

**OPERATIONS AND MAINTENANCE PLAN
FOR
FLOOD CONTROL STRUCTURES
RED VALLEY RANCH
CITY OF MARICOPA, ARIZONA**

August 2, 2013

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APPROVED BY CITY OF MARICOPA

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Date

Print Name

Title/Position

CVL Job Number: 01-0231201

1.0 PURPOSE:

The purpose of this document is to serve as a guideline for the inspection and maintenance of the Flood Control Structures Interior to the Red Valley Ranch development. This Operations and Maintenance Plan shall apply to the channels, and culverts located within the Red Valley Ranch development that is within the City of Maricopa, Pinal County, Arizona, as more particularly described on Exhibit A. Capitalized terms not otherwise defined herein shall have the meaning set forth in that certain Agreement between the City of Maricopa and Crescent dated _____, 20__, to which this document is attached as an exhibit.

This Operations and Maintenance Plan establishes the formal procedures that will ensure the stability, and overall integrity of the Flood Control Structures and that its associated structures and systems will be maintained. This plan specifies the maintenance activities to be performed, the frequency of their performance, and the entity responsible for their performance. The Flood Control Structures must be maintained in accordance with this officially-adopted plan.

2.0 LOCATION:

The project, Red Valley Ranch (site), is a future residential site and will consist of various family houses, drainage facilities, local streets and open spaces. The site is irregular in shape, consisting of approximately 157 acres. The site is currently bare desert and drains toward the west and northwest. The site is surrounded by both residential development and farm land, as more particularly described in Figure 1 and Figure 2.

The site is located within the limits of the City of Maricopa, Arizona, in Pinal County. Furthermore, the site is bounded by Farrell Road on the north, residential development on the south, Anderson Road on the east, and East Main Irrigation Canal on the west. The site is located in a portion of Section 3, Township 5 South, Range 4 East of the Gila and Salt River Base and Meridian, Pinal County, Arizona.

3.0 OWNERSHIP:

The current owner of the Flood Control Structures is Crescent Bay Holdings Land Fund 1, LLC (“Crescent”). All maintenance activities will be the responsibility of Crescent and the future Red Valley Ranch Home Owner Association. The channels are located along the eastern, western, and northern boundaries of the site and culverts along the north boundary and northwest corner of the site.

The City of Maricopa and Pinal County have ultimate responsibility for public safety, and for the maintenance of public rights-of-way. As a member of the National Flood Insurance Program (NFIP), the City of Maricopa (City) has assumed ultimate responsibility for the maintenance of the Flood Control Structures. The City will have the right, without notice, to enter the Flood Control Structures to inspect and make repairs, should it be deemed necessary to protect the public or public facilities. Should Crescent and the future Red Valley Ranch Home Owner Association default

in the inspection, maintenance and restoration of the Flood Control Structures, the City will assume responsibility for maintenance of the Flood Control Structures and shall draw funds from a posted bond, provided, however, if the bond is insufficient to cover the costs of such inspection, maintenance or restoration, such costs shall be charged to Crescent and the future Red Valley Ranch Home Owner Association who shall cover such costs within thirty (30) days after receipt of notice from the City outlining such costs.

3.1 FIELD INSPECTOR QUALIFICATIONS

The inspector reviewing and signing off on the channel inspection should be a registered civil engineer licensed in the State of Arizona. Field inspection, photography, field surveys and monitoring should be performed by the qualified inspector or under his/her direct supervision.

4.0 RED VALLEY RANCH CLOMR SOLUTION:

The proposed Flood Control Structures, structural improvements, are shown on the Red Valley Ranch Proposed Development plans.

4.1. Description

The proposed Red Valley Ranch development is located within the existing FEMA designated Flood Zone 'A', with no base flood elevations determined, and FEMA designated Flood Zone "X" Shaded is also used to designate base floodplains of lesser hazards, such as areas protected by levees from 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile. The requested floodplain revision is based on the proposed structural improvements within the site. The proposed channel is designed to intercept water at the east boundary of the site, along Anderson Road. The channel will route off-site flow along the eastern boundary to a channel along the northern boundary of the site. The proposed channel along the western boundary is designed to intercept water from the south boundary and on-site flows. The off-site and on-site flows will course within the channel banks to a box culvert in the northwest corner of the site, where it will return to its historical flow path. The channel has an approximate length of 5564 feet, with an average slope of 0.20%. There are two culverts located along the channel, one on the north channel to allow vehicle access to the site from Farrell Road, and the second is located in the northwest corner of the site for the site out flow.

4.2 Survey Monuments

Refer to the Topographic Data And Drainage Map for Red Valley Ranch included in the Conditional Letter of Map Revision Request.

5.0 MAINTENANCE TOPICS:

5.1. Erosion Control and Local Drainage

Different magnitudes of erosion may occur along the embankment:

- a) Riling, or small channels forming vertically along the channel, is caused by local runoff from the roadway and landscaping, and does not affect the function or integrity of the channel.
- b) In the event that rips occur in the geotextile fabric of the channel an engineer employed by Crescent or the future Red Valley Ranch Home Owner Association will issue a repair procedure letter. A letter to be sealed and signed by the engineer will detail a repair procedure if so deemed by the engineer. The letter will reference best practices and make every effort to document where this is an accepted practice.

5.2. Benchmark and Grade Control

- a) As indicated on the plans for the channel, a benchmark has been set and survey monuments have been set at three locations around site.
- b) An elevation survey should be conducted every five years by a Registered Land Surveyor, contracted by Crescent or the future Red Valley Ranch Home Owner Association. Spot elevations at the monuments located on the top of the channel should be compared to the as-built plan elevations.
- c) The areas of the channel between the monuments should be visually inspected on an annual basis for evidence of settling, and additional elevation survey shots should be taken at any such spots.

5.3. Vegetation Maintenance and Control

The channels flowing to the north and west, parallel to Anderson Road, Farrell Road and East Main Irrigation Canal. The vegetative cover should be maintained to reduce erosion during flood events, while maintaining plant size control in order to avoid root damage.

5.4. Embankment Integrity

The embankment should be monitored and address cracking of embankments to mitigate piping through the embankment or foundation, or slope instability.

5.5. Erosion

- a) Areas should be monitored for the development of erosion or undercutting of the flood control structures.
- b) In the event that erosion or undercutting of the flood control structures, an engineer employed by Crescent or the future Red Valley Ranch Home Owner Association will issue a repair procedure letter. The letter to be sealed and signed by the engineer will detail a repair procedure, if so deemed by the engineer. The letter will reference best practices and make every effort to document where this is an accepted practice.

5.6. Sediment Build Up

The depth of sediment deposition in the base of the channel should be monitored. The channel has been designed outlet to the northwest through a culvert crossing Farrell Road. Based on the design, any sediment should be removed from the channels, including the box culverts, after a major storm event. If sediment is allowed to build up in the channels, the channels could overflow back onto the site. If sediment is allowed to build up in the outlet culvert water could overtop Farrell Road.

5.7. Rodent and Insect Control

Rodents and insects may affect the integrity or function of the channel. During the visual examination, signs of activity should be looked for. A pest control service should be contacted if necessary.

5.8. Structural Integrity

The condition of the box culverts should be monitored for signs of distress, sulfate attack, cracking, differential settlement, tilting, surface water ponding near the foundations, or unauthorized modifications. Close inspection of the geotextile fabric side slopes may reveal ripping and concrete structures may reveal cracking. Rips should be repaired to ensure proper erosion control. Cracks should be repaired to avoid further piping and additional concrete damage. Inspection and repair of expansion joints must also be performed for these same reasons.

6.0 SUMMARY OF MAINTENANCE RESPONSIBILITIES:

- 6.1. Stability check; visual inspection: to occur **Annually** by a **Professional Civil Engineer** contracted by Crescent or the future Red Valley Ranch Home Owner Association. All maintenance topics listed above in Section 5.0 should be inspected annually.**
- 6.2. Height check; elevation survey: to occur at **Five-Year intervals** by a **Professional Civil engineer** contracted by Crescent or the future Red Valley Ranch Home Owner Association or a **Registered Land Surveyor** contracted by Crescent or the future Red Valley Ranch Home Owner Association
Maintenance topic 5.2, Benchmark and Grade Control should be inspected and measured at five-year intervals.**
- 6.3 Overall integrity check; visual inspections: to occur **Annually** by the **City of Maricopa Floodplain Administrator**. All maintenance topics listed above in Section 5.0 should be inspected visually annually.**
- 6.4 Joint Inspection: The City and Crescent or the future Red Valley Ranch Home Owner Association shall use their best efforts to jointly conduct the inspections required pursuant to this Section 6.0.**

7.0 INSPECTIONS:

It is the responsibility of Crescent and the future Red Valley Ranch Home Owner Association to provide inspections and maintenance. The City of Maricopa and Pinal County have the right to gain access to maintain the Flood Control Structures if needed. If there are any questions arising from these inspections, a registered civil engineer should be consulted for advice. Crescent or the future Red Valley Ranch Home Owner Association shall contract with a registered civil engineer for the inspection of the embankment, and a licensed contractor for any repairs. The following inspections shall be conducted:

7.1. Annual Operational Inspections

Annual inspections are designed to provide insight to the Flood Control Structure's current condition of operability. These inspections are intended to evaluate how the channel, transition zones, and upstream of culverts, have changed from their original as-built condition. These inspections should be performed mid-year after high spring flows have subsided. Annual inspection records should be kept and maintained by Crescent and the future Red Valley Ranch Home Owner Association. It is recommended that an effort be made for the City of Maricopa and the contracted Professional Civil engineer do joint inspections whenever possible.

7.2. Major Storm Event

For this project, a *major storm event* is defined as the channel having a flow depth of 3 feet or more. Post-storm inspections should be performed as soon as possible after flood conditions have subsided. Although the Flood Control Structures are designed for 100-year flow conditions, they are still susceptible to damage during other flow conditions. Post-storm inspection records should be kept and maintained by Crescent and the future Red Valley Ranch Home Owner Association. Listed below are key elements to be inspected after storm flows have subsided:

- Vegetation: high flow erosion damage.
- Earthen fill: slope and bank protection integrity, and seepage through embankment face.
- Box Culverts: clogging of culverts to ensure free flowing conditions.
- Embankment crests: in event of overtopping, check that concentrated flow areas do not develop.
- Erosion: monitor the improvements for indications of erosion. At the turning points, the entire internal curve part on both sides has to be checked for erosion.
- Sediment build up: monitor the depth of sediment deposition in the base of the channel.

7.3. Citizen Complaints and Inquiries Relative to the Flood Control Structures

- a) Investigate area of complaint.
- b) Respond to citizen within 48 hours.

- c) Take action if the problem lies within Crescents or the future Red Valley Ranch Home Owner Association's responsibility, or refer to proper agency.

7.4. Field Inspection Reports

A field inspection report, pursuant to Sections 7.1 and 7.2, shall be completed and submitted to the City within fifteen (15) days from the time that an inspection within the subject area has been performed.

Field inspection reports shall include:

- (1) A description of the current condition, or conditions, of the erosion control walls, box culverts, embankments, and side slopes for the entire length of the improvements. Especially note areas where erosion is, or will likely become, a problem.
- (2) A description of the existing vegetation, if any, and the loss of any vegetation, together with comments and/or recommendations regarding the need for the addition and/or removal of any vegetation which may impede the flow within the channel, or which may need to be replaced for erosion control.
- (3) Comments and/or notes, with photographs if necessary, of any damage to any culverts, irrigation pipes, utilities, etc.
- (4) Recommendations for remedial actions which are necessary for the preservation of the channel, embankments, or culverts in order to serve its designated function.
- (5) Inspect, and include comments in the report, with regard to any existing utilities in, or adjacent to the channel, which may have been impacted by the storm event.
- (6) Inspect for sediment, silt, debris, trash, or deleterious material. Where depths of sedimentation exceed depths specified in Section 5.6, debris causes flow restrictions, or trash has accumulated, removal shall be required.