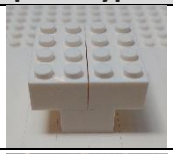
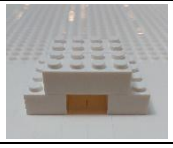
CONSTRUCTION YARD (SOLUTION)

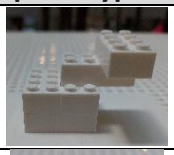
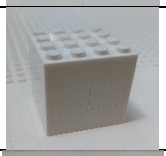
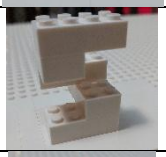
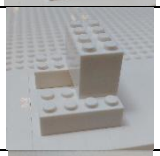
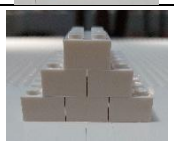
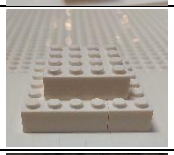
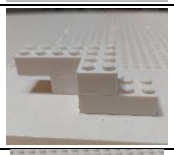
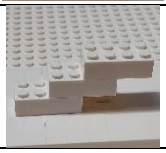
by Ong Kah Kien

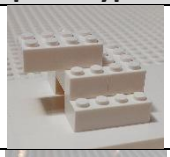
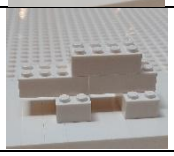
The first step is to use the 2x4 Lego bricks and given instructions to build the 16 prototypes. The instructions use several consistent coded symbols/text to represent various building steps, which need to be inferred. The table below summarizes the building steps represented by the different symbols/text used in the instructions (note the stud numbering format based on both orientations are in the provided bricknets):

Instruction codes	Represented building steps
[brick] hdr	Lay brick as a header (i.e. short end facing solver) at ground level
[brick] str	Lay brick as a stretcher (i.e. long end facing solver) at ground level
[brick] (hdr/str) (#) ∧ [brick] (#) …	Lay first brick (as header/stretcher) (with studs #A-#B) on top of second brick (studs #X-#Y) (and any other bricks similarly)
[brick] ∧∧ [brick]	Lay first brick completely on top of second brick

After deciphering the instruction codes, the 16 prototypes can be unambiguously built using the instructions. Each of the prototypes is an abstract/simplified Lego model representing something under one of the 4 clued categories clued by the colored icon at the start of the instruction. These icons and categories are from the Lego Creationary game, namely Green for Nature, Yellow for Vehicles, Blue for Things, and Red for Buildings. However, as hinted that they are mostly original ubiquitous prototypes, it is not necessary to try to match them against the actual cards from the game. As the models are abstract/simplified, the category, alphabetical order, and enumeration are important to help narrow down and identify each of them. After identifying the models, a clue for the next step is that the colors for the Blue and Red category icons have been slightly adjusted to better match the colors of those two respective colored bricks. This hints that it is necessary to find the colored brick matching with its category color in each set of instructions. Each set of build instructions uses 3-6 colored bricks, and always includes the colored brick matching with its category color. The position in the instruction sequence at which this matching-colored brick first appears could be used as an index into the name of the model. The instructions for the models are given in alphabetical order of their names, to provide confirmation to their identification.

Categories	Number of bricks used	Assembled prototypes	Prototype names	Indices from sequence of matching colored brick	Extracted letter
Vehicles	3		BOAT	1	**B**
Buildings	4		BRIDGE	3	**I**

Categories	Number of bricks used	Assembled prototypes	Prototype names	Indices from sequence of matching colored brick	Extracted letter
Vehicles	6		CABLE CAR	5	**E**
Things	3		COUCH	3	**U**
Things	6		CUBE	2	**U**
Nature	3		DUCK	1	**D**
Things	5		HELIX	4	**I**
Things	4		HURDLE	4	**D**
Buildings	5		HUT	2	**U**
Nature	6		MOUNTAIN	3	**U**
Vehicles	4		PLANE	2	**L**
Buildings	6		PYRAMID	4	**A**
Nature	4		SNAKE	2	**N**
Buildings	3		STAIRS	1	**S**

Categories	Number of bricks used	Assembled prototypes	Prototype names	Indices from sequence of matching colored brick	Extracted letter
Vehicles	5		TANK	3	**N**
Nature	5		TORTOISE	4	**T**

The last step is to use the given diagram at the end of the puzzle. The diagram references the format of a standard Lego Creationary clue card shown below, which has 4 fixed sections for the different categories:

There are 4 prototypes of each category, each comprising a unique number of blocks from 3-6, thus they can be matched in this order with the corresponding number in its section. Reordering the extracted letters for the prototypes using these numbers spells the instruction phrase – `BUILD US A DUNE UNIT`. Solvers who submit this phrase in the answer checker will receive more detailed instructions to build and submit photos of a model of a Dune military unit using any objects. Once solvers submit photos of a credible build, they will receive the answer for this puzzle – **`WALL`**, thematically a Dune structure that can be built.

Constructor's notes:

As usual, I wanted to include an SGPH puzzle that would involve an MIT Mystery Hunt-style task submission, so that solvers can have some fun working on some creative task together. At the same time, I also wanted a puzzle with physical elements that needed some hands-on work, ideally things that solvers might already have and didn't have to spend time assembling, and Lego bricks was the natural choice. The six Lego bricks are actually Lego Six Bricks, a way which Lego is being used for childhood education. Building models from six 2x4 Lego bricks also references the fact that there are 915103765 different ways to put them together.