PART 2

STURDA BACKFILL BARRICADE

OPERATOR MANUAL: 14FT X 16FT BARRICADE

Revision Date: August 21st, 2022

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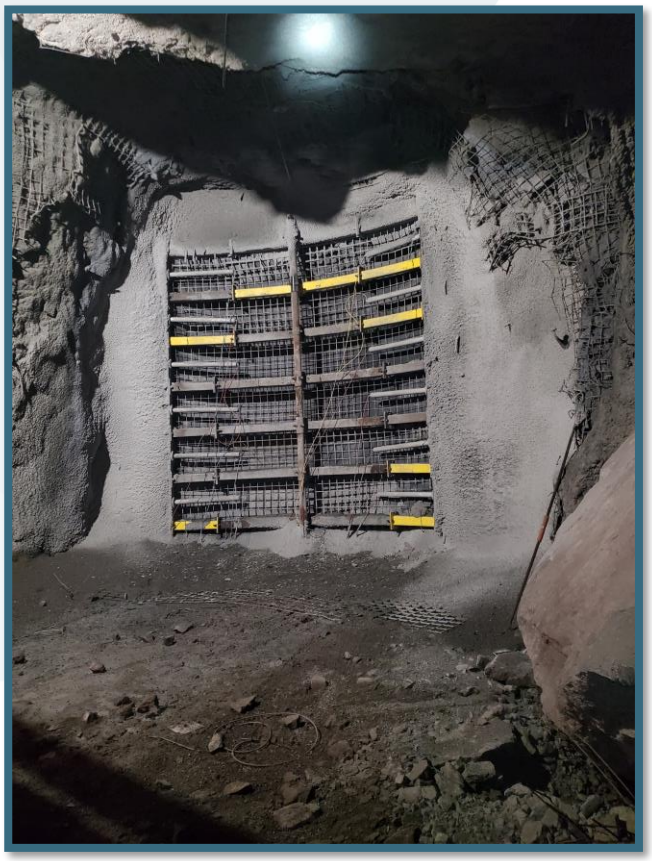
What is the Sturda Backfill Barricade?

The Sturda Backfill Barricade is a patented and engineered fill fence that can be installed in close proximity to the brow.



HOW DOES IT WORK:

- The Backfill Barricade consists of a steel frame with a mounted decanting geotextile membrane
- The Backfill Barricade is erected at the brow using the Sturda Deployer
- Dywidag bolts are then deployed pneumatically, pinning the membrane to the perimeter
- The perimeter is shotcreted to seal the contour of the drift
- As fill is poured behind the Barricade, water decants through the membrane

BENEFITS:

- Installing the Barricade directly at the brow eliminates need to resill area
- Greatly reduces the amount of shotcrete used
- Can be installed without any drilling
- Reduction in labour hours needed for installation
- Greater decanting surface reduces pressure

Product specifications

The table below lists the parts and quantity needed to assemble the 14ft x 16ft Sturda Backfill Barricade

14ft x 16ft Barricade

Part Name	Quantity
Center Post – Bottom	1
Center Post – Middle	1
Center Post – Top	1
Center Post Attachment	1
End Plate – 6'10"	4
1ft Girder	4
2ft Girder	4
3ft Girder	10
4ft Girder	14
A325 Structural Bolts – 2" x ¾"	117
Barricade Receivers	7
Air Cylinders	14
Geotextile Membrane (20'x20')	1
TOTAL WEIGHT (lbs.)	1758

Tools

Below is a list of tools that will be needed for the installation of the Sturda Backfill Barricade

- ☐ 300 ft. minimum of ¼" air brake tubing
- ☐ **(1)** Impact drill with 1-1/4" socket
- ☐ **(1)** Can spray paint
- ☐ **(2)** Crescent wrench
- ☐ **(1)** Sturda Manifold (sold separately)
- ☐ **(1)** roll of wire mesh screen
- ☐ **(1)** bag electrical tie wraps
- ☐ Measuring tape
- ☐ Cutting disc or equivalent to cut center post

Pre-Operation Criteria

Prior to commissioning the Sturda Backfill Barricade, verify that all pre-operation criteria are met to ensure safety and optimal productivity

Pre-Operation Checklist:

- ☐ Are all the necessary materials and tools present on site and in working order
- ☐ Have all personnel been trained in installing the Barricade
- ☐ Has the stope been pre-inspected to ensure there is no excessive sloughing or risk of muck falling
- ☐ Have personnel been briefed on all safety protocols prior to installation
- ☐ Is the area free of debris or any other loose material to allow the Deployer to be positioned adequately
- ☐ Have the legs of the Deployer been adjusted such that the Deployer sits level (can be determined by level situated on Deployer frame
- ☐ Has the location of the barricade been excavated and leveled to ensure a flat surface
- ☐ Is the back of the drift free of any loose bolts or screen that could hinder the installation of the barricade
- ☐ Has the brow been shotcreted 10-15 ft. back
- ☐ Has a dry fit been performed to ensure the Barricade fits adequately
- ☐ Is there an air source available to deploy the air cylinders
- ☐ Has the site been marked with spray paint to identify the location the Barricade is to be erected
- ☐ Has the top of the stope been double-roped and the site of installation single-roped off with **CAUTION** signs prior to installations

- ☐ Has form oil been applied to the deployer frame and the hydraulic cylinder to ensure shotcrete does not stick
- ☐ Have all nuts and bolts been adequately tightened prior to erecting the Deployer arm

If you are unable to check every box above, stop and correct prior to installing the Sturda Backfill Barricade

Installation Procedure

1) Ensure all workers have proper PPE.
2) Check ground conditions in area. Ensure there is a ventilation fence erected on the sill above. Shotcrete to be applied to the brow extending 15 ft. away from no man entry location.
3) Ensure barricade is located outside the no entry location, as per site procedure.
4) Mark up location for the STURDA barricade. Identify the center line for the barricade location.
5) Level the deployer by adjusting the length of the legs and set up in safe zone. Use level mounted on Deployer as guide.
6) Measure distance from the floor to the hinge pin while the deployer is still in the horizontal position. Will consist of two measurements, the vertical distance from the floor to the bottom of the deployer deck and another horizontal measurement from the bottom of the deployer deck to the top of the deployer deck. The sum of these measurements will provide the total height.
7) Place full length of center post on the deployer deck by combining all three segments (total length should be 2 ft. below the height of the drift). Ensure the post is centered on the deployer deck and that the appropriate number of receivers are in place.
8) Measure and ensure the receivers are 2 ft. apart from each other starting 2 ft. from the bottom of the center post.
9) Start installing girders to the receivers, ensuring longest girders are closest to the center post. Install 2 at a time, filling each receiver before moving to the next one. The girders are installed using 2” x ¾” A325 Type 1 assembly bolts to attach the end plates of the girders to the receiver plate.
10) Once the first set of girders are installed, (there should be one on either side of the receiver), continue to attach girders to either side until all rows are entirely filled.

11) Install end plates on either side of the fill barricade on the outer girders using 2” x ¾” A325 Type 1 assembly bolts. Cut the end plates to the recommended height.
12) Install air cylinders into the designated holes in the end plate on either side of the fill barricade.
13) Using a forklift, position the deployer to where the Backfill Barricade will be installed. Using the remote, erect the Sturda Fill Barricade into place to ensure it fits properly in the shape of the drift. Add or remover girders as needed to ensure a proper fit. It is important to ensure the Barricade is erected as close to 90 degrees as possible.
14) After testing to ensure the Barricade fits, return the Deployer deck to the start position, (horizontal). And retreat to safe zone.
15) Install all air lines, connecting each manifold valve to an air cylinder
16) Install a double screen to the face of the Sturda Barricade while it rests on the Deployer. Perform this installation by ensuring the screens are slightly offset from one another and attach to the girders using tie wrap or mechanical wire. The screen should extend a minimum of 1.5ft passed the girders allowing overhang on either side.
17) Fold geotextile liner over the screen and use electrical tie wraps to attach the geotextile through the grommets and tying off to the screen.
18) Reposition the deployer in the same location as tested and erect the Sturda Barricade into position.
19) Deploy cylinders one at a time, completing each row before moving to the next one. Ensure each line is receiving 5 psi of air pressure.
20) Once all cylinders have been deployed into the walls of the drift, deploy the top two air cylinders into the brow.
21) Shotcrete the perimeter and allow to cure to a minimum of 20 MPa.
22) Once the shotcrete has set, lift the jacking legs, and remove the deployer from the area.

Pour Procedures

- ☐ A single lift plug pour of 23 ft, (or 5 ft above the top of brow) is possible using the Sturda Backfill Barricade. Allow the first lift to drain before starting the subsequent lift. A continuous plug pour is possible provided that the loading pressure on the barricade does not exceed a maximum pressure of 12.37 psi. Monitor the drain water coming out of the fill barricade. If there is excessive leakage around the perimeter, shut down the pour and re-apply shotcrete to seal the ground.

  Please note: While a single continuous pour is possible, it is recommended to follow the engineering standards laid out by your local engineering office

- ☐ Apply a fill recipe with binder for the plug pour as specified by mine technical services (mts), in order to achieve a minimum unconfined compressive strength (UCS) of greater than 25 psi at the prescribed curing period

- ☐ Start the next lift of the stope body pour at the fill recipe specified by MTS. Continue to monitor the pressure and water ponding above the solids. If the water depth exceeds 10 feet, stop the pour and allow to drain. Resume the pour when the water depth to top of solids is lower than 10 ft.

- ☐ Flush water is preferably diverted out of the stope to minimize water ponding and maintain good quality of fill

Policies and Precautions

To optimize success and worker safety while assembling and installing the Sturda Backfill Barricade, the following policies are to be followed

- ☐ Materials provided with Backfill Barricade package are not to be modified or replaced as this an engineered product. Sturda Inc. cannot guarantee the success of the Backfill Barricade if the design has been altered
- ☐ Personnel are to remain at a 1:1 ratio away from the brow under all circumstances
- ☐ A minimum of **(3)** workers will be present to assemble the Backfill Barricade
- ☐ Ensure whip checks are in place prior to activating air source
- ☐ Under no circumstance should a worker attempt to climb the Backfill Barricade
- ☐ Ensure bottom of geotextile membrane does not pass below the base of the center post
- ☐ Bolts to be installed with head facing center post
- ☐ Personnel to remain a safe distance from the brow prior to the plug being poured
- ☐ Ensure all workers are aware of the following:
    - Master switch
    - Pinch points
    - Energy sources
    - Safe zone
    - Proper PPE

Failure to adhere to these policies and precautions increase the risk of workplace injury and diminish the efficacy of the Sturda Backfill Barricade

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