

**MEMORANDUM**

To: David Krizek  
From: Brent A. Bartz, P.E.  
Date: July 9, 2012  
Subject: Rosemont Copper T-Intersection Project; SR 83  
Drainage Improvements Analysis  
Psomas Job Number 7ROS110101

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This Drainage Memorandum is provided in conjunction with the Rosemont Copper Company (Rosemont) encroachment permit application for the T-Intersection project proposed between milepost (MP) 46.63 and MP 47.14 along State Route 83 (SR 83); approximately 30 miles southeast of Tucson, Arizona in Pima County. The T-Intersection project shall provide a permanent access turnout at MP 46.83 (station 175+00.00). The permanent access turnout will match a primary access road for the Rosemont Copper mining and mineral processing operation located on the east side of the Santa Rita Mountains. The purpose of this memorandum is to discuss how the roadway and drainage improvements for the T-Intersection project will not affect the existing drainage conditions present along SR 83.

According to the 1956 as-built plans S-249(1), and an as-built survey performed in August 2011, there is one drainage structure located within the project limits. There is a 24-in x 60-ft corrugated metal pipe (CMP) located at MP 47.06 (station 186+99.06) that would at a minimum need to be extended. The as-built survey indicates that the slope of the existing pipe is approximately 0.0750 feet per foot from west to east and there is no erosion control protection present at the inlet or the outlet. The pipe captures flow within a roadway cut ditch along with some localized off-site sheet flow on the west side of SR 83. The pipe transports the water west to east under SR 83 as it outlets to a spread, sheet flow condition.

A review of the cross section at the pipe location (see Detail D2 of the project plans) suggests minimal cover with the existing roadway near the pipe inlet (west side of the roadway). The cross section shows that if the pipe were simply extended, the inlet extension would encroach within the proposed widening of SR 83. At the pipe outlet, the east side of the roadway, an extension would require a grade break and an increased slope greater than 0.1000 feet per foot which

would not be desired. Both the encroachment and undesired grade break and slope indicate that replacing the pipe is a better alternative than extending.

Therefore, the existing pipe will be replaced in kind as shown in Detail D2 of the project plans. The new pipe will be a single 24" CMP and will be 115 feet in length. The new pipe will be lowered by approximately 2 feet and will maintain the same slope as the existing pipe. The pipe inlet will match the new cut ditch with a graded inlet to better capture the flow in the ditch along with local off-site sheet flow. The inlet will utilize a metal safety end section per an ADOT provided detail sheet (see Detail A of the project plans). The lowered pipe inlet results in an increased pipe capacity prior to roadway overtopping due to an increase in the available headwater depth. The existing outlet conditions is sheet flow, as can be deduced from aerial topography, and no existing erosion protection has been provided. A new riprap splash pad will be constructed at the pipe outlet and will extend to the edge of road R/W to provide erosion control protection. The outlet will utilize an ADOT standard metal end section (see ADOT Standard Detail C-13.25).

The existing Davidson Ranch turnout is on the on the east side of SR 83 at MP 46.95 (station 181+30.00, Rt). Currently, there are no drainage provisions for the existing Davidson Ranch Road turnout and the existing SR 83 roadside drainage ditch. The topography seems to indicate that any runoff outside the roadside ditch sheet flows across the existing graded road and is collected in a small drainageway beyond the existing right-of-way. Improvements to SR 83 will provide a more defined roadside cut ditch along the east side of the roadway that will necessitate a new drainage pipe under the improvements to Davidson Ranch Road (see Detail D and D1 of the project plans). As shown on Detail D1 of the project plans, the new pipe will be a single 24" CMP and will be 82 feet in length. The new pipe will direct drainage from the new cut ditch under the Davidson Ranch Road improvements and outlet to an existing drainageway outside the newly constructed fill slopes. The pipe will have a mild slope of 0.0195 feet per foot from south to north and will utilize ADOT standard end sections (see ADOT Standard Detail C-13.25) at both the inlet and outlet. A riprap splash pad will also be constructed at the outlet in order to provide erosion control protection.

In conclusion, the improvements do not result in a significant change to the watershed contributing runoff to the cross culvert under SR 83. Minimal changes to the peak discharge, if any, would occur and water surface elevations would be lowered depending on the storm event. Also, the improvements with the Davidson Ranch Road will provide all-weather access without a significant change to the present conditions that occur. Therefore, in our estimation the improvements at both SR 83 and Davidson Ranch Road do not adversely affect the existing drainage conditions but will improve upon what is there presently.