

Ron and Luci's Pond Progression Log

The following is my personal journal of pond construction starting from the first shovel of dirt, to completion. The pond, landscaping, electrical, plumbing and construction was completed in 22 working days. This is not provided as THE way to build a pond, as everyone's requirements differ. This just happens to be the way MY pond was designed and built. Your mileage may vary.

Work was done by Masuko Landscaping – recommended for your renovation or new pond construction. After pond completion, I additionally contracted Masuko to do additional landscaping projects to create a rain containment system, and port pond waste water for garden and front yard irrigation, tree cutting and monthly yard maintenance.

Contact info:

Daniel Masuko, Glitchwaffle@gmail.com
Richard Masuko, pondedge@comcast.net
510-582-5191
Masukolandscaping.net

Postscript 4/6/2018

After the pond was completed, I had the koi club over to provide feedback. Feedback as follows:

- NOT to use duckweed, as it is invasive and once in, will never be able to get out. Instead, will use water hyacinths which the koi will eat, and if not, easy to net out. Also, since hyacinths are so prolific, I will use surplus in my green mulch bin.
- Remove slate slabs as it protrudes edges that the koi can cut themselves. Slate originally was placed so you can climb out of the pond as we have had two people fall in, and a dog drown prior to rope barricade. There should be nothing in the pond.
- Will retrofit later the addition of a biofilter to supplement the Ultima filter. I still have a 4'x4'x3' deep fiberglass tub that was the original gravel filter setup up 10 years ago. This will be integrated and filled with J mat filter media. Available at Champion in San Jose, or Amazon
 - <https://www.amazon.com/CNZ-Japanese-Filter-Mat-40/dp/B00JQR329E>
- Something I need to research further is use of UV sterilizer, which is used to kill algae, but must investigate what it does to the beneficial good bacteria what is needed for filtration. I've visited two multi tens of thousands gallon ponds that use strictly biological filtration with excellent and clear results.
- Thin the pond of less desirable fish to ensure adequate filtration levels, or when adding new fish. I currently have 12 fish, most 24"+, in a 3000 gallon pond. I posted on Nextdoor free koi, and will interview candidates to ensure my fish go to a suitable home.

Day's 1 - 3 > Nov 21 to Nov 23, 2017

Site Prep

- Old waterfall has not been used for years due to leakage. Additionally, there is a separation between waterfall and pond, so water seeps into the ground.
- Jack hammered the waterfall to remove it. Cement was mixed with an epoxy which made it very hard. Waterfall was not properly constructed; liner only covered some, but not all the waterfall. Stones were also not suitable, as they are highly porous, which can cause leaking.
- Removed overhanging branches from pine and oak trees. Fallen and decaying leaves in the pond turn the water into a "tea" toxic to koi.
- None of the rubble was wasted, as it was used to widen the ledge in the ravine so a bobcat can safely get to the pond site. Bobcat will come in through the side gate, where some of the planter boxes may have to be dismantled to clear a path to the pond area.
- Redwood was brought in for the extended deck that will wrap around the pond for access and seating for koi viewing

- The filtration system will be expanded to triple the capacity as the pond will go from 1200 to 5100 gallons. A new filter, which does not pack down to clog, will replace old. The old pump will be used to run the bog filter, aeration and the irrigation system to the planter box and front yard. Solar system will be running by time the pond is complete to offset the increase in power used for the pond.

Day 4 - November 27, 2017

- Demolition of waterfall complete.
- Postholes and framework at the back of pond where waterfall and stream will flow being constructed. Even though it rained, the ground is an adobe soil with lots of rocks so a jackhammer had to be used to dig out the post holes. Behind the waterfall is the view of San Francisco skyline.
- The previous old school 4'x4' sand filter housing can be relined and used as the bog container.
- The mound remaining from the old waterfall location will be leveled out. The earth from the mound and the section that will be dug out will be needed to level out the waterline and surrounding area of the pond.

Day 5 - November 28, 2017

- Back wall where waterfall is going to be situated is built. Placement of the waterfall is such that you will have a view of San Francisco right above the waterfall from the deck, and from inside the house when you have the patio door open.
- Two areas ledges were built to accommodate the bobcat access to the pond site. The first is the narrowest area by the main planter box. The step down from the patio will be removed and rebuilt. The second area is a ramp by the main gate into the backyard as there is a lip between patio concrete and gravel surface.
- There was a huge clump of roots under and around the waterfall which sucked up water from the pond.
- Most of the rocks surrounding the pond liner have been removed. The concrete will be repurposed to help build the ground around the pond level to the waterline.
- The 4" board on the deck has dry rot. A wider board will replace it so it creates a lip to there to give you a sensory point not to walk further.
- Three large bins will be hooked up to the filtration system when fish are removed tomorrow. As much as possible of the water, and bio media will be kept to seed the new pond and filter.
- Bobcat is planned for Thursday to dig out new pond site that will be roughly oval in shape. There will be aeration to help keep the water flowing around the pond at all times.
- Where the existing waterfall was, is a dead area, so a viewing spot will be created for chairs and table to relax and watch the fish. There will be stepping stones in the stream to allow access throughout the pond.
- The pump will be elevated so it will not have to work so hard to pump up to the waterfall. Also, the existing system has 17 90 degree bends, which requires more pressure. The new pipe layout will only have 7 - 8, and they are going to be 45 degree bends to help maintain water pressure.

Day 6 - November 29, 2017

- A big day - fish are now out of the pond in two 150 bins with the existing filtration system jury rigged to keep koi aerated in clean water.
- The pond is much smaller than I thought ... filling the two 150 gallon each bins drained about two thirds of the water. Current pond is estimated to be 800 - 1000 gallons.
 - The new pond is going to be 5050 gallons
- Final prep for the site to bring in the bobcat to dig out a 13'x13'x4' deep hole for pond liner. Also, the entire site will be leveled out so the waterline is even throughout.
- Plans are being made with Steve and Ruth on koi transport. Daniel and I are planning a trip with the koi sock net, some double bagged bins and other paraphernalia for safe transport and introduction.
- Pond is made not as anticipated with plastic, but fiberglass. As the water was being drained it was seen the UV coating was gone which means potential structural failure was in the future.

- It was right timing to remodel to a new pond from a liner and equipment standpoint. The filter because it has solid beads, state of the art years ago when purchased, but has a tendency to clog. The new filter uses macaroni shaped beads which increase flow, bacteria surface level and is lower maintenance.
- The 30 year old existing liner would have been difficult to repair if it would have fractured with all the water and fish.
- Great technique was used to herd fish, a bin was used as a barrier was placed at the narrowest part of the pond so all fish were trapped at the side closest to holding bins. Koi should be safe for a maximum two weeks in this constrained area. With the lowered water level and finite area bunching up the fish, the sock net was able to scoop out the 18 - 24" and larger fish safely.
- Vacuumed out remaining water out of pond so it is completely empty to minimize weight for removal. We will attempt to remove existing liner intact for future use for farming aquatic plants by the pond guys, but uncertain if the potentially brittle fiberglass will lift out intact.
- Note photos of the area between the patio deck and the retaining wall. All that is going to change as trees will be relocated and pond / stream / sitting area is formed.
- Nothing goes to waste. Two small trees will have to be removed from the new pond area, will be planted on the hillside to help with erosion.

Day 7 - November 30, 2017

- "This yard is one big rock". A bobcat was rented for the day to excavate the new pond. Usually you go down about 4' before you hit hardpan. However, from the first shovel we hit a huge rock, as the entire yard consists of packed soil of primarily rock, mixed with adobe and a little sand. If we did not hit rock, we hit massive pine tree roots that had to be sawed in pieces before it could be removed. There was one particularly large rock that was 3' long and 17" wide which is part of a huge rock wall. We had to stop when we hit the rock wall, but fortunately it was at a point where the pond was wide enough.
- This 3' long stone from hell, and the four pallets of rock we dug up, will be used to build walls, steps and serve as ornamental pieces. See the video of momentous battle of man (Daniel) vs rock and some skilled bobcat driving, a jackhammer, and a 8' pry bar that was actually bending due to strain:
- Six minute video of pond excavation
<https://youtu.be/n2VjCtXrdWo>
- Because the pathway the bobcat had to cross the yard was so narrow two areas were built out using debris and concrete. The planter boxes did not have to be disassembled, just the rock stairs by the patio which is simple to rebuild.
- The pond shell could not be saved and was broken up in the digging.
- The back retaining wall where the debris is stacked against will be the basis for the elevated waterfall. Now that rough shell of the pond has been cut out, tomorrow the rest of the excavation.

Day 8 - December 1, 2017

- Yesterday, the bobcat was the blunt instrument to move massive amounts of rock. Today the instruments of choice to shape and form the pond and waterfall are jackhammer, prybar, shovel and strength to take out sharp edges that would puncture the liner.
- The stone that was taken during excavation is for exterior use only, as it will eventually dissolve in the water and creating sentiment and water quality issues. However, the stone makes for excellent rock wall, foundation and decoration.
- Rocks are now hand placed and pressed into crevices to not only smooth the sides, but to build ledges that will allow exit if someone falls in. The ledges will be deep enough so critters will not be able to lean in (16"). "Ecoboxes", very sturdy boxes, will be put on the bottom, to serve as shelter for koi to find refuge.
- Much discussion on pond configuration on where to put the bog filter, type of filtration equipment needed, length of the streams and waterfall will be adapted to pond shape and size.

- The red filaments on the side of the wall are roots from the pine tree in search of water. Fortunately, pine tree roots are not as aggressive as bamboo or redwood roots which will puncture the liner. These roots actually serve to strengthen the liner.
- We lost one koi as it jumped out of the bin despite being covered. We started feeding the fish again now that they are settled in.
- Old pond was calculated to be approximately 1077 gallons. The new pond is estimated to be 3000 gallons, based on ability to dig where rock walls stopped progress. Even though smaller than anticipated, the pond is triple the capacity (more when including the bog filter for water plants), than the old pond.
- Dry rot was found on the deck and be replaced. Two people have fallen in and our dog drowned in the pond. The edge board will have a lip so people know they are at the edge of the patio deck. We are putting up rope fence - human / kid height, one dog height; pls have ledges to assist in climbing out. There will be a string of LED lights to make people aware of the edge. Also discussed was a netting system to put over the pond to prevent egrets and vultures from raiding the pond as they are known for sitting on the deck.
- Waterfall is being shaped with retaining wall and rock, where there will be multiple streams feeding into the pond. To keep from having dead water spots, an air pump will push water from opposite end of the waterfall to keep flow going. The air pump for flow and oxygen also pushes debris into the surface skimmer to filter out leaves and big debris.

Day 9 - December 4, 2017

- A friend designed a 24" round gold and green stained glass with the Chinese characters peace and harmony. It will be installed on the pond patio roofing frame. When you exit the house to the pond it will be the first thing you see. Sunlight will back light it framed by trees, blue sky and white clouds. We will also have spotlights on the stain glass for night viewing. See stain glass photo and triangular area it will reside.
- A tree at the edge of the pond where the extended deck will be built was transplanted. The fish that jumped out \-(was buried below the tree to act as fertilizer, and his final resting place. All the other shrubbery was moved and transplanted with the exception of one tree that will be growing out of the deck.
- The sharp edges around the pond are being blunted using a hammer, and up to three layers of under liner will be put over the wall to prevent sharp edges puncturing the liner. The sand you see in the pond site came from the previous pond. Sand was put between the fiberglass shell and ground surrounding.
- At the bottom of the pond pit there is a little shovel. We have gone from bobcat earth moving to crevice molding in one day.
- We will not know until end of week on projected fish introduction back into the pond. We are shooting for Wed of next week to pick up Steve and Ruth's seven large koi once pond is stable.
- We discussed two sofa benches will be built to sit on for pond viewing and chilling.
- Lumber for the decking and retaining walls were brought in.
- The ground still must be leveled. The piece of lumber spanning the back side of the pond is where level needs to be. Leveled will be the pathway, waterfall, stream and bog filter areas.
- There is still a lot to do before water can be introduced. Only a few photos were taken today as in appearance it looks similar, as detail work is not apparent.

Day 10 - December 5, 2017

- We have water in the pond!
- 70' long, 6' wide, of under liner was laid down prior to the actual pond liner... as many as 4 layers put on jagged of rocks to prevent punctures.
- A single sheet, 25'x35' of pond liner 45 mm thick was installed with excess to go to to waterfall as one continuous sheet - no seams to leak.

- Key to keeping the new pond clean, and not in the old pond, is a surface skimmer that was cemented in permanently. There will be an aeration pump by the main deck to move "dead (non moving) water" to push any surface debris into the skimmer.
- We will be running the old and new filters concurrently to ensure the pond is adequately seeded with beneficial bacteria. Pond water from Ruth and Steve's, as with 300 gallons of old pond water will also be used to prep the pond for fish introduction. The old filter will also be backflushed into the new pond. Additional enzymes and bacteria will be added to seed the pond.
- A bottom drain was installed.
- "Eco-boxes", high strength plastic crates were added to create ledges.
- Took a quick peek at the fish in the bins and they seem to be ok. Only fed them twice since they have been in the bins.

Day 11 and 12 - December 6 and 7, 2017

- Yesterday was primarily prep work on cementing in deck extension supports, pond skimmer and bottom drain.
- Today, the pond was filled up about 80% and the fish were reintroduced.
- All storage bin water was put in the new pond to seed it, as with back flushing the filter, and adding bacteria directly into the new filtration system. There are only four fish in it now, 18 – 24+ inches in size. We will introduce 7 more equally large fish mid next week. Total of 12 large fish.
- Lumber has arrived for decking. A half horsepower pump, an additional UV light to make a total three UV filters, aeration pump and a 4000 gallon capacity filter has arrived.
- The new pump is bigger than the old, but it also has to push more water and further away from the waterfall.
- Electrical work must be done to expand the number of outlets as we will have UV, pump, LED lighting, aeration pump all running. There will be redundancy in the filtration between mechanical and biological, as with air pump on a separate circuit.

Because we have had a massive die off due to the pump cord not being plugged in and on vacation previously, we will use a remote kill button so electrical will never have to be touched.

- Quick research has found that 12 LARGE koi should be ok in a 3000 gallon pond. With the loss of my jumper and favorite fish\-, I will get one more koi, probably a butterfly, after the pond establishes itself.

Day's 13 - 19

- New filtration system is up and running - new filter, pump and addition of a third UV light
- Aeration system with dedicated pump and air stone in place will move dead water, add oxygen, and push debris toward skimmer. It is also put on a different circuit than the pump as a fail safe in event a circuit pops.
- Original filter was emptied out and will be turned into a duckweed containment unit. The white beads in photo are the original bio beads that are solid, and prone to clumping. The new beads are hollow allowing water to flow through and add more surface area for bacteria.
- Reflective water clarity was amazing as you can see the trees and clouds. This was clouded considerably when new gravel was added to the bog filter as dirt was released into pond, but after a few days cleared up when settled and filtered out.
- Bog filter has pvc pipe with holes that force water through the gravel bed to provide a secondary source for the waterfall. This also acts as a mechanical filter trapping debris from the pond. Flow is roughly 20% bog, 80% waterfall. Plants were added from existing supply, and from Steve and Ruth's pond. The bog now acts as a redundant biological filter to the actual filtration system.
- The black container by the skimmer is where we will cultivate duckweed for the fish to eat.
- The second pond and filtration system you see is Steve and Ruth's, which has amazing water clarity. The pond was super oxygenated 24 hours in advance of us bagging fish and putting them in plastic bins.

- Once new fish were transported home we left the bags floating in my pond for temp acclimation and added pond water to balance chemistry. We used Steve and Ruth's pond water to help seed the new pond system.
- The filter came with dry seed material, which was added to jumpstart the bacteria, as with back flushing the old filter into the pond.
- Salt and azomite powder was added to the water for trace minerals since the majority of the water is new.
- The beginning of the rock waterfall was using existing stone. An entire pallet of 3000 pounds more rock was delivered to build out the rest of the waterfall.
- It is amazing that the sound / harmonics of the waterfall changed with water flow, experimentation of placement for the spillways and mix of bog vs waterfall flow. Each rock placement had a reason and was not just jumbled in.
- Once the rock is in place, the black liner will be cut. The entire pond is made from one, seamless piece.
- Flat rock was placed in front to also act as paving if you wanted to walk across the waterfall.
- The waterfall is placed so directly behind it is a view of San Francisco, and the waterfall can be seen from the dining room, kitchen and family room through the patio door.
- Two concrete lantern pieces from the original pond was re-integrated into the new design.

Day20

- LED lighting has been installed, 6 in the pond, 4 in the waterfall, 2 in the concrete lanterns.
- 3000 pounds of rock has been moved from the pallet and structured around the pond sides and further building out the waterfalls. Some rocks have been concreted in for stability.
- Once all the rock is down, excess pond liner and sealer will be removed.
- Pond is targeted to be complete by Christmas, and all the finish work by new years.
- Two areas still under construction is the area between the deck extension and pond which has to be raised and made level. The second is to the left of the waterfall around the filter system and access to the pond skimmer for stability and accent rocks.
- Stain glass must be mounted, and benches for pond viewing and chilln' were built.
- There are several areas where plants can be added:
 - bog filter that is 4" to 8" deep that can include calla lily, elephant ear, and watercress.
 - waterfall pockets are 6 - 8" deep can be parrot feather or vine plants that can grow in fast moving water
 - shelf in front of the pond, by adding a 2' x 4' long container where the water is 16" deep. Needed will be aquatic soil, river rock and gravel.
- Contacted another koi hobbyist about butterfly's, and he noted that three of his has "disappeared". Flashes of turkey vultures and egrets landing on our deck contemplating a sushi lunch came to mind. A pond net that will be put up with a system of eye hooks will be installed.

Day 21 / 22 – Pond is Done!

- The light show was tested for several days and is solid.
- After several days of cloudy water due to addition of all the new rock, as another 1000 pounds plus gravel in the bog filter was added. To get the fine particles to clump together ClearMax was added and within a day the water turned crystal clear.
- The areas that were finished off with rock were the edge of the pond, and building up the main waterfall. There are six waterfalls in total. Stones that would be walked on were concreted in for security.
- My long forgotten concrete lanterns were lit for the first time in 30 years with the new LED system.
- The black basin is my old filter with the top cut off. I will be ultimately buried so only a few inches would be at the surface to skim off from the duckweed farm. This cultivation cauldron will be by the surface skimmer so both are close in proximity for access.
 - After thought note – duckweed was advised to be invasive, and any one the fish do not eat will multiply. Will use containment system for lilies or ornamental goldfish.

- The bog filter rock framework, as with a ring of rocks to surround Japanese Iris plants we saved from the big dig. Love the way Daniel never throws anything away and repurposes everything.
- We will do some work outside the original contract that will cut away the blocked views of San Francisco by cutting additional pine and oak limbs. We will chip all the branches and use it as mulch in the front yard and around the trees. Some will be saved for the summer garden.
- Spoke to Daniel about water harvesting with the winter rains coming soon, so investigating in building out rainwater collection for the tree's on the side patio, and for the garden area. We will also have back flush water pumped to the front yard to keep that area irrigated. Thousands of gallons will be saved just in the first year. Plus, rain is free \-)
- After thought note – In three storms, 1000 gallons of water was harvested.
- Need to go to Connie's to check out plant options for the bog filter which is 4 - 8" deep, 2' across and 3' wide. Will probably wait a few weeks until the pond is more established as the gravel in the bog filter is still sterile and there are no nutrients in it.

Hayward is in zone 10A, so need to buy species that could do half sun and shade in this temperature climate. Options include calla lily, elephant ear and watercress.

Mail order options for bog / water / pond plants. Unless Connie's does not have what I want, here are two mail order options with good selection:

- https://www.homedepot.com/b/Outdoors-Garden-Center-Garden-Plants-Flowers-Water-Pond-Plants/N-5yc1vZc8s1?Ns=P_Topseller_Sort%7C1
- <https://www.pondmegastore.com/shop/home.php?cat=281>