Wash and Drainage Committee Report: Board-Assigned Inspection

Task:

Inspect and evaluate the washes, culverts, catch basins and drainage system of the community. Specifically note the performance of the drainage system performance under exceptionally high rainfall in 2023. Present findings, including a grade (w 1 being the worst and 5 being the best) for each area of the community.

Goal:

To inform the Board and the community of how our system has performed thus far in 2023.

Has there been any flooding, pooling of water, blocked or restricted culverts, erosion, or large movement of sediment.

What impact has 3.5" of rain in less than three months had on our system?

Committee Statement:

As a group of community volunteers who, since our formation in September, 2022, have dedicated hours of time to the discovery process primarily revolving around the needs of Pima Wash, we have learned a great deal about water conveyance in general and conveyance through the Point South Mountain Residential Property specifically. In February, we acquired a new member who has a PhD in Geography and Planning and is working as a Post-Doctoral Research Fellow in Geography, Urban Planning and Water Policy. This member's addition has added value to the committee in the form of her educational background and work experience. That said, this committee reiterates that it is a group of community volunteers, working in an advisory role to the PSMRA Board of Directors, and is providing the following insights and opinions based upon the level of knowledge commensurate with their level of knowledge gained through research and by consultation with various professionals in the areas of Land Development, Geotextiles, Structural Foundations, Civil and Geotechnical Engineering, Natural Resources Conservation, and Reserve Studies, and, now, by the addition of their new member. The Committee advises that assessment by licensed and bonded professionals be the next step in the process of discovery in order to confirm or enhance the information being provided by the Committee and that actions to reverse the findings on inspection be those that are in keeping with the City of Phoenix standards for maintenance of drainage systems.

Winston Wash:

Evidence of:

- **Flooding: No**
- **Pooling of Water: Yes**
  - At 48th St culvert inlet and outlet; moist soil condition present on 3/30/23 inspection; corrosion and rusting of pipe material
    - no significant change
- **Blocked or Restricted Culverts: Yes**

    - 100% blockage of PVC pipe inlets (pipes run under earthen footbridge at E Winston cul-de-sac); appears to be earthen collapse vs downstream sediment movement; soil condition is dry
        - increased
    - Partial blockage through length of PVC pipe to outlets (under earthen footbridge at E Winston cul-de-sac); soil condition is dry
        - no significant change
    - Marked degree of restriction of 48th St culvert inlet by sediment; mix of rock, gravel and sand.
        - mildly increased
    - Sediment running full length of 48th St culvert
        - mildly increased
    - Severe restriction at 48th St culvert outlet; woody debris trapped by concrete structure protecting AZ Grand water pipe; sand accumulation within and outside of the terminal portion of culvert outlet.
        - significantly increased
- **Erosion: Yes**
    - Upper and mid portions of wash where vegetation is limited; some areas of severe scour on R bank, mid portion; scour and undercutting of rock wall on downstream side of earthen footbridge
        - no significant change with exception of the PVC pipe area mentioned above (at footbridge)
        - degree of undercutting of mortared rock wall appears increased
        - exterior yard enclosure walls are not under significant threat from channel flow
        - embankments are under threat of erosion from rainfall in areas lacking vegetation
            - consistent with previous inspection
    - Grassy areas are stable
- **Large Movement of Sediment: Yes**
    - Course sand deposits present in channel of upper and mid Winston Wash; finer sand deposited in lower portion, extending as far as 30 yards downstream into the grassy area
        - increased
- **Presence of Deteriorated Wash Health: Yes**

  (presence of deposited debris, vegetation overgrowth, presence of vegetation that causes choking or clogging of water flow, evidence of water diversion, presence of garbage)
        - deposition of debris
        - vegetation overgrowth
        - choking or clogging of channel flow, worse in upper and upper mid portions of wash
        - water diversion in upper portion, reducing downstream
        - garbage, including packaging from various products, clothing, citrus fruit

Winston Grade - Function: 3
Winston Grade - Health: 4

Desert Wash:

Evidence of:

- **Flooding: No**
- **Pooling of Water: Yes**
    - In upper portion from Golf Course to Desert Dr. and the lower portion from 48th St culvert outlet to 51st culvert inlet; lower portion pooling mainly at culvert locations; corrosion and rusting of culvert pipe material
        - no significant change
    - In terminal portion at the 51st outlet; soil moist on today's inspection
        - increased
- **Blocked or Restricted Culverts: Yes**
    - Restriction at 48th St culvert inlet; irrigation hose location is contributing to snag of debris
        - increased
    - Restriction at 48th St culvert outlet; 10" of sand deposit
        - increased
    - Restriction at 51st culvert outlet; appears to be related to development of improper grade just downstream of outlet
        - increased
- **Erosion: Yes**
    - R bank erosion in limited area of mid portion between 47th and 48th Streets
        - minimally increased
    - Erosion at the site of exposed PVC pipe (? irrigation pipe) in center of channel, mid portion
        - minimally increased; posing no danger to structures
    - Grassy areas are stable
- **Large Movement of Sediment: Yes**
- **Presence of Deteriorated Wash Health: Yes**
  (presence of deposited debris, vegetation overgrowth, presence of vegetation that causes choking or clogging of water flow, evidence of water diversion, presence of garbage).
        - deposition of debris
        - vegetation overgrowth
        - choking or clogging of channel flow, worst in mid portion (Fountain Grass)
        - water diversion L bank just upstream of 48th St culvert inlet
        - presence of trash, including packaging from various products, paper, citrus fruit, dog feces

Desert Wash Grade - Function: 3
Desert Wash - Health: 3

Pima Wash:

Evidence of

- **Flooding: No**
    - Because Pima has a rain gauge at the 48th St culvert inlet, this is the only wash on the Property with official data collection
        - Maricopa County Flood Control District reports:
            - 5.9 feet = “Bank Full”;
            - 8.6 feet = “Flood Stage”. *(note: culvert height is 8’ by design, now reduced to 7’ in areas due to sediment deposit)*
        - The rain gauge is triggered to begin recording channel flow at the 2-foot stage.
        - Anything flowing less than 2 feet will not be recorded, though water may be flowing.
        - There is no data reported for 2023, though we have observed channel flow, indicating we have yet to trigger the rain gauge as it has not elevated to the 2-foot stage to date.
- **Pooling of Water: Yes**
    - R and L sides of 48th St culvert
        - saturation from halfway point to outlet; worse R vs L sides; pooling evidence R side, worse at surface drain pipe outlet
            - increased
    - Channel L approximately 380 feet downstream from culvert outlet, running approximately 100 feet downstream; moist to saturated on today’s inspection
        - increased
- **Blocked or Restricted Culverts: Yes**
    - 1 foot of sediment build-up (sand) in 48th St culvert
        - increased
    - Storm sewer outlet (PVC pipe) R bank w blockages at or near 4910 E Siesta, approximately 300 feet downstream from culvert
        - increased
- **Erosion: Yes**
    - Development of R and L accessory channels, all portions of Pima
        - increased
    - Rills and undercutting along embankments, primarily in the first 600 feet of the wash length
        - increased
    - Scour at the E Hazel Dr retaining wall measuring 16”; scour at the Grade Control Structure, center and left, measuring 13” and 15” respectively; scour holes within channel at locations of sediment build-up, positive grade and obstruction in the form of vegetation; scour at terminal end where vegetation and rocks cause backflow
        - increased
- **Large Movement of Sediment: Yes**

    - Entire channel length; transportation of rock, gravel and sand; loose sand up to 5” deep throughout channel from culvert to Grade Control Structure; scour of sand within the Grade Control Structure leading to holes up to 15” deep; center island soil deposit built up to at least 23” as measured from floor of R accessory channel (location 190’ downstream from culvert outlet; running approximately 90’ downstream; unable to define height based off of L channel floor due to equipment limitations); loose, fine sand measuring from 1”-3” deep deposited from Grade Control Structure to terminal end. *(Note: depth of sand deposit for purposes of this assessment was measured to point of first resistance; a known accumulation of 2’ within the Grade Control Structure pre-dates this inspection assignment)*
        - Increased
- **Presence of Deteriorated Wash Health: Yes**
  (presence of deposited debris, vegetation overgrowth, presence of vegetation that causes choking or clogging of water flow, evidence of water diversion)
    - deposition of debris (much removed by volunteers over the past 2 months with recent assistance from landscape team)
    - vegetation overgrowth in the terminal end (volunteer trees/shrubs and invasive weeds); invasive weeds throughout channel and on embankments
    - water diversion:
        - Just downstream from culvert outlet, L channel w massive build-up of soils causing water flow toward R bank and hard into Hazel retaining wall
        - Just downstream from Hazel retaining wall, massive build-up of soils in R-center of channel causing splitting of water flow into L and R accessory channels, undercutting toe of embankments
        - Vegetation causing choking or clogging of water flow is limited in number, but great in impact; already forming an island that shunts water to L>R bank downstream of the Grade Control Structure
        - Significant to severe water diversion, worst in location of center island approximately 190’ downstream from 48th St culvert outlet
    - presence of garbage, including human feces, used disposable mask, bottle, cans, packaging from various products, citrus fruit, paper, dog feces

Pima Wash Grade - Function: 2
Pima Wash Grade - Health: 2

Mulligan Wash:

Evidence of

- **Flooding: No**
- **Pooling of Water: Yes**
    - Two locations, both with copious vegetation for assistance with absorption
- **Blocked or Restricted Culverts: Yes**
    - 48th St inlet restricted by vegetation and debris

    - Street drain on west side of 51st with leaves and garbage built up within the culvert
    - Street drain on east side of 51st with standing water
- **Erosion: Yes**
    - Surface erosion on embankments primarily in the area of the 47th Pl. cul-de-sac
- **Large Movement of Sediment: Yes**
    - Sliding of large rocks on the R embankment is evident, again in the area of 47th Pl. cul-de-sac; otherwise, unremarkable
- **Presence of Deteriorated Wash Health: Yes**
  (presence of deposited debris, vegetation overgrowth, presence of vegetation that causes choking or clogging of water flow, evidence of water diversion)
    - Multiple areas of vegetation overgrowth
    - Presence of garbage within the culvert running under 51st St; other areas clear

Mulligan Wash Grade - Function: 3
Mulligan Wash Grade - Health: 4

Questions to be answered:

1. **Has our system been able to adequately shed the rainwater this year?**
    - **Yes**:
        - The volume of water accumulated during individual rain events in 2023 has not been sufficient to overcome the ability of our conveyance systems to function adequately and no portion of the property has been in peril of major casualty due to channel flow.
    - **However:**
        - Debris and sediment has shifted downstream under the early rainfall conditions suggesting that greater flow volumes will do the same and these volumes have the potential to cause greater movement of matter that will threaten to dam portions of the conveyance system. Because of the width of their channels and culverts, this will be particularly noticeable in Winston and Desert washes, to a lesser degree in Mulligan. However, flow-related transportation of debris and sediment has potential to be most devastating in Pima where the majority of the rainwater runoff from South Mountain is directed, where the greatest amount of sediment deposit currently exists which causes deviation from the original hydrology, where the majority of soils are transported from South Mountain due to upstream soil conditions, and where significant amounts of soil is currently exposed and vulnerable to further erosion around structures such as retaining walls, trees, sidewalks, stairs and building foundations.
        - Observation through the surface grates and into the catch basins for the storm sewer system for roads and driveways through the Property reveals accumulation of debris and garbage, which is a condition that should be prevented as able, and addressed where present.

- Outlet pipes from the storm sewer system have been observed to be blocked, some partially and some completely, by debris. This condition should be prevented as able and addressed where present in order to prevent back up within the catch basins and overflow into roads and driveways.

2. **Has this rainfall caused additional erosion?**
   - **Yes**:
     - This is most notable in areas with exposed soil within all four major washes but is most noticeable in the channel and on the banks of Pima. By contrast, grassy areas show no measurable erosion.
3. **Are we prepared for Monsoon season?**
   - **No**:
     - Assuming long duration and/or high volume rains associated with Monsoon season, the Committee can foresee failures within our drainage system under current conditions.
       - Culvert restrictions, restrictions and blockages of our PVC storm sewer outlet pipes, debris accumulation in storm sewer catch basins, debris accumulation within wash channels which are vulnerable to transportation to snag points during channel flow, and the high number of snag points throughout our washes all pose high potential for damming of water threatening flooding of roadways, driveways, sidewalks, and, potentially, homes, as well as major loss of soils on embankments that are not protected by vegetation or by constructed protective barriers.
       - Areas already suffering from changes due to erosion are predicted to be made worse.
       - The Grade Control Structure in Pima is currently rendered ineffective by presence of sediment from years of accumulation, making downstream Pima vulnerable to the force of water flow. There is a high probability of water escaping Pima's banks and there is a high likelihood of water pooling at the Grade Control Structure resulting in a dangerous condition and a health hazard potential.
4. **What proposals can the committee present to the Board which could be realistically put into place prior to Monsoon season?**
   - **Winston Wash**
     a. Clean out culverts, particularly the PVC pipes running under the earthen footbridge at the E Winston cul-de-sac
     b. Protect the mortared rock support structure on the downstream side of the footbridge, upper portion
        - Sandbags would be temporary stopgap option
   - **Desert Wash**
     a. Clean out culverts
     b. Relocate irrigation line at 48th St culvert inlet to remove snag
     c. Remove fallen branch R bank, mid portion

    d. Remove/cut back Fountain Grass, beginning w those in center of channel, in mid portion near 47th St
    e. Remove debris from snags and areas near culverts
- **Pima Wash**
    a. Obtain Engineering design for Pima remediation to provide actual numbers for budgeting purposes
    b. Remove channel vegetation that is causing water diversion
    c. Protect R bank, upper portion, and retaining wall at Hazel
        - Sandbags would be temporary stopgap option
    d. Encourage residents to become involved in the WDC experiment for dispersing water from scuppers that flow onto embankments to prevent splash and rill erosions
    e. Remove debris (predict it would be 40-50 man hours of work)
    f. Remove blockages from PVC storm sewer drain pipes for improved surface runoff
    g. Use available rock to place at storm sewer pipe outlets where no protection exists against erosion
- **Mulligan Wash**
    a. Remove vegetation causing snags and restrictions of channel flow and culvert access
    b. Remove dead branches laying along the channel banks
    c. Remove garbage and debris from catch basins of storm sewer system
- **Streets, Driveways, Parking Areas**
    a. Clean debris from surfaces
    b. Ensure inlets are clear of debris
- **Communication - some suggestions below:**
    a. Ensure the Board and Management have a policy/procedure for reporting to Management any measures to proactively address potential threats to the function of the drainage system prior to the onset of Monsoon rainfall and to report emergencies as they present themselves during the season.
    b. Publish to the community the procedure for reporting preventive maintenance requests and emergency flood-related conditions related to the drainage system on the Property.
    c. Communicate what constitutes an “emergency report” regarding Monsoon season water accumulation
    d. Get ahead of the situation by using FSR to email all community members some educational materials - “what you can do” and “what to look out for”:
        - Volunteer your time to prepare driveways, particularly those that tend to shed small-sized asphalt particles, by clearing them of debris that might be transported to drain inlets and cause clogging that results in flooding.
        - Volunteer your time to help clear our washes of accumulated debris such as dead leaves, dead grasses, twigs and branches, then communicate to Management what areas you have cleared so that they can arrange for removal of bags containing the debris. *(The City of Phoenix has a tool-lending program to assist*

neighborhoods with volunteer clean-up days. Information can be located at: https://www.phoenix.gov/nsd/programs/cleanups-and-tool-lending)

- Report to management any larger issues you may observe, noting the location as specifically as possible, such as fallen tree limbs, fractured tree limbs that may fall and cause damage, etc. You may use your Wash and Drainage Committee members to help you assess the location if needed.
- Help increase the eyes of management. If you see a clogged drain pipe that is meant to move water off of streets, driveways or parking areas, please send a report. Small storms, wind and Mother Nature can drop leaves from trees at a rate faster than the clean-up schedule. Having the residents help spot and report areas of need will help protect the entire community.
- If you live in a residence that you know is prone to flooding, please ensure you have a plan in place to prevent water building up within your residence in the event that this Monsoon season brings us historic rainfall.
- Before the rains come, take note of the location of surface drains in your immediate area. Once rains do come, if you see water accumulating in roads, driveways or parking areas there is a good chance that the drain inlet has unknowingly become covered by leaves or garbage. If you are comfortable doing so, you can help by using a pole, a rake or a squeegee to gently scrape in the area of the drain to free the debris and allow water to flow. If water still does not flow, please report immediately to Management for a more thorough assessment of the cause.

Emergency Preparedness and Response Suggestions:

- Sandbag preparation:
  - Volunteers can fill sandbags from the free and available sand accumulation in Pima Wash and those filled bags can be made available in emergency situations within the community.
- Sandbag Storage:
  - The sandbags can be stored in a Common Area or multiple Common Areas as agreed upon by the Board
- Sandbag Access and Utilization:
  - Volunteers can sign up for a phone or text “tree” where neighbors can access the “tree” to ask for help from neighbors to access, transport and place sandbags when they are in an emergency situation.
  - Once the emergency has passed, the same method can be used to return the sandbags to their storage location.
- Drain Clearing:
  - Knowing that not all residents have tools at their disposal, each area of the community (an address-specific zone system) can identify who has appropriate tools and who would be willing to assist with drain clearance in emergency

situations (ie removal of surface debris likely clogging a screen covering a drain inlet/catch basin inlet). Each zone can establish their method of contacting each other in these situations.