



May 31, 2016

### **Synopsis of Town work in the Pines 1 subdivision**

The Town began working with Richmond American Homes in early 2015 to stabilize a section of Mountain Stone Pine Way and adjacent residential yards in the Pines 1 subdivision. Eight homes in Pines 1 experienced greater than normal settlement, and further analysis revealed that as many as 12 additional homes in Pines 1 could potentially experience some surface settlement.

The Pines 1 subdivision was constructed on a reclaimed sand and gravel quarry. The area within the Pines 1 subdivision that experienced greater than normal settlement had been used for deeper material extraction and the ponding of water needed for the quarry operations. This area may also have been captured by the 1983 flood. The affected area was not backfilled to proper engineering standards before the Pines 1 subdivision was built. As a result, greater than normal settlement occurred in this affected area.

The Town of Marana initiated an emergency procurement of contractors to:

- 1) stabilize the settlement,
- 2) restore the original elevations or grade,
- 3) reconstruct Mountain Stone Pine Way, and
- 4) Provide structural evaluations for properties within the affected area.

To stabilize the settlement, an engineered foam product was injected that expanded to fill voids in the poorly compacted affected area. This is a widely accepted repair for similar situations. The engineered foam product was injected as deep as 34 feet to within 4 feet of the ground surface.

Once the deepest areas were stabilized, Pima County Wastewater open cut the road to repair a sanitary sewer line that had sagged as a result of the settlement. To restore the original elevations or grade, the Town of Marana used another engineered foam product in the top 4 foot layer of the affected area. This engineered foam product had expansive properties that caused the ground and concrete surfaces to rise to their original elevations or grade.



To reconstruct Mountain Stone Pine Way, the Town replaced any concrete curbs and sidewalks that had experienced cracking or damage from the lifting phase. Lastly, the Town repaved Mountain Stone Pine Way.

The Town has provided structural evaluations to residents within the affected area to determine if their homes are experiencing greater than normal settlement that would warrant full forensic evaluation.

Moving forward, the Town contracted a laser topographical survey of the entire Pines 1 neighborhood. This survey is highly accurate and comprehensive in the number of data points it generates. This survey will form the baseline to investigate any future concerns regarding settlement. The Town has also contracted to conduct additional soil borings in the subdivision both to further refine the limits of the area of possible settlement and to broaden the geotechnical information for the subdivision as a whole. These additional soil borings will be used to analyze the area of concern (the area that has not experienced but has the potential for greater than normal settlement) to determine if additional stabilization is needed before we experience settlement.

The Town of Marana has confidence in the products used for this repair. The Town has successfully used these products in other areas of the Town. In addition, the Town has proactively taken actions to minimize the potential for future subsurface settlement.

Sincerely,

Keith Brann, P.E., CFM  
Town Engineer