FIRST® LEGO® League Challenge UNEARTHED™ Building Instructions

Build 11: Silo

This build is 121 pieces, and 50 building steps.

Welcome to text-based instructions from Bricks for the Blind. Before you start building, here are some terms we'll be using:
- In Front of/Front: towards you.
- Behind/Back: away from you.
- Up: towards the ceiling.
- Down: towards the floor.
- Stud: the bump on a LEGO brick. Example: A 2x1 brick has two studs on it.
- Vertically: going from front to behind.
- Horizontally: going from left to right.
- Upright: pointing up towards the ceiling.
- That one/ppp: previously placed piece.
- Plate: piece with studs.
- Tile: smooth piece without studs (unless otherwise specified)
- Symmetrically: a mirror image. Example: If you place a 2x1 brick with technic connector on the front wall at the right, connector to the front, and then place another such piece symmetrically on the back wall, at the right, the technic connector of the second piece should point to the back, since it will be placed symmetrically.
- Centered-vertically: even amount of space in front of and behind the piece
- Centered-horizontally: even amount of space left and right of the piece.
- Row: studs lined up horizontally (left to right/side to side).
- Column: studs lined up upright or vertically (top to bottom/back to front).
- Standing upright: the piece is perpendicular to the ground, like a wall.
- Lying flat: the piece is parallel to the ground, like a piece of toast which fell off the table.
- Anti-stud: the portion of a piece which accepts studs, like the bottom of a plate.
- Jumper plate: a 1x2 plate with a single stud on top, or a 1x3 plate with only two studs on top.

A note on LEGO Technic™ part names. These parts are somewhat different from regular LEGO bricks. Here are some definitions in case the builder or helper is not familiar with LEGO Technic™.

Axles - An axle is a connector which has an X shaped cross-section. Because their cross section is not round, anything connected to an axle using an axle-hole will rotate with that axle. Axles are longer than they are wide, and the length of an axle corresponds with how many bricks long it is. Aka a 3L axle is three bricks long. Axles come in a variety of lengths, with a 2L axle being the shortest available. They may be combined with pins, or have circular stops on them. A stop prevents the axle from sliding through an axle-hole at a specific point on the axle.

Pins - A pin is a connector which has a circular cross section and a flanged notch out of one or both ends. This flanged notch allows them to click into bricks with a pin-hole. Pins come with and without friction ridges, which are small bumps on the pin which prevent them from rotating freely. For standard pins, black is a high friction pin, and gray is a low friction pin. A standard length pin is two brick lengths long, with a stop in the middle. This prevents a brick from being pushed from one side of the pin to the other. A 1L pin is one brick long and still retains the stop, however it also includes a hollow stud at the other end. A 3L pin is three bricks long, and only contains a stop at one side, allowing two bricks to be pushed onto the other side of the pin. Pins may also have one side which is an axle.

Lift-arms - A lift-arm is a basic structural element, similar to a brick or a plate, but usually without any studs. It is a beam with rounded ends and with holes in it, with the same spacing as the studs on a LEGO brick. lift-arms come in a variety of lengths, including a 1x1 lift-arm which looks like a cylinder. Thick lift-arms are as wide as a LEGO brick, and thin lift-arms are half as wide as a LEGO brick, but not the same thickness as a LEGO plate! The holes in a lift-arm arm may accept axles or pins. They also come in a variety of shapes, including tees, ells and triangles.

Gears - A gear is a functional element. They are typically discs with teeth on the outside, there are also worm gears which look like a spiraling cylinder! Gears connected by axles transmit or even transform rotational motion!

Axle and Pin Connectors - These elements are typically smaller than lift-arms and are used to connect some combination of pins or axles. They might have pins or axles, as well as axle or pin-holes. They have a lot of different angle combinations! The simplest just connects two axles or pins together in a straight line.

Bushes/Bushings - LEGO Technic™ uses bushes largely as spacers, but they also can reduce friction between rotating parts, or can form useful elements such as handles. Bushes are typically light gray, generally cylindrical, and have an axle-hole running through the middle. They have a flange at the front and back to make them easier to pull on and off.

Technic™ Bricks and Plates – There are also regular bricks and plates that are adapted for use with Technic™ elements. Technic™ bricks have holes for either pins or axles on the sides and are only one brick wide. One of the most common of these is a 1x2 brick with a single pin hole. Most often, these bricks have pin holes, not axle holes. Technic™ plates have holes on the flat surface between the studs and are a minimum of two bricks wide. The holes in these plates can accept pins or can allow an axle to pass through and still spin.

For builders with low vision, or a sighted building partner who may want to follow along with the printed visual instructions that come with each set. As low vision users may benefit from viewing the instructions on a personal device where they can zoom in on content and use assistive technologies to enhance the visuals.

Sorting Instructions:

This LEGO set comes in the bag labeled 18-19 and some large pieces from bag 0. Sort the pieces into groups as described below. Note that where there are multiple colors of the same brick in a step, the colors will be split across two groups to make telling the difference easier for the builder! LEGO includes a few spare parts in case you lose something. Set these into their own group away from the rest, in case you need them later.

Build 11

Bag 18 (7 groups of bricks)
Main Build: Large Silo

Group 1 contains the pieces for steps 1-8. Include a light gray 4x12 plate, a light gray 6x12 plate, and a light gray 6x12 right wedge plate from bag 0.
Group 2 contains the pieces for steps 9-16. Include a light gray 6x12 left wedge plate from bag 0.
Group 3 contains the pieces for steps 17-23. Include a red 15L liftarm from bag 0.
Group 4 contains the pieces for steps 24-30. Include a light gray 6x12 plate, a light gray 6x12 left wedge plate, and a light gray 6x12 right wedge plate from bag 0.
Group 5 contains the pieces for steps 31-33 and two lime green 1x1 tiles for step 34.
Group 6 contains the two brown 1x1 tiles for step 34.
Group 7 contains the rest of the pieces for step 34 and the pieces for steps 35-36.

Bag 19 (2 groups of bricks)
Sub-build: Small Silo

Group 8 contains the pieces for steps 37-42.
Group 9 contains the pieces for step 43.
Group 10 contains the brown 1x1 tile and two black 1x2 tiles for step 44.
Group 11 contains the dark gray 1x1 tile for step 44.
Group 12 contains the rest of the pieces for step 44 and the pieces for steps 45-50

Building Instructions:

Group 1.

Main Build

1.1. Let's get started building the silo! Place a light gray 4x12 plate, horizontally, in front of you.

1.2. Place a light gray 1x2 brick, vertically, on the back two studs of the leftmost column of the previous piece.

2. Place a light gray 1x10 brick, vertically, in front of the previous piece.

3. Place the leftmost column of a light gray 6x12 plate, horizontally, under the previous piece and in front of the 4x12 plate.

4. Rotate the base 90 degrees clockwise so the 1x10 brick is horizontal at the back. Place the back row of a light gray 6x12 right wedge plate, horizontally with the longest row at the front, under the left two studs of the 1x10 brick and to the left of the previous piece.

5.1. Place a light gray 1x6 tile, horizontally, on the right six studs on the second row from the back of the silo.

5.2. Place a light gray 1x1 tile to the left of the previous piece.

5.3. Place a light gray 1x4 tile, horizontally, to the left of the previous piece.

6.1. Place a dark gray 1x3 tile, horizontally, in front of the previous piece so the left sides are even.

6.2. Place a dark gray 1x8 tile, horizontally, to the right of the previous piece.

7.1. Place a white 2x4 tile, horizontally, in front of the previous piece so the right sides are even.

7.2. Place a light gray 1x6 tile, horizontally, to the left of the back row of the previous piece.

7.3. Place the back stud of a black 1x2 tile, vertically, to the left of the previous piece.

8. Place a light gray 1x6 brick, horizontally, to the right of the front stud of the previous piece.

Group 2.

9. Find a light gray 4x4 rounded corner brick. This brick is cut out so it looks like a macaroni noodle, I'll call it a "4x4 macaroni brick" from now on. Place the rightmost stud of this piece, with the flat sides on the right and front, to the left of the 1x10 brick on the back row of the silo. The brick should curve towards you.

10.1. Place the rightmost stud of a light gray 4x4 macaroni tile, with the flat sides at the right and front, to the left of the row of tiles in front of the 1x10 brick from step 2. The left side of this piece should extend one stud in front of the previous piece.

10.2. Place a dark gray 3x3 macaroni tile, with the flat sides at the right and front, in front of the previous piece so the right and front sides are even.

10.3. Place a light gray 2x2 macaroni tile, with the flat sides at the right and front, in front of the previous piece so the right and front sides are even.

11. Place the back three studs of a light gray 1x6 brick, vertically, on the leftmost column of the silo. Place another, vertically, in front of the left stud of the 4x4 macaroni brick from step 9. The left piece should overhang by three studs to the front and the right should overhang by four studs.

12. Place a light gray 6x12 left wedge plate, horizontally with the longest rows at the back, under the previous two pieces and to the left of the 6x12 plate from step 3.

13.1. Place a light gray 1x6 tile, vertically, to the right of the right 1x6 brick from step 11, in front of the 4x4 macaroni tile. The front side should be even with the front of the silo.

13.2. Place a light gray 2x6 tile, vertically, to the right of the previous piece.

13.3. Place a light gray 1x4 tile, vertically, to the right of the previous piece so the back sides are even. There should be three free studs in front of this piece.

14. Place a light gray 1x6 brick, vertically, on the front six studs of the rightmost column of the silo.

15.1. Place a light gray 1x2 brick, horizontally, to the left of the front stud of the previous piece.

15.2. Place the front row of a black 2x2 tile with a pin on top to the left of the previous piece.

15.3. Place a white 2x4 tile, vertically, behind the previous piece.

16.1. Place a light gray 1x4 brick, horizontally, on the front row to the left of the 2x2 tile with a pin on top.

16.2. Place the front stud of a light gray 1x2 brick, vertically, to the left of the previous piece.

Group 3.

17.1. Stack three 2x3 wedge plates and place them, vertically with the column of studs on the right, to the left of the previous piece so the front sides are even.

17.2. Place the left column of an olive green 2x4 wedge brick, vertically with the column of studs on the right, behind the right column of the previous piece.

18.1. Place a light gray 1x1 tile on the front row to the left of the stack of 2x3 wedge plates from step 17.1.

18.2. Place a light gray 1x1 brick in front of the second 1x6 brick from the left side of the silo. This is on the seventh column from the left.

19. Push the sixth hole from the front of a red 15L liftarm, vertically with the holes on the top and bottom, onto the pin of the 2x2 tile with a pin from step 15.2. This will be a lever we can use to launch things out of the silo later on!

20.1. Place a light gray 1x1 plate on the back right corner of the silo. This will be on a row of bricks behind two rows of tiles.

20.2. Place a light gray 1x4 plate, horizontally, to the left of the previous piece.

20.3. Place a dark gray 1x6 plate, horizontally, to the left of the previous piece.

20.4. Place the back row of a light gray 5x5 macaroni plate, with the flat sides on the right and front, to the left of the previous piece so this piece attaches to the macaroni brick below it.

21.1. Place a dark gray 1x6 plate, vertically, in front of the left column of the previous piece.

21.2. Find the 1x6 brick that is horizontal on the fifth row from the back and to the left of the 15L liftarm. Place a dark gray 1x6 plate, horizontally, on this brick.

21.3. Place the right column of a dark pink 2x4 wedge plate, vertically with the column of studs on the right, in front of the leftmost stud of the previous piece. This piece goes on the 2x4 wedge brick from step 17.2.

22. Place a dark gray 1x6 plate, vertically, on the vertical 1x6 brick on the leftmost column of the silo.

23.1. Place a dark gray 1x6 plate, vertically, on the vertical 1x6 brick on the rightmost column of the silo. The front side should be even with the front of the silo.

23.2. Place a light gray 1x2 plate, horizontally, to the left of the front stud of the previous piece.

23.3. Skip two studs to the left and place a light gray 1x4 plate, horizontally.

23.4. Place the front stud of a light gray 1x2 plate, vertically, to the left of the previous piece.

23.5. Place a light gray 2x3 wedge plate, vertically with the column of studs on the right, to the left of the previous piece so the front sides are even.

Group 4.

24. Place a light gray 6x12 plate, vertically, on the right six columns of the silo.

25.1. Place a light gray 1x8 plate, vertically, to the left of the previous piece so the front sides are even.

25.2. Place a light gray 1x1 tile on the back stud of the same column as the previous piece.

25.3. Place a light gray 2x12 plate, vertically, to the left of the previous two pieces.

25.4. Place a light gray 1x8 plate, vertically, to the left of the previous piece so the front sides are even.

25.5. Place a light gray 1x1 tile on the back stud of the same row as the previous piece.

26. Place two light gray 6x12 wedge plates in front of you, horizontally with the longest columns on the right. Place the one with the longest row at the back to the left of the 1x8 plate from step 25.4 so the front sides are even. Place the other symmetrically behind the first. These will follow the shape of the wedge plates below them.

27. Keeping the lever at the front, flip the silo upside down. Place a light gray 2x2 plate, upside down and centered vertically, on the leftmost two columns of the silo.

28. Place a light gray 4x6 plate, upside down and horizontally, centered vertically to the right of the previous piece. Place another to the right of the first.

29.1. Keeping the silo horizontal, flip it right side up so the lever is at the back. Place a light gray 2x4 slope brick, vertically with the slope on the right, on the leftmost two columns of the silo so the back sides are even.

29.2. Place a light gray 1x1 slope tile, with the tall side at the front, on the front stud of the previous piece.

30.1. Place a light gray 1x4 brick, horizontally, in front of the previous two pieces so the left sides are even.

30.2. Place a light gray 1x2 slope brick, horizontally with the slope on the right, on the left two studs of the previous piece.

30.3. Place a light gray 1x1 slope tile, with the tall side on the left, to the right of the 1x4 brick from step 30.1.

Group 5.

31.1. Place a light gray 2x4 brick, horizontally, in front of you.

Place a light gray 2x2 plate on the left two columns of the previous piece.

31.2. Place a light gray 2x3 plate, horizontally, to the right of the previous piece.

31.3. Place the leftmost column of a light gray 2x3 slope brick, horizontally with the slope on the right, under the rightmost column of the previous piece.

Place a light gray 2x3 slope brick, horizontally with the slope on the right, on the 2x2 plate from step 31.1 so the left sides are even.

31.4. Place the sloping assembly we just made in front of the 1x4 brick from step 30.1 so the left sides are even. There should be five free rows in front of the slopes.

32. Place a light gray 1x2x2 tall slope brick, horizontally with the slope on the right, in front of the slopes we just placed so the left sides are even.

33.1. Place a light gray 3x3 angled corner plate, with the angled corner at the back right, in front of you.

Place a light gray 2x2 slope brick, with the slope on the right, on the left two columns of the previous piece so the front sides are even.

33.2. Place a light gray 1x1 slope tile, with the tall side at the front, behind the left column of the previous piece.

33.3. Place the 3x3 angled corner plate on the front three rows of the silo so the left sides are even.

34.1. Place a lime green 1x1 tile on the second stud from the back on the second column from the right of the silo.

34.2. Place a lime green 1x1 tile on the fifth stud from the front on the eleventh column from the right of the silo.

Group 6.

34.3. Place a brown 1x1 tile on the second stud from the front on the fifth column from the right of the silo.

34.4. Place a brown 1x1 tile on the third stud from the back on the fourth column from the left of the silo.

Group 7.

34.5. Place a green 1x1 tile on the second stud from the front on the fifth column from the left of the silo.

34.6. Place a green 1x2 tile, vertically and centered vertically, on the eighth column from the right of the silo.

34.7. Place a green 1x2 tile, horizontally, on the sixth and seventh studs from the right on the second row from the back of the silo.

34.8. Place a lime green 1x1 plate on the third stud from the back on the tenth column from the right of the silo.

35.1. Keeping it horizontal, flip the silo upside down so the lever is now at the front. Place a light gray 2x2 inverted slope brick, upside down with the slope on the right, on the front two rows of the silo so the left sides are even.

35.2. Place the left two columns of a light gray 2x3 inverted slope brick, upside down with the slope on the right, behind the previous piece.

36.1. Place a light gray 2x2 plate in front of you.

Place a light gray 1x2 brick, vertically, on the right column of the previous piece.

36.2. Place a light gray 2x3 inverted slope brick, horizontally with the slope on the left, to the left of the previous piece.

36.3. Flip this assembly over so it is upside down with the inverted slope brick on the right. Place it, centered vertically, on the silo so the left sides are even.

Bag 19.

Group 8.

Sub-build: Small Silo

37.1. Now we will build a second, smaller silo. Set the big one aside for now. Place a light gray 2x8 plate, horizontally, in front of you.

37.2. Place a light gray 1x4 brick, vertically and centered vertically, on the rightmost column of the previous piece. It will overhang one stud to the front and back.

38. Place two light gray 3x8 wedge plates, one left and one right, in front of you, horizontally with the three stud columns on the left. Take the one with the longest rows at the back and place its rightmost stud under the front stud of the previous piece. Place the other symmetrically on the back side.

39.1. Place the right two studs of a light gray 1x4 brick, horizontally, on the front row of the front piece from the previous step. It will overhang two studs to the left.

39.2. Place a light gray 1x6 brick, vertically, behind the rightmost stud of the previous piece.

39.3. Place the right stud of a light gray 1x10 brick, horizontally, behind the previous piece.

40. Place a light gray 4x8 plate, vertically, under the previous two pieces and to the left of the two wedge plates from step 38. The 1x10 brick from the previous step should overhang four studs to the left.

41. Place the back row of a light gray 3x8 right wedge plate, vertically with the longest column on the right, under the leftmost three overhanging studs of the 1x10 brick from step 39.3. There should be one empty row between this piece and the 4x8 plate.

42.1. Place the leftmost stud of a light gray 1x4 brick, horizontally, on the front stud of the previous piece. The right side of this piece should be to the left of another 1x4 brick.

42.2. Place a light gray 2x3 wedge brick, vertically with the column of studs on the right, on the third through fifth rows from the back of the small silo so the left sides are even.

Group 9.

43.1. Place two light gray 3x8 wedge plates, one left and one right, in front of you, vertically with the three stud rows at the back. Take the one with the longest column at the right and place it on the leftmost three columns of the small silo.

43.2. Place the other 3x8 wedge plate, horizontally with the longest row at the front, on the back three rows of the silo so the right sides are even.

43.3. Place the back three rows of a light gray 4x8 plate, vertically, to the left of the previous piece.

43.4. Place a light gray 2x4 plate, vertically, to the right of the previous piece so the front sides are even.

Group 10.

44.1. Place a brown 1x1 tile on the back stud on the third column from the right of the silo. This will be on the 3x8 wedge plate from step 43.2.

44.2. Place a black 1x2 tile, vertically, on the second and third studs from the front on both the eighth and tenth columns from the right of the small silo.

Group 11.

44.3. Place a dark gray 1x1 tile on the second stud from the back on the fifth column from the right of the silo. This is two studs to the left of the other 1x1 tile.

Group 12.

44.4. Place a green 1x1 tile on the third stud from the back on the tenth column from the right of the silo.

44.5. Place a lime green 1x1 round tile on the rightmost stud on the back row of the small silo.

44.6. Place a lime green 1x2 tile, vertically, on the leftmost column of the small silo so the back sides are even.

44.6. Place a lime green 1x2 tile, vertically, on the second and third studs from the front on the second column from the left of the small silo.

44.7. Place a lime green 1x1 plate in front of the previous piece. Place another in front of the 1x1 round tile from step 44.5.

45. Place a lime green 1x1 round tile on both of the pieces from the previous step. We'll use these later on to hold the small silo at the correct angle.

46.1. Now we'll make the attachment for the small silo. Find a green 1x4 hinge plate. This looks like two 1x2 plates connected at one corner. You can open it all the way out so it looks like a 1x4 plate, or close it all the way so it looks like a 2x2 plate. When it is all the way open, the hinge will stick out like a little half-circle. Open this all the way so it is a 1x4 and place it, horizontally long, with the half-circle hinge at the front, in front of you.

Place the front row of a dark gray 2x3 inverted slope brick, vertically with the slope at the back, on the left two studs of the previous piece.

46.2. Place a clear 1x1 brick to the right of the previous piece.

46.3. Place a green 2x2 plate on the back two rows of the 2x3 inverted slope brick from step 46.1.

46.4. Rotate the small silo 90 degrees counterclockwise so it is vertical. There should be a gap on the fourth row from the front on both the top and bottom. Place the rightmost stud of the 1x4 hinge plate under the leftmost stud on the fourth row from the front of the small silo. The bottom should be even with the bottom of the silo.

47. Place the left two studs of a green 1x4 hinge plate, opened all the way and horizontally with the half-circle hinge at the front, on the front row of the 2x3 inverted slope brick from step 46.1. The rightmost stud should connect to the leftmost column of the small silo.

48. Place a green 1x1 tile on the second stud from the right of the previous piece.

49. Place the big silo in front of you so that it stands upright with the slope bricks at the bottom and the lever at the right. The anti-studs should be facing you. Find the two 4x6 plates on the large silo. The small silo will stand up at an angle. Stand it up on the front two rows, which are 3x8 wedge plates so it should lean to the left. Turn it around so the anti-studs face the front. Rotate the hinged part of the small silo so that the 2x3 inverted slope brick points straight up. Connect this to the left two anti-stud columns of the 4x6 plates on the large silo so its right column is above the left column of a 2x3 inverted slope brick. The two 1x1 round tiles from step 45 should hold the small silo in place by hitting the side of the large silo if you pick the silos up.

50. Keeping it standing upright, rotate the silo 180 degrees so the lever is on the left. There are two slots on the left side of the silo. Slide a 20 tooth gear into the lower slot, like you would with a coin in a gumball machine. The gear should fall down to the right. Then, if you hit the lever, you will launch the gear out! Be careful! There are two tan gears and one blue one that you can do this with.

Congratulations! Now this build is complete!

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