

NOBLIN & ASSOCIATES, L.C.

Consulting Engineers

SWIMMING POOL PATIO/RETAINING WALL EVALUATION

THE HOMES AT SWAN POND

WALPOLE, MASSACHUSETTS

SUBMITTED TO: The Homes at Swan Pond
178 Clear Pond Drive
Walpole, Massachusetts 02081

SUBMITTED BY: Noblin & Associates, L.C.
4 First Street
Bridgewater, Massachusetts 02324

DATE: September 2010

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September 27, 2010

The Homes at Swan Pond
178 Clear Pond Drive
Walpole, Massachusetts 02081

Attn: Lori McMahon

**RE: Swimming Pool Wall/Patio Evaluation
The Homes at Swan Pond
Walpole, Massachusetts**

Dear Lori,

As part of our ongoing work at Swan Pond, this office returned to the site on Friday, September 24th. J. Stanton Contracting was brought to the site to make test cuts through the concrete patio surface, and to remove the cement parge coating from the face of the swimming pool wall. The intent was to determine a proper, permanent fix for both the wall and patio. Our findings along with recommendations and preliminary budget estimates are contained herein.

BACKGROUND HISTORY

The “new” concrete patio began to crack shortly after it was installed in 2007. This office reviewed the scope of work, and discussed what was done at the time with the contractor, and determined the likely cause of the patio cracking was the failure to utilize any form of metal reinforcement, coupled with questionable compaction.

Soon afterward, the patio also began to break off at the edges (particularly at the fence post locations), and to separate from the wall. In Spring of this year, Stanton Contracting performed temporary, remedial repairs to keep the swimming pool area usable through the swimming season.

Based on the exposed side of the patio/wall near the pool building basement, we have always assumed we would find a concrete block wall built on a poured in place concrete foundation (see photo). However, test cuts revealed differing construction in each of the 2 new areas that were cut open and examined. A test cut at the side of the pool, in the corner where it meets the newer segmental block wall, revealed a 12” concrete block wall on a concrete block foundation (see photo). Next, a portion of the patio was removed near the top of the access ramp, at which we discovered a poured concrete structure all the way up to the underside of the patio (see photo). So in three areas that we have investigated or examined we found; 1) a concrete block wall on a poured concrete foundation; 2) a concrete block wall extending completely below grade (unknown if there is also a poured concrete foundation); and 3) a poured concrete wall all the way to the underside of the patio.

FINDINGS

Along with finding three different wall/foundation scenarios, we determined that compaction of the substrate when the patio was replaced was poor. We also believe that the majority of water damage was occurring as a result of water getting below the slab and on top of the wall through the fence post sleeves (see photo). The discovery of three different wall assemblies has complicated the process of replacing the wall, but may have pointed us toward a less disruptive, and less costly project, that may prove to be a fairly long-term solution. A poured concrete wall should not be placed on top of a block foundation, nor should a segmental block wall.

To be clear, the only way to guarantee a long-term (i.e. 20+ year) repair, without any chance of recurring patio or wall damage, would appear to be to replace the entire patio and wall(s). The lack of proper reinforcement in the "2007" slab means that it will always be vulnerable to cracking, and the lack of a proper drainage system through the walls is a serious flaw. The poor compaction makes cracking of the patio even more likely, as does the vibration loading from the adjacent T tracks. Unfortunately, replacing the walls and the patio in their entirety may also mean replacing the swimming pool itself, due to the lack of clearance between the pool and the walls. The amount of excavation required to facilitate wall replacement could undermine the pool structure.

However, we believe that we may have come up with a scope of work that could provide a fairly good return on investment in terms of years (+/- 10 years), without the major cost associated with complete removal and replacement of the patio and walls.

RECOMMENDATIONS AND COST ESTIMATES

The first step in this process will be to saw cut and remove the concrete patio to a point just behind the pool cover tie-down points. This will remove approximately 90% of the patio slab cracking. In the corner opposite the access ramp, additional portions of the patio will have to be removed if the intent is to remove ALL patio slab cracks. Once the patio slab has been removed, substantial re-compaction of the substrate will be needed. We expect the Contractor will have to truck in some additional materials to fill the voids. However, the amount of additional fill that will need to be brought in cannot be determined until more of the substrate is revealed.

After the substrate is filled/stabilized/compacted, this office is advising forming a cap on top of the existing walls in accordance with the attached drawing. The cap should be approximately 16" wide, which will allow it to overhang the front and back of the wall by approximately 2", and approximately 6" thick. As is shown in the drawing, a drip channel should be formed in the bottom of the front edge. The cap must be reinforced with #4 rebar in accordance with the drawing, and should be pinned and epoxyed into the top of the existing wall(s). This cap will serve two functions. First, it will provide a reinforced, monolithic, rigid stiffening member on top of the wall, helping it to resist lateral pressures. Next, by overhanging the front face of the wall and forming in a drip channel (see Detail Drawing), the cap will limit the amount of water that washes down the face of the wall, which is one of the reasons that the parge coating continues to fall off.

Once the cap is formed/poured and cured, the sections of the patio that were saw cut and removed can be re-poured. To set expectations, the replacement concrete will not match the existing concrete exactly. It will be very obvious that the patio was made in two separate pours.

It may be possible to make the new concrete look similar to the old concrete by using a pigmented concrete stain, but it will not match exactly. When the new concrete slab is poured, soft control joints should be utilized where the slab meets the cap, and where the new slab meets the old slab. The two slabs should be rigidly bonded together in order to resist differential settlement. Smooth 3/8" x 6" alloy steel dowel should be drilled into the bottom 3rd of the original concrete patio, and epoxied in place. The smooth finish of the dowels will prevent the new concrete from bonding solidly, which will allow some slight horizontal movement. The intent is to now allow the old and new slabs to move slightly relative to one another in the horizontal plane, without the uncontrolled cracking that has occurred since the patio was installed.

Once the new cap is finished, we would advise removing the original cracking, loose parge coat from the face of the block wall. After all loose materials are removed, the wall should be thoroughly powerwashed to a clean condition, prior to applying a new parge coat. It is possible that mechanical cleaning will be required prior to re-application of a parge coat.

Finally, we are advising that the swimming pool fence not be re-installed through the wall cap. Along the access ramp, connecting to the cap may be un-avoidable. However, rather than putting sleeves through the cap, we would advise utilizing mechanical fasteners (expansion sleeve anchors) to attach a galvanized post with a 4" x 4" flat base. At the side of the pool (facing the Clubhouse), we would advise installing a new 8' tall fence through the lower swimming pool slab (in front of the new wall cap). This will eliminate the need to penetrate the new cap, and will effectively hide the face of the wall, in case the parge coat begins to spall off again in the future.

If you are in need of additional information, please do not hesitate to call us.

Sincerely,

Paul E. Martin
Senior Project Manager

Encl: Photographs
Detail Drawing A-1 & A-2



TEST CUT #1 REVEALED A BLOCK WALL



THE FOUNDATION BELOW THE WALL AT TEST CUT #1 IS OF CONCRETE BLOCK



TEST CUT #2 NEAR THE ACCESS RAMP, REVEALED A Poured CONCRETE WALL



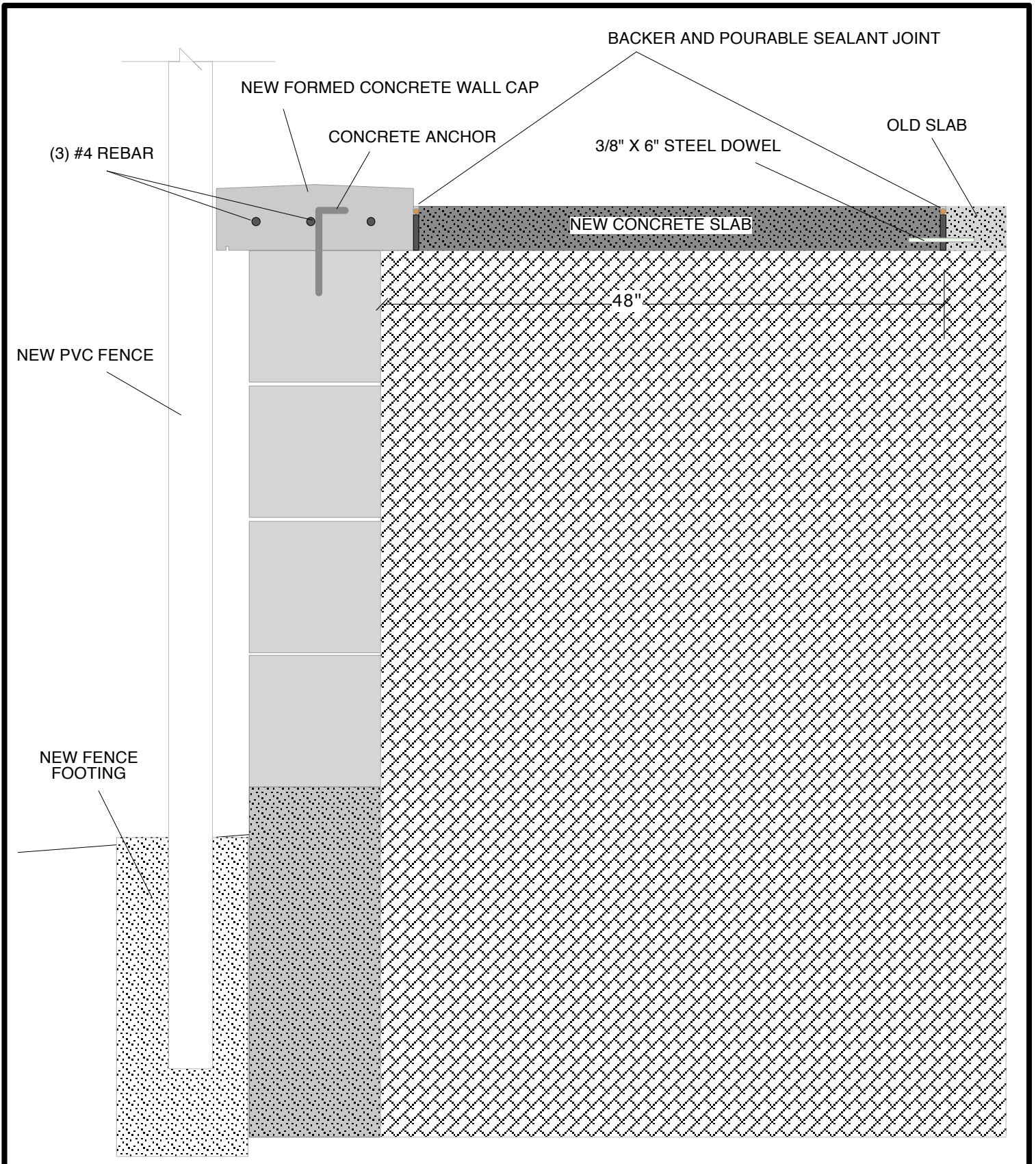
THE MAJOR DAMAGE TO THE PARGE COAT WAS CAUSED BY WATER PENETRATION THROUGH THE FENCE POST SLEEVES



NEAR THE POOL BUILDING, THERE IS A BLOCK WALL ON A Poured CONCRETE FOUNDATION



PATIO CRACKING OPPOSITE THE ACCESS RAMP EXTENDS BEYOND 4' FROM THE EDGE



BACKER AND POURABLE SEALANT JOINT

NEW FORMED CONCRETE WALL CAP

OLD SLAB

(3) #4 REBAR

CONCRETE ANCHOR

3/8" X 6" STEEL DOWEL

NEW CONCRETE SLAB

48"

NEW PVC FENCE

NEW FENCE FOOTING

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POOL WALL/PATIO REPAIRS AND RELATED WORK
THE HOMES AT SWAN POND CONDOMINIUM
WALPOLE, MASSACHUSETTS

WALL CAP
DETAIL

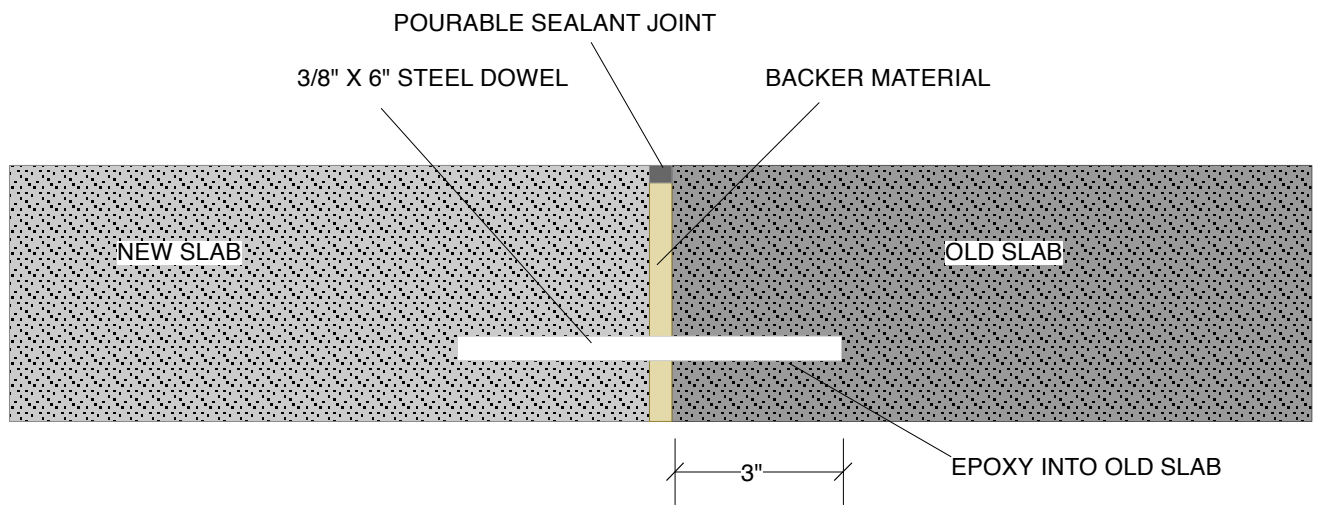
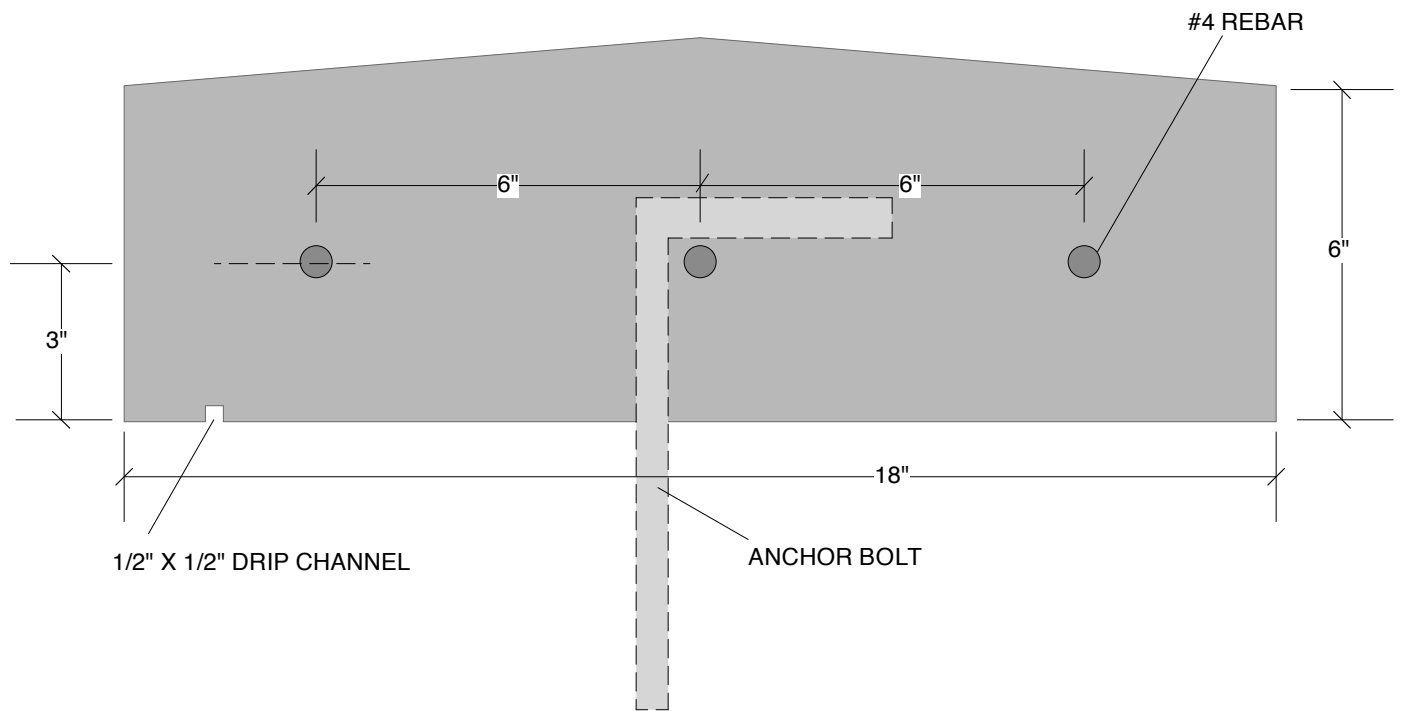
A-1

DRAWN: PEM

SCALE: NTS

CHKD: REMN

DATE: 9-10



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WALPOLE, MASSACHUSETTS

WALL CAP
DETAIL

DRAWN: PEM

SCALE: NTS

CHKD: REMN

DATE: 9-10

A-2