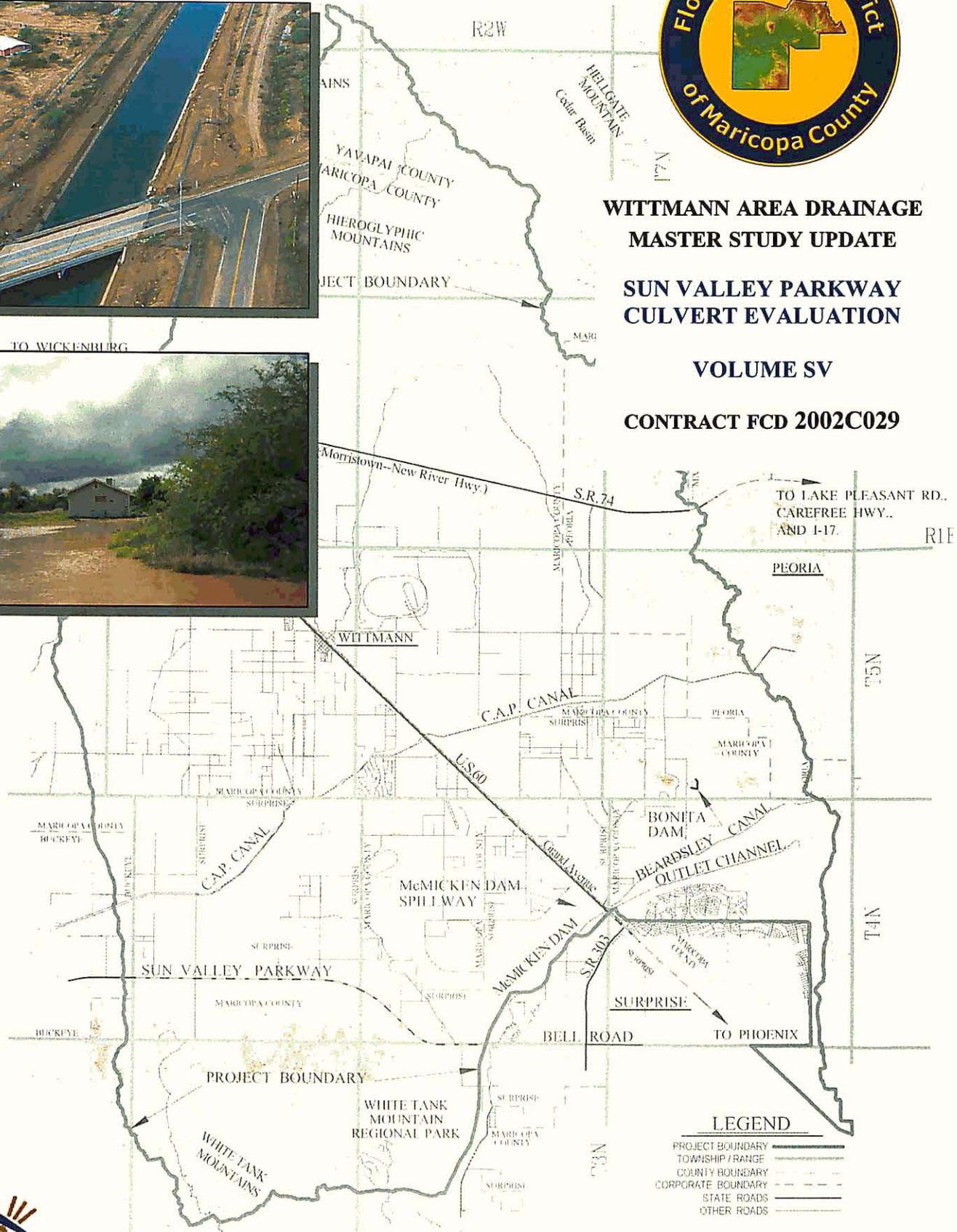




**WITTMANN AREA DRAINAGE  
MASTER STUDY UPDATE  
SUN VALLEY PARKWAY  
CULVERT EVALUATION  
VOLUME SV  
CONTRACT FCD 2002C029**



**LEGEND**

PROJECT BOUNDARY	—————
TOWNSHIP / RANGE	—————
COUNTY BOUNDARY	—————
CORPORATE BOUNDARY	—————
STATE ROADS	—————
OTHER ROADS	—————

**WITTMANN AREA DRAINAGE MASTER STUDY UPDATE**

**CONTRACT 2002C029**

<u>VOLUME NAME</u>	<u>VOLUME ID</u>
EXISTING CONDITIONS ANALYSIS (PART I).....	EC
ADMSU HYDROLOGY .....	HY
MCMICKEN DAM HYDROLOGY.....	MD
FLOODPLAIN DELINEATION .....	HD
ALTERNATIVES IDENTIFICATION (PART II).....	AI
ALTERNATIVE ANALYSIS MCMICKEN DAM.....	MA
RULES OF DEVELOPMENT (PART III).....	RD
REPORT OF SURVEY .....	SR
GEOMORPHOLOGY REPORT.....	GR
SUBSIDENCE REPORT .....	SU
ADMINISTRATIVE REPORT.....	AR
SUN VALLEY PARKWAY CULVERT EVALUATION.....	SV

*Note: Volume ID will be used for Section, Plate, Figure, and Table Identifiers.*



**WITTMANN AREA DRAINAGE  
MASTER STUDY UPDATE**

**SUN VALLEY PARKWAY  
CULVERT EVALUATION**

**VOLUME SV**

**Contract FCD 2002C029**

**March 2005**

*Prepared by:*



*Intelligent Engineering  
Environmental Solutions*



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*In association with:*



**Wittmann Area Drainage Master Study Update  
FCD 2002C029**

**TABLE OF CONTENTS**

**SUN VALLEY PARKWAY CULVERT EVALUATION (VOLUME SV)**

**SECTION SV-1: INTRODUCTION..... 1-1**

**SECTION SV-2: PROCEDURES ..... 2-1**

    2.1 Data Collection ..... 2-1

    2.2 Field Investigations ..... 2-1

    2.3 Data Organization ..... 2-2

    2.4 Data Analysis ..... 2-2

        2.4.1 Categories ..... 2-2

        2.4.2 Recommended Remediation ..... 2-3

            2.4.2.1 Upstream Sedimentation ..... 2-3

            2.4.2.2 Downstream Headcutting ..... 2-8

            2.4.2.3 Culvert Vegetation and Man-Made Obstacles ..... 2-13

**SECTION SV-3: CONCLUSION..... 3-1**

**APPENDIX A. REFERENCES ..... A-1**

**APPENDIX B. FIELD NOTES ..... B-1**

**APPENDIX C. CULVERT SPREADSHEET ..... C-1**

**APPENDIX D. PHOTOGRAPHS ..... D-1**

**APPENDIX E. DIGITAL FILES ..... E-1**

**LIST OF FIGURES**

Figure SV-2.1	Upstream Sedimentation Problem
Figure SV-2.2	Upstream Sedimentation Fix
Figure SV-2.3A	Downstream Headcutting Problems
Figure SV-2.3B	Downstream Headcutting Problems
Figure SV-2.4	Baffle Outlet
Figure SV-2.5	Gabion Basket

**WITTMANN AREA DRAINAGE MASTER STUDY UPDATE  
CONTRACT FCD 2002C029  
SUN VALLEY PARKWAY CULVERT EVALUATION  
(VOLUME SV)**

**SECTION SV-1: INTRODUCTION**

The Maricopa County Department of Transportation (MCDOT) requested assistance from the Flood Control District of Maricopa County (District) to analyze and make recommendation, on the culverts along the Sun Valley Parkway located in the Wittmann Area Drainage Master Study Update (ADMSU) and Buckeye/Sun Valley ADMS study areas. The purpose of this evaluation was to identify the existing condition of the structures maintained by MCDOT, to identify any potential erosion or sedimentation problems that may exist, and recommend general solutions to remedy any deficiencies of the culverts. This evaluation was added to the Wittmann ADMSU scope since Entellus is familiar with the area and could provide an economical, timely review of the culverts prior to any work being done on the Parkway.

The section of the Sun Valley Parkway from Interstate 10 to McMicken Dam was designed in 1987 and built in 1989 and crosses various washes along the approximate 29-mile stretch. The drainage structures on the west portion of the parkway drain to the Hassayampa River, while the majority of the culverts on the northern stretch of road drain to McMicken Dam. MCDOT is currently responsible for the maintenance of all the structures.

In *MCDOT 2001 State of the System Report (Reference 1)*, MCDOT identified most of the culverts along the Sun Valley Parkway as structures in need of close tracking. During the following inspection cycle (2 years) in the publication *MCDOT 2003 State of the System Report (Reference 2)*, MCDOT identified the continual degradation of the culverts along the Sun Valley Parkway, and the need for ongoing monitoring.

## SECTION SV-2: PROCEDURES

### 2.1 Data Collection

Several items were collected as part of the data collection including the following:

- A shape file provided by PBS&J containing all the drainage structures within the Buckeye/Sun Valley ADMS from I-10 to structure #990150.
- A shape file from MCDOT containing all the bridge inspection structures and several MCDOT Bridge Inventory Excel spreadsheets containing bridge inspection data, sufficiency ratings, and other miscellaneous information. These are included on the CD in **Appendix E** of this report.
- As-builts for the portion of the Sun Valley Parkway contained within the study limits of the Wittmann ADMSU that was used for the Hydrology Volume, from which Entellus, Inc. generated a shape file.
- Color aerial photography (December 2003) for the study area furnished by the District.

### 2.2 Field Investigations

Field investigations were performed for each MCDOT box culvert along the Sun Valley Parkway from Structure #7645, (0.7 miles north of McDowell Road) to Structure #7705 (24.2 miles north of McDowell Road at approximately 203<sup>rd</sup> Avenue). In addition, selected pipe culverts were investigated. Three separate field trips were taken to photograph and investigate the culverts. Copies of the field notes are found in **Appendix B**. Particular attention during the field investigation was paid to the following items:

- I. Vegetation and debris in the wash

2. Sedimentation upstream and downstream
3. Headcutting and erosion upstream and downstream

Select photographs on both the upstream and downstream ends of the culverts are in **Appendix D**. All photographs are contained in digital format on the interactive CD (**Appendix E**) included with this report.

## 2.3 Data Organization

Upon completion of the data collection and field investigation, the data was categorized and organized. The condition of each of the three criteria (vegetation, sedimentation and headcutting) was evaluated for both the upstream and downstream portions of each culvert and assembled into the spreadsheet found in **Appendix C**. Each culvert was rated based on each of the three criteria using a 1 to 4 scale based on the severity of the problem.

1. No Apparent Problem (Structure is in good condition)
2. Minor Problem (Problem unlikely to create significant damage)
3. Significant Problem (Problem appears to be getting worse and may eventually jeopardize structural integrity)
4. Serious Problem (If problem is not resolved, will, in near future, jeopardize structural integrity)

A problem is defined as being anything that might jeopardize the integrity of the culvert or surrounding structures (maintenance fence, etc.). Additionally, any other observations or comments regarding each culvert were added to the spreadsheet.

## 2.4 Data Analysis

### 2.4.1 Categories

Once the severity of the vegetation, sedimentation, and erosion was recorded in spreadsheet form, each culvert was classified from 'A' to 'D' based on the following criteria:

Unlikely to Develop a Problem (Category A)

Potential for Developing a Problem	(Category B)
Evidence of a Problem	(Category C)
Significant Problem Requiring Immediate Action	(Category D)

The conversion from the three-criterion problem severity rating category was performed based on the perceived urgency and extent of the associated problem(s). This was done in order to group the culverts based on the urgency of maintenance or repair. This is different from the severity of the associated problem(s). As an example, downstream headcutting of 2 feet is not very severe, but if that headcutting occurs at the culverts downstream face it becomes an urgent issue that requires immediate attention. However, downstream headcutting of 8 feet is severe, but if the headcutting occurs 200 feet downstream of the culvert the problem is not urgent and does not require immediate attention.

Of the 103 culverts, eight (8) have severe problems and require immediate attention (Category D); 27 have evidence of problems developing (Category C); 41 appear to be in good condition but can potentially develop a problem in the near future (Category B); and the remaining 41 are in good condition and do not appear as though they may develop a problem in the near future (Category A).

#### 2.4.2 Recommended Remediation

The three major problems associated with the culverts along the Sun Valley Parkway are upstream sedimentation, downstream headcutting, and culvert obstacles.

##### 2.4.2.1 Upstream Sedimentation

Severe sedimentation occurs in six (6) culverts along the Sun Valley Parkway, and some sedimentation occurred in 31 additional culverts. Culvert #7705 had the most severe sedimentation problem attributed to its proximity to the White Tank Mountains,

which provide the upstream watercourse with larger and more angular sediment. The downstream end of the culvert shows minor sediment accumulation, but the upstream end of the culvert for two of the three barrels is completely blocked. The remaining barrel is relatively sediment free. As shown in **Figure SV-2.1**, the upstream end of the culvert appears to have been designed below grade, while the downstream end was designed to be at grade. The wash seems to be reacting to this and attempting to re-stabilize its equilibrium slope, thus the heavy sediment at the upstream end, but minimal at the downstream end. This sediment tends to interlock and stabilize at a steeper grade than a less angular sediment load.

A possible solution for the general sedimentation problem might be to direct all low flows to only one of the barrels and make the other barrels available only for larger flows. Limiting the low flows to one barrel will increase the velocity through the culvert and decrease the potential for sediment deposition. This basically mimics the current balance condition for low flows (sediment obstructing unused barrels), but maintains the other barrels free of sediment and available to convey larger flows. To accomplish this, a berm could be constructed that would force all flow below a specified elevation to a single barrel. Once that elevation was exceeded, flow would overtop the berm and flow into the other barrel(s).

Some sedimentation would build up over time in the high flow barrels due to more significant flows that would overtopped the berm; however, most of the larger particles are carried along the bottom of the wash and are less likely to be carried by flow over the berm. Once a larger flow occurs, the smaller grain size deposits would be flushed by the flow. A typical configuration, with relative dimensions, can be seen in **Figure SV-2.2**. Possible

structures that this remedy might be applied to are those with a rating category of 'C' or 'D', specifically Cculverts 7646, 7647, 7649, 7650, 7663, 7705, and any others that might exhibit severe sedimentation problems in the future.

Another option is to construct sedimentation basins at the upstream side to remove the sediment before it enters the culvert. The use of sedimentation basins needs to be carefully evaluated because they tend to have significant effects on watercourse dynamics and can potentially cause more problems than they solve. Isolating a watercourse from its sediment source often means increasing erosion downstream, in particular, if the sediment source generates an armouring layer (layer of significant size and configuration to create stream bed equilibrium). A thorough analysis should be conducted if sedimentation basins are considered.

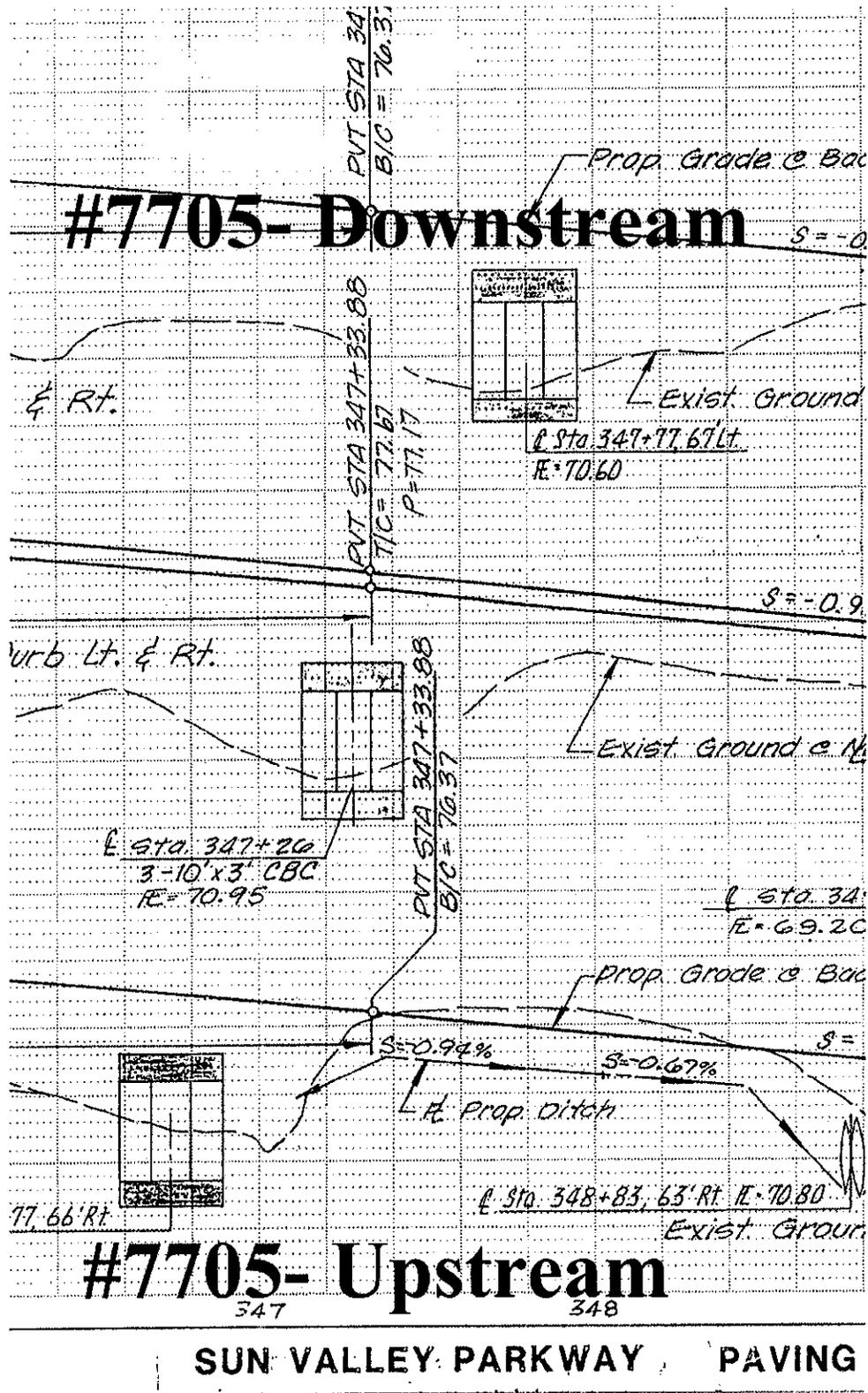
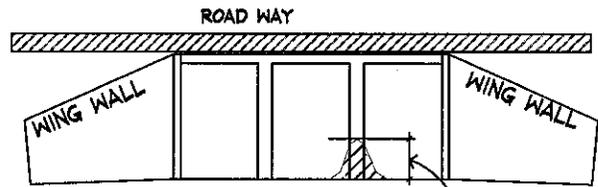
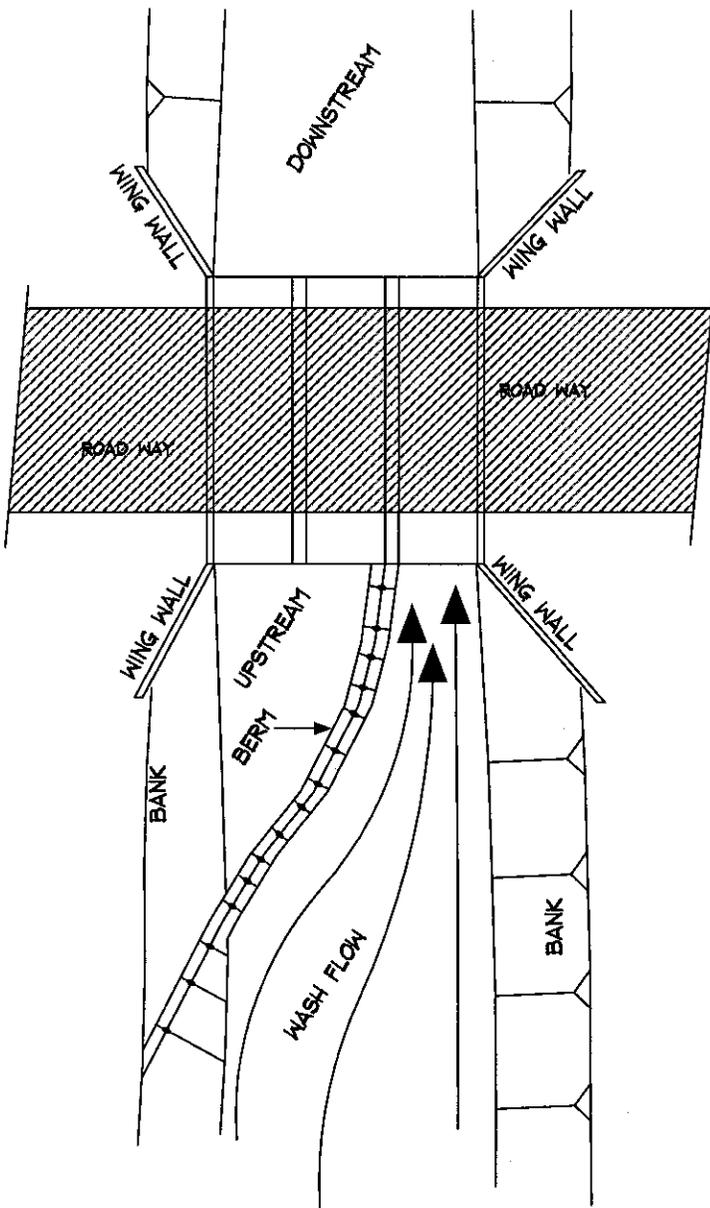


Figure SV-2.1



BERM HEIGHT APPROX. 1/3 OF TOTAL CULVERT HGT. CONSTRUCTED OF GROUTED RIPRAP.

NOTE:  
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FIGURE SV-2.2  
UPSTREAM SEDIMENTATION FIX

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#### 2.4.2.2 Downstream Headcutting

Downstream headcutting appears to start at some point downstream and work its way upstream until it is stopped by an immovable object such as the riprap at the downstream end of a culvert. There appears to be a very distinct group of culverts with severe headcutting affecting all 24 structures between Structure 7664 and 7675, which is just south of Wagner Wash. Upon review of the 2003 color aerial photography, there appears to be a man-made operation occurring at the edge of the Hassayampa River at the downstream-most portion of the affected culverts. This operation might be adversely affecting the headcutting conditions of the culverts in question. The locations of affected culverts, as well as the man-made operation, are enclosed in red in **Figure SV-2.3A**, and a zoomed aerial view of the man-made operation is shown in Figure SV-2.3B.

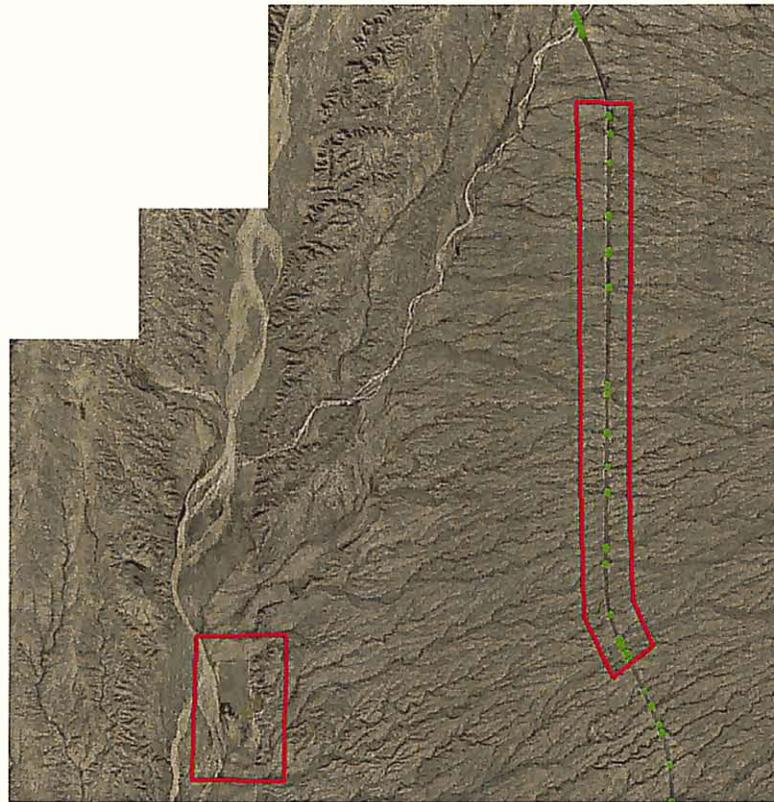


Figure SV-2.3A



**Figure SV-2.3B**

There are two recommended solutions for downstream headcutting:

1. Installation of a baffle outlet
2. Installation of tie gabion baskets

The first is recommended in general for culverts where the downstream headcut is greater than four (4) feet. There are five

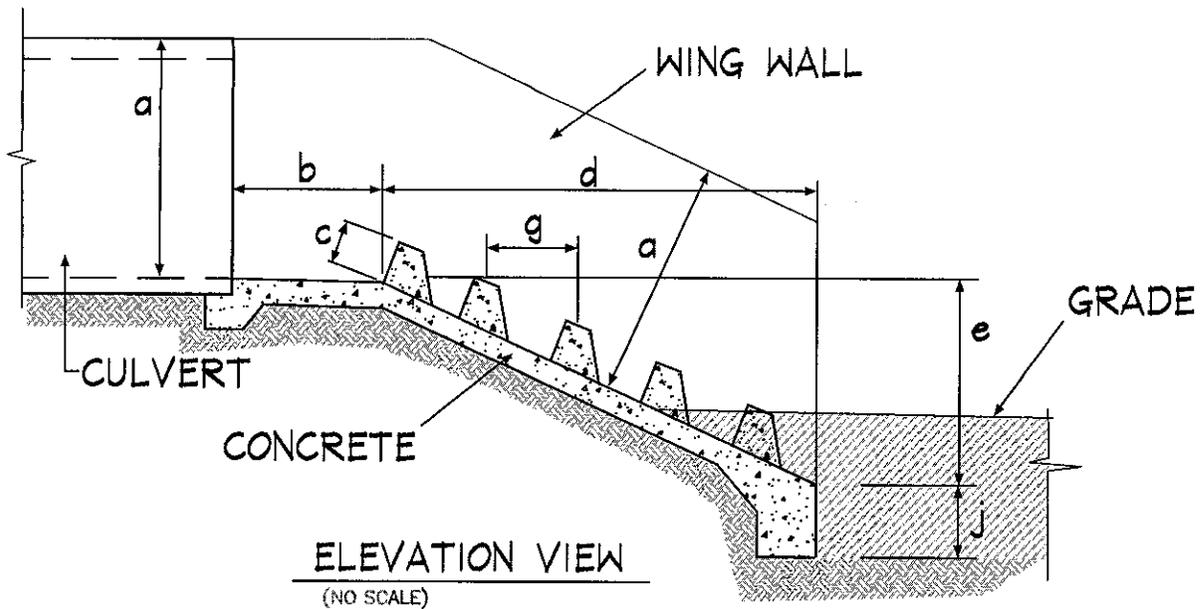
structures that currently fall into this category: 7667, 7668, 7673, 990148, and 990149.

The second recommendation is for culverts where the downstream headcut is four feet or less. There are 18 structures that currently fall into this category: 39A, 7647, 7654, 7656, 7664, 7665, 7666, 7669, 7670, 7671, 7674, 7675, 7676, 7677, 7685, 990140, 990141, and 990189.

An exception to the less than four feet of headcut is Structure #7685. There was greater than six feet of headcut in the downstream portion of the channel, but because of the amount of grouted riprap that is already in place, a gabion basket was recommended.

A typical layout and range of dimensions for the baffle outlets is shown in **Figure SV-2.4**. Also, a typical layout and dimensions for the gabion baskets are shown in **Figure SV-2.5**.

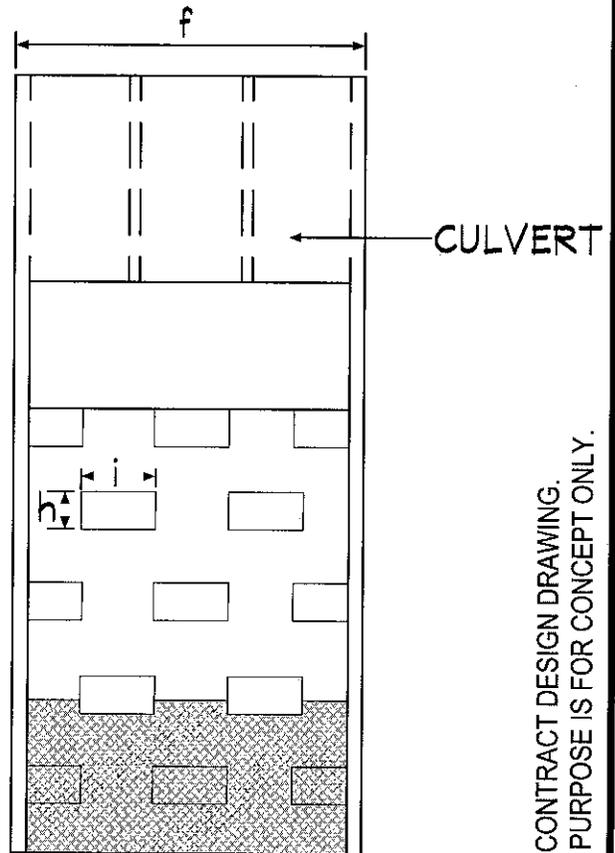
Downcutting is usually a response of the watercourse to changing conditions. The condition may be a change of grade downstream, an increase of typical flows, a decrease sediment load, or others. It is expected that, as the area upstream and downstream of the parkway is developed, the watercourse dynamics will change. Both of the recommendations allow for some flexibility. The gabion baskets allow for the most flexibility since they will adapt to the channel shape as the channel changes. It is recommended to tie the baskets together to prevent separation as they adjust to the changing channel shape.



ELEVATION VIEW  
(NO SCALE)

TYPICAL RANGE  
OF VALUES

- $3' < a < 8'$
- $a < b < 3a$
- $.25a < c < a$
- $6c < d < 30c$
- $6' < e < 15'$
- $10' < f < 100'$  (Width of Culvert)
- $c < g < 3c$
- $6'' < h < 12''$
- $1' < i < 3'$
- $2' < j < 4'$



PLAN VIEW

(NO SCALE)

NOTE:  
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P:\300\310\310032 (Wittmann ADMSU)\Deliverables\Sun Valley Parkway\Baffle\_Outlet.dwg Date: 2/23/05



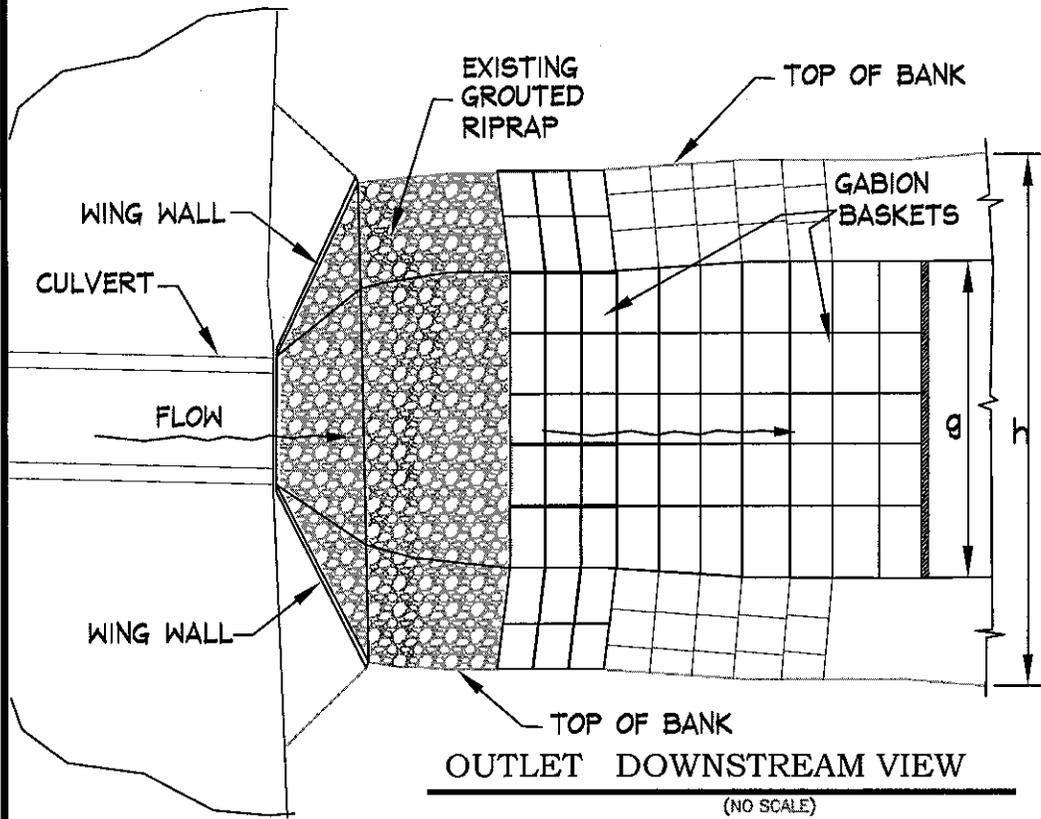
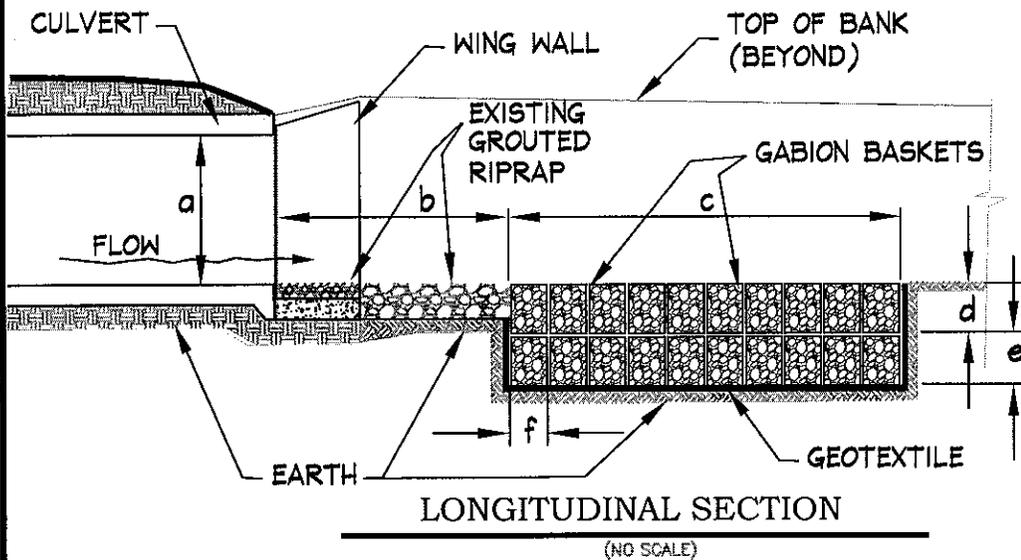
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FIGURE SV-2.4  
BAFFLE OUTLET

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CONTRACT FCD 2002C029

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TYPICAL RANGE OF VALUES

- $3' < a < 8'$
- $5' < b < 100'$
- $3' < c < 18'$
- $1' < d < 3'$
- $1' < e < 3'$
- $1.5' < f < 6'$
- $9' < g < 120'$
- $18' < h < 400'$

P:\300\310\310032 (Wittmann ADMSU)\Deliverables\Sun Valley Parkway\Gabion Basket.dwg Date: 2/23/05



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FIGURE SV-2.5  
GABION BASKETS

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### 2.4.2.3 Culvert Vegetation and Man-Made Obstacles

In many cases, obstacles at the inlet or outlet of the culvert appear to be the primary problem. These obstacles include excess vegetation, such as a large Palo Verde tree at the outlet, or a barbed wire fence through the wash or tied to and hanging across the inlet or outlet causing. These obstacles cause the accumulation of debris. Although these problems may not be as immediate a concern as downstream headcutting, they pose a potential conveyance problem.

Small vegetation such as grasses and brush are not a significant concern. However, trees can create significant obstruction and decrease the capacity of the culverts to dangerous levels. The accumulation of vegetation, while adversely affecting a culvert's performance, can also become a much larger problem to remove if vegetative growth becomes a 404 permit issue regulated by the US Army Corps of Engineers. The obvious remediation for this is to simply de-vegetate the culvert inlet and outlet clean with periodic scheduled maintenance. There are several culverts that possibly have reached the point of requiring a 404 permit in order to remove vegetation; they should be analyzed further before any removal is performed. Almost all of the culverts investigated displayed some sort of vegetation accumulation at or near the inlet or outlet.

Culverts that are experiencing excessive vegetation problems are: 43A, 7646, 7647, 7648, 7651, 7652, 7653, 7655, 7660, 7661, 7667, 7668, 7673, 7675, 7678, 7679, 7681, 762, 763, 764, 7685, 7690, 761, 7692, 7693, 7694, 7696, 7698, 7701, 7702, 7703, 990134, 990137, 990141, 990192, 990194. These culverts must be analyzed further to determine if 404 permit and mitigation are necessary.

Barbed wire across the inlet or outlet was encountered quite often. In general, the barbed wire is placed by ranchers in an effort to keep livestock from wandering through the culvert. These pose a potential clogging threat since they are generally on the upstream side. Barbed wire fences running through the washes were very common as well, and pose a threat of debris accumulation. The remedy would be to install a flood gate similar to ADOT design specifications C-12.10, sheets 3-4. These flood gates should only be installed on the downstream side of the culverts to minimize any accumulation of debris against the inlet and to minimize clogging of the culvert. Locations where the installation of a flood gate should be considered are: 26A, 67A, 76A, 7656, 7664, 7667, 7668, 7669, 7670, 7673, 7674, 7676, 7677, 7681, 7682, 7683, 7685, 7697, 7699, 7700, 7701, 7703, 990139, 990140, 990141, 990142, 990143, 990145, 990147, 990148, 990149, 990189, 990193.



# 1428000 Inlet

HEET 1 OF Ryan

BY DATE 10-07-04

CHECK DATE

CLIENT SVP Culverts

JOB NAME

JOB NO.

# 7645 - small wash 3 barrels 3x10

7 photos

- > large structure
- > Sediment deposits
- > Vegetation Growth
- > Down cut, Deposition

9" of sedimentation

# 1010

Herman Believes Riprap works but still sedimentation

# 7646 3 3x10

5 photos

- Left Barrel probably clean of Sediment

- 2 other Barrels Blocked by vegetation

1st Barrel (RT) appears to be Perched due to Sediment (1.5 ft)

- Some down cutting  
↳ not as bad as # 7645

2A

1-RCP 4x4

- Some Sedimentation

- Channel along Rd span set away, exposed Rock  
↳ soil

Down cutting

large P. intended? fac Down/up cutting



SHEET 2 OF \_\_\_\_\_

BY \_\_\_\_\_ DATE \_\_\_\_\_

CHECK \_\_\_\_\_ DATE \_\_\_\_\_

CLIENT \_\_\_\_\_

JOB NAME \_\_\_\_\_

JOB NO. \_\_\_\_\_

# 7647

6 - 3x10

6-7  
Pits

- 2 feet or more of Sediment in many places
- Debris, vegetation
- most of all culverts in ~~place~~ <sup>channel</sup> ~~sediment~~ <sup>along Road</sup>
- I tend to culverts from <sup>channel</sup> ~~along~~ Road and from wash
- Heavy sediment in wash
- large cracks in Road above culverts

# 7648

2 3x10

5  
Pits

- No problems
- 1 deal
- channel along Rd good here

# 7649

6 4x10's

- lots of Sediment
- NO sign of RIP RAP ~~area~~
- vegetation
- 1 foot of flow depth in 2 barrels
- 2-3' in other 4
- someone tried to <sup>dig and</sup> see Bottom of culvert



HEET 3 OF \_\_\_\_\_

BY \_\_\_\_\_ DATE \_\_\_\_\_

CHECK \_\_\_\_\_ DATE \_\_\_\_\_

CLIENT \_\_\_\_\_

JOB NAME \_\_\_\_\_

JOB NO. \_\_\_\_\_

#7650

- 3x10
- majority of rock caused in sediment
  - some downcutting @ culverts
  - some downcutting; Deposition slightly U.S.
  - 1 Barrell up 2.5' of flow depth
  - 2 Barrells 1-1.5'

7651

- 3 - 3x10
- little sedimentation
  - some vegetation
  - wash is very vegetated
  - NO Real Problem
  - some down cutting in stream

7652

- 2 3x10
- Barrell good
  - 2nd Barrell 4' to 5' of sediment  
SC-50 1-1.5'
  - tree blocks flow to Barrell



SHEET 4 OF \_\_\_\_\_

BY \_\_\_\_\_ DATE \_\_\_\_\_

CHECK \_\_\_\_\_ DATE \_\_\_\_\_

CLIENT \_\_\_\_\_

JOB NAME \_\_\_\_\_

JOB NO. \_\_\_\_\_

7653

2 3x10

- Clear
- Rg free
- Not Bad

990134

1 - 3x10

- 6-8" of soil
- lots of vegetation - water forced to 1 side
- ↳ that's why's cleaner
- ↳ some down cutting where water is forced
- ↳ also erosion along channel there as well
- veg. obstructs flow from Rd Channel to culvert

10A

1 RCP 4x4

- Major Down cutting !!
- Concrete chute NOT Functioned



PAGE 5 OF \_\_\_\_\_

BY \_\_\_\_\_ DATE \_\_\_\_\_

CHECK \_\_\_\_\_ DATE \_\_\_\_\_

CLIENT \_\_\_\_\_

JOB NAME \_\_\_\_\_

JOB NO. \_\_\_\_\_

7654                      6 - 4x10  
tons of sed.  
18-24" of flow depth  
- minor down cutting marks

7655                      3 - 3x10  
relatively clean  
- sand bag first collects sediment  
over all good.

7656                      4 - 4x10  
U.S. is very clean  
zero sediment  
- lots of vegetation in wash  
major problem D.S.

900135                    1 - 3x10  
- clean culverts  
- some erosion on P.P. Rip  
- vegetation in wash



SHEET 6 OF \_\_\_\_\_

BY \_\_\_\_\_ DATE \_\_\_\_\_

CHECK \_\_\_\_\_ DATE \_\_\_\_\_

CLIENT \_\_\_\_\_

JOB NAME \_\_\_\_\_

JOB NO. \_\_\_\_\_

15A RCP 4x4

2 contracts  
DS  
of 7656

Very clean inlet  
cross on head of RCP



~~2 x 3 x 3~~

1 3 x 6

Contract #  
990136  
990136

Br. Bed wire @ inlet

Down cutting along Rd  
Clear

15A

2 RCP 3x3

Several Down cutting 4-5'

Some sed.

Down cutting!

5' comp



HEET 7 OF \_\_\_\_\_

BY \_\_\_\_\_ DATE \_\_\_\_\_

CHECK \_\_\_\_\_ DATE \_\_\_\_\_

CLIENT \_\_\_\_\_

JOB NAME \_\_\_\_\_

JOB NO. \_\_\_\_\_

7657

3 3x6

Very clean  
minimal sed.  
NO Serious Problems U.S.

7658

2 3x10

- lots of Sediment  
- Down cutting in wash  
vegetation

- Down cutting along Berbedmire fence

7666

3 ~~3x10~~  
3x10

large amounts of Sediment

Only  $\frac{1}{2}$ ' of flow depth in middle barrel

- Down cutting in wash

7665

6 4x10

Relatively clean Culverts

- Some larger Rock sediment

- Down cutting U.S. in wash → joined w/ 7664

7664

6 4x10

much more Sediment than 7665  
middle culvert ~ 18"

~ 24 erosion along  
road channel.

- General Beginnings of Down cutting/erosion @ top of Riprap  
→ most of Riprap Partially Buried.



HEET 8 OF \_\_\_\_\_

BY \_\_\_\_\_ DATE \_\_\_\_\_

CHECK \_\_\_\_\_ DATE \_\_\_\_\_

CLIENT \_\_\_\_\_

JOB NAME \_\_\_\_\_

JOB NO. \_\_\_\_\_

110146

1 3x5 ±

- Only Flow appears to be from Rd channel
- No Sed, Very Clean
- High bit legs.

990145 Clean

- Possibly Down cutting in wash
- Flow from Rd channel.

30A

2 CMP 3x3  
CSP

- No Sediment
- Rip-Rap along Road channel works well
- Debris in wash, but no problems.

30

1 5x6 box

990144

- Minor sediment @ opening
- Culverts Clean
- Downcutting in wash.
- but no major Problems.

29

990143

2 5x8

- Large Debris/Rocks @ Base of Culvert
- Relatively clean
- ~~lots of sediment in wash.~~
- Overall - all Good.



SHEET 9 OF \_\_\_\_\_

BY \_\_\_\_\_ DATE \_\_\_\_\_

CHECK \_\_\_\_\_ DATE \_\_\_\_\_

CLIENT \_\_\_\_\_

JOB NAME \_\_\_\_\_

JOB NO. \_\_\_\_\_

28  
990142  
↑  
Close  
and  
very  
silted.  
↓

1 - 4x8

NO Sed.

NO veg.

Rip rap in Good Shape  
Very Good Culvert

Rip rap along  
Road Channel

27  
990141

1 4x8

minor sediment

very clean

- Rip rap road → also along Rd Channel
- some down cutting in wash.

26A

minimal sed.

lots of veg

26  
990140

2 - 5x8

Clean Culverts  
minor sediment

- on North side of wash an inlet to wash  
was removed all Dirt Down to Certificate (Picture)
- Some down cutting upstream.



CLIENT \_\_\_\_\_

JOB NAME \_\_\_\_\_

JOB NO. \_\_\_\_\_

25  
7663

6 3x10

Large amounts of Sediment  
4 barrels restricted to 12-18" of Flow depth  
Barrel closest to the inlet relatively clean

24  
7662

3 3x10

2 barrels restricted to 18" of Flow  
most of Rip Rip covered in Sed.  
Large amounts of Sed.  
Down cutting U.S.

23  
990139

1 4x10

Zero Sediment  
Some loose River Rock north of culvert b/c Rip Rip  
↳ b/c of this some Rip Rip is Breaking  
↳ missing? → River Rock should have been  
laminated in w/ Rest of Rip Rip.

(22)  
22 A

4x4 pipe

- Clean Pipe  
- Sed. depositione Base of pipe  
- Some bit Rip Rip covered  
- erosion occurring @ bit Rip  
Down cutting in U.S. wash.



MEET 11 OF \_\_\_\_\_

BY \_\_\_\_\_ DATE \_\_\_\_\_

CHECK \_\_\_\_\_ DATE \_\_\_\_\_

CLIENT \_\_\_\_\_

JOB NAME \_\_\_\_\_

JOB NO. \_\_\_\_\_

22  
7661

4 3x10

- almost completely filled w/ sediment
- vegetation blocking all Berrells
- Down cutting d.s. wash
- most Berrells  $\approx$  12-18" of flow through vegetation
- almost all rip rap covered in veg

21

4 4x10

more vegetated  
wash than  
other places

- heavily vegetated - Paloverde trees
- only 12-18" of flow in 1 barrel
- $\approx$  24" of flow in 3 Berrells

7660

- $\rightarrow$  tons of sedimentation
- $\rightarrow$  almost could not get to culvert b/c of vegetation

20

1 - 3x6

990138

- heavy veg from Rd Channel
- minor erosion on some rip rap  $\rightarrow$  all flow to culvert
- very clean.



CLIENT \_\_\_\_\_

JOB NAME \_\_\_\_\_

JOB NO. \_\_\_\_\_

19  
990137

1 - 4 x 10

Large tree just U.S. in wash,  
causing Dam cutting U.S. in wash.  
- Same Sediment @ Base of Culvert, but overall Clean  
Rip Rap on North of Headwall NOT cemented causing  
Some erosion (downcutting) (pic).

18  
7659

3 4 x 10

- Only about 2' of Flow depth available  
lots of Sed.  
2 side ~~inlets~~ inlets to ~~wash~~ wash show  
~~downcutting~~ Downcutting  
→ there is minimal vegetation @ culverts.

Haines 10-07-04

Site 1  
7645

Pictures

- 1) downstream from road
- 2) from north side of culvert looking south
- 3) toward culvert outlet

upstream signs of downcut

Grouted riprap

downcut entrenching upstream

sedimentation on culvert about 9"

7646

Pictures

1 downstre J. R.

2 from north

3 culvert outlets

downstream channel

no picture 1

South channel list sedimented - bear obstruction on outlet

Grouted riprap upstream, some downcut but wider.

Channel less entrenched.

200

1 Pipe outlet

2 downstream channel

7647

- 1 Dams/lot/oom
- 2 to spot
- 3 boundary change
- 4 culvert outlet
- 5 downstream channel

appear in equilibrium with signs of old cut in filled w/ more recent sediments

- 6 100 ft downstream significant down cut in - expect it to reach culvert
- 7 downstream from down cut
- 8 down cut

7648

- 1 a
- 2
- 3

Good culvert

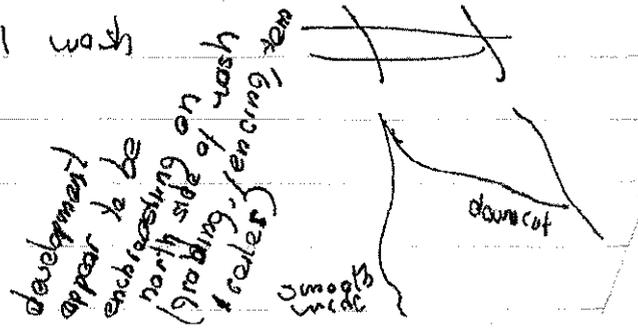
7649

- 1 from road
- 2 from road
- 3 culvert outlet
- 4 downstream channel

appear in equilibrium

7650

- 1 down cut on small bifurcal wash
- 2 downstream channel
- 3 culvert outlet
- 4 connecting channel
- 5 culvert outlet



128 Memory card.

S18  
7651

- 1 from road
- 2 downstream channel
- 3 outlet

nice wide sandy channel appear in equilibrium  
tree on outlet no much sediment.

---

7652

- 1) 2 lane culver outlet.
- 2) downstream channel
- 3) same downcut downstream  
vegetation appear to control downcut  
multiple channel downstream

7653

- 1 -
- 2

good condition.

~~990135~~

~~990135~~

990131

- 1 culver from road
- 2 downstream channel  
vegetation obstruction to the side  
most carefully maintained
- 3 downstream nice

~~990135~~

- 1 downstream channel from pipe

10A

~~990134?~~ or 10A?

7654

- 1 from the road  
~~fan~~ fence on downstream need to be removed.
  - 2 downstream channel
  - 3 toward culvert
  - 4 away from culvert
- good entrenched channel /  
some culvert sedimentation and vegetation on outlet  
but no la bad.
- 

7655

- 1 from road
  - 2 downcut downstream from outlet.
  - 3 away from culvert.
  - 4 towards culvert.
- 

~~7655-1-1~~

7656

~~7656-1~~

- 1 from road fence on outlet.
  - 2 downstream severe downcut 3-4 ft cut  
soon concrete would start falling.
  - 3 downstream channel
- 

90013

~~7655-2-1~~

- 1 clean no significant downcut
  - 2 outlet and fence. one barrier
- 

~~7655-1-1~~

11A

- 1 small downstream channel
- 2 pipe downcut potential but not significant at this time
- 3 some downcut at outlet.

~~990135~~

1 downstream channel

2

~~990136~~

3 culvert outlet, single box

159

2 barrel 36"

1 outlet

2 downstream channel wall - entrenched 200'

7657

1 from road

2 culvert outlet

3 away from culvert

4 toward culvert

some gulping mat appeared outlet but ultimately  
undistinguishable wash 200 ft away from culvert.

~~7658~~

1 down from channel

7658

2 downstream channel

3 outlet

4 channel hard to see 200 ft downstream

After Lunch.

South direction.

7666

1 set of 3 culvert grouping

2 channel downstream north side.

3 same channel further downstream

7665

4 middle channel

5 south most downcutting

7664

6 South channel 200' downstream.

Single barrel

990146

1 outlet

2 downstream channel well defined stable

3 200' away from the culvert

4 " toward culvert.

Single barrel

990145

1 outlet

2 downstream channel

3 200' downstream.

2 CMP 36

30A

1 - Scar hole 50 ft downstream of outlet

2 - Pole ~~hole~~ in front of outlet

3 - Culvert outlet.

30

990144

1 downstream channel

2 outlet

3 channel downstream

4 away

5 toward.

29

1 Culvert outlet 2 S X 10?

990113

2 downstream channel

3 away

4 toward

28

1 outlet

2 away

990142

3 toward

4 scour hole away from outlet

5 significant amount of fractive rocks 3-4" d 50  
self armoring

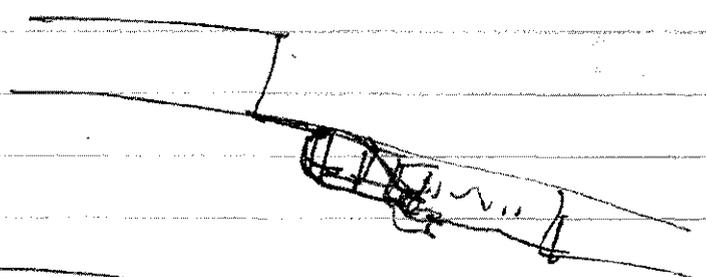
27

1 outlet

2 downstream down cut

990141

3 50' downstream tree destruction covers downcut



26a

2 30"

1 downstream channel

2 culvert outlet

3 some downcut about 50' away

26

1 from the road

2 culvert outlet

3 2-3' downcut

770410

4 100' ft downstream fragmented rock 4-8"

downcutting through bench sedimented Metaconglomerate

25

1 from the road

2 moderate scour at outlet on south side

3 north side downcutting about 12" at along end of grouted riprap.

7663

4 downstream channel 50' away north side

5 south higher north lower

24

1 toward outlet.

7662

2 downstream channel poorly defined too signs of potholes.

7667.1

1 culvert outlet leads clean 1-2" dso material

770139?

2 100' away from culvert

770139

3 toward

SVP

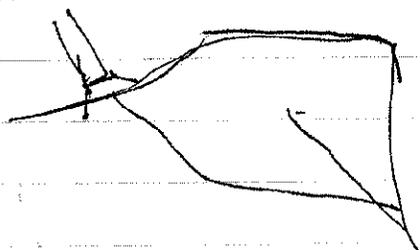
7662.2

1 downstream channel

22A?

2 PIPE outlet

22A



well entrenched stable

22  
7661  
1 outlet  $\frac{1}{3}$  blocked by light sediment  
2 downcut and fill in evidence, cyclic sedimentation currently continuing.  
3 downstream 200' ft from outlet undistinguishable water

21  
7650  
1 from the road -  
2 culvert outlet plate roads trees on the way  
3 undistinguishable channel from 30'  
4 downstream channel 200'  
heavy vegetation especially upstream  
Probably good water supply.

20  
99058  
Single box  
1 - culvert outlet  
2 downstream channel undistinguishable.

19  
99037  
1 barrel outlet heavy vegetation  
2 toward culvert outlet  
3 downstream channel.  
4 " " 100 ft.

19  
7659  
1 heavy vegetated culvert outlet.  
2 channel downstream 100 ft away  
3 towards  
significant vegetation around culvert ponding  
likely downstream no vegetation suggest water supply stops here

4/5/6 panoramic from south side  
7/8/9/10 panoramic east side heavy vegetation  
11/12 panoramic west low vegetation.

UPstream Ryan's

11-10-01

(1)

???

2 - 30x42

36C

1-11

3 pcs

1.) culvert

2.) wash

3.) Roadway channel

- minor sediment, almost none

-> minor erosion in Roadway channel

- Some vegetation in wash.

~~7671~~

4

5x40

5-10

7667

- some sediment, relatively minor, but more than

- large Plo verde in wash

- Big potential problem is the Barbed wire: treats limbs hanging in front of inlets.

- Pipe through culvert?

~~7672~~

??

5

4x5

11-17

7668

- main flow from Roadway channel

- 3 Boxes clean

- 1 some sediment

- lots of mud sediment

- lots of debris by the Plover: Cattle barbed wire.

- all in all not bad

~~990140~~ ??

- Clean

18-21

990148

- Barbed wire @ inlet

- No major problems.

upstream

2

990149 - lots of Rip-Rap both sides of culvert

39A

→ 0 Sediment

22-27

→ lots of vegetation in wash

→ minor erosion along control fence

990150

990149 - NO Sediment, sparkling clean

28-35

→ Barbed wire obstruction

→ one side of Box has Rip-Rap <sup>along road</sup> → clean

↳ other side does not, some erosion

North of what we thought was 990150

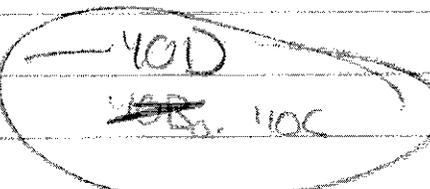
40C, D

2 separate structures 36-41

2 structures

1 large ≈ 36" pipe

1 small ≈ 15" pipe



- lots of Rip-Rap,

↳ some sediment in low spot of Rip-Rap.

→ some erosion @ upstream edge of Rip-Rap

→ cattle fence causing collection of debris/vegetation

Another notation list

- some sed.

3 x 6

42-115

- erosion in wash

Possibly

990150

990150

upstream

(8)

7669

3

5x6 ±

46-49

Relatively clean

- trees causing some debris
- barbed wire a potential problem
- very good in general

~~7670~~  
7670

#43

3 5x6

50-54

- water line being fed through Box
- some debris
- minor sediment
- Palovene: some creosote causing debris
- minor erosion by creosote bushes

NO Name  
43A

2 3' CSP

55-57

- minor sediment
- erosion is partially covered in sediment
- creosote bush causing sediment deposition

NO Name 2  
43B

2 3' CSP

58-61

- no sediment
- no real problem

NO Name 3  
43C

3 36" CSP

62-64

- very clean
- Good rip-rap
- no real problem

Upstream

(4)

#44

7671

4-

65-69

- Same sediment, especially on low flow side
- Bush collecting debris @ box
- lots of vegetation in wash.
- over-all not ~~bad~~ bad
- lots of clean Rip-Rap & log loading.

7672

70-76

- lots of sediment
- almost completely Buried.
- erosion in front of Rip-Rap
- vegetation causing cutting

10" of sed  
to 1.5'

#46

next to 1

7673

77-82

- uniform sediment
- Down cutting <sup>prolonging</sup> ~~prolonging~~ upstream
- erosion at ~~at~~

990189

1

3x6±

83-86

- minor sediment
- minor debris
- nothing Bad about this
- Rip-Rap looks Good

#48.  
990190 1-3x6 ±

87-91

- NO sediment
- Kio-Log bed
- NO Problem

92-97

3-

7674

- Cutting in wash - 4' → Propagates into main system throughout.
- Sediment in Boxes
- lots of vegetation in wash

7675

3-

98-101

- NO sediment
- NO defined channel ~~and no energy~~
- Nothing Really happening here.
- Picks up lots of sheet flow and concentrate.

#51  
7676

impeccably clean Boxes, not 1 grain of sand. 102-107

- lots of vegetation
- all flow from roadside + some sheet flow
- PVC pipe through culvert
- water appears to pond, causing all the veg.
  - ↳ still standing water; mud from Rain few days ago.

7677

Similar to ↑

108-111

- also wash starting to form
- ↳ NO defined wash yet.

7678 #53

- minimal sediment in Boxes

118-122

7679 #51

- very large wash

115-117

↳ very sandy tons of sand.

112-114

→ trees block part of flow to some of the inlet boxes.

→ NO erosion

→ NO Big Problems

7680 #55

123-125

Same ↑

lots of vegetation! sand in wash

7681 #56

large area of ponding upstream of Boxes

133-136

7682 #57

↳ tons of thick vegetation

130-132

~~most~~ NO sediment in Boxes

126-129

vegetation, no vegetation

no defined wash

Downstream DWLBT

144-149

Downstream

99029/

- NO Sediment

Downstream

- mild gullying

- erosion on Fence

→ not bad.

→ mild ~~gullying~~ eroding along fence

erosion

(7)

Down Stream INLET

137-143

7683 erosion @ edge of Rip-rap

~~Down Stream~~ - mild Gullying  
- Clean Culverts  
→ erosion in bank along fence line

7684 - Some cutting Down Stream  
#60 - Clean Boxes

Down Stream - erosion @ edge of Rip-rap.  
- Bushes @ edge of Rip-rap too.  
- cutting Back behind headwall

7685 6-

Downstream - tons of Rip-rap  
↳ covered up some sediment  
channel from Road drains to recess well.  
- heavy cutting 6' in off-shoots where  
channel and wash meet.  
- Large Rip-rap 2' diameter @ bottom of Rip-rap  
→ tons of sediment in channel.

7687 ~~upstream~~ mild Gullying by road crossing  
#65 - some sediment → not bad.  
- some veg.

W Stream

- 7658 - mild erosion on dirt crossing
- #66 - 2-3' cutting upstream of dirt road
- Clean inlets minor sediment, almost none
- minor veg.

W Stream

- 64 - Beginning of major head cutting upstream @ <sup>Dirt</sup> Road Crossing
- 990193 - erosion along Road
- Some Veg
- minor sed.
- Fine bits eroding away.

63

- 990192 - Very Clean
- minor veg
- minor erosion upstream of R.P. Rap.
- appears to be Pondryman, still muddy.

990194 ~~stream~~ some sed.

- half of Box has thick sed @ inlet, bushes growing, other half is washed away
- major erosion, down to lock, 2-3 or more

7689 Small 1" Pipe across adjacent Ponding area to culvert  
No Sed.

minor erosion  
No well defined wash  
lots of Rip-rap: Strat sets on Banks.

Retention  
area w/ a  
By-pass  
over to the other.

7690 Same  
appears to be man-made Ponding area  
to keep flow from Berm along Road.

tons of veg... inaccessible almost.

7691 identical, Not as much veg.

950795  
#71 erosion: bank of Rip-rap  
lots of Sed. deposits  
By-pass 1" Pipe mostly clogged.

7692 mid Gully: erosion of Rip-rap  
Pipe By-pass inlet  
Same  
- vegetation

990196

Solid R.P. Pipe

NO Sediment

mil / erosion Bank by fence

By Pass Pipe enters

↳ from large pondy area.

All Good.

7693

- Some sediment

- Veg. carrying sediment / detritus

- mild erosion in wash.

Pipe By Pass → here culvert is clean.

7694

- Some sed. in culverts

→ lots of sed @ end of concrete apron Before Screens.

#75

→ trees in wash

→ erosion on concrete apron

7695

- NO Sed.

- minor erosion where man made channel parallel to road dumps to culvert.

- minor veg

I skipped the little pipe.

990197

- Some Sed.

- some veg

- some cutting in wash. ~2'

- erosion on Bank.

- 7696 - minor Sed.
- veg.
- cutting in upper wash.
- lots of Rip-Rap on Bank.
- By - Pass inlet Pipe.

- 7697 - 18" of sed in most ditches
- heavy veg.
- roadside channel contributes water.
- lots of Rip-Rap along Bank, and Berm along Roadside channel.

- 7698 - lots of sed
- " of veg.
- a tree blocks 2 hole inlet
- cutting upstream, exposed Fence posts.
- mild erosion <sup>cutting</sup> in places.

- 7699 - lots of Sed in 2 barrels
- Not much of a Problem

- 7700 - lots of Sed. @ barrels in wash
- #82 - lots of veg/larger bushes @ Rip-Rap.

- 7701 - heavy veg.
- erosion where concrete apron empties in front of culvert
- NO Sed.

(12)

7702

mine erosion

- Standing water
  - no sediment
  - lots of veg.
- 

7703

- Zero sediment
  - large trees make culvert inaccessible
  - minor erosion in upstream wash by load.
- 

990198

- No sediment
  - erosion on handwall
  - erosion in upstream wash
  - minor veg.
  - erosion on side banks
- 

7704

- No Sed.

#87

- no veg <sup>dist</sup>
  - erosion on Road
  - very good culvert.
- 

7705

- lots of Sed.
- most of 2 barrels jammed w/ Sed & debris
- lots of veg.

herman's Sun Valley Parkway  
Culverts Noted

11-10-04

30 x 12 CMP double

366  
(2)

1 - outlet head cut

2 - loading downstream from outlet

4 - 10 x 6

3 headcut at end of apron of outlet

4 outlet headcut

7667  
(6)

5 pileup on apron

6 repaired pipe pipe

7 downstream channel installed 20 w by 4 high.

8 downstream channel towards outlet

9 culvert outlet from bank

10 outlet 6 10 x 5

7668  
(7)

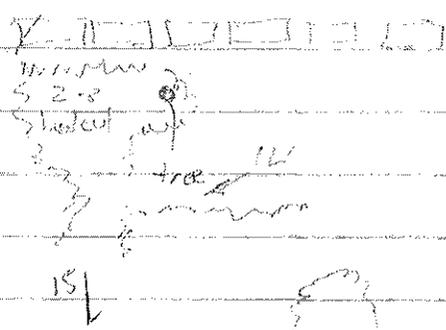
11 head cut on the left side

12 head cut on right side

13 downstream right channel

14 " left channel

15 " left



990148

990149

7669

(2)

16 1 - 10 x 6 ft headcut next outlet

17 downstream channel



39A

18 from road leaching downstream

19 5-6 ft head at 50' from outlet

~~990149~~

39' x 52' CMP

(2)

outlet apron pools hollow probable internal erosion

990149

20 from road downstream

21 head cut 10ft from outlet apron

(4)

22 lower box shown 4 ft head cut

23 downstream channel

40C/40D

24 72' x 48" CMP

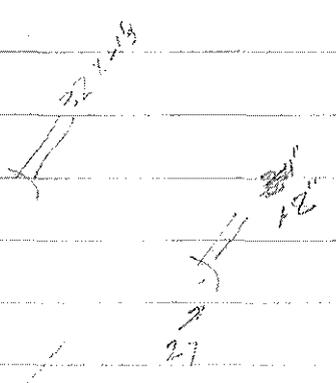
hollow outlet

(4)

25 downstream channel

26 further downstream

27 outlet of smaller pipe



990150

28 outlet

3x6 RBC

(3)

29

30 downstream channel

3 - 10 x 4

31 outlet from left

32 head cut 2.5 to 3 ft

7669  
(6)

33 head cut concentration at end of span

34 channel downstream from spring well

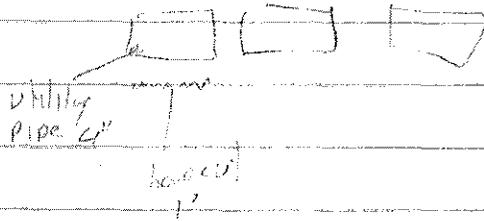
35 downstream channel

L10 (out of sequence) channel downstream below from roadway

3 - 10 x 4

36 culvert outlet

7670  
(4)



37 downstream channel

38 head cut

39 channel 100 ft downstream

43A

~~441~~ culvert outlet 2 32 x 48 CMP

(3)

~~442~~ outlet block hole sediment pit

~~443~~ downstream channel

43B

~~444~~ 2 33" 48" CMP

45 downstream channel

43C

46 3 36" CMP

47

48 downstream channel

- 7671 49 paver road  
 (5) 50 culvert outlet vegetation at outlet  
 51 headcut about 30 ft from outlet  
 52 headcut located upstream / box in background  
 53 downstream channel 300 ft from outlet

- 7672 4-10 YZ  
 (3) 54 culvert outlet some sediment  
 55 bft culvert open right 3 partially full  
 56 downstream channel mild poorly defined.

- 7673 3 12 x 5  
 (4) 57 outlet  
 58 some sediment deposited evenly on all barrels  
 59 downstream channel wide mild  
 6" headcut 50' from outlet only 2 ft wide  
 probably no avulsion  
 60 downstream channel

- 940189 61 1 10 x 4 culvert outlet some bedcut near  
 (3) 62 downstream channel  
 culvert appears to be oriented in angle to wash

- 63 100ft downstream  
 meandering stream



64 single box 10 x 3  
some sediment accumulat

65 barrel

66 downstream area no channel evident other than a very  
narrow swall

67 downstream channel, low flow channel right of redwood trees

3-10-3

68 from roadway no channel apparent downstream

69 outlet ~~clear~~ clear no signs of erosion or sedimentation

70 downstream channel wide poorly defined

71 60 ft downstream need cutting at two locations within  
channel - minor at this time but may need culvert

72 from road

73 outlet clear no signs of erosion small amount of sediment 2' deep

74 downstream channel wide shallow

75 5' w x 3' deep cut extending downstream as far as can see

76 further downstream

77 " " " " " "

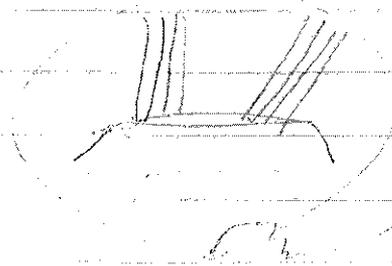
2 sets of 3-10' x 4' RBC

778 outlet

779 some erosion at end of apron

780 gully forming between the sets

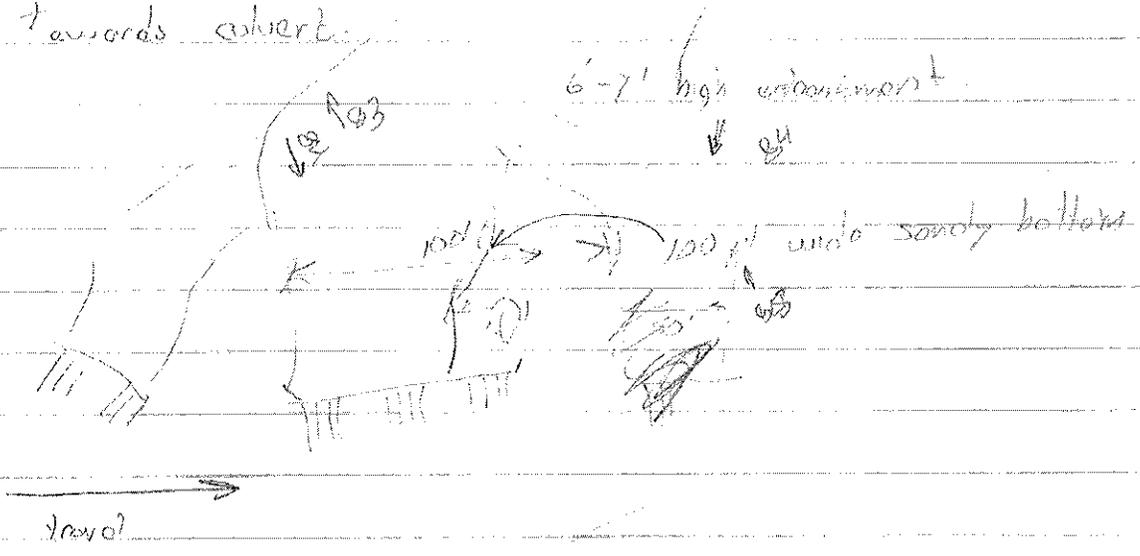
81 71 downstream channel



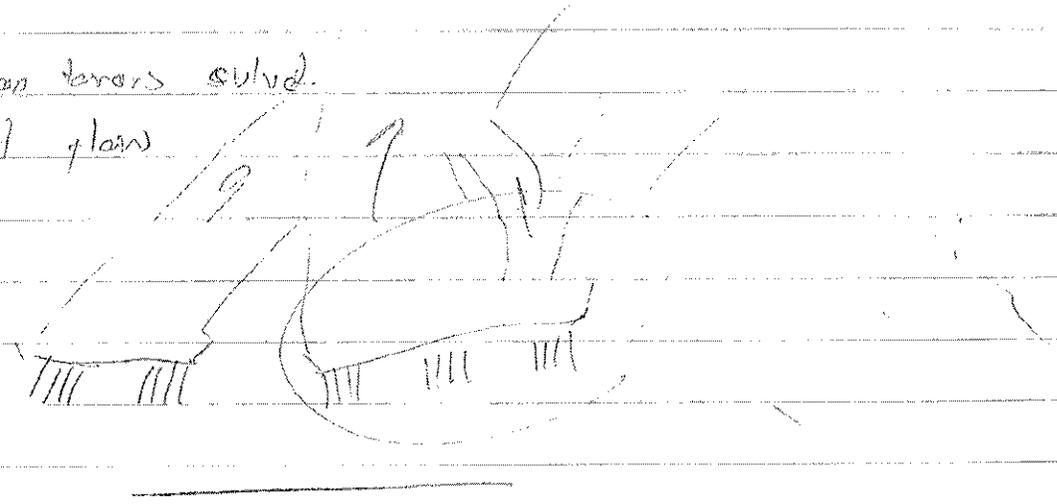
7678  
7679  
7680

7683 sets of 3 10 x 6 RBC  
 7683 downstream channel w/ wide sandy  
 7684 100 ft downstream  
 7685 towards culvert  
 7686

(8)



7687 upstream towers sub'd.  
 7688 spot plan  
 7689



7691  
7692

7690 2 set of 3 10 x 4  
 7691 channel parallel to road  
 7692 downstream re channel  
 7693

(4)



7683  
upstream

8/24 2-10x3 from road upstream channel

out of  
sequence

8/25 culvert inlet drop inlet w/ gravel wrap

8/26 from the culvert upstream

(3)

clean culvert heavy vegetation upstream no  
apparent problem or erosion evidence

990191  
upstream

→ Single 10x4

8/27 from road upstream channel

8/28 culvert inlet drop structure

clean

(4)

8/29 some bank erosion near right wing wall

8/30 upstream channel heavy vegetation

should be double

8/31 Culvert inlet from the road (single 10 x 4)

7684  
upstream

8/32 Drop inlet appear clean

8/33 sand ponding 10' ft from inlet apron

(5)

8/34 ponding from upstream

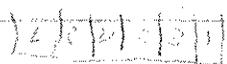
8/35 upstream channel

7685  
upstream

8/36 from road upstream

8/37 6-10x5 drop inlet clean

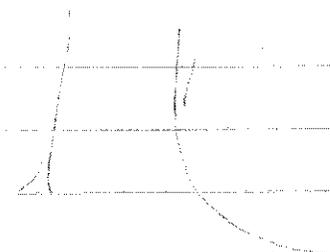
110 8/38 side channel course 10'  
of 10' @ inlet 10' x  
2 deep



108  
109

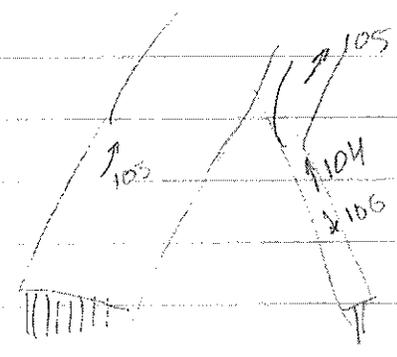
8/39 sediment in barrel 2 some large size 2" to 4" dia

8/40 upstream channel sandy 10' wide mild slopes



111 100 1/2 way rock downstream channel 6 - 10 x 4  
 112 101 outlet

7687 110 102 50' downstream from outlet gully <sup>gully</sup> extending downstream  
 114 103  
 (4)



115  
 116 104 downstream channel  
 117 105 downstream channel  
 7688 118 106 downstream 20' of outlet  
 (5) 119 107 2 10 x 3

3/17 or 18/19

120 108 single 10 x 3  
 121 109 1 foot of sediment  
 990193 122 100 downstream channel  
 123 111 downstream channel  
 (5) 124 112 100 ft downstream approximate 4" <sup>Average</sup> rock size

990192 115 125 downstream channel from road  
115 126 single 10 x 3 clean no sign of sedimentation or  
scour

(3) 115 127 downstream channel



990194 116 128 downstream from road  
116 129 downstream channel from bank

(5) 116 130 10 x 10 single  
116 131 some sediment accumulate in box and downstream  
wash appear to be grading in this area

120 132 downstream channel

~~117 133~~ → 67A

777 117 133 arch corrugate pipe  
outlet unexcavated

(2) 117 134 downstream channel



135 123 near road downstream

7689 136 120 5' 10 x 41 open drain no significant scour

(5) 137 125 vegetated channel no well defined wide

138 126 100' downstream plus sign of gullies

139 127 incised channel 150' downstream

140 128 culvert outlet

7690 141 129 5' 18 x 41 clean no scour

(5) 142 130 downstream channel / wide shallow

143 131 channel downstream 100' side gullies

144 132 150' downstream

145 113 downstream from road

7691 114 116 4 10 x 4 culverts

(3) 118 117 downstream channel

990195 118 downstream channel from road

(3) 119 single 10 x 4 clear no scum

116 150 channel downstream

151 117 from road

152 118 4 10 x 4 clear

153 119 scum

7692 (4)



154 120 50' downstream

155 121 downstream from road

990196 122 scum at outlet of single 10 x 3 scum 1.5' to 6"

(4) 157 123 downstream channel

158 124 downstream channel 50' from C.

7693 159 125 from road heavy vegetation downstream

(4) 160 126 six 10 x 4 ~~slit~~ dip some scum (minimal)

161 127 downstream channel sandy portion 8' wide 1-2' high.

162 128 culvert outlet through vegetation

163 170 Culvert through vegetation  
7694 163 181 no scour signs of some sedimentation  
165 172 channel downstream (low flow SWX 1.8 deep)  
(3)

Hervey Cormorant. Card #2

7695 K28 downstream channel from road  
2295 10x4 no sediment vegetation  
(5) K30 no scour on outlet  
K31 downstream channel  
K32 50' down.

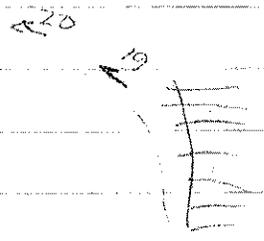
76A K33 downstream channel  
???  
(2) 734 CMPA

35 8 downstream channel  
36 9 outlet  
990197 37 10 outlet some sediment and ponding in outlet  
(5) 38 11 narrow outlet  
39 12 100 ft downstream

7696 13 channel from rd.  
(4) 14 toward culvert  
15 survey from culvert  
16 100 ft.

47 17 from road  
 48 18 6 10x4 some sediment no bog  
 49 19 downstream change

7697  
 (4)



47 20 50' away

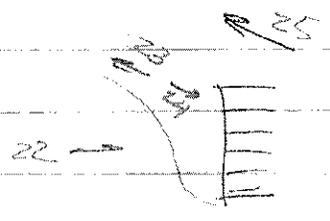
48 21 downstream from road

7698 49 22 6 10x10 some sediment

(5)

50 20

51 23 heavy vegetation



52

53  
 54 24

7699 55 25 low flow 10 w x 1.5 deep  
 56 26 3 10x3 left deep other 2 6"-10" sediment  
 (4) no significant scort

7700 57 27 from road

58 28 4 10x4 heavy blockage on one bank  
 fairly clean

(3)

59 29 low flow 16' wide 1.5 ft deep

60 30 from road

61 31 6 10x6 clean no sign of scour - falling

7701 32 downstream channel vegetation

(5) 63 33 from bank toward ~~channel~~ current

64 34 " " away from

---

65 35 from rd.

7702 66 4 10x3 clean no scour slide sedimentation

(3) 67 37 no well defined wash.

---

68 38 from Rd.

7703 69 4 10x4 clean some debris on post no scour

70 40 road crossing 30' from outlet

71 41 60 ft from outlet - headcut on tributary no on

(5) outlet

72 42 outlet outlet.

---

73 43 wide well defined channel 25 ft wide 10 ft deep.

74 44 10 x 10 single ponding by culvert

slide sedimentation no scour.

(4) 45 75 distrib. channel from Beach

46 76 erosion by wing wall

77 ~~47~~ 1 am Rd

770 48 78 2 10 x 8

79 49

80 80 downstream ✓ skaye 80 top <sup>u</sup> 10' deep.

81 ~~41~~ 41 downstream proceed.

7705 42 82 channel 50' downstream 10 ft wide 1.5' deep

83 43 scour by two down barrels

84 44 large particle deposition in two barrels

85 looking I expect

① leyl overbank

2

3

④ vpsvroom p-ran. roght



Entellus™

SHEET \_\_\_\_\_ OF \_\_\_\_\_

BY \_\_\_\_\_ DATE \_\_\_\_\_

CHECK \_\_\_\_\_ DATE \_\_\_\_\_

CLIENT \_\_\_\_\_

JOB NAME \_\_\_\_\_

JOB NO. (Facing East is Upstream)

# 990147

Upstream = East Side of Road  
D.S. = West Side of Road

7.6 m. dia.  
of manhole

36

1-3x10 RCBC

# on upstream wingwall in white paint, circled.

# 7686

Upstream = South Side  
Downstream = North Side

11.4 m. dia.  
of manhole

62

2-3x10 RCBC

- 1) picture from Rd over top of culvert
- 2) picture looking directly at inlet/outlet
- 3) pic of any erosion/entry
- 4) pic of Downstream face of upstream

990147

4 or 5 pics on each side (up & down stream)

36

Picture #	US	DS	DESC.
1	✓	✓	over top of culvert from rd. facing upstream
2	✓	✓	looking at inlet
3	✓	✓	inlet
4	✓	✓	looking upstream (channel)
5	✓	✓	inlet riprap
6	✓	✓	over top of downstream from road
7	✓	✓	looking at outlet
8	✓	✓	looking downstream
9	✓	✓	outlet

No signs of rutting  
or erosion or blockage  
culvert in good  
condition.

7676

- 62  
45 1 over top upstream
- 45 2 into inlet
- 05 3 over top downstream
- 05 4 into outlet

5 over view shot of culvert/channel from road.

- 6
- 7
- 8
- 9

Culvert/channel in good condition.  
no cutting/erosion present, no  
clogging but little sediment in bottom  
of channel.

**APPENDIX B. FIELD NOTES**

### SECTION SV-3: CONCLUSION

As previously documented by MCDOT, significant problems exist with the culverts along the Sun Valley Parkway. There were three (3) types of problems encountered with the culverts:

1. Sedimentation on upstream side of culvert
2. Headcutting on downstream side of culvert
3. Obstacles obstructing the culverts

The recommended remediation for culverts experiencing severe sedimentation problems is the construction of a small berm to direct low flows into one barrel of multiple-barrel culverts (**Figure SV-2.2**).

The recommended remediation for downstream headcutting is one of the following:

1. Installation of a baffle outlet
2. Installation of gabion baskets

For headcutting of four (4) feet or less, the gabion basket is recommended as shown in **Figure SV-2.5**. For headcutting greater than four (4) feet, the baffle outlet as shown in **Figure SV-2.4** is recommended.

The recommended remediation for culvert vegetation obstruction is to obtain any needed permits, remove the tree(s) or tree seedling(s), and to maintain the structure on a regular basis to prevent excessive growth.

Barbed wire, poles, walls, and other man-made obstructions should be removed from the vicinity of the culvert outlet. Floodgates can be installed at the downstream end to prevent livestock from entering the culverts.

All problems relating to the culverts were as of the time of inspection (October and November of 2004). It is possible that additional culvert degradation has occurred

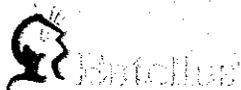
since the time of inspection and will continue to occur until remediation is performed.

## APPENDIX A. REFERENCES

2001 Bridge Management System Report, by Maricopa County Department of Transportation, Transportation Planning Division Program and System Analysis, 2003.

2003 Bridge Management System Report, by Maricopa County Department of Transportation, Transportation Planning Division Program and System Analysis, 2003.

APPENDIX C. CULVERT SPREADSHEET





# Sun Valley Parkway Culvert Evaluation

## Appendix C



N#	N# Location	Stationing *	# of Barrels	Material	Approximate Culvert Size	Upstream Headcutting	Upstream Vegetation	Upstream Sedimentation	Upstream Comments	Downstream Headcutting	Downstream Vegetation	Downstream Sedimentation	Downstream Comments	Headcutting Problem **	Vegetation Problem **	Sedimentation Problem **	Rating ***	Rating Comments
7645	0.7 mi N/ McDowell Rd	46+60	3	RCBC	3x10	~1 to 2ft+ cut. No immediate damage to structure	Middle Barrel Mostly blocked by bush	~1ft+ sediment in upstream barrels	Bush causing some sediment deposits, ~1ft+	None	Vegetation in wash	~1' sediment in downstream barrels		2	2	2	B	Lots of sediment that might plug culvert
7646	0.8 mi N/ McDowell Rd	53+90	3	RCBC	3x10	Some cutting	Tree and grasses blocking barrels	2 of 3 barrels almost completely blocked ~2ft of sediment		None	Tree growing at outlet, other minor vegetation	2 of 3 barrels with sediment		2	2	3	C	Sediment beginning to plug culvert
2A	0.9 mi N/ McDowell Rd	59+80	1	RCP	4x4	Cutting and scour along roadway channel	Minimal	Minimal	Potential for downcutting on upstream side	None	Minimal	Some	Trench was dug, probably not a major issue	2	1	1	B	Potential cutting problems upstream
7647	1.3 mi N/ McDowell Rd	79+20	6	RCBC	3x10	None	Fairly heavy vegetation in wash at inlet	Culverts have 2ft+ sediment, heavy sediment deposits in wash	Culverts almost entirely ineffective due to sediment deposits. Protective riprap buried in sediment	Severe cutting downstream (~6ft+)	Large trees and other vegetation at outlet	sediment in all barrels	Down cutting propagating towards culverts, currently ~100ft downstream	3	2	3	C	Upstream Sediment and severe downstream cutting
7648	1.5 mi N/ McDowell Rd	88+90	2	RCBC	3x8	Minimal	Minimal	None	Ideal Culvert	None	Minimal	None	Very good culvert	1	1	1	A	No problem
7649	1.9 mi N/ McDowell Rd	112+20	6	RCBC	4x10	None	Bushes blocking 2-3 of the barrels	~2-3ft+ sediment in several barrels, riprap completely buried	Vegetation and sediment a major problem and have reduced effective flow significantly	None	Trees growing at outlet	Some	Trees at outlet only potential problem	1	3	3	C	Heavy sediment and vegetation issues
7650	2.0 mi N/ McDowell Rd	114+30	4	RCBC	3x10	Some cutting in wash and cutting along Roadway Channel: fence post completely exposed (~3ft)	Some vegetation at edge of riprap	riprap mostly covered, 2 barrels w/ 1.5-2ft sediment	Cutting potentially detrimental to structures, and barrels have been rendered rather ineffective	There are 2 channels at different elevations, and the lower channel is cutting towards the higher channel	Minimal	Some	Cutting could potentially be a problem	3	2	3	C	Heavy sediment and cutting issues
7651	2.5 mi N/ McDowell Rd	142+40	3	RCBC	3x10	Minimal	Some bushes at inlets	Minimal	No real problem	None	Large trees blocking outlet	Minimal	Trees at outlet only potential problem	2	2	1	B	Large trees at downstream end a potential issue

\* Stationing at McDowell Rd. is 10+00

\*\* 1-No Apparent Problem, 2-Minor Problem, 3-Significant Problem, 4-Serious Problem

\*\*\* a-Unlikely to Develop a Problem, b-Potential for Developing Problem, c-Evidence of Problem, d-Significant Problem



# Sun Valley Parkway Culvert Evaluation

## Appendix C



N8	N9 Location	Stationing *	# of Barrels	Material	Approximate Culvert Size	Upstream Headcutting	Upstream Vegetation	Upstream Sedimentation	Upstream Comments	Downstream Headcutting	Downstream Vegetation	Downstream Sedimentation	Downstream Comments	Headcutting Problem **	Vegetation Problem **	Sedimentation Problem **	Rating ***	Rating Comments
7652	2.6 mi N/ McDowell Rd	145+20	2	RCBC	3x10	None	Tree blocking flow to 1 barrel	Minor sediment in 1 barrel		Downcutting occurs in vegetation, possibly controlled by vegetation	Large trees and other vegetation in wash	Minimal	There are multiple channels downstream, downcutting does not appear to be a major issue	2	2	2	B	Minor sediment and minor cutting potential issues
7653	2.6 mi N/ McDowell Rd	147+40	2	RCBC	3x10	None	Tree blocking flow to 1 barrel	None		None	Large trees in wash	None	Very good culvert	1	2	1	B	Tree upstream potential issue
990134	2.9 mi N/ McDowell Rd	161+50	1	RCBC	3x10	Some erosion on headwall	Major vegetation forces water to one side	~0.5 to 1ft+ sediment in half of barrel	Vegetation major problem causing blockage and sedimentation	None	Large trees blocking part of outlet	Minimal	Downstream channel is nice, not much of a problem	2	3	2	C	Beginning of erosion on wing wall could be problem
10A	3.1 mi N/ McDowell Rd	171+30	1	RCP	4x4	Erosion at headwall and riprap, and along concrete apron	Some vegetation directly in front of barrel	Some at vegetation	Concrete apron is destroyed from erosion, and much of riprap is suspended from erosion	None	None	None	Very good culvert	3	2	1	C	Erosion on upstream riprap, and concrete apron has been destroyed
7654	3.3 mi N/ McDowell Rd	183+80	6	RCBC	4x10	Minor cutting in wash upstream	Minimal	~1.5-2ft sediment in all barrels	Main problem is large quantities of sediment	Cutting in downstream wash	Minimal	Minimal	Not too bad	3	1	2	B	Upstream Sediment and minor cutting
7655	3.4 mi N/ McDowell Rd	188+70	3	RCBC	3x10	None	Bushes at inlet, and some vegetation in upstream wash	some sediment collected around bushes at inlet	Bushes cause sedimentation at inlet, but no major problem	Cutting in downstream wash	Some at outlet	Minimal	Cutting could potentially be a problem	2	2	2	B	Upstream vegetation and minor cutting a potential issue
7656	3.6 mi N/ McDowell Rd	202+00	4	RCBC	4x10	None	Some Vegetation in upstream wash	None	Cattle Barbed wire across inlets could be possible problem in future. No major problems	Severe cutting, has exposed riprap completely, and might break. Also cutting downstream in wash	None	None	Cutting is a major issue. riprap is being undermined	4	2	1	D	Downstream riprap completely exposed

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# Sun Valley Parkway Culvert Evaluation

## Appendix C



N8	N9 Location	Stationing *	# of Barrels	Material	Approximate Culvert Size	Upstream Headcutting	Upstream Vegetation	Upstream Sedimentation	Upstream Comments	Downstream Headcutting	Downstream Vegetation	Downstream Sedimentation	Downstream Comments	Headcutting Problem **	Vegetation Problem **	Sedimentation Problem **	Rating ***	Rating Comments
990135	3.7 mi N/ McDowell Rd	206+70	1	RCBC	3x10	Some erosion along roadway channel	Some Vegetation in upstream wash	None	No major problems	None	Some vegetation at edge of riprap	None	No major problem	1	1	1	A	No major problem
14A	3.8 mi N/ McDowell Rd	209+30	1	RCP	4x4	Erosion at headwall and along riprap	Some Vegetation in upstream wash	None		Potential for downcut at pipe, nothing currently	Minimal	None	No current problem. Potential for downcutting at pipe	2	2	1	B	Possible downstream cutting
990136	4.2 mi N/ McDowell Rd	229+50	1	RCBC	3x8	Some erosion along roadway channel	None	None	Barbed wire across inlet	None	None	None	No major problem	1	1	1	A	No major problem
15A	4.3 mi N/ McDowell Rd	234+10	2	RCP	3x3	Severe erosion and downcutting: ~4-5ft in some places, riprap completely exposed	None	Minimal	Cutting and erosion is major problem. Looks like wash was diverted slightly from natural course and new route is being cut	Headwall entrenched, fence post completely exposed	None	None	Headwall an issue	4	1	1	D	Upstream riprap completely exposed, and downstream head wall an issue
7657	4.4 mi N/ McDowell Rd	244+40	3	RCBC	3x8	None	Minimal	None	No major problems	Downcutting occurs in downstream wash	Trees growing at outlet	None	Cutting could be potential problem	2	1	1	B	Cutting downstream potential issue
7658	4.5 mi N/ McDowell Rd	246+40	2	RCBC	3x10	Cutting along roadway channel and fence, some cutting (1-2 ft) near inlet, and some cutting in wash	Some	Sediment almost completely covers riprap (~1-2 ft)	Cutting and sediment deposition main issues	None	Tree growing at outlet, other minor vegetation	None	Not too bad	2	2	2	B	Sediment and cutting potential issues
7659	4.6 mi N/ McDowell Rd	251+00	3	RCBC	4x10	Cutting in wash and along fence (Fence posts exposed)	Minimal	Lots of sediment ~2 ft	Erosion and sediment major issues	Some erosion in wash	Heavy vegetation at outlet	Lots of sediment	sediment and vegetation issues downstream	2	2	2	B	Upstream cutting potential issue
990137	4.6 mi N/ McDowell Rd	254+60	1	RCBC	4x10	Erosion in wash, and at headwall due to uncemented river rock	Large Palo Verde tree in wash	Minor sediment at base of culvert	Tree appears to be forcing water to flow to smaller area, increasing velocity and erosion in wash and at headwall	None	Palo Verde tree at outlet, heavy vegetation	None		2	2	1	C	Erosion on wing wall, vegetation problems

\* Stationing at McDowell Rd. is 10+00

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\*\*\* a-Unlikely to Develop a Problem, b-Potential for Developing Problem, c-Evidence of Problem, d-Significant Problem



# Sun Valley Parkway Culvert Evaluation

## Appendix C



ID	N9 Location	Stationing *	# of Barrels	Material	Approximate Culvert Size	Upstream Headcutting	Upstream Vegetation	Upstream Sedimentation	Upstream Comments	Downstream Headcutting	Downstream Vegetation	Downstream Sedimentation	Downstream Comments	Headcutting Problem **	Vegetation Problem **	Sedimentation Problem **	Rating ***	Rating Comments
990138	5.0 mi N/ McDowell Rd	273+30	1	RCBC	3x6	Minor erosion on some riprap	Some vegetation	None	Only flow appears to be from roadway channel	None	Minimal	None	No major problem	2	1	1	A	No major issue
7660	5.1 mi N/ McDowell Rd	277+70	4	RCBC	4x10	None	Extremely vegetated w/ Palo Verde trees and bushes. Inlet almost inaccessible	Lots of sediment, 1 barrel almost completely blocked, others ~1.5-2 ft of sediment	Vegetation could potentially completely block inlets	None	Large Palo Verde trees and other vegetation at outlets	sediment in all barrels	No defined wash. Large Palo Verde's and vegetation could be an issue	1	2	2	B	vegetation potential problem
7661	5.3 mi N/ McDowell Rd	292+00	4	RCBC	3x10	Some cutting in wash	All barrels blocked by vegetation	riprap completely covered, ~2-2.5 ft of sediment	Culverts have become almost completely ineffective	Downcut and fill in wash	Some vegetation at outlet	About 1/3 full of sediment		1	2	2	B	Upstream vegetation potential issue
22A	5.5 mi N/ McDowell Rd	300+10	1	RCP	2x2	Some cutting in wash	None	Minimal	Minor erosion at riprap and cutting in wash only issues	None	None	None	No major problem	2	1	1	B	Possible minor erosion on upstream side
990139	5.6 mi N/ McDowell Rd	303+30	1	RCBC	4x10	some erosion on roadway channel	Minimal	None	Erosion on roadway channel only issue. River rock was placed next to riprap, and this edge is where erosion, and minor riprap breakage has occurred	None	Some vegetation in wash	None	No major problem	2	1	1	B	Erosion on roadway channel only issue
7662	6.1 mi N/ McDowell Rd	330+20	3	RCBC	3x10	Some cutting in wash, ~2-4 ft	Minor vegetation at riprap	Lots of sediment. riprap completely covered, barrels w/ ~1-2 ft sediment	Cutting and sediment deposition main issues	None	Bushes in poorly defined wash	Minimal	No sign of problems	2	1	2	B	Upstream cutting and sediment potential issues
7663	6.1 mi N/ McDowell Rd	333+40	6	RCBC	3x10	None	Some vegetation at edge of riprap	Lots of sediment. 4 barrels w/ ~2 ft of sediment, only 1 barrel relatively clean. riprap completely covered	Culverts have become almost completely ineffective	Downcutting at edge of riprap (~1ft)	Some vegetation at outlet	Minimal	Cutting could undermine riprap in future,	2	1	3	C	Heavy upstream sediment an issue
990140	6.4 mi N/ McDowell Rd	347+70	2	RCBC	5x8	some cutting, Part of north bank of wash eroded down to rock	Lots of bushes at edge of riprap	Minimal	debris hanging by barbed wire possible issue, also vegetation at riprap causing debris collection	Downcutting in wash (~2-3ft)	Pair of large trees 100+ft downstream	Large fragmented rock downstream of downcut	Cutting could undermine riprap in future	3	2	1	C	Cutting potential problem for culvert

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\*\* 1-No Apparent Problem, 2-Minor Problem, 3-Significant Problem, 4-Serious Problem

\*\*\* a-Unlikely to Develop a Problem, b-Potential for Developing Problem, c-Evidence of Problem, d-Significant Problem



# Sun Valley Parkway Culvert Evaluation

## Appendix C



N#	N# Location	Stationing *	# of Barrels	Material	Approximate Culvert Size	Upstream Headcutting	Upstream Vegetation	Upstream Sedimentation	Upstream Comments	Downstream Headcutting	Downstream Vegetation	Downstream Sedimentation	Downstream Comments	Headcutting Problem **	Vegetation Problem **	Sedimentation Problem **	Rating ***	Rating Comments
26A	6.5 mi N/ McDowell Rd	354+40	2	CSP	2x3	None	Lots of vegetation and debris in wash	Minimal	Barbed wire fence across wash and vegetation in wash causing debris pile up	Minor Downcutting in wash	Bush vegetation in wash	Minimal	Vegetation at outlet and minor downcutting not currently serious problems	1	3	1	B	Minor cutting a potential problem
990141	6.6 mi N/ McDowell Rd	360+50	1	RCBC	4x8	Some cutting in wash	None	Minimal	debris hanging by barbed wire possible issue	Tree in wash causing downcut ~50ft downstream	Tree, debris in wash downstream	Minimal	Cutting propagating towards outlet, caused by obstruction in wash. Potentially very serious	3	3	1	C	Cutting and vegetation problems
990142	6.7 mi N/ McDowell Rd	363+50	1	RCBC	4x8	None	None	None	debris hanging by barbed wire possible problems	Minimal	None	Significant amount of fractured rock (d50=3-4")	No major problems	2	1	1	A	No major problems
990143	6.8 mi N/ McDowell Rd	371+10	2	RCBC	5x8	None	Bush at headwall and 1 barrel	Large rocks, debris at base of barrels	Bush could cause minor clogging	None	Minimal	Minimal		1	2	2	B	Vegetation could cause culvert clogging
990144	7.0 mi N/ McDowell Rd	377+80	1	RCBC	5x6	Some cutting in wash	Minor at edge of riprap	Minor sediment	No major problems	None	None	Minimal	No major problems	1	1	1	A	No major problems
30A	7.1 mi N/ McDowell Rd	380+60	2	CSP	3x3	None	Some debris in wash	None	Long riprap apron along roadway channel works well. No major issue. Debris could potentially clog inlets	Cutting in downstream wash	Large Palo Verde at outlet	None	Palo Verde could be issue, cutting minor, but potential problems	1	2	1	B	Potential for downstream cutting
990145	7.2 mi N/ McDowell Rd	390+50	1	RCBC	3x8	Minor cutting in wash upstream	None	None	No major problems	None	Minimal	None	No major problems	1	1	1	A	No major problems
990146	7.3 mi N/ McDowell Rd	393+90	1	RCBC	3x6	None	None	None	Only flow appears to be from roadway channel. High protective riprap. No issue	None	Minimal	None	Wash is stable, no problems	1	1	1	A	No major problems
7664	7.3 mi N/ McDowell Rd	397+30	6	RCBC	5x10	Cutting in upstream wash, joint with 7665, erosion along roadway channel	Minor vegetation at riprap	1 semi-clean barrel, others ~1-2 ft of sediment (more sediment than 7665) most of riprap buried	Barbed wire across inlet, and sedimentation problems	Erosion in downstream wash and cutting in wash, some all the way up to riprap (exposed)	Minimal	Minimal	7664, 7665 & 7666 have 1 outlet location: Cutting has already undermined some riprap, and is an issue	4	1	2	D	Cutting (exposed riprap a problem)

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# Sun Valley Parkway Culvert Evaluation

## Appendix C



ID	Location	Stationing *	# of Barrels	Material	Approximate Culvert Size	Upstream Headcutting	Upstream Vegetation	Upstream Sedimentation	Upstream Comments	Downstream Headcutting	Downstream Vegetation	Downstream Sedimentation	Downstream Comments	Headcutting Problem **	Vegetation Problem **	Sedimentation Problem **	Rating ***	Rating Comments
7665	7.4 mi N/ McDowell Rd.	398+50	6	RCBC	5x10	Cutting in upstream wash, joint with 7664	Some at edge of riprap	Some sediment ~1.5 ft	Barbed wire across inlet	Erosion in downstream wash and cutting in wash, some all the way up to riprap (exposed)	Minimal	Minimal	7664, 7665 & 7666 have 1 outlet location: Cutting has already undermined some riprap, and is an issue	4	1	2	D	Cutting (exposed riprap a problem)
7666	7.4 mi N/ McDowell Rd	400+10	3	RCBC	5x12	Cutting in upstream wash	Minor vegetation at inlets partially blocking barrels	Lots of sediment, middle barrel ~2 ft sediment, riprap completely covered	Sediment major problem	Erosion in downstream wash and cutting in wash, some all the way up to riprap (exposed)	A few bushes at outlet	Minimal	7664, 7665 & 7666 have 1 outlet location: Cutting has already undermined some riprap, and is an issue	3	1	2	B	Upstream sediment a potential issue
990147	7.6 mi N/ McDowell Rd	410+00	1	RCBC	3x10	None	Some vegetation in wash	None	No major problem	None	Some vegetation in wash	Some sediment at outlet	No major problem	1	1	1	A	No major problem
36C	7.8 mi N/ McDowell Rd	421+70	2	CSP	2x4	Minor erosion in roadway channel	Some Vegetation in upstream wash	None	No major problem	Cutting on riprap	Some vegetation in wash	Sediment in wash	Cutting not too bad yet, but potential	2	1	1	B	Potential for Erosion of riprap
7667	8.0 mi N/ McDowell Rd	429+60	4	RCBC	4x10	None	Large Palo Verde tree in wash	Minimal	Barbed wire and debris strung across inlets	Severe undermining of riprap (~3-4') occurring. Palo Verde tree at riprap uprooted.	Palo Verde tree uprooted at edge of riprap	None	riprap in jeopardy of being destroyed. Major problem	4	3	1	D	Cutting major problem
7668	8.1 mi N/ McDowell Rd	435+90	6	RCBC	5x12	None	Large Palo Verde tree in wash at inlet	Some sediment in 1 of 6 barrels	Lots of debris by Palo Verde and in barbed wire fence	Severe undermining of riprap (~3-5') occurring. Palo Verde tree being uprooted at edge of riprap. Also cutting throughout wash immediately downstream.	Palo Verde tree partially uprooted at edge of riprap	None	riprap in jeopardy of being destroyed. Major problem	4	3	2	D	Cutting major problem
990148	8.5 mi N/ McDowell Rd	456+60	1	RCBC	3x10	None	Some vegetation in wash	None	Barbed wire and debris across inlets	Severe cutting (~4-6') propagating towards riprap	None	None	Severe cutting will undermine culvert	4	2	1	C	Cutting potential problem for culvert
39A	8.5 mi N/ McDowell Rd	461+50	1	CSP	2x3	Minor erosion along control fence	Lots of vegetation in wash	None	Lots of riprap, no major problem	Major cutting (~4' deep) propagating towards culvert (~15' away)	Minimal	Minimal	Cutting will undermine culvert	3	2	1	C	Severe down cutting and possible undermining of downstream

\* Stationing at McDowell Rd. is 10+00

\*\* 1-No Apparent Problem, 2-Minor Problem, 3-Significant Problem, 4-Serious Problem

\*\*\* a-Unlikely to Develop a Problem, b-Potential for Developing Problem, c-Evidence of Problem, d-Significant Problem



# Sun Valley Parkway Culvert Evaluation

## Appendix C



N8	N9 Location	Stationing *	# of Barrels	Material	Approximate Culvert Size	Upstream Headcutting	Upstream Vegetation	Upstream Sedimentation	Upstream Comments	Downstream Headcutting	Downstream Vegetation	Downstream Sedimentation	Downstream Comments	Headcutting Problem **	Vegetation Problem **	Sedimentation Problem **	Rating ***	Rating Comments
990149	8.6 mi N/ McDowell Rd	466+40	1	RCBC	5x6	Some erosion along fence	Some vegetation in wash	None	Barbed wire and debris across inlets	Severe cutting (~3-4') propagating towards riprap	None	None	Severe cutting will undermine culvert	4	2	1	C	Cutting potential problem for culvert
40C,D	8.8 mi N/ McDowell Rd	472+80	1	CSP	2x2 3x4	Some erosion at the edge of riprap	Some vegetation in wash	Minimal	Barbed wire fence collecting debris and vegetation	Cutting in wash propagating towards culvert, not as serious as 39A	Large Palo Verde tree near cutting, also one of culverts covered by vegetation	Minimal	Cutting not as serious as 39A, but will eventually reach and undermine culvert	2	3	1	C	Severe down cutting and possible undermining of downstream, not as serious as 39A
990150	8.9 mi N/ McDowell Rd	479+10	1	RCBC	3x6	Some erosion in wash	Some vegetation in wash	None	No major problem	None	Minimal	None	No major problem	1	1	1	A	No major problem
7669	9.2 mi N/ McDowell Rd	494+40	3	RCBC	5x10	None	Some vegetation in wash	None	Barbed wire and debris across inlets	Severe undermining of riprap (~3) occurring. Also cutting throughout wash immediately downstream.	None	None	riprap in jeopardy of being destroyed. Major problem	4	2	1	D	Cutting major problem
7670	9.2 mi N/ McDowell Rd	497+60	3	RCBC	5x10	Some erosion by vegetation	Palo Verde and creosote in wash	Some caused by vegetation	Waterline through inlet, barbed wire fence possible issue, and debris around vegetation	Cutting occurring at edge of riprap (~1-2')	Vegetation at the edge of riprap	Minimal	Fence and vegetation at edge of riprap possibly causing cutting at riprap.	4	2	2	D	Cutting a problem (not as bad as 7668 and 7669)
43A	9.6 mi N/ McDowell Rd	516+10	2	RCP	3x3	None	Creosote bush causing sediment	Some sediment covering part of riprap		None	Lots of vegetation almost completely blocking culverts	Debris at outlet	vegetation and debris at outlet causing problems	1	4	1	B	vegetation potential problem downstream
43B	9.7 mi N/ McDowell Rd	522+40	2	RCP	2x3	None	Minimal	None		Minor erosion on Wing wall	Vegetation covering part of one culvert	none	No major problem	1	2	1	B	Downstream wing wall erosion potential problem
43C	9.8 mi N/ McDowell Rd	528+90	3	RCP	2x3	None	Minimal	None	No major problem	Cutting (~1') propagating towards culverts	None	None	Cutting not as bad as 40C,D, but will eventually reach and undermine culverts	3	1	1	B	Erosion downstream potential problem
7671	10.0 mi N/ McDowell Rd	535+50	4	RCBC	5x10	None	Lots of vegetation in wash	Sediment and debris at inlets	Over-all not bad	Cutting (~1-2') about 50' downstream	Vegetation in wash	None	Cutting propagating towards outlet. Currently far enough downstream that there is no immediate problem.	3	2	2	C	Major cutting not yet arrived at culverts

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\*\* 1-No Apparent Problem, 2-Minor Problem, 3-Significant Problem, 4-Serious Problem

\*\*\* a-Unlikely to Develop a Problem, b-Potential for Developing Problem, c-Evidence of Problem, d-Significant Problem



# Sun Valley Parkway Culvert Evaluation

## Appendix C



N8	N9 Location	Stationing *	# of Barrels	Material	Approximate Culvert Size	Upstream Headcutting	Upstream Vegetation	Upstream Sedimentation	Upstream Comments	Downstream Headcutting	Downstream Vegetation	Downstream Sedimentation	Downstream Comments	Headcutting Problem **	Vegetation Problem **	Sedimentation Problem **	Rating ***	Rating Comments
7672	10.2 mi N/ McDowell Rd	548+20	4	RCBC	3x10	Some erosion in wash	Minimal	Lots of sediment (~1-2') covering most of riprap	Sediment major issue	None	Some large vegetation immediately downstream of outlet	Some sediment at outlet (~0.5-1')	No immediate problem	1	1	2	B	Sediment could potentially plug culvert
7673	10.2 mi N/ McDowell Rd	549+50	3	RCBC	5x10	Major cutting (~4-6') propagating upstream	Tree blocking flow to 1 barrel	Some sediment	Cutting major issue	Minimal cutting in downstream wash	Some vegetation in wash	None	No immediate problem	3	2	1	C	Upstream cutting and tree blocking culvert potential issues
990189	10.5 mi N/ McDowell Rd	562+10	1	RCBC	3x10	None	Minimal	None	No major problem	Cutting just downstream of riprap (~2')	None	None	No major problem	3	1	1	B	Cutting potential problem for culvert
990190	10.8 mi N/ McDowell Rd	582+40	1	RCBC	3x10	None	Minimal	None	No major problem	None	Minimal	Minimal (~6")	No major problem	1	1	1	A	No major problem
7674	11.1 mi N/ McDowell Rd	593+60	3	RCBC	3x10	Cutting in wash (~4')	Lots of vegetation in wash	Sediment covering most of riprap	Cutting, vegetation and sediment all issues	Some cutting (~1-2') in downstream was	Minimal	None	Cutting propagating towards outlet. Currently far enough downstream that there is no immediate problem.	3	2	2	B	Cutting and vegetation problems
7675	11.2 mi N/ McDowell Rd	600+50	4	RCBC	3x10	None	Minimal	None	No defined wash	Cutting (~3') in downstream wash as far as can be seen	Large trees at outlet	Minor (~2-4")	Cutting could eventually reach outlet	3	2	1	C	Cutting and vegetation problems
7676	11.8 mi N/ McDowell Rd	633+50	3	RCBC	4x10	None	Thick vegetation. There appears to be standing water	None	Vegetation a potential issue	Erosion at edge of riprap, and cutting (~2') 15' downstream	Large trees and shrubs at edge of riprap	Debris in wash	Waterline through culvert is completely suspended due to cutting. Cutting is approaching riprap. Joint with 7677.	3	2	2	C	Cutting and vegetation problems
7677	11.8 mi N/ McDowell Rd	634+90	3	RCBC	4x10	Minor gullying, wash starting to form	Thick vegetation	None		Erosion at edge of riprap, and cutting (~2') 15' downstream	Large trees and shrubs at edge of riprap	Debris in wash	Waterline through culvert is completely suspended due to cutting. Cutting is approaching riprap. Joint with 7676.	3	2	1	C	Cutting and vegetation problems

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\*\*\* a-Unlikely to Develop a Problem, b-Potential for Developing Problem, c-Evidence of Problem, d-Significant Problem

# Sun Valley Parkway Culvert Evaluation

## Appendix C

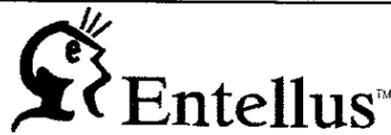


N8	N9 Location	Stationing *	# of Barrels	Material	Approximate Culvert Size	Upstream Headcutting	Upstream Vegetation	Upstream Sedimentation	Upstream Comments	Downstream Headcutting	Downstream Vegetation	Downstream Sedimentation	Downstream Comments	Headcutting Problem **	Vegetation Problem **	Sedimentation Problem **	Rating ***	Rating Comments
7678	11.9 mi N/ McDowell Rd	637+10	3	RCBC	6x10	None	Trees blocking some inlets	Sediment, covering lots of riprap. It is a very large sandy wash	7678, 7679 & 7680 part of same system	None	Some vegetation at/on riprap	Minimal	Large sandy wash, no major problems. Joint with 7679 and 7680.	1	2	2	A	Sediment only potential problem
7679	11.9 mi N/ McDowell Rd	638+00	3	RCBC	6x10	None	Trees blocking some inlets	Sediment, covering lots of riprap. It is a very large sandy wash	7678, 7679 & 7680 part of same system	None	Some vegetation at/on riprap	Minimal	Large sandy wash, no major problems. Joint with 7678 and 7680.	1	2	2	A	Sediment only potential problem
7680	11.9 mi N/ McDowell Rd	638+90	3	RCBC	6x10	None	Trees blocking some inlets	Sediment, covering lots of riprap. It is a very large sandy wash	7678, 7679 & 7680 part of same system	None	Some vegetation at/on riprap	Minimal	Large sandy wash, no major problems. Joint with 7678 and 7679.	1	2	2	A	Sediment only potential problem
7681	11.9 mi N/ McDowell Rd	640+90	3	RCBC	4x10	None	Thick vegetation	None	7681 & 7682 part of same system. No defined wash	None	Lots of vegetation along fence at edge of riprap	None	Fence and vegetation could possibly cause problem. Joint with 7682.	1	2	1	A	Sediment only potential problem
7682	12.0 mi N/ McDowell Rd	641+80	3	RCBC	4x10	None	Thick vegetation	None	7681 & 7682 part of same system. No defined wash	None	Lots of vegetation along fence at edge of riprap	None	Fence and vegetation could possibly cause problem. Joint with 7681.	1	2	1	A	Sediment only potential problem
990191	13.1 mi N/ McDowell Rd	702+30	1	RCBC	4x10	Some erosion on wing wall	Some vegetation in wash	None	Erosion on wing wall could be future problem	Mild gulying in wash and mild cutting along fence	Minimal	None	No major problems, potential with gulying and erosion	3	2	1	C	Erosion on wing wall a problem for culvert
7683	13.9 mi N/ McDowell Rd	742+40	2	RCBC	3x10	None	Heavy vegetation at edge of riprap	None	Heavy vegetation only possible issue	Mild gulying in wash, minor erosion at edge of riprap and erosion along fence	Some vegetation al edge of riprap	None		2	3	1	B	Sediment and minor erosion only potential problems

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\*\* 1-No Apparent Problem, 2-Minor Problem, 3-Significant Problem, 4-Serious Problem

\*\*\* a-Unlikely to Develop a Problem, b-Potential for Developing Problem, c-Evidence of Problem, d-Significant Problem



# Sun Valley Parkway Culvert Evaluation

## Appendix C



ID	N9 Location	Stationing *	# of Barrels	Material	Approximate Culvert Size	Upstream Headcutting	Upstream Vegetation	Upstream Sedimentation	Upstream Comments	Downstream Headcutting	Downstream Vegetation	Downstream Sedimentation	Downstream Comments	Headcutting Problem **	Vegetation Problem **	Sedimentation Problem **	Rating ***	Rating Comments
7684	14.1 mi N/ McDowell Rd	756+30	2	RCBC	3x10	None	Heavy vegetation at edge of riprap	None	Heavy vegetation and standing water only possible issues.	Erosion at the edge of riprap, cutting behind headwall, cutting in downstream wash	Vegetation at the edge of riprap	None	Cutting behind headwall potentially major problem	3	3	1	C	Erosion on headwall an issue of concern
7685	14.3 mi N/ McDowell Rd	766+50	6	RCBC	5x10	Cutting (~1-2') in upstream wash	None	None	No major problem	Major cutting (~6') on off chute of wash	Vegetation at the edge of riprap	Lots of sediment covering riprap, and at large rocks at end of riprap. Lots of sediment in channel	Cutting is a major problem. Already taken out part of barbed wire fence, possibly uproot trees in near future	4	2	2	C	Cutting could potentially be a major problem
7686	14.9 mi N/ McDowell Rd	794+40	2	RCBC	3x10	None	None	Some sediment in bottom of channel	Concrete lined channel. Ponding occurs in between drop structures and sediment is deposited all along channel	None	Some grasses growing in sediment	6-8" of sediment throughout downstream channel	This channel empties into 7685 wash. Quite a bit of sediment throughout channel	1	1	2	A	No major problem
990192	17.7 mi N/ McDowell Rd	945+90	1	RCBC	3x10	Very minor erosion at edge of riprap	Some vegetation at edge of riprap	None	No major problem	None	None	Minimal	No major problem	1	1	1	A	No major problem
990193	18.1 mi N/ McDowell Rd	967+40	1	RCBC	3x10	Possible beginning of major cutting upstream of dirt road crossing. Erosion along road, erosion at fence posts	Minimal	None	Potential for cutting	None	Some vegetation at outlet	Some sediment at outlet	No major problem	2	1	1	B	Potential for cutting a problem
7687	18.3 mi N/ McDowell Rd	978+30	6	RCBC	4x10	Gullying started upstream	Minimal	Minimal		Some gullying in wash	Vegetation at outlet	Minimal	No major problem	2	1	1	B	Potential for cutting a problem
7688	18.4 mi N/ McDowell Rd	980+20	2	RCBC	3x10	Cutting (~2-3') started at dirt road crossing and propagating upstream	Minimal	Minimal	Cutting could be a problem	Some gullying in wash	Vegetation at outlet	Minimal	No major problem	3	1	1	C	Potential for cutting a problem
990194	18.5 mi N/ McDowell Rd	987+00	1	RCBC	8x10	~2-3ft of erosion (down to rock)	Bushes growing in half of box, other half clean	Half of box with lots of sediment	Erosion and bushes in culvert potential problems	None	Some vegetation in wash	Some sediment at outlet	No major problem	2	2	2	B	Vegetation and erosion potential problems
67A	18.8 mi N/ McDowell Rd	1000+70	1	CSP	2x3	***	***	***	***	Minimal at outlet	None	None	Fence directly in front of outlet which could cause future problem	1	1	1	A	No major problem

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\*\* 1-No Apparent Problem, 2-Minor Problem, 3-Significant Problem, 4-Serious Problem

\*\*\* a-Unlikely to Develop a Problem, b-Potential for Developing Problem, c-Evidence of Problem, d-Significant Problem



# Sun Valley Parkway Culvert Evaluation

## Appendix C



N8	N9 Location	Stationing *	# of Barrels	Material	Approximate Culvert Size	Upstream Headcutting	Upstream Vegetation	Upstream Sedimentation	Upstream Comments	Downstream Headcutting	Downstream Vegetation	Downstream Sedimentation	Downstream Comments	Headcutting Problem **	Vegetation Problem **	Sedimentation Problem **	Rating ***	Rating Comments
7689	18.9 mi N/ McDowell Rd	1006+30	5	RCBC	4x10	Minor gulying occurring	Minimal	None	No well defined wash, retention area	Some gulying in wash, no well defined wash	Vegetation at outlet	Minimal	No major problem	2	2	1	B	Potential for cutting a problem
7690	18.9 mi N/ McDowell Rd	1008+80	5	RCBC	3x12	None	Lots of vegetation	None	No well defined wash, retention area	Some gulying in wash	Vegetation at outlet	Minimal	No major problem	1	2	1	B	Potential for cutting a problem
7691	19.1 mi N/ McDowell Rd	1015+40	4	RCBC	4x10	Minimal erosion	Minimal	None	No well defined wash, retention area	None	Minimal	Minimal	No major problem	2	2	1	B	Potential for cutting a problem
990195	19.1 mi N/ McDowell Rd	1020+40	1	RCBC	3x10	Erosion along bank riprap, breaking of riprap	Minimal	Some sediment (~1ft). 1' by-pass pipe almost completely clogged	Erosion in particular and sediment issues of concern	Some erosion at road crossing	Minimal	None	No major problem	3	1	2	C	Erosion and sediment problems
7692	19.3 mi N/ McDowell Rd	1026+00	4	RCBC	3x10	Gulying/ erosion occurring at the edge of riprap	Lots of vegetation	None	Gulying and erosion could become major issue	None	Minimal	None	No major problem	2	2	1	B	minor erosion only potential problem
990196	19.5 mi N/ McDowell Rd	1040+70	1	RCBC	3x10	None	None	None	Lots of riprap, no major problems	Some erosion at edge of riprap and minor cutting in downstream wash	Minimal	None	riprap erosion could be possible problem in future	2	1	1	B	Erosion on riprap a potential problem
7693	19.6 mi N/ McDowell Rd	1043+80	6	RCBC	4x12	Some erosion on riprap and gulying in wash	Vegetation in wash	Minimal	Vegetation causing some sedimentation and debris	None	Vegetation at outlet	Minimal	No major problem	1	2	1	A	No major problems
7694	19.7 mi N/ McDowell Rd	1048+30	6	RCBC	4x12	Erosion on concrete apron	Lots of vegetation	Some sediment in culverts, more at end of concrete apron	Concrete apron could possibly break in future	None	Fairly heavy vegetation at outlet	Minimal	No major problem	3	2	2	C	minor erosion only potential problem
7695	19.7 mi N McDowell Rd	1052+50	5	RCBC	4x12	Minimal erosion	Minimal	None		None	Vegetation at outlet	Minimal	No major problem	1	1	1	A	No major problems
990197	19.8 mi N/ McDowell Rd	1057+50	1	RCBC	8x10	Some cutting in wash (~2') and erosion on the banks	Minimal	Minimal	Cutting and erosion could be potential problems	None	Minimal	Minimal	Standing water at outlet, but no major problems	2	1	1	B	Cutting in wash potential problem
76A	19.8 mi N McDowell Rd	1064+20	1	CSP	2x3	***	***	***	***	None	Minimal	None	No major problem	1	1	1	A	No major problem

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# Sun Valley Parkway Culvert Evaluation

## Appendix C



N8	N9 Location	Stationing *	# of Barrels	Material	Approximate Culvert Size	Upstream Headcutting	Upstream Vegetation	Upstream Sedimentation	Upstream Comments	Downstream Headcutting	Downstream Vegetation	Downstream Sedimentation	Downstream Comments	Headcutting Problem **	Vegetation Problem **	Sedimentation Problem **	Rating ***	Rating Comments
7696	20.4 mi N/ McDowell Rd	1087+90	3	RCBC	3x8	cutting in wash (~2')	Minimal	Minimal	Cutting could be a problem	None	Vegetation at outlet	Minimal	No major problem	2	1	1	B	Cutting in wash potential problem
7697	21.4 mi N/ McDowell Rd	1139+50	6	RCBC	5x12	None	Lots of vegetation/ trees at edge of riprap	Minimal sediment (~1.5')	Lots of riprap along banks	None	Vegetation at outlet	Minimal	No major problem	1	2	2	A	Vegetation only possible problem
7698	21.6 mi N/ McDowell Rd	1148+90	6	RCBC	8x10	Erosion in wash exposing fence posts, and edge of riprap	Some vegetation in wash and Palo Verde tree blocking entire inlet	Some sediment in culverts (plants growing in sediment)	Tree in culvert and erosion of wash/ fence are problems	None	Vegetation at outlet	Minimal	No major problem	2	2	1	B	Cutting in wash potential problem
7699	22.1 mi N/ McDowell Rd	1177+80	4	RCBC	3x10	None	Minimal	Sediment in 1 inlet	No major problem	None	Minimal	None	No major problem	1	1	2	A	No major problem
7700	22.5 mi N/ McDowell Rd	1196+30	4	RCBC	4x10	None	Large bushes at edge of riprap	Minimal	No major problem	Minor cutting wash, looks to have stabilized	Large tree in wash	Minimal	No major problem	1	1	2	A	No major problem
7701	22.6 mi N/ McDowell Rd	1201+90	6	RCBC	6x10	Erosion where concrete apron empties in front of culverts	Heavy Vegetation	None	Erosion could undermine concrete apron. Heavy vegetation possible future problem	None	Minimal	None	No major problem	2	2	1	B	Vegetation and cutting potential problems
7702	22.9 mi N/ McDowell Rd	1220+60	4	RCBC	3x8	Minimal gullyng occurring	Heavy Vegetation	None	Heavy vegetation a possible future problem	None	Minimal	None	No major problem	2	2	1	A	Vegetation only potential problem
7703	23.4 mi N/ McDowell Rd	1245+50	4	RCBC	4x10	Minimal erosion	Heavy Vegetation	None	Heavy vegetation a possible future problem	Some erosion road crossing, and some cutting in wash	Fairly heavy vegetation at outlet	None	No major problem	2	2	1	B	Vegetation and cutting potential problems
990198	23.6 mi N/ McDowell Rd	1257+00	1	RCBC	8x10	Erosion behind headwall, on side banks and in wash	Minimal	Minimal	Erosion could be potential problem, especially behind headwall	Erosion on wing wall	Minimal	Minimal	Erosion on wing wall a future problem	4	1	1	C	Erosion on wing wall a problem for culvert

\* Stationing at McDowell Rd. is 10+00

\*\* 1-No Apparent Problem, 2-Minor Problem, 3-Significant Problem, 4-Serious Problem

\*\*\* a-Unlikely to Develop a Problem, b-Potential for Developing Problem, c-Evidence of Problem, d-Significant Problem



# Sun Valley Parkway Culvert Evaluation

## Appendix C



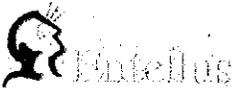
N8	N9 Location	Stationing *	# of Barrels	Material	Approximate Culvert Size	Upstream Headcutting	Upstream Vegetation	Upstream Sedimentation	Upstream Comments	Downstream Headcutting	Downstream Vegetation	Downstream Sedimentation	Downstream Comments	Headcutting Problem **	Vegetation Problem **	Sedimentation Problem **	Rating ***	Rating Comments
7704	24.1 mi N/ McDowell Rd	1283+50	2	RCBC	8x10	Erosion on dirt road crossing	None	Minimal	Road could become difficult to use	None	Minimal	None	No major problem	2	1	1	A	No major problem
7705	24.2 mi N/ McDowell Rd	1288+60	3	RCBC	3x10	None	Bushes at edge of riprap	Debris and sediment/large rocks blocking most of both inlets	Culvert currently has minimal capacity	None	None	Some larger rocks in culvert	No major problem	1	2	4	C	Upstream culvert blocked significantly with debris

\* Stationing at McDowell Rd. is 10+00

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**APPENDIX D. PHOTOGRAPHS**



7647: Upstream Inlet- Large amounts of sediment



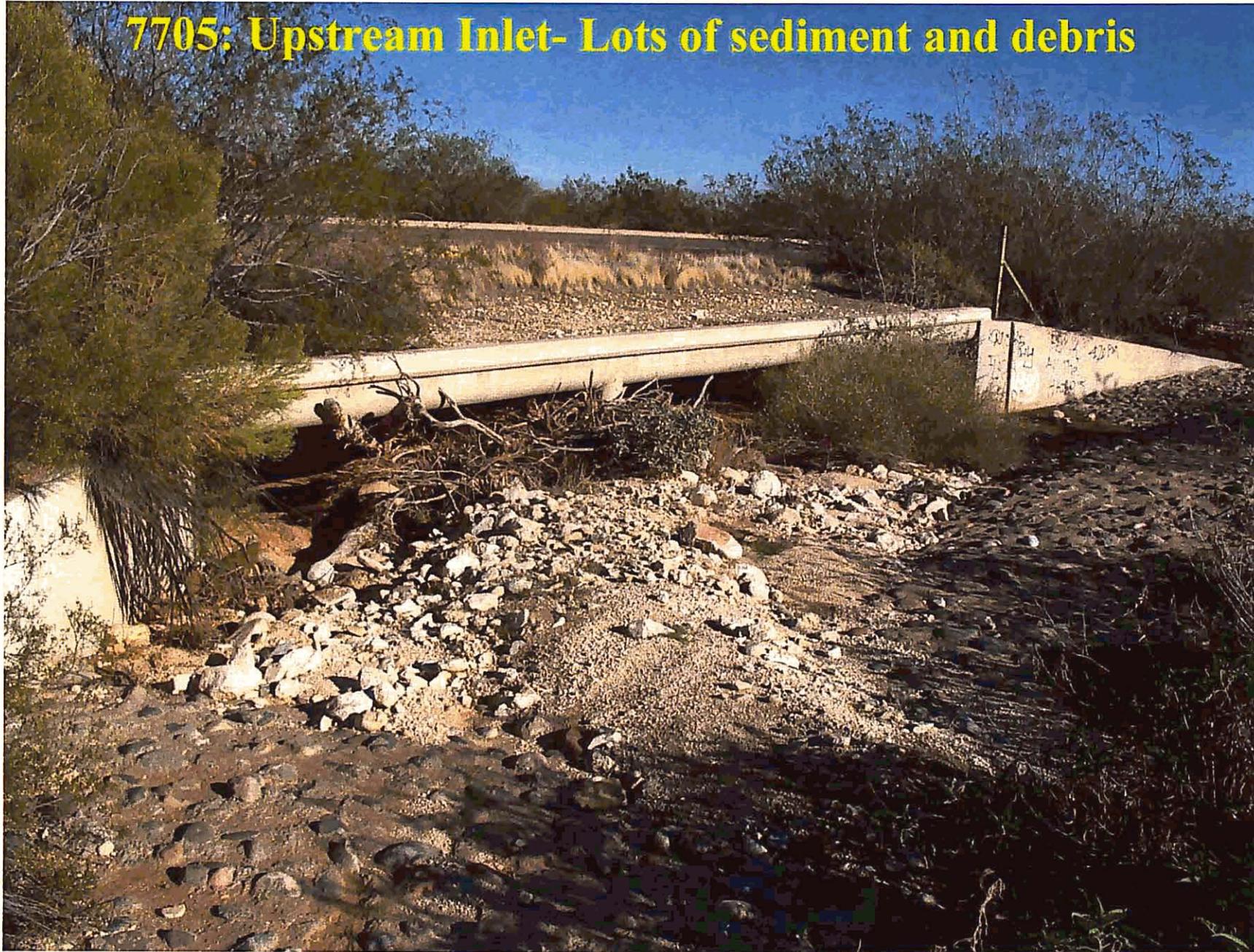
**7650: Upstream Inlet- Heavy sediment ~1-1.5' of flow depth**



**7663: Upstream Inlet- Heavy sediment  
4 barrels restricted to 1-1.5' of flow depth**



**7705: Upstream Inlet- Lots of sediment and debris**



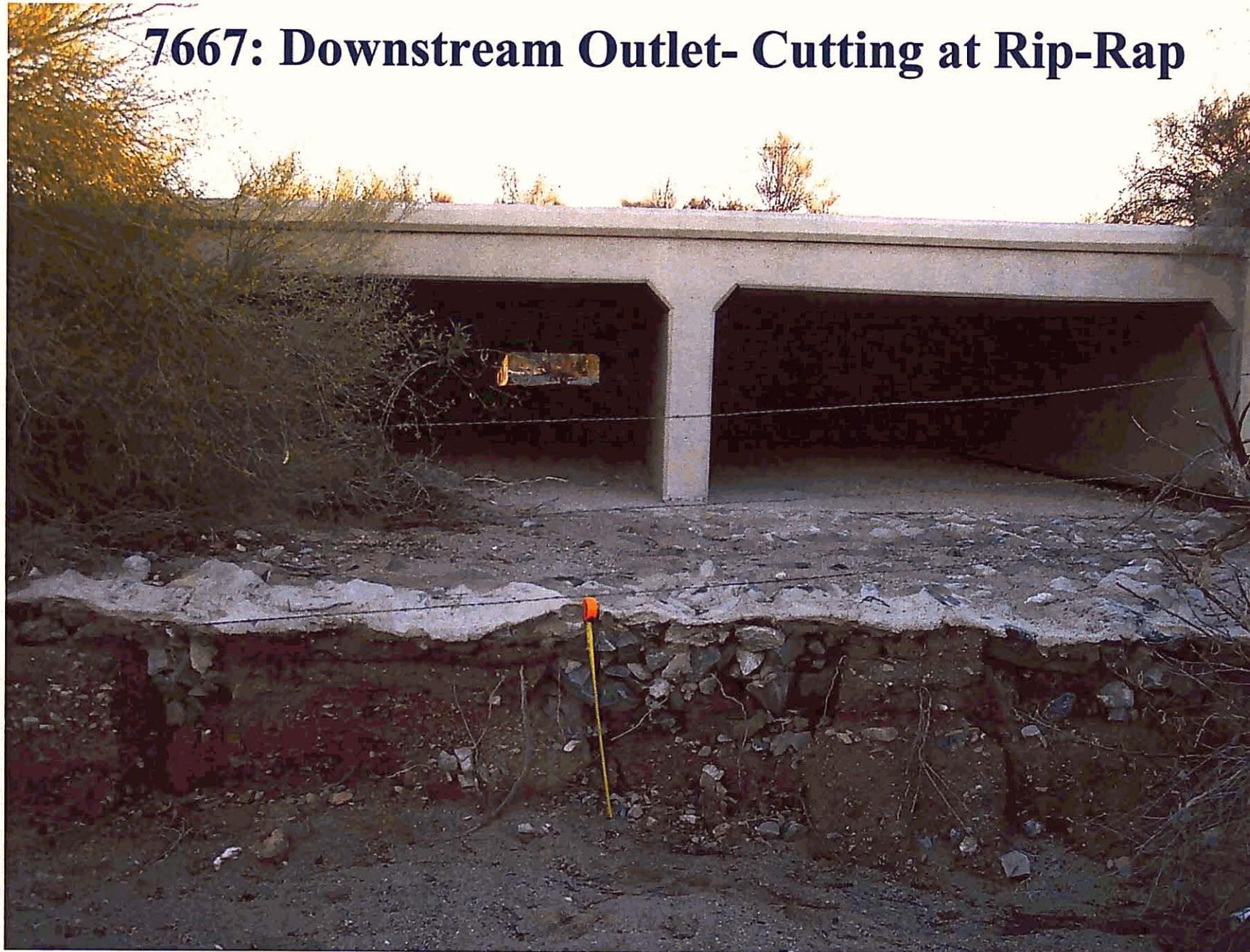


**990149: Downstream Outlet- Cutting near Rip-Rap**

## 7650: Upstream Inlet- Major cutting along road channel



# 7667: Downstream Outlet- Cutting at Rip-Rap



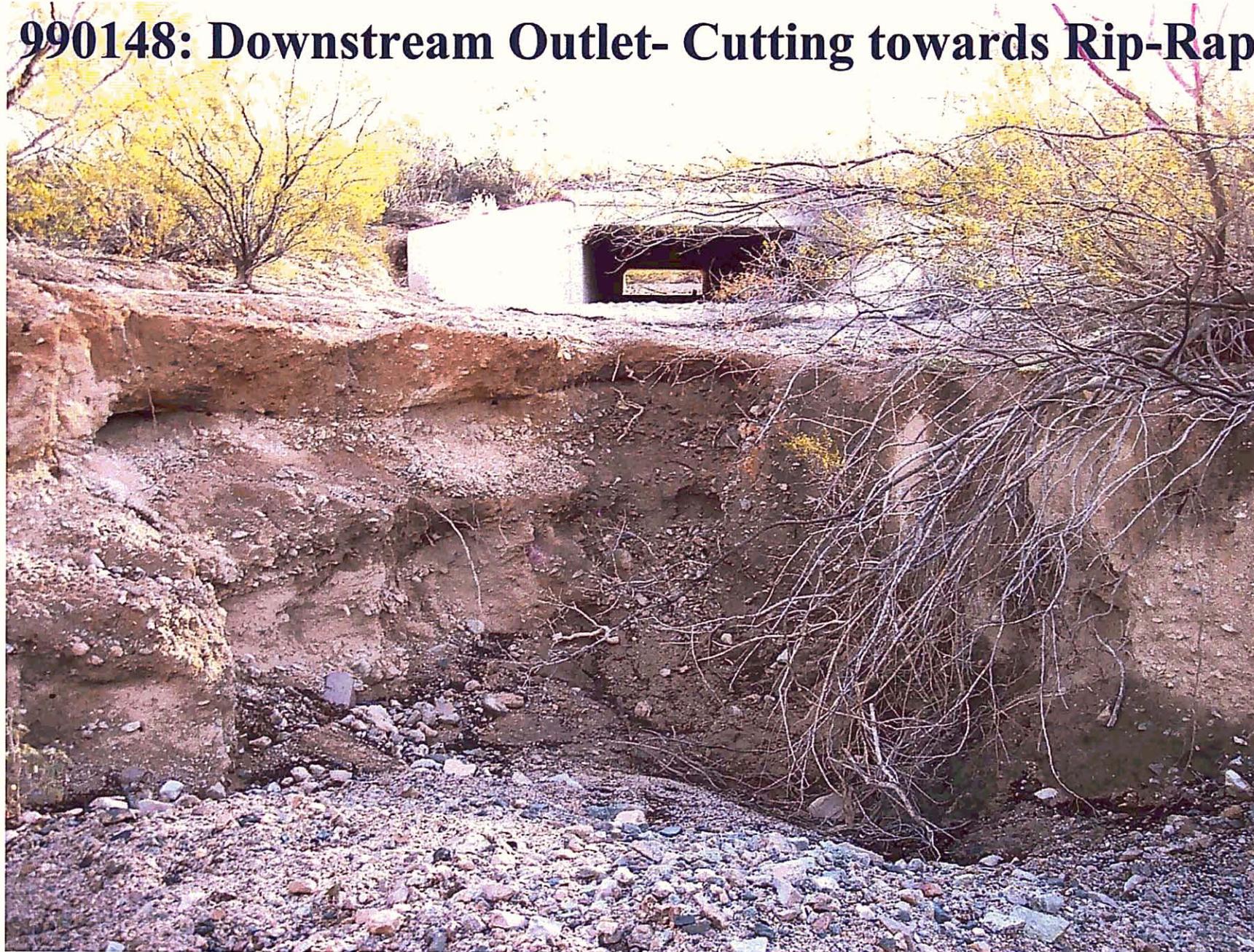
# 7669: Downstream Outlet





**7685: Downstream Outlet- Heavy cutting (~6') off of wash**

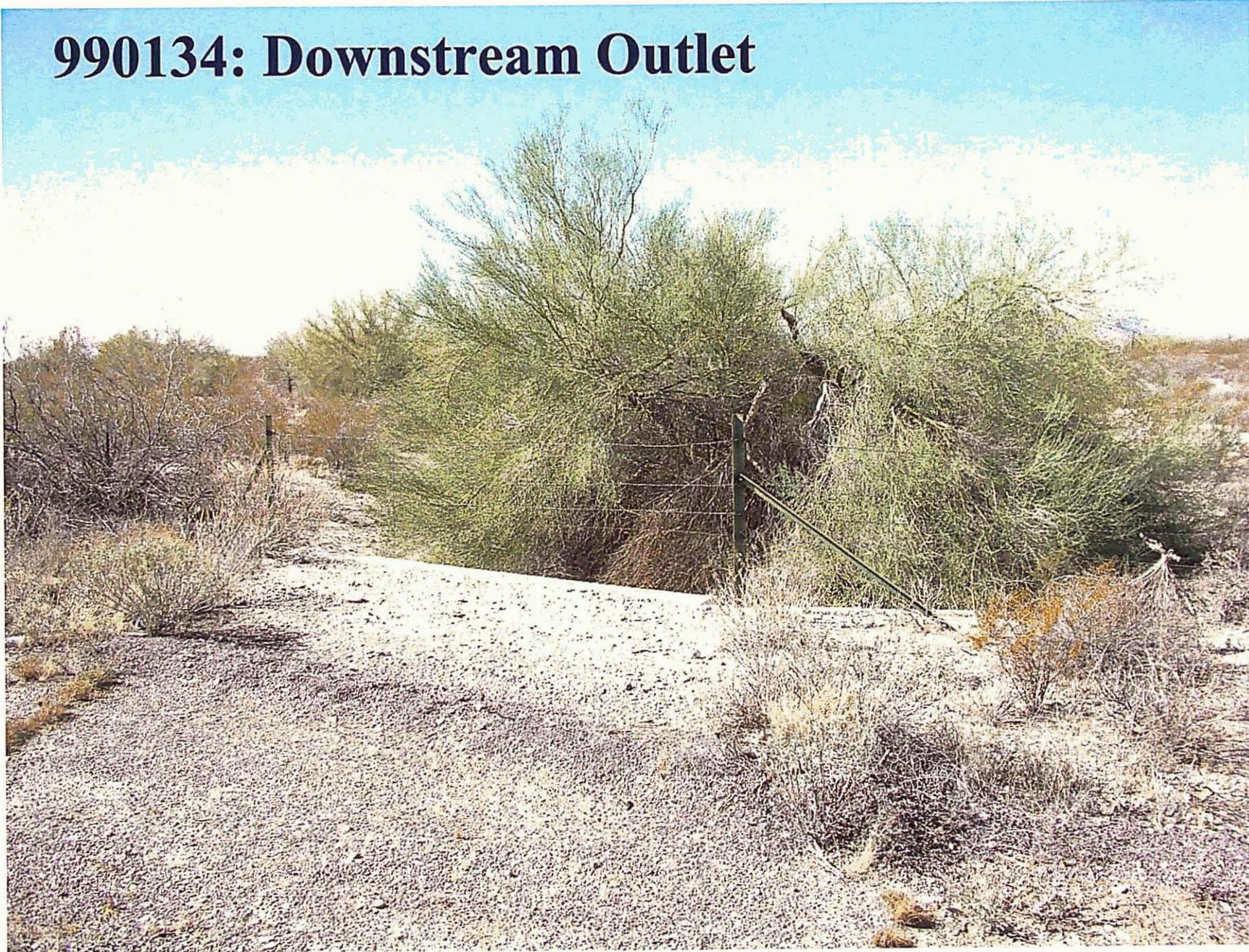
# 990148: Downstream Outlet- Cutting towards Rip-Rap



# 7651: Downstream Outlet- Large trees at outlet



# 990134: Downstream Outlet



**APPENDIX E. DIGITAL FILES**

