

# Roof Control Plan

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## Roof Support Materials

All components of the roof bolt assembly shall comply with the American National Standards Institute as specified in ANSI/ASTM F 432-88 "Standard Specifications for Roof Bolting Materials in Coal Mines."

### **Roof Bolt Rods:**

<b>Manufacturer:</b>	American Mine Roof Wright Bolt, Inc.	<b>Manufacturer's designation:</b>	K-RRB560, RRB548, RRB542  B60R, B48R, B40R
<b>Minimum length:</b>	42"	<b>Diameter:</b>	5/8", 3/4", and 7/8"
<b>Type steel:</b>	40, 60-grade rebar	<b>Type of head:</b>	Standard
<b>Minimum yield:</b>	18,000 lbs.		
<b>Rod Dimensions:</b>	Head - 1 1/8", Flange - 1 1/2", 2"		

### **Resin:**

<b>Manufacturer</b>	<b>Manufacturer's Designation</b>
So-Tite Corporation	R625 series for 5/8", R750 series for 3/4", R875 series for 7/8"
Lockit Resins and Adhesives, Inc.	LOK-A series for 5/8", LOK-B series for 3/4", LOK-C series for 7/8"

<b>Type:</b>	Polyester resin	<b>Method of Drilling:</b>	Rotary and percussion
<b>Size of finishing bit:</b>	+ .030	<b>Dust Control:</b>	Permissible unit

<b>Rod diameter:</b>	3/4"	<b>Size of finishing bit:</b>	1"
<b>Rod diameter:</b>	7/8"	<b>Size of finishing bit:</b>	1 3/8"
<b>Rod diameter:</b>	1"	<b>Size of finishing bit:</b>	1 3/8"

To prevent accidental intermixing of resins, the resin cartridges supplied by more than one manufacturer shall not be stored in the same areas of the supply yard.

***Roof Bolts:***

<b>Manufacturer:</b>	American Mine Roof Wright Bolt, Inc.	<b>Manufacturer's designation:</b>	K-B60, K-B48, K-B42  B60C, B48C, B42C
<b>Minimum length:</b>	42"	<b>Diameter:</b>	5/8"
<b>Type steel:</b>	High Strength	<b>Type Thread:</b>	Rolled
<b>Length of Thread:</b>	4"	<b>Type Head:</b>	Standard
<b>Bolt Head Dimensions:</b>	Head - 1 1/8"	<b>Flange:</b>	1 5/8"

***Bearing Plates:***

<b>Manufacturer:</b>	American Mine Roof Wright Bolt, Inc.	<b>Manufacturer's designation:</b>	K-B  BC
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Dimensions - 6" x 6", 6" to 6 1/2" x 14" to 18"  
Center hole size - 15/16", 1", 1-1/8" or 1-3/8"  
Shape - Donut or bell embossed, elliptical and flat

### **Washers:**

<b>Manufacturer:</b>	American Mine Roof Wright Bolt, Inc.		
<b>Type steel:</b>	Hardened	<b>Size:</b>	2" diameter x 1/8", 2"x2"x 1/8"
<b>Shape:</b>	Round or square	<b>Hole size:</b>	Rolled

Note: Washers shall be compatible to the bearing plates being used.

### **Anchorage Unit:**

<b>Manufacturer:</b>	American Mine Roof Wright Bolt, Inc.	<b>Manufacturer's designation:</b>	K-A AU3 Bail
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Type – Leaf \*Size finishing bit – 1 3/8”  
Install torque – 120 ft. lbs to 160 ft. lbs  
Method of Drilling – Rotary and percussion  
Dust control – permissible

### **Roof Support Material – Conventional or Temporary and Supplemental:**

Dimensions of posts: The length of posts shall be as required and the diameter must be at least 1” for each 15” in length, but shall not be less than 4”. Split posts shall have a cross-sectional area equal to that required for round posts of equivalent length.

Types of posts: Posts will be round or split of solid, straight grain wood with ends sawed square, free from defects that would affect their strength.

\*Cap blocks, size and shape: Cap blocks and footers shall have flat, parallel sides and be not less than 3” x 5” x 16” in size.

Wedges, size and shape: Wedges shall be 10” – 12” x 4 ½” tapered.

\*Crossbars, type and size: Crossbars shall be of straight grain solid wood and shall be not less than 4” thick by 8” wide and of varying lengths. Steel beams of equivalent strength may be used in lieu of crossbars.

\*Planks, size: Planks will be a minimum of 1” thick by 8” wide and of varying lengths.

Cribbing blocks, size and shape: Cribbing blocks shall have flat parallel sides and be a minimum of 30” in length and of varying cross-sectional area.

\*NOTE: When wooden material is used between roof bolt bearing plates and the roof to achieve additional bearing surface, the use shall be limited to short-life openings (not to exceed 3 years) unless treated.

### ***Face Equipment and Section Haulage Equipment:***

1. Continuous Miner: MINECO Equipment Co., Model 14CM1
2. Shuttle Car: MINECO Equipment Co., Model 21SC56
3. Roof Bolter with ATRS: Atlas Bolter Corp., Roof Boss Lo-Frame Twin Boom Bolter – Model AL36-2B
4. Scoop: MINECO Equipment Co., Model S36LF

## Sequence of Mining and Installation of Supports Including Temporary Supports

Drawings shall be attached showing the maximum width of entries, rooms, intersections, crosscuts, and if applicable, pillar splits. Drawings will also show the sequence of support installation, including temporary supports; the spacing of supports; and where applicable, the sequence of mining pillars, including cut sequence in those pillars necessary to establish a uniform pillar line that eliminates pillar points and pillars that protect inby the break line. **Note: This mine practices partial pillar extraction. Two parallel lifts, each 10 feet wide and 20 feet deep are taken on only two sides of each pillar.**

Entry Width: 18 ft., 20 ft.

Centers: 65 - 75 ft.

Crosscut Width: 18 ft., 20 ft.

Centers: 65 - 75 ft.

Room Width: 18 ft., 20 ft.

Centers: 65 - 75 ft.

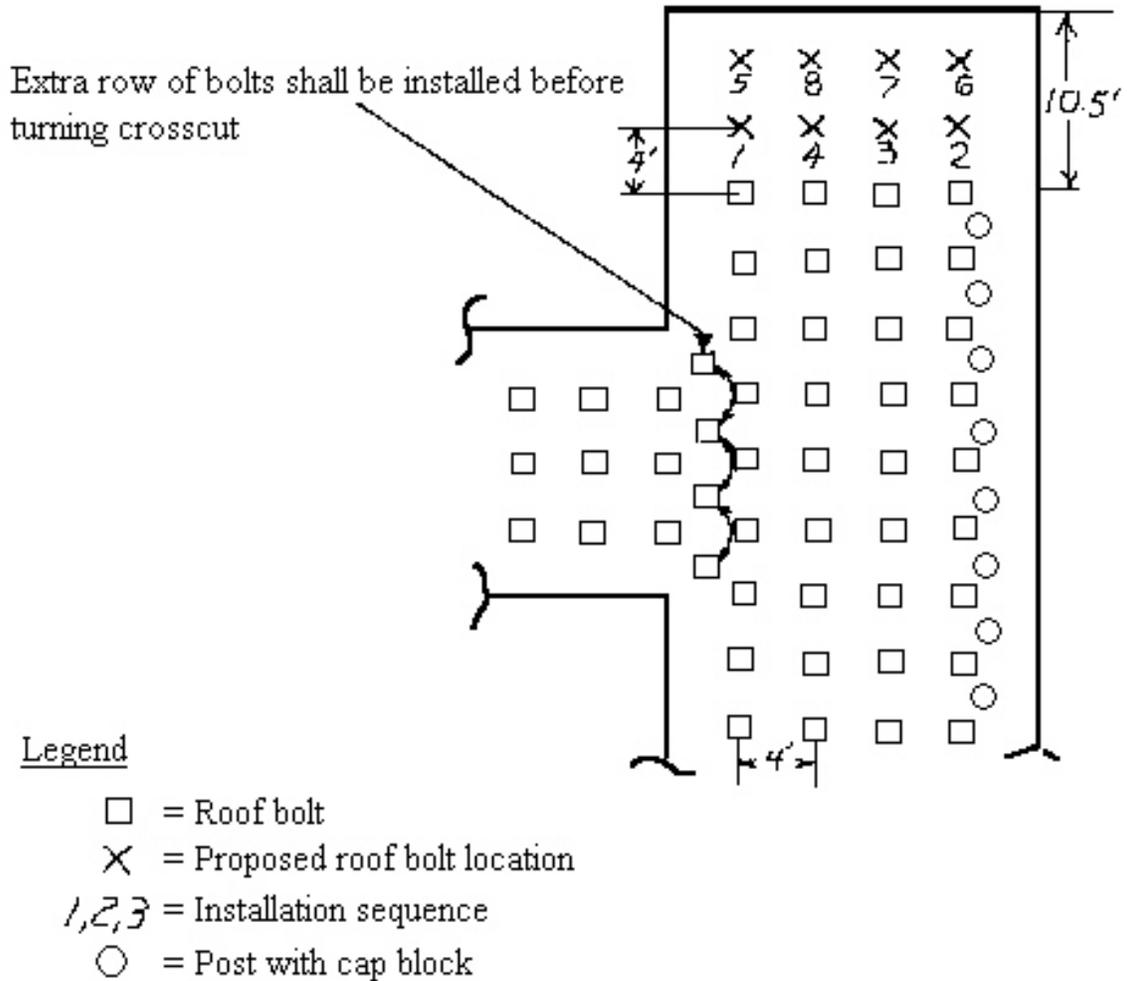
Room Crosscut Width: 18 ft., 20 ft.

Centers: 65 - 75 ft.

Pillar Split Width: 20 ft.

Pillar Fender Dimension Range: N/A

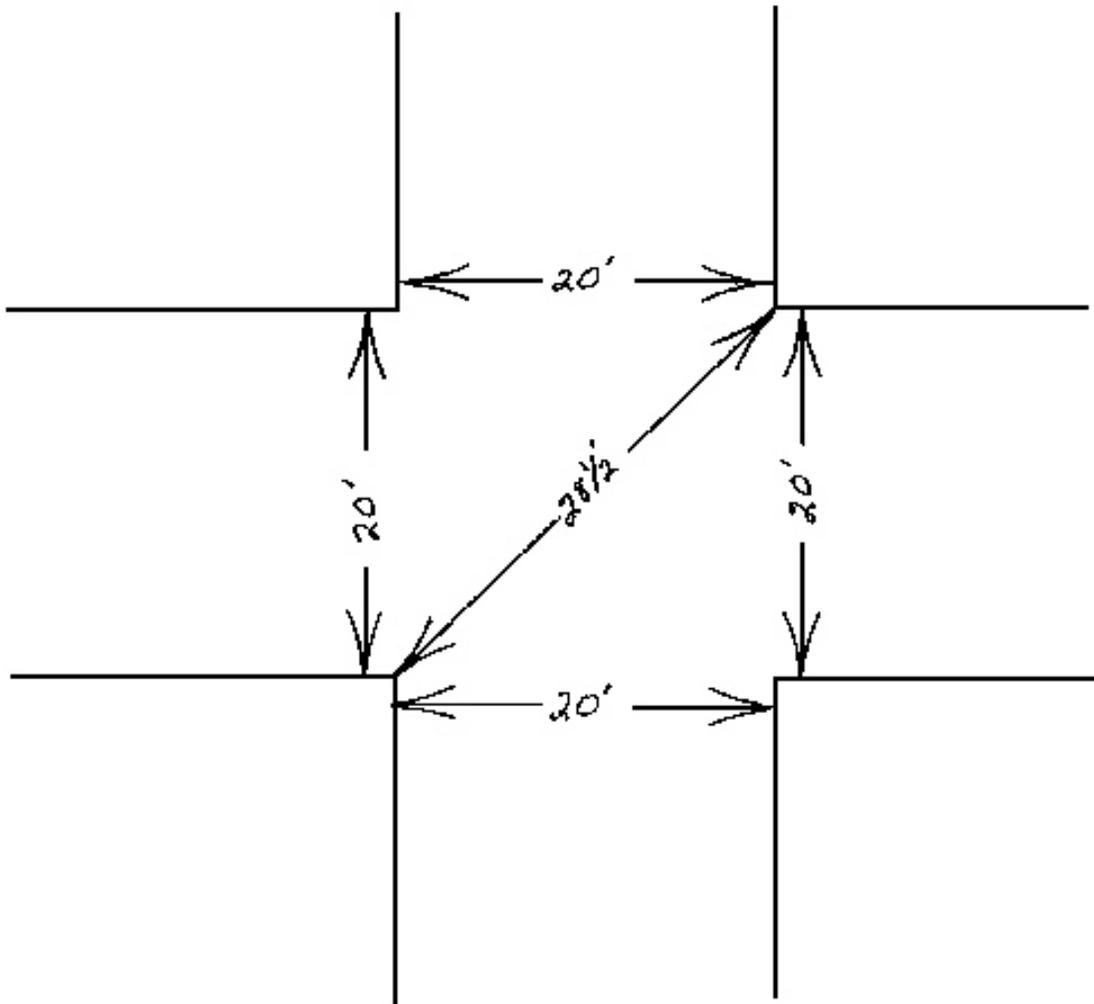
**Plan for Installing Roof Bolts in Places 20 Feet Wide or less:**



**(roof bolt spacing not to exceed four feet)**

**Diagonal Intersection Distance:**

The diagonal distance of a 4-way intersection based on 20 foot wide places, shall not exceed 28.5 feet.



If the diagonal exceed 28.5 feet, posts and/or cribs shall be installed to reduce the diagonal measurement.

## Safety Precautions

**Post a copy of this plan near each portal where miners enter the mine in such a manner that said plan will be available to the mine workers.**

1. This is the minimum roof control plan and was formulated for the roof conditions normally encountered at this mine. It does not relieve the operator or any individual of the responsibility for the installation of additional roof supports where conditions indicate such need. If changes are made in the mining system that necessitate changes in the roof control plan, the plan shall be revised accordingly and approved by the Mine Safety and Health Manager before such changes are implemented.
2. All personnel required to install roof supports shall be trained by a qualified supervisor designated by the operator before being made solely responsible for such work. This training shall insure that such persons are familiar with the functions of the support being used, proper installation procedures, and the approved roof control plan.
3. If temporary supports need to be used, provisions under 30 CFR 75.210 shall be followed.
4. The roof, ribs, and face in areas where miners work shall be examined by sight and, where safe to do so, tested by the sound-and-vibration method before any work is started and after each work stoppage or at more frequent intervals if necessary to insure safety.
5. When testing roof or installing roof supports in the face area, the workers shall stay within 5 feet of a temporary or permanent roof support.
6. Where re-bolting work is being done or crossbars are being installed to eliminate a known hazardous roof condition, ATRS shall be used.
7. Where loose material is being taken down, a minimum of two (2) roof supports on centers of not more than five (5) feet shall be installed between workers and the material being taken down unless such work can be done from an area supported adequately by permanent roof supports. Instead of temporary supports, ATRS shall be used.
8. All metal jacks shall be installed with a cap block between the jack and the roof unless an oversize bearing plate is provided (not less than 36 sq. in.).
9. When it is necessary to remove temporary roof supports before permanent roof supports are installed, they shall be removed by some remote means, such as a pull rope, that will assure that persons removing the supports shall remain under supported roof.

10. Roof bolts shall be installed in the sequence shown on the accompanying drawings.
11. During each production shift, at least one roof-bolt hole in each active working place shall be drilled to a depth of at least 12 inches above the anchorage horizon of the bolts being used to determine the nature of the strata (does not apply to installations where resin bolts are used).
12. The roof at the face of a working place shall be supported according to the approved plan before any side cut is started.

### ***Safety Precautions for Resin-Grouted Rods:***

13. Persons responsible for the installation of resins shall be instructed in safe handling procedures for such materials.
14. The hole dimensions, rod size, and the size and number of resin cartridges are critical; therefore, adequate training and supervision shall be provided to assure proper installation.
  - a. Proper installation procedures for installing a resin-grouted bolt:  
First, drill a borehole one inch deeper than the required depth and insert the proper number of cartridges of the correct diameter in the hole. All cartridges used in one hole shall be the same diameter, but lengths can be mixed. For proper anchoring, total equivalent length of these cartridges shall equal or slightly exceed the bolt length. Insert the bolt using the drilling machine with a straight-in motion if desired; however, rotation of the bolt during insertion will facilitate rupture of the cartridge casing. With the bearing free of the roof line, spin the bolt rapidly for the manufacturer's recommended time (do not over spin). Then immediately push the bearing plate or header block tight against the roof with the machine's maximum pressure and hold for the resin manufacturer's recommended time. **Note:** When rotating the bolt for mixing the resin, bearing plate or header block must remain free from the roof line to prevent heat buildup at the bearing plate, bolt head, and roof line. In no case shall the manufacturer's recommended mixing time be exceeded.
  - b. All resin-grouted rods shall be used with bearing plates approved for use at the mine. Bearing plates shall be installed tight against the roof, header blocks, crossbars, or other bearing surface material after resin is cured.
  - c. Drill steel(s) shall be equivalent in length to the rods being used or be adequately marked. The hole must be one (1) inch deeper than

the length of the rod being installed. The hole depth shall be corrected when header blocks, crossbars, etc. are used.

15. Resin provisions –

- a. Resin shall not be used if the manufacturer's recommended shelf life has been exceeded. This shelf life will be marked on the end of each box.
- b. Resin packages shall be protected during storage according to the manufacturer's recommendations.
- c. Broken cartridges of resin or cartridges that show signs of deterioration or where the shelf life has been exceeded shall be removed from the underground areas of the mine by the end of the next scheduled supply trip for the affected section (s) where resin-grouted rods are being installed.
- d. Resin-grouted rods shall be installed in accordance with the manufacturer's recommendations. However, these recommendations shall in no way preclude the approved safety precautions for the installation of resin-grouted rods.

16. The first resin-grouted rod installed in each working place shall be checked with a click-type torque wrench prior to removing any temporary supports. Torque applied shall be 100 to 150 foot-pounds. Should the rod rotate one full turn, 360 degrees in the hole, a second rod shall be installed and tested in the same manner. If this rod also turns, resin bolt installation shall be discontinued until reasons for failure of the resin are determined.

17. All safety precautions in the approved roof control plan shall apply, except the torque checks for conventional roof bolts or as noted. NOTE: A minimum vacuum reading of 9 in. of mercury should be maintained on the dust collection system of the roof bolting machine.

18. When resin-grouted rods cannot be installed immediately after the working place is exposed (due to failure of equipment, unavailability of manpower, etc.) the entire exposed roof area inby the last row of permanent roof supports shall be supported by installing temporary supports on not more than 5' centers. The installation of such temporary supports shall begin as soon as possible after completion of mining in the work place and shall continue until all the required temporary supports are installed.

19. Resin-grouted rods and conventional roof bolts shall not be intermixed unless they are used either as supplementary support or a systematic plan has been approved by the appropriate enforcement agency for combining the two roof support systems. The exception to this provision is where the immediate roof has been removed from overcast, cavities, etc. b.) Where the roof support system is changed from resin rods to conventional bolts, all affected personnel shall be immediately notified. Safety precautions for installation of conventional bolts shall then be followed.

### ***Safety Precautions for Installing Conventional Bolts:***

20. An approved calibrated torque wrench that will indicate the actual torque on the roof bolts by a direct reading shall be provided on each roof bolting machine in operation.
21. The torque on the first and at least one out of every four succeeding roof bolts installed in any location shall be checked by a qualified person. Such tests shall be made immediately after each bolt to be tested is installed. If the torque on any bolt tested is not within the approved torque range, the reason shall be determined and necessary corrections made immediately. If the required torque cannot be obtained, supplementary supports such as longer bolts with adequate anchorage, posts, cribs or crossbars shall be installed.
22. On a daily basis, spot checks of torques shall be made on at least one roof bolt out of every ten from the outby corner of the last open crosscut to the face in advancing sections. The results of these tests shall be recorded in the onshift examination book. The record shall show the number of bolts tested and the number above and below the required range. If the results show that a majority of the bolts tested are not maintaining at least 100 foot-pounds of torque (70 foot- pounds if plates bear against wood) or have loaded up to where they exceed 240 foot-pounds or torque, supplementary roof support such as additional roof bolts, longer roof bolts with adequate anchorage, posts, cribs or crossbars shall be installed (does not apply to resin bolt installation).
23. When an opening is no longer needed for storing of supplies or for travel of equipment, the roof at the entrance of all such openings along the track and conveyor belt lines shall be supported by extending a post line across the opening. A minimum of three (3) posts shall be installed across such openings.
24. Posts installed under roof that is disturbed or susceptible to sloughing shall have a wooden cap block, plank, or crossbar between them and the roof. Where crossbars or planks are installed, they shall be blocked to equally distribute the load across their length.
25. Posts shall be installed tight on solid footing and not more than two (2) wooden wedges shall be used to install a post.
26. An additional supply of supplementary roof support material consisting of 20 roof bolts at least 12 inches longer than the bolt length being used and a minimum of 20 posts with sufficient cap pieces and wedges shall be provided at the dumping point or within four (4) crosscuts from the nearest face, whichever is closer. Tools and equipment necessary to install such support shall also be available within this distance.

27. In addition to the supply of supplementary roof support materials, emergency supplies will be maintained in accordance with 30 CFR 75.1100-2(i). The supplies will be located at the end of South Mains No.1 spur and will include, at the minimum: 1,000 board feet of brattice boards; 2 rolls of brattice cloth; 2 hand saws; 25 pounds of 8d nails; 25 pounds of 10d nails; 25 pounds of 16d nails; 3 claw hammers; 10 bags of cement for stoppings; and 200 bags of rock dust.

***Safety Precautions When Bolting in Unsupported Area:***

The approved ATRS system shall be positioned and pressurized using controls that are operated from under supported roof. For persons to work or travel under and/or between the pressurized support device of the ATRS and the other acceptable support (bolts, rib, or face), the distance shall not exceed five (5) feet. **No person is allowed inby the ATRS unless the distance to the face is less than 5 feet.**