

# Retaining Wall Installation Instructions

## PART 1—RETAINING WALL GENERAL

### Work Included:

All labor and material for the furnishing and installing of exterior stone landscaping wall.

### Related Work

Masonry Contractor shall include building into masonry equipment and materials furnished through other divisions such as drain pipes or brackets and anchors as shown on plans to provide a complete job.

### System Description:

Stone walls for landscaping purposes comprised of naturally occurring quarried stone laid dry or set in cement mortar. Structural requirements for walls supporting applied loads such as lateral soil loads or loads from other structures shall be as shown on the plans.

### Shop Drawings:

Provide shop drawings of any cut stone components for approval prior to fabrication.

### Samples:

Natural stone materials are products of nature. Samples provided display a sufficient range of color, size, and character of the natural stone. Since the sample is a small representation of the product there may be colors, size and characteristics beyond what was provided in the sample, exact color matches are not likely in natural stone and cannot be binding.

### Delivery, Storage, and Handling:

1. Stone shall be delivered on pallets.
2. General Contractor shall provide a dry, stable roadway for stone delivery truck and equipment for removing loaded pallets from truck. The weights of pallets range from 3,500 to 4,500 pounds. Special quantities can be arranged upon request.
3. Pallets shall be placed on level ground and shall not be stacked.
4. Contractor shall provide tarpaulin covering during inclement weather.

### Site Conditions:

Stone walls shall be constructed on a stable compacted base as specified on the plans. Walls shall not be placed on frozen or muddy soil base. Before commencing with work, tarpaulins shall be provided to protect newly laid masonry from damage by inclement weather. This protection shall be placed and removed as required. Ambient temperature shall be 40 degrees or above while masonry is being erected. When ambient temperature falls below 50 degrees the mortar mixing water and that used for wetting down stone shall be heated.

## **PART 2—RETAINING WALL PRODUCTS**

### **MATERIALS:**

Material: Glacier Stone Supply Retaining Wall

Mortar Mix: ASTM C-270-73 Type M

Sand: ASTM C144-70

Anchors and Ties: Stone ties should be zinc-coated metal ASTM A-153 or stainless steel.

## **PART 3— RETAINING WALL EXECUTION**

### **BUILDING CODE REQUIREMENTS**

Building code requirements vary from area to area. Check with local authorities for building code requirements in your area.

### **Inspection:**

Before starting, verify that base material or structure complies with specifications on the plans. If stone is to be laid against a structure backer, verify that backing is plumb and that all bearing surfaces are level. For mortar laid walls, base must extend below frost line. For dry laid walls base may not be required to extend below frost-verify with supervising architect.

### **Preparation — Mortar Laid:**

#### **Footing**

1. A level concrete footing is required down to the frost line.
2. For a 12" thick wall pour footing 8" thick by 24" wide.
3. Install 12" concrete block to just below grade.
4. At grade install 8" concrete blocks leaving a 4" shelf to install the stone add.
5. Anchoring stones, ties, anchors etc. must be cleaned of loose rust, ice or foreign matter before incorporating into the walls.
6. Provide minimum one tie per 2 square feet of walls surface area.
7. Maximum spacing between adjacent ties shall be 16" vertically and 12" on center horizontally.
8. Ties should be embedded in horizontal joints 2" minimum.
9. Drain tiles should be placed in coarse gravel at the back of the wall and weep holes of rust free pipe should be used throughout the wall to let out water that could accumulate behind the wall.

### **INSTALLATION - MORTAR LAID WALLS**

1. Stone wall shall be erected plumb and true to lines.
2. Lay with completely filled mortar joints.
3. Do not furrow bed joints.

### **Pattern:**

1. Lay stone in random order taking care to avoid vertical joints by overlapping each joint with the stone above.
2. Distribute the color range of the stone evenly throughout the work area.

### **Jointing Work:**

Where fresh masonry joins partially set masonry.

1. Remove loose stone and mortar.
2. Stop off horizontal run of masonry by raking back  $\frac{1}{2}$  the length of stone in each course.
3. Tothing is not permitted.

**Joints:**

1. Lay stone with no more than ½" mortar joint.
2. Tool joints when "thumb print" hard with a round jointer, slightly larger than width of joint.
3. Rake joint and brush smooth with flexible paint brush.
4. Trowel-point or concave-tool exterior joints below grade.
5. Flush cut joints are not tooled.
6. Retempering mortar is not permitted.

**Weep Holes:**

1. Provide additional weep holes in head of joints of first course immediately above flashing with sash cord in joint at 24" o.c. maximum.
2. Protect weep holes and area above flashing from mortar droppings.

**Sealant Recesses:**

1. Provide open joint ¾" deep, and to ¼"-3/8" wide.

**Expansion Joints:**

1. Provide joints as shown on plans.
2. Keep joints clean and free of debris.

**Cleaning:**

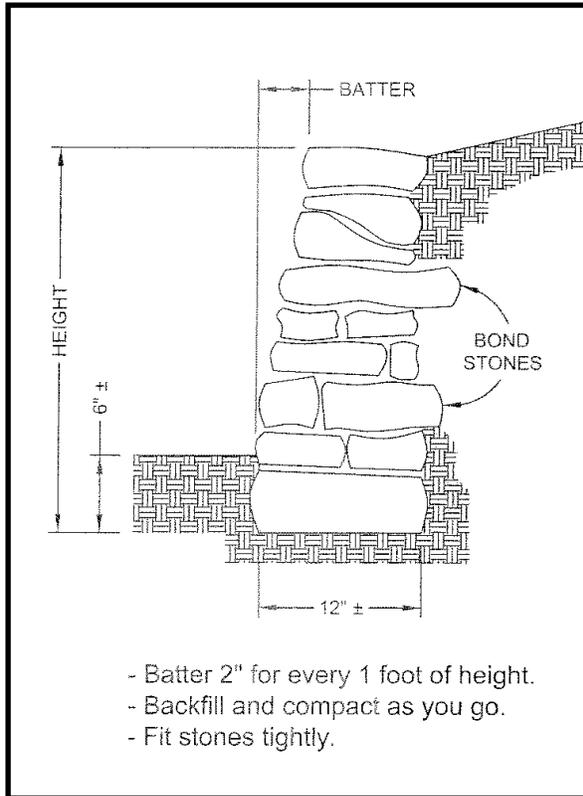
1. Cut out and repoint any defective joints.
2. Do not use cleaning agents on stonework. Clean stone with stiff brush and clean water. For more thorough cleaning alternatives, please refer to the instructions in our Cleaning and Sealing section.
3. Contractor shall clean site of mortar droppings and stone chips, etc.

**INSTALLATION—DRY LAID WALLS****Preparing the Base:**

- a. Sub-base shall be virgin or compacted soil.
- b. Provide minimum 3-4" deep compacted gravel base.
- c. Drain tiles should be placed in coarse gravel at the back of the wall.
- d. Install heavy landscape fabric below the first course of the stone and at the back of the wall.

**Dry Laying the Stone:**

- a. Because natural stone varies in thickness, sort the stone in piles to like thicknesses.
- b. Start in corner use thickest and longest stones for first course. First course should be installed at least half the thickness of the stone installed below grade.
- c. Make sure first course is level, install subsequent layers making sure to setback each additional course ½" (batter), or 2" back every 2 feet high.
- d. When installing retaining wall stone never stack vertical joints, always keep a running bond.
- e. Make sure each course is level, you may need to shim-add soil under the stone to make level.
- f. Continue laying stones until the desired height is achieved.
- g. Backfill and compact with native soil.
- h. Finish the top of wall with flat stones and keep it level. The top pieces should also be fit together very tightly.



# Building A Dry-Laid Wall

1. Determine the length and height of the wall to calculate stone tonnage.
2. Gather tools and materials:
  - a. Stone Hammer
  - b. Folding Rule or Tape Measure
  - c. Pick and Shovel
  - d. String Line
  - e. Crushed stone or gravel (for base)
  - f. Selected Stone
3. Dig a trench approximately 6" deep and 12" wide along the base of the proposed location for the wall.
4. Fill the trench with compacted gravel or crushed stone as base.
5. Sort wall stones by size. Set aside the most attractive pieces of stone for the wall cap.
6. Place the largest stones in the trench end to end
7. While stacking the wall, work from one end to the other sloping the stone back toward the high ground.
8. Avoid continuous horizontal or vertical joints by breaking them up using larger or smaller stones.
9. Place the stones tightly minimizing joint size for increased wall strength.
10. Fill in the area behind the wall with dirt or gravel, compacting it as you go.
11. Every couple of courses, turn the stone lengthwise into the hill to act as an anchor.
12. The final step is to pace the cap stones to top off the wall.

# Landscape Stone Paving Stone Installation Instructions

## **PART 1—PAVING STONE GENERAL**

### **Work included:**

All labor and material for the furnishing and installation of exterior stone paving.

### **Related Work:**

Paving contractor shall include building into the paving, equipment and materials furnished through other divisions such as site drains, tree grates, curbing and other miscellaneous items, and shall also be required to do the cutting and patching of paving where necessary to accommodate work of other trades all as hereinafter specified, shown on plans, or reasonably implied in either, providing a complete job.

### **Samples**

Natural stone materials are products of nature. Samples provided display a sufficient range of color, size, and character of the natural stone. Since the sample is a small representation of the product there may be colors, size and characteristics beyond what was provided in the sample, exact color matches are not likely in natural stone and cannot be binding.

### **Delivery, Storage, and Handling:**

1. Stone shall be delivered on pallets.
2. General Contractor shall provide a dry, stable roadway for stone delivery truck and equipment for removing loaded pallets from truck.
3. Pallets shall be placed on level ground and shall not be stacked.
4. Contractor shall provide tarpaulin covering during inclement weather.

### **Site Conditions:**

Base material shall not be frozen. Sand joint fill shall not be frozen or wet.

## **PART 2— PAVING STONE PRODUCTS**

### **MATERIALS:**

Dry Laid Stone: Bed material to be gravel or crushed stone,  
Bedding to be sharp torpedo sand.

Mortar Laid Stone: Mortar Mix: ASTM C-270-73 Type M  
Sand: ASTM C144-70

## **PART 3 — STEPS TO PREPARATION**

### **MEASURE AREA**

Determine the length and width of the finished space.

### **SELECT MATERIAL**

Determine the look you are trying to achieve. You may have many different effects on an area depending on if you use a patterned stone, a tumbled stone or irregular stone.

## **ESTIMATE QUANTITIES**

To estimate the quantities of stone needed take the overall length of your area and times it by the overall width of your area, which equals the square footage of material needed. Take the total square feet number and divided that by the square foot coverage per ton, which will tell you the number of tons needed for you project. Remember when ordering the material you may want to purchase a few extra stones than you think you will need so you will have more control over the look that you are trying to achieve and will not have, to make additional trips for more material. You can always incorporate extra pieces as accents around your yard.

## **ORDER MATERIAL.**

Please plan on appropriate lead times. Some items have long lead times especially during peak season.

## **GET READY**

1. Gather all the material needed for your project
  - Paving material
  - Crushed stone
  - Stone dust
  - Edging
  - Weed proof fabric
  - Mortar, polymeric sand, or sand dust for in between joints
2. Follow all safety procedures.
  - Wear protective lifting support and practice safe lifting when working with large flagstone material.
  - Wear gloves and safety glasses to protect your hands and eyes.
  - Consider using knee pads or kneeling pads for placing the stone.
  - Call Diggers Hotline and other companies to mark out gas, water, and utility lines before any digging begins.
3. Tips
  - To prevent water from running to your home, have finished height of the patio be a minimum of 2-3" below the finished floor level and slope away from the house at a slope of a minimum of 1/4" per foot.
  - Patterned material is easier to work with and requires little to no sawing if planned correctly.
  - For irregular shaped material cutting or trimming may be required. To shape the paving material, use a hammer and stone chisel to score a line where you want the stone to break. Do not hit the chisel too hard or it will cause the stone to break unpredictably or in many pieces. Another way to cut the stone is by using a wet circular saw with a diamond tipped blade.
  - Be sure to compact the sub-base and stone dust to ensure a firm base. The better the base is compacted the more stable your end result will be.

## **PART 4 — PAVING STONE EXECUTION**

### **BUILDING CODE REQUIREMENTS**

Building code requirements vary from area to area. Check with local authorities for building code requirements in your area.

### **INSPECTION**

Verify that rough grading is per plan and that paving will not be set on any uncompacted fill. Before setting final elevations, verify that walk and surrounding areas have adequate slopes and swales to provide drainage and proper runoff of surface water. If wall is to be laid on soil base, remove any loose soil and debris. If walk is to be laid on a concrete slab base, clean surface of any debris.

## **INSTALLATION DRY LAND**

1. Preparing the Base
  - a. Sub-base shall be virgin or compacted soil.
  - b. Provide minimum 3-4" deep compacted gravel base.
  - c. For minimal weed growth, lay down landscape fabric,
  - d. Over base provide minimum 2" sand bedding. Screed, sprinkle, and compact until proper grade is reached.
  
2. Dry Laying the Stone
  - a. Stone shall be laid in specified pattern, starting at a corner and work along one side, then work across.
  - b. Color range should be uniformly distributed' over total area of work.
  - c. Position stone tight to one another by lowering stone vertically into position.
  - d. Set stone by tapping with rubber mallet.
  
3. Joints
  - a. Spread fine dry sand or similar materials such as Polymeric Sand over surface of stone and sweep joints, until completely full.
  - b. Wet surface of stone to remove loose sand and chips.

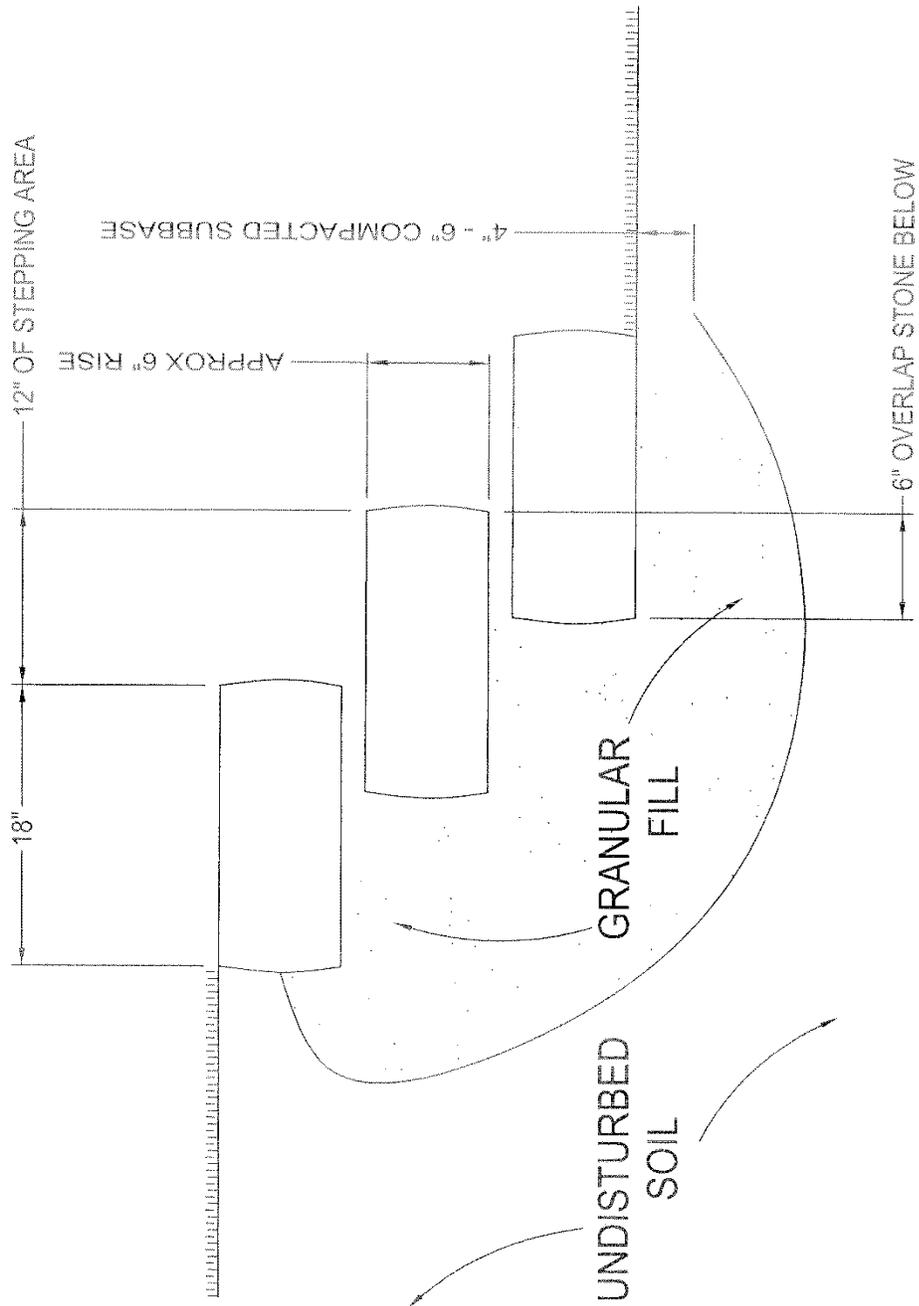
## **INSTALLATION WITH MORTAR**

1. Preparing the Base
  - a. Sub-base shall be virgin or compacted soil
  - b. Provide a 4" concrete slab with reinforcement 1/2" steel rods; or 6" x 6" wire mesh.
  - c. Screed and bull-float leave rough.
  - d. Construction per standard concrete sidewalk practice.
  - e. Allow concrete to dry next day application for stone.
  
2. Laying the Stone
  - a. Moisten concrete before laying stone this helps bonding. Leave pallets wrapped so that moisture is retained in stone-if stone is dry moisten to damp-not wet.
  - b. Spread 1/2" mortar on concrete slab, check that material is level.
  - c. Stone shall be laid in specified pattern with 3/8" mortar joint.
  - d. Color range should be uniformly distributed over total area of work.
  - e. Use a grout bag or hand tool to fill mortar between joints-pack joints. Make sure to keep the surface of the stone clean of mortar.
  - f. Tuck-point joints when "thumb print" hard and brush smooth with flexible paint brush. Flush cut joints are not tooled and recommended for outdoor application.
  - g. When joints have hardened for 24 hours, clean stone with stiff brush and clean water only.

## **INDOOR MORTARED INSTALLATION**

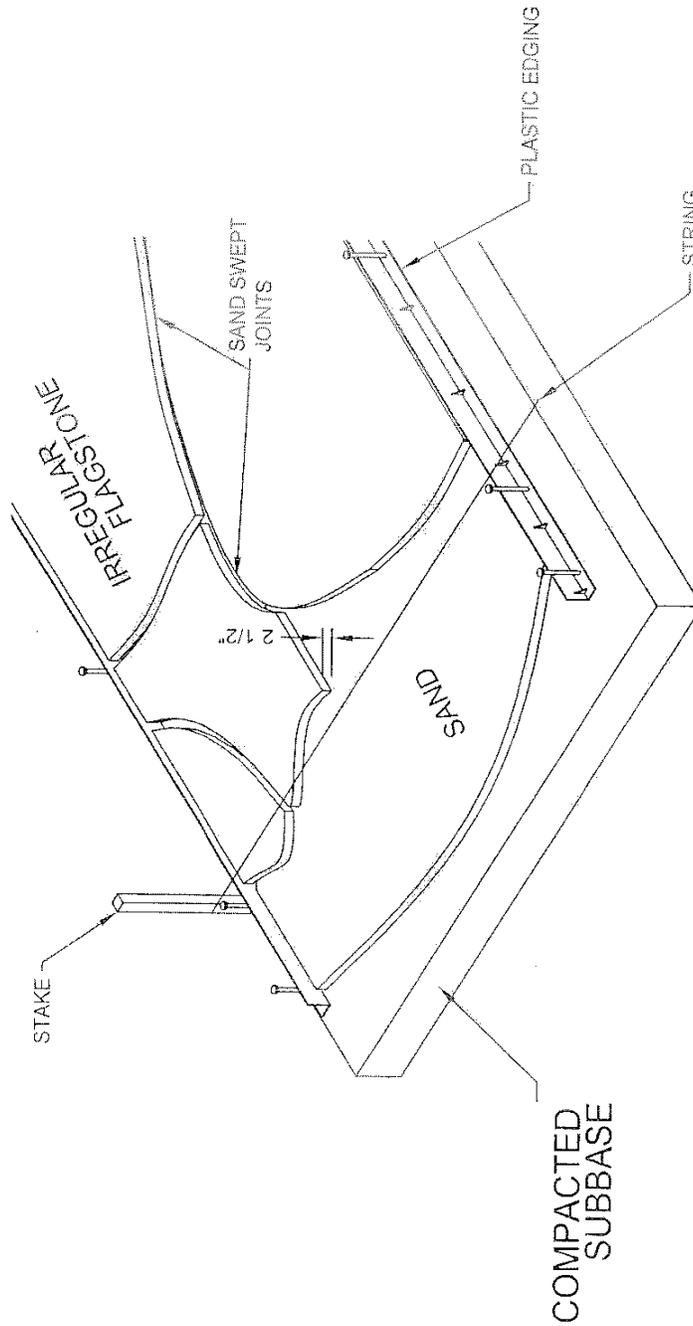
1. Preparing the Base
  - a. Sweep floor.
  - b. Apply with staples 30# felt paper as moisture barrier.
  - c. Install either expanded metal lath or 18 gauge galvanized woven wire mesh with galvanized screws.
  - d. Stone shall be laid in specified pattern with 3/8" mortar joint.
  - e. Color range should be uniformly distributed over total work area.
  - f. Make sure stone is level throughout and keep mortar off stone surface,
  - g. Tuck-point joints when "thumb print" hard and brush smooth with flexible paint brush. Flush cut joints are not tooled and recommended for outdoor application.
  - h. When joints have hardened for 24 hours, clean stone with stiff brush and clean water only.
  - i. Apply stone sealant.

# Natural Stone Step Installation



# CREATING A STONE PATIO OR WALKWAY

DRY-NOT MORTARED



UNDISTURBED  
SOIL BELOW