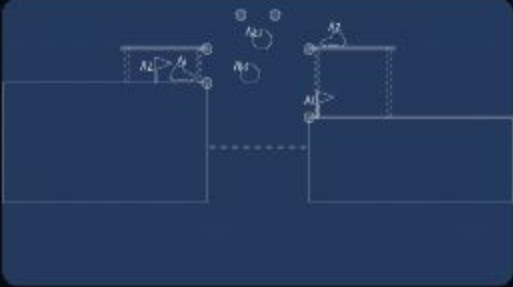
**Submit to Workshop**

To upload a Sandbox Level to the Workshop, you must build a successful bridge in Build Mode. Once complete use the Submit to Workshop button. You may then add a title, description, and view the thumbnail of your design. Also, you may add tags as detailed below. After a successful simulation your completed level will be uploaded to the Steam Workshop.

**Steam Workshop Tags**

Tags allow players browsing the Steam Workshop to sort levels by labels assigned by the level creator.

Difficulty Tags: Easy, Medium, Hard, Expert, Insane
Art: Showoff your amazing designs.
Contraption: For Rube Goldberg devices like trebuchets and ferris wheels.
Replica: For replicas of real bridges.
Autoplay*: If selected your Sandbox solution will auto-load when playing the Workshop item. Allow others to play and improve upon your solution.
Unbreakable*: If selected all materials will be unable to break, boats and planes will pass through materials, respecting their unbreakable status.

*Autoplay and Unbreakable are set separately from other tags but will appear as a tag in the Workshop.
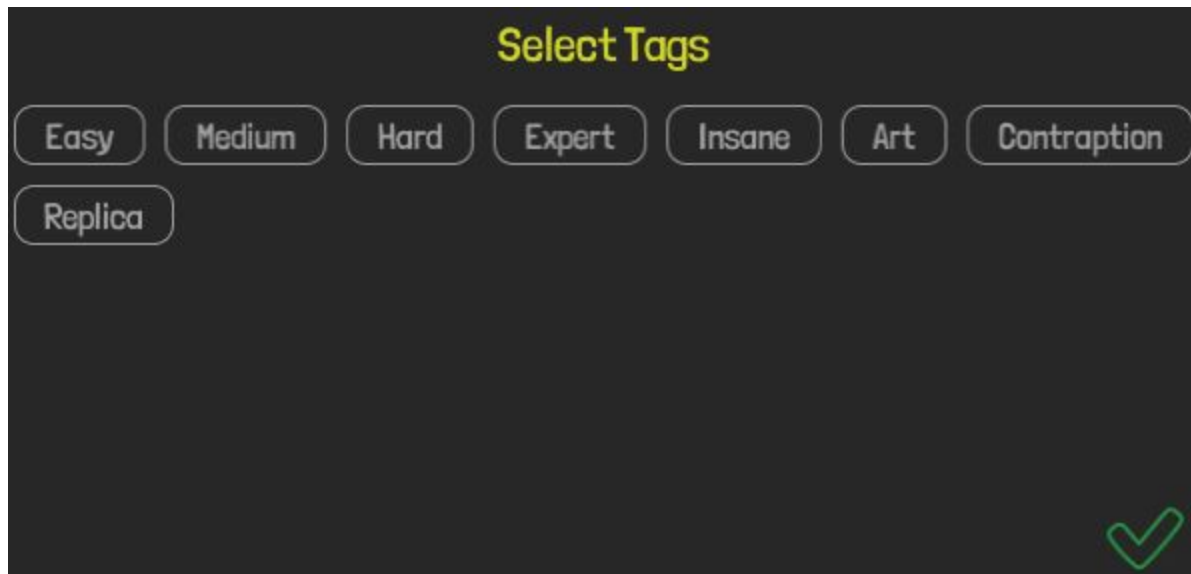
**Edit and Update Workshop Levels**
You may view levels you have submitted in the Steam Workshop Browser under the 'My Items' tab. You will have to subscribe to your levels first. This is also where you view community replays for your Workshop Levels. You may also edit the visibility of your level here to public, friends only, or hidden. Visibility of submitted Workshop levels is public by default.

Once subscribed you will be able to play as normal or edit your level in Sandbox. Make any adjustments, ensure your solution still works, and then Submit to Workshop. You will be prompted to either create a new workshop submission or update the existing submission. Once chosen you will be presented with the submission dialogue where you may edit the title, description, and other details as normal. Simulate and Submit as normal to complete the process.

## 8 - Music

Adrian Talens is our talented composer and musician, you can check him out on his webpage below. The soundtrack is available separately as DLC on the Poly Bridge Steam Store Page.

http://adriantalens.com
http://store.steampowered.com/app/367450
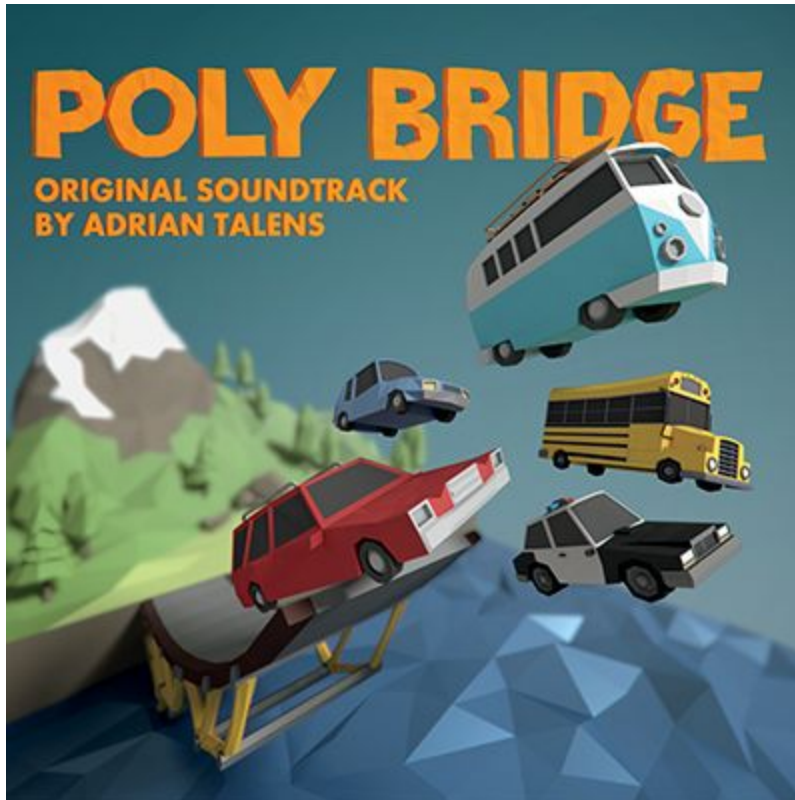


## 9 - Credits

**Code & Design**
Patrick Corrieri

**Art**
Javier Villalba

**Music**
Adrian Talens

**Production**
Christian Redding

**Icons**
Irina Miroshnichenko

**Web**
Davide Gaido

**Level Design**
Bolt986
Jaso
Violets-Are-Blue
Wergat
Zautos

**Localization**
Adriene Dupere
Taichi Yokoyama
Isabela Pedrarosa
Aleksandra Golubeva


http://www.drycactus.com
http://steamcommunity.com/app/367450/discussions/
https://www.reddit.com/r/PolyBridge/
support@drycactus.com