



“Trying to Put a Square Peg into a Round Hole!”

A property in an affluent Phoenix area contacted me regarding an excessive amount of standing water that was occurring in a portion of their community after every rain event. The amount of water storage was so bad that one of the residents immediately adjacent was encountering water drainage into his garage. The community was at a loss for why this was occurring and needed someone to investigate the property and determine why they were having this problem.

After an field initial investigation, it was determined immediately that at the designed storm drain release point it was obvious that the conveyance device (a concrete “U” channel of approximately 12” in width and 6” in depth) was of insufficient size to convey any extensive amount of water cascading from the community and locations upstream. The storm flow to this specific location not only included the upstream portion of the community; but also the large mountainside sheet flow release due north of the community.

Once this was determined, we were lucky that the community manager still had the grading and drainage plans from the original construction of the community to evaluate. This helped in analyzing what the engineer’s original design intent was for this community. What we discovered was quite amazing.

It was never the intent of the original design engineer to accept storm water from any property much less the heavy sheet flows of the previously mentioned mountainside. Review of the plans identified well upstream a large catch basin inlet that was to accept the mountainside flows and divert them to the community’s adjacent golf course for further conveyance downstream. This included the construction of a graded channel at the base of the mountain that drained to this catch basin. Upon investigation of the “in place” condition, it was determined that the channel had completely filled with sediment and all storm water was now spilling on to the community’s main street. In addition, the catch basin was located on a private residence which the owner subsequently had filled in the remaining part of the channel and abandoned the catch basin in place in order to landscape his yard.

In addition to this issue, the engineering plans assumed that all residences would retain their own storm water. In lieu thereof, all residences dumped their storm water on to the streets. Therefore, the local street of storm release was taking all surface runoff from all upstream lots, the upstream streets themselves, and the upstream mountainside sheet flows. Attempting to release this extensive amount of water through a 12” wide by 6” deep “U” channel to a downstream detention basin is the ultimate cause of the storage of water and the ultimate residual damage to the pavement it stored on.

There were several modifications required to thoroughly and appropriately address this issue (starting at the furthest upstream issue). Since the channel had fully compromised with sediment and the residence where the inlet basin was abandoned were not options, we chose to intercept the mountainside flows where they existed at the time of the investigation (within the street at the gutter line). To that end, a “curb inlet” catch basin was installed in the gutter and was built around the below grade existing storm drain line that led to the golf course. The upstream section of pipe was concrete slurry backfilled and abandoned. This allowed the majority of sheet flow off of the mountain to travel to its originally intended location on the golf course. Further downstream at the “U” channel, a civil engineer was retained to determine the revised volume and velocity of water from the residences and the streets combined. From this calculation, a new “U” channel was constructed to the detention of appropriate size to convey the additional storm flows. Finally, the neighbor whose garage was flooded driveway was re-engineered and then reconstructed to ensure that the high water mark of storage during dissipation did not exceed the grade break in the drive; thusly leaving all water storage on the street during a 100 year event; should one occur. Otherwise no storage would exist on the street and all storm water would be conveyed through the new channel to the detention basin for further release downstream.

The condition encountered on this property is not uncommon. Many custom subdivisions or even “in fill” projects are designed with one engineering thought in mind and then constructed by other engineers or even modified in the field by contractors or even end users without knowledge of the overall design intent. This lack of knowledge (or even disregard for knowledge) is the root cause of why many drainage issues of this nature create substantial residual damage to pavements, foundations, etc.

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