

PAVERS BY IDEAL

The
Ideal Way
to Build

Walls

with

Style™

using
Stonewall™
and
Tumbled
Stonewall™



Our line of **Stonewall** retaining wall products is beautiful and easy to install. Choose from our curved face, straight face, or Drum-Roll Tumbled® straight face units. Like our other styles of landscape retaining wall systems, they sit on a base of compacted gravel. Strong nylon pins align the units and automatically step them back



Curved Face



Straight Face

when stacked. Mortar or concrete are not required, so you can take your time building a strong, durable retaining wall that will provide years of lasting beauty.

This step by step guide will assist you from start to finish for beautiful do-it-



Tumbled Straight Face

yourself results. Using basic construction techniques, you can build classic style retaining walls, 90° corners, and stairs. We have even included some helpful hints that the professionals use.

1 Planning

First, determine the height, length, and configuration of the wall and make a drawing showing any adjoining fences, structures, stairs, and paved areas. Be sure to include an accurate sketch of the area to be retained, noting the slope and drainage patterns.

Once the plan is complete, check with your local building department to determine if a permit will be necessary. In some cases, a stamped drawing may be required, which means you will need the services of a professional engineer. The authorized **Ideal** dealer in your area may be able to help you obtain this type of service. They can help determine the quantity of **Stonewall** units, gravel, crushed stone, and other materials you will need to complete your project. You can also refer to the handy charts we have included in the **Estimating Section**.

Most likely, you will need to have the materials delivered. Remember that delivery trucks are heavy, so select a convenient location where the materials can be placed. The **Stonewall** units will arrive on pallets. The gravel and crushed stone will be sent in separate trucks and dumped into piles or may be available in large sacks that can be shipped with the **Stonewall** block. Plan to move the materials by wheel-barrow and to do some clean up afterwards. Also, you will require the following tools, equipment, and materials:

- perforated pipe
- torpedo level
- carpenter's level
- caulking gun
- landscape filter fabric
- ¾" stone
- processed gravel
- wheelbarrow
- tape measure
- line level
- wood stakes
- hard rubber mallet
- mason's chisel or brick-set
- construction-grade adhesive
- shovel
- string line
- brush
- rake
- 3 lb hammer
- gloves

In addition, you may need a hand tamper or plate compactor and a power saw with a diamond blade. Check with your **Ideal** dealer or local equipment rental store for these items.

2 Preparing

Before beginning any excavation, contact your local utility companies such as *Dig Safe* or *Call Before You Dig* and request that they mark underground cables or pipes. These services are usually free, but may require 72 hours notice.

The following instructions are typically suitable for walls under 4' high (**measured from the first course of blocks placed below grade on the base**) with optimum site conditions. Walls 4' and higher, terraced walls, sites with poor drainage, weak soils, excessive groundwater, sloping embankments and surcharges such as parking behind the wall, will require special consideration and construction techniques, including the use of geogrid. See the section titled "**Engineered Walls**" for more information. We recommend you contact a qualified soils engineer for these conditions. Remember, safety is paramount, so you may need to use the services of a professional contractor. Ask your **Ideal** dealer to provide you with names. Some advice before you start. Follow the directions carefully as you proceed through each step. If you make a mistake, simply take the units apart to dismantle the section of the wall, correct the problem, and pick up where you left off.

3 Excavating

The key to building a good retaining wall is preparing a stable foundation to support the wall. Fortunately, segmental retaining walls are considered flexible structures, so the footing does not need to be placed below the frost line.

Begin by staking out the location of your wall. Be sure to allow for the automatic step-back of ½" per course (¾" per vertical foot). If building your wall in front of an existing embankment, allow 12" of space behind the wall for a drainage zone, which will be filled with ¾" stone as you build the wall. The wall location is especially important on outside (convex) curves where the step-back of the units will decrease the radius of the curve as the wall height increases. See the section on **Curved Walls** for more information.



Once you have staked out the wall location, excavate a trench at least 14" deep by 24" wide. You will need to dig deep enough to allow for a 6" thick gravel

base and the first row of units that will be embedded 8" below the finished grade. If the wall will step-up into a slope at different levels, start

at the lowest point and excavate each rise in elevation in 8" increments. If the wall has multiple step-ups, be sure to allow for the 1/2" step-back that occurs in every course for each 8" increase in height.

Note: If the height of your wall above finished grade is 2' or less, make the gravel base 4" thick and bury the first course of **Stonewall** just 4". If your wall is greater than 4' high, you will need to bury the first course of **Stonewall** an additional 1" for every foot over 4'. For example, for a 6' high wall, you will need to dig the trench at least 16" deep in order to bury the entire first course and 2" of the second course of block. If a slope exists in front of the wall, you need to bury two full courses

The soil at the bottom of the trench must be firm and stable. Remove all loam, grass, roots and large rocks. If necessary, continue to excavate until you reach granular type soil. Compact with the plate compactor or hand tamper until the bottom of the trench is level and firmly packed. Next, cover the bottom and sides of the trench with landscape fabric. To prevent soil from washing into the crushed stone drainage zone that will be behind the wall, extend the fabric up the slope to completely cover the embankment. Overlap sections of fabric by at least 12".

4 Installing & Compacting the Base

The material for the base, or footing as it is sometimes called, should be well-draining, coarse granular material. We recommend 1 1/2" **processed gravel** or 3/4" **crusher run**.

Fill the trench with about 3" of gravel, then level and compact it thoroughly with the plate compactor. If you are using a hand tamper, compact only 1" to 2" of gravel at a time (Fig 1). When you can walk on the base without leaving an indentation, add the next layer of gravel. Add and compact enough gravel until the base is 6" thick and the top 8" below grade. (As noted earlier, the elevation of the base will be deeper for walls over 4' high.)



Figure 1



Tip: To facilitate the compaction process wet, but do not saturate, the gravel with water.

5 Installing the First Course

The first course of wall units is the most important and takes the longest time to install. Once you have positioned and leveled the units in this row, you will be able to place subsequent courses quickly and easily.

Start by placing the **Stonewall** units directly on the base in the center of the trench. **The slots in the block should be on the bottom.** If your wall steps up, begin at the lowest elevation. **Use a carpenter's level to align and level each unit from side to side and front to back (Fig. 2).** Use some gravel or coarse concrete sand to shim the blocks as needed and use a hard rubber mallet to tap them into position. Never tilt the block forward.



Figure 2



Tip: You also may begin by setting and leveling the first couple of units at each end of your trench. Pull a string line between them along the back of the block and use this line to align the rest of the blocks in the row.

Lay the units edge to edge along the length of the footing, following the desired alignment of the wall. Adjust spacing between the units for curves as needed. If your wall has 90° corners, it is best to start from a corner. See the **Details Section** for more information on building corners. You can also start next to a fixed structure such as a house foundation.

After the first course has been installed, place perforated pipe behind the wall to help collect water and drain it away (Fig. 3). Lay the pipe, with the holes facing **down**, on the base behind the units along the entire length of the wall and several feet beyond. Some types of pipe are available with a geotextile sock, otherwise, wrap the pipe in filter fabric. Slope the pipe at each end to allow gravity to drain water beyond the wall.

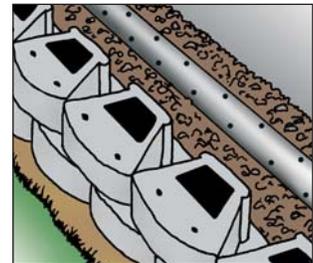


Figure 3

Now fill the cores and the space between the units with 3/4" **crushed stone**, which should be uniform in size and not contain fines. Place enough stone to also backfill the trench behind the first course and tamp level to the top of the wall units, being careful not to move them in any way. Now, fill and compact the trench on the front side of the

units by using the same 1 1/2" processed gravel you used for the base. Sweep the top of the wall units clean and insert the nylon pins into the holes in the top of the block. Use a hammer to tap open the holes and seat the pins with the smooth portion of the stem pointing up. Two pins are used for each unit.

Note: Pins are used to assist alignment. Connection strength is achieved by the stone used to fill the cores which creates a "rock-lock" between courses of block. If pins are misplaced, set the block 1/2" back from the course below. Align the faces as much as possible.

6 Laying the Wall

Install the second course of **Stonewall** by fitting the slot in the bottom of the units over the pins protruding from the block in the first row. Position the units in a "running bond" pattern, staggering the joints over the middle of the wall unit below. Align the units to achieve a uniform appearance; the design of the slot allows some play for adjustment. While a perfect running bond is not necessary, always maintain some stagger to the joints. You may need to use half units to maintain the running bond, or even cut some units. Use a mason's chisel or cut-off saw if necessary. **Remember to always exercise caution, wear safety glasses, ear protection and a NIOSH approved respirator!** Occasionally, it may be necessary to shim units to maintain level coursing. Trim the face of the units as needed using a 3 lb hammer and mason's chisel or brick-set.



Figure 4



Tip: Level wall and corner units using plastic shims or asphalt shingles.

When you have laid the second course, fill the cores and backfill with 3/4" crushed stone as described in **Section 5**. Complete by pulling the filter fabric over the front of the wall and filling the space with 3"- 4" of 1 1/2" processed gravel (or soil that was excavated from the site). Compact thoroughly. Add enough gravel or soil until it is even with the top of the wall units. If needed, add more 3/4" drainage stone and tamp level. The key is to consolidate the stone and backfill material as much as possible to avoid future settlement. Repeat this procedure for the remaining courses until you have reached the desired height of your wall. Be sure to backfill after each course, taking care not to move the units out of alignment. Do not backfill the last course at this point.



Tip: Always select block from several pallets as you are installing to distribute the color uniformly.

7 Finishing the Wall

At the mid level of the next to last row, fold the filter fabric over the drainage zone of 3/4" stone to prevent dirt from washing into the stone and reducing drainage capability.

To finish the wall, use one of our coping units for the last course. We offer the following styles:

Universal Coping Stone is 3 5/8" h x 16" w x 13" d. **Universal Coping Stone** features one face that is split, while the opposite face is smooth. Either face may be positioned at the front of the wall. It can be used to create corners by splitting it into either 13" x 13" or 9" x 13" pieces.



Universal Coping

Roman Pisa Coping also is 3 5/8" h x 16" w x 13" d, but features our Drum-Roll Tumbled® antiqued finish that captures the rustic appearance of natural stone. Like **Universal Coping**, it can be used to create corners.



Roman Pisa Coping

Stonewall Caps are 4" h x 12" w x 8" d and are available in straight or tapered styles. Use **Stonewall Caps** when you want to match the face appearance of **Stonewall** curved face units.



Stonewall Cap

Our **Ancestral™ Coping**

features our Drum-Roll Tumbled® finish on all surfaces and edges and is available as a paired set. The "A" unit is 16" long on one face and 13" on the opposite face, while the "B" unit is 13" long on one face and 10" on the opposite face. Both units are 3 5/8" high x 13" deep. As a tapered coping, the paired set is alternated for straight walls or used in combination to follow the curve of serpentine walls.



Ancestral Coping

Secure the cap style you select to the top course with a construction-grade adhesive that's been formulated for use with concrete. Simply apply several $\frac{3}{8}$ " beads to the top surface of the units in the last course (Fig. 5). It's best to do only 3 or 4 units at a time to prevent the sealant from skinning over. When setting the coping units, apply firm pressure to secure them in place. Allow 24 hours or so for complete curing.

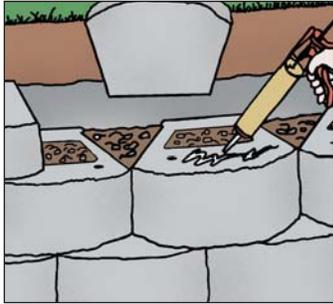


Figure 5

Universal Coping Stone, Roman Pisa Coping and Ancestral Coping also can be used for stair treads. Please see the **Stairs Section**.

To complete the project, add topsoil behind the wall to bring the embankment to the desired height. Finish the grading so that water will not pond behind the wall. If necessary, construct a small swale to collect and channel the water away, or grade the surface to direct water over the top and down the face of the wall. Complete your new landscape wall by installing sod, flowers, and plants. And don't forget, **Stonewall** walls look great with **Ideal** interlocking concrete pavers. You can integrate a walkway, patio, or terrace into your wall design to maximize your outdoor living area!

Congratulations! You have built a beautiful landscape retaining wall that will provide years of enjoyment and maintenance-free service.

All units meet the physical requirements for Segmental Retaining Wall Units of ASTM C 1327 and/or NCMA Tek 2-4B.

A white deposit known as efflorescence may appear as a natural by-product on any concrete or masonry product. It may be more apparent on darker color units. It does not effect the structural integrity, and is not indicative of defective concrete or a flawed product. It is water soluble and will lessen, if not disappear over time. We recommend that it be allowed to dissipate naturally. For more information, ask for **Ideal's Efflorescence Advisory**.

Details

Step-ups

When building into the direction of a slope, the wall must be stepped in 8" increments. Do not attempt to slant the wall to the angle of the slope (Fig. 6).

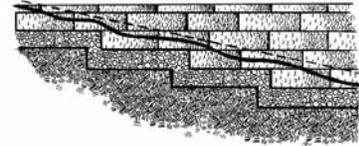


Figure 6

Ending the Wall

Stonewall offers a couple of ways to end the wall along a slope. One is to turn the units into the grade, burying at least one complete block along the incline (Fig. 7).

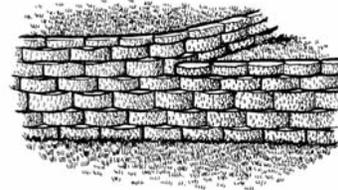


Figure 7

The second choice is to place a **Stonewall** corner unit at the end of every course that steps up. To finish this detail, split a *Coping Stone* to attain a 1" overhang. Be sure to secure it with our construction-grade adhesive (Fig. 8).

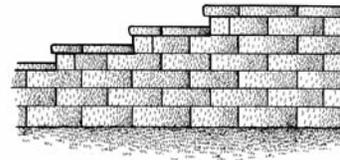


Figure 8

Curved Walls

Stonewall creates graceful serpentine walls with concave and convex curves. The minimum radius is 3' to the face of the block, so you can build tree rings and planters as small as 6' in diameter. When erecting walls over 4' high, they will have a radius equal to the height of the wall. For example, a 6' high wall will require a radius of 6'. When building walls with a radius, the first course must be wider to allow for the $\frac{1}{2}$ "

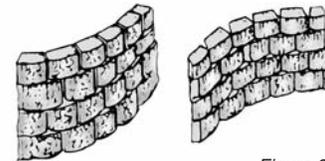
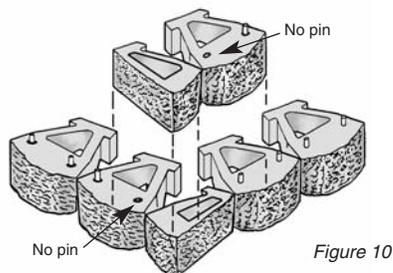


Figure 9

automatic step back in subsequent courses. To minimize this, pull the block forward against the pins in every course in order to lay the wall as vertical as possible. Otherwise, it will be necessary to cut some units in the upper courses to fit.

Corners

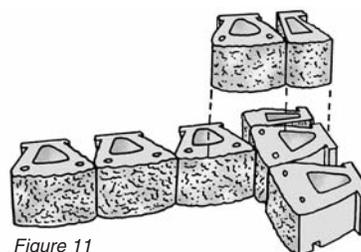
Outside Corners: When it comes to building outside corners, Stonewall gives you two choices and both are easy to do. The corners can be a simple convex curve based on a radius discussed previously, or they can be built at a 90° angle. When incorporating 90° corners, you will need to order *Stonewall Corner* units. It is best to start in a corner and build out. Follow these simple steps to construct 90° corners (Fig. 10).



- 1) As you lay out the location of the wall, mark the position of the corner with a stake and use string lines to indicate the line of the intersecting walls. When digging the trench, allow for additional space at the corner location.
- 2) Once the gravel base has been placed and compacted to the desired elevation, mark the exact location of the corner. Use a builder's square to ensure an accurate 90° angle, or lay it out using the 3-4-5 triangle method.
- 3) Carefully position a *Stonewall Corner* unit on the base where the intersecting lines meet in the corner. Then using a level, align and plumb the units. Continue the wall on each side using **Stonewall** units as described in **Section 5**, except do not put in a pin in the closest hole of the block sitting adjacent to the shortest face of the corner. Backfill with $\frac{3}{4}$ " stone.
- 4) For the second course, position a *Stonewall Corner* unit in the alternate direction onto the corner block in place. Place regular **Stonewall** units on each side following the directions shown in Section 6, once again leaving out a pin in the closest hole of the block sitting adjacent to the shortest face of the corner.
- 5) Continue this procedure for each course remembering to alternate the *Stonewall Corner* units 90° every course to maintain the running bond pattern. When the wall reaches the height you desire, use the coping unit of your choice to finish the corner.

Note: Apply several $\frac{3}{8}$ " beads of construction-grade adhesive to the top of each corner unit immediately prior to placing the successive corner unit. If your wall has 90° corners on each end, it will be necessary to cut units within the wall to accommodate the wall batter and to maintain the running bond pattern.

Inside Corners: If your wall has inside corners, Stonewall gives you several choices here as well. You can build them as a concave curved wall or at 90°. When building them at 90°, one method is to abut one of the walls against the other using half blocks in every other course to keep it flush to the adjoining wall. The second way ties the walls into each other by overlapping block from one wall into the other in alternating courses. Be sure to apply construction-grade adhesive to the blocks in the corner in every course (Fig. 11).



Stairs

A stairway built into a **Stonewall** retaining wall adds a functional and beautiful dimension to any landscape design. Building stairs with **Stonewall** is relatively simple. **Stonewall** units are used for the side walls and risers, while *Universal Coping*, *Roman Pisa Coping*, or *Ancestral Coping* is used for the treads.

Most stairs are 48" wide; otherwise lay them out in multiples of 12". You will need to comply with minimum requirements for riser height and tread depth. Check the building code for your area. Determine the location of the stairway. Be sure to allow enough space behind the wall, as each stair will step back 12".

It is better to construct the corners and side walls independent of the risers. Start by building corners, as shown in the **Corner Section**, on each side of the stairs. To avoid the automatic setback as you construct the side walls, do not use pins to connect the full size **Stonewall** units. Instead, lay each course **vertically with no setback** and be sure to bond the units together with construction-grade adhesive. Otherwise, you will need to cut the riser and treads for each stair to accommodate the step back developed in the side walls. Backfill the area behind the units and the cores with $\frac{3}{4}$ " stone as you go up, using filter fabric to keep the soil from infiltrating the drainage stone.

Stair Construction using the "Cut" Method

With the "cut" method (Fig. 12), a separate gravel base is used under each stair. Start by preparing the footing of the first step. Place and compact gravel in 2-3" layers until the base is at least 6" thick. For 6" high risers, the top of the base should be about $5\frac{1}{2}$ " below the finished grade leading up to the step using *Universal*

Coping Stone, Roman Pisa Coping, or Ancestral Coping as treads. **Note:** If the subgrade is soft, or for added stability, use 2 courses of **Stonewall**

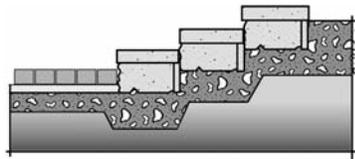


Figure 12

to construct each riser. Place a row of **Stonewall** units onto the base across the width of the stair opening, then level them from front to back and side to side. The top of the block should be 2 1/2" above finished grade. For 7" and 8" high risers, increase the dimensions by 1" and 2" respectively.

After the risers for the first step have been placed, prepare the footing for the next step and repeat the process. Continue to lay successive risers in the same manner for the number of stairs you need. Fill all of the units in each of the stair risers and the spaces between them with 1 1/2" processed gravel and sweep the block clean.

If using one of our coping units as treads, adhere them with construction-grade adhesive as instructed in **Section 7 - Finishing the Wall**. Position the treads to provide a 1" overhang. Allow the adhesive to cure at least 24 hours before opening the stairs to traffic.

Note: When using coping units as stair treads, we recommend treating them with a penetrating type of sealer such as **SRW® Paver Seal Plus** to protect them against salt damage due to excessive use of deicing chemicals.

Stair Construction using the "Fill" Method

Although more units are required using the "fill" method, it may prove faster and easier, especially if there are a small number of steps. Simply excavate the entire stairway area straight back, then place and compact a 6" thick gravel base as a level foundation. Use multiple courses of wall units to build up the risers for the number of steps you want. This method results in an 8" rise (Fig. 13).

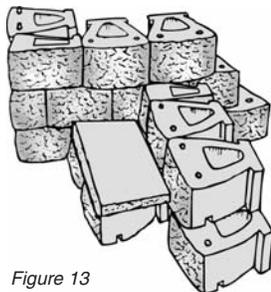


Figure 13

Engineered Walls

Stonewall, as well as all other types of segmental retaining walls, or SRWs as they are known, function as gravity structures where the weight of the wall resists the weight of the earth it retains. When the wall is 4' and higher, or if the site involves conditions as noted in **Section 2**, additional construction techniques, such as tiered construction or the use of geogrid are necessary. These conditions require the services of a qualified engineer.

As a "rule of thumb", a terraced wall should be set back a distance equal to, but not less than, twice the height of the lower wall in front. For example, if the lower wall in front is 3 1/2' high, the tiered wall behind it should be built at least 7' back.

Geogrid is a PVC-coated polyester mesh that reinforces the earth behind the wall when embedded between layers of soil. The grid is placed on the wall units, then extended back over the compacted gravel. Additional gravel is placed on top of the grid and compacted. As courses of units are added and back-filled, additional layers of grid are placed at appropriate heights. The number of layers and length of geogrid depend on several conditions, including the type of soil being retained. Poor draining soils such as clay require more geogrid than granular soils, which drain well.

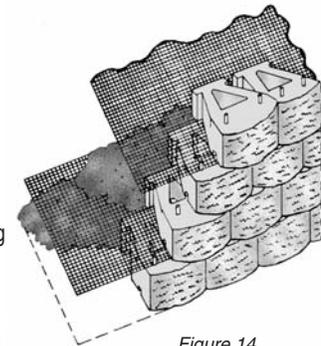


Figure 14

Typically, grid should be placed every 2 or 3 courses and should extend back a distance about equal to the height of the wall (Fig. 14). Your engineer will be able to specify the number of layers of grid that will be required for your wall and the distance the grid should extend back.

Note: Walls that retain soils which support dwellings, or poor draining soils, high water tables, and sloping banks behind the wall, are some conditions that can affect the stability of all types of walls. We recommend you contact a qualified soils engineer or professional contractor for these situations.

Estimating Chart

The following chart and Coping Stone information should be used as guides to estimate the number of units required to build a **Stonewall** wall. Remember to allow a few extra units for cutting and waste. Walls exceeding the heights shown on the charts require additional construction techniques and engineering consideration. Contact **Ideal** for additional information.

STONEWALL™ - Curved & Straight Face STONEWALL TUMBLED™ - Straight Face

8"h x 12"w x 12"d • 1.5 pcs/sf

HEIGHT & COURSE		LENGTH						
		5'	10'	15'	20'	30'	40'	50'
8"	1st	5	10	15	20	30	40	50
16"	2nd	10	20	30	40	60	80	100
24"	3rd	15	30	45	60	90	120	150
32"	4th	20	40	60	80	120	160	200
40"	5th	25	50	75	100	150	200	250
48"	6th	30	60	90	120	180	240	300

Shaded row is the buried course

COPING UNITS

Stonewall Caps: Size: 4" h x 12" w x 9" d Coverage: 1 piece/lf

Universal Coping: Size: 3⁵/₈" h x 16" w x 13" d Coverage: 1.33 lf/piece

Roman Pisa Coping: Size: 3⁵/₈" h x 16" w x 13" d Coverage: 1.33 lf/piece

Ancestral Coping: Size: A unit: 3⁵/₈" h x 16"/13" w x 13" d

B unit: 3" h x 16"/13" w x 13" d Coverage: 2.16 lf/pair

Adhesive: 14 lf per 10 oz tube using 3/8" bead

Here are some "rules of thumb" that you might find handy for estimating the amount of gravel needed for the base and the quantity of 3/4" crushed stone used for drainage.

Base material*: Approx. 5-6 tons of processed gravel or crusher run are required to construct a base 6" thick by 24" wide by 100' long.

Drainage stone*: For every 100 sf of wall, approx. 5 tons of 3/4" crushed stone will be required to fill the 12" drainage zone behind the wall.

*Based on the approx. weights of: 115 lb/cu ft for processed gravel or crusher run
100 lb/cu ft for 3/4" crushed stone

Ideal cannot assume liability for the accuracy or completeness of the information contained in this brochure, nor do we guaranty or warrant the recommendations contained herein. Final determination of the suitability of any information provided and its manner or use, is the sole responsibility of the user.



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