SUN CITY
DRAINAGE CHANNELS

INSPECTION AND REPORT OF EXISTING CONDITIONS

Prepared For

DEL WEBB HOME CONSTRUCTION
P.O. Box 1705
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By

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INTRODUCTION

As Sun City was developed through the years, a network of drainage channels had been constructed to safely convey storm water runoff to designated outfill locations. The channels typically are lined with 2" of wire fabric reinforced pneumatically placed mortar (gunite). Construction of the channel system was phased over time with the oldest channel being completed over twenty years ago. The channels were constructed within drainage easements or public right-of-way.

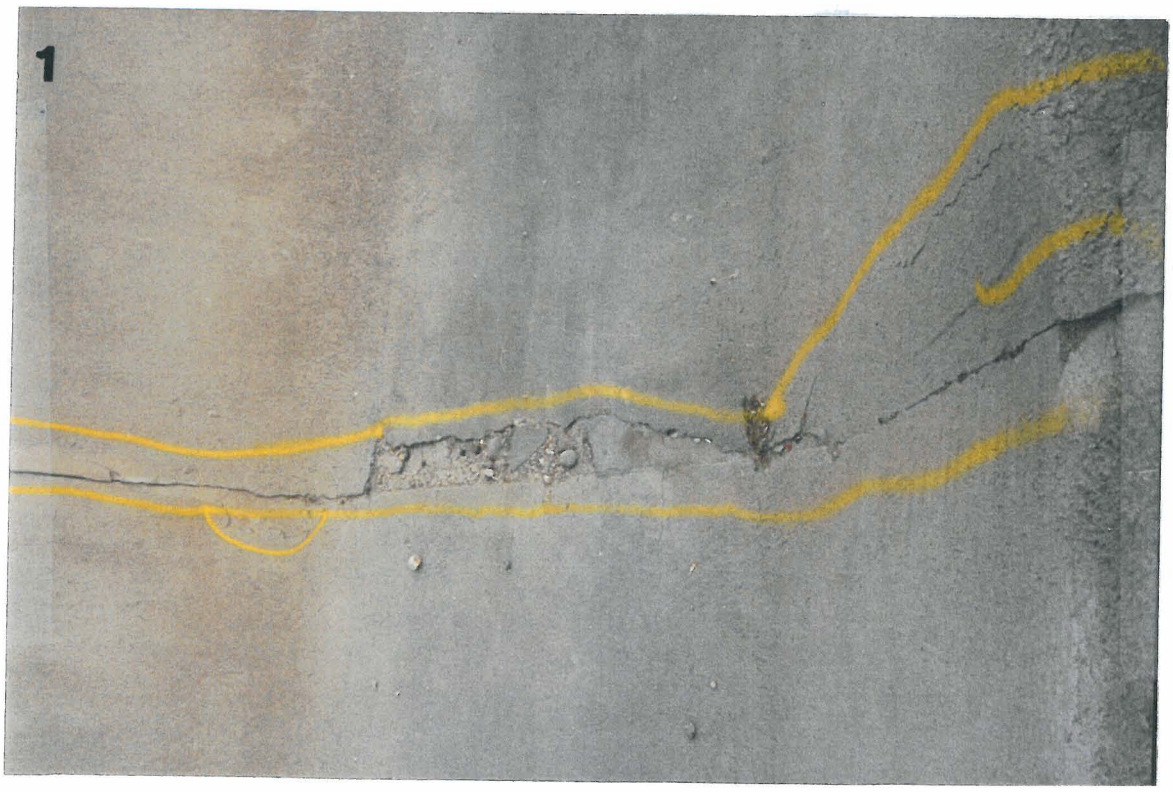
Del Webb desires to relinquish its ownership of these channels to the Maricopa County Flood Control District. The purpose of this investigation and report is to provide as consulting engineers our assessment of the condition of the drainage channels, noting areas of deficiency, if any, and to recommend repairs if needed. This report may be relied upon by the Maricopa County Flood Control District and Del Webb in developing conditions for transfer of ownership of the channels.

APPROACH

On December 20, 21 and 26, 1989, a team from Stanley Consultants inspected the drainage channel system. The typical inspection routine consisted of establishing centerline stationing, with tick marks every 100' and station callouts every 500'. All markings were done with yellow spray paint. Field notes were kept noting deficiencies and relating them to channel station. Specific problem areas were outlined with yellow paint. Photographs were taken to illustrate typical deficiencies.

Subsequent to the field investigation, discussions were held with several concrete repair contractors to gain their insight into possible remedies for some of the more unusual failures noted in the investigation.

Lastly, this report was prepared to summarize our findings and quantify the necessary repair work.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FINDINGS & RECOMMENDATIONS

Listed below, by station, are our inspection notes and findings for each individual channel, as well as statement regarding its general condition. At the end of each set of inspection notes are recommended repair procedures.

1. NORTH OF OLIVE AVENUE - 99TH AVENUE TO 103RD AVENUE

This channel is ± 1500' long with approximately 5800 square yards of gunite. It is the oldest channel segment in the network. The channel has evidence of wire reinforcement and appears to have previously been patched with mortar but surface cracking has reappeared. There is a large amount of cracking the full length of the channel. Base structure appears to be sound. Some surface scaling and flaking was noticed. The most excessive damage is centered around the expansion joints. Some small voids were noted behind the channel lining along the top of the slope. Approximately 120 square yards of removal and replacement was marked in the field.

0+00 Expansion joint at west end of box culvert at 99th Avenue heading west.

0+16 Some minor patching of old cracks. ±24" pipe to south.

See Photo #1 for typical expansion joint cracking, this channel

0+62 Spillway from north. Water has ponded from continual use.

0+85 Expansion joint cracking. Vertical separation on south side.

1+04 Bottom cracking, minor.

1+14 North and south sides, bottom, 4"x8" hole through to dirt.

1+57 3 overhead conduits. One scupper from north. Ninos Pizza washes grease into channel at this point.

1+66 Scupper to south.

2+07 2"x6" hole through to dirt at expansion joint.

2+92 Pipe from north.

3+29 Expansion joint cracking out at bottom. Not to dirt but quite rough, 1'x10'.

3+58 Expansion joint blow out on north side, 3'x10'.

3+89 Expansion joint holes on north and south sides. Not to dirt, but quite rough, 1'x3' and 2'x2'.

3+93 Spillway from north.

4+48 Expansion joint blowout and holes 1' to 2' wide for full width of channel. Hole to dirt in bottom for 60% of width.


2

4+77 Expansion joint. Small hole on north side, not to dirt.

5+10 Expansion joint. Hole to dirt in bottom on south side, 1'x5'.

5+39 Expansion joint. Scaling and cracking. Surface gone but not through to dirt, 1'x10'.

5+72 Expansion joint blow out. Large hole with grass growing through. Cracked and broken full width of bottom, 20'x1' to 3'. See photo #2.

6+05 Hole in expansion joint with grass growing, 1'x1' and 3'x4' and 1'x1'.

6+13 Scupper from north.

6+35 Expansion joint. Scaly surface holes. 3 holes through to dirt, 3 - 1'x1'.

6+65 Expansion joint. Edge separation on south side. Scaly cracking on north side. Broken piece on top of north bank, 1' to 2' wide the whole width.

6+96 Expansion joint. Minor surfaces scaling not through to dirt, 2 - 1'x2'.

7+29 Expansion joint blow out. 2' wide x full width of bottom, through to dirt.

7+62 Expansion joint. 3 scaly holes 2 - 1'x1', 1 - 1'x2'.

7+92 Expansion joint. 4 scaly holes, one through to dirt. 4 - 1'x2'.

8+25 Expansion joint blow out in bottom. 1'x5'. Scaly hole 1'x2'.

8+34 Scupper from north.

8+55 Expansion joint. 1'x2' scaly hole.

8+85 Blow out in bottom at expansion joint. 20'x2' to 4' to dirt with grass.

9+17 Expansion joint. 2 holes, 1' x 1'. One hole through to dirt.

9+51 Expansion joint. Large hole with grass and broken concrete in bottom, 20'x4'.

9+71 Pipe to north.

9+81 Expansion joint. Scaly crack full width of bottom, 2'x13'.

10+15 Expansion joint. Scaly crack 1'x1'.

10+45 Large scaly crack, 3'x14' not through to dirt.

10+56 Scupper from north.

10+78 Expansion joint. Excessive cracking and scaly holes, 5'x15'.

10+86 ±36" pipe from south.


3

11+14 Expansion joint. Scaly crack section 4'x15'. 2 small holes to dirt.

11+45 Expansion joint. Scaly cracking. 3'x15'.

11+64 to

11+89 Whole bottom and 3' wide along expansion joint is bad, 25'x13'. See photo #3.

12+10 Expansion joint. 1'x10'. Vertical separation. 4'x4' hole to dirt in middle.

12+40 Expansion joint across bottom is blowing out with minor holes, 3'x15'.

12+92 Expansion joint. 2 - 1'x2'. Scaly holes not through to dirt.

13+25 Expansion joint. Scaly holes 2' x 16'. Some through to dirt.

13+60 Expansion joint. Break out cracking on south side. Overlap of gunite on north side. Looks bad but feels solid. Gunite appears to be shot at different times or possibly overlaid on this whole area to the north. 2'x10', 1'x2'.

13+81 South bank separating crack, 1'x6'.

14+07 Expansion joint. South bank separating cracked out. Sliver in bottom not out just cracked, 1'x16'.

14+45 to

14+77 North wall shows excessive cracking to a large blow out, 32'x7'.

14+84 Cracked area at bridge and at hole in expansion joint to dirt 2'x3' and 1'x1'.

15+00 Under box culvert at 103rd Avenue.

Most of the failures in this segment center on the expansion joints. They have apparently ceased to operate property over time probably due to being filled with sand or pebbles and preventing movement of the slabs, thereby allowing for cracking outside of the joint area. The appearance of the joints are made worse by the application of a mortar top-coat which has chipped away. It is recommended in these areas that all loose concrete and vegetation be removed. Broken areas of concrete at the joints should be saw-cut out and replaced with mortar patch. Joints should be routed clean.

In several areas at either end of the channel, where blow-out has occurred, the concrete should be removed entirely. The base should be allowed to dry and then reshaped. New gunite, complete with wire reinforcing, should then be installed.

On the west end of the channel along the south side are several areas where a minor amount of wash out under the lip of the lining turndown has occurred. Pressure grouting of these voids will prevent future failure and blow-outs due to migration of water.

2. ALLEY SOUTH GRAND - 102ND AVENUE TO 103RD AVENUE

This is an asphalt paved alley accepting drainage from surrounding properties mostly to the north. With the exception of the west 200', the entire length is in poor repair with very large holes. The alley will need to have holes repaired and a full length overlay to put back into shape.


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3. CHANNEL NORTH OF GRAND AVENUE

FULL LENGTH EAST PROPERTY LINE TO 99TH AVENUE

This reach is 2530 feet long with approximately 11,200 square yards of wire reinforced gunite. Approximately 420 s.y. of gunite removals and replacement will be required to repair this section, mostly due to blow outs along the bottom. Also a large section of approximately 340 s.y. of gunite is missing, possibly due to an old box culvert being removed and not filled in. This segment will require a large amount of crack repair and most of the expansion joints are rough and pushed up. Cracking is excessive in numerous areas. Bottom is very irregular and rough. The majority of this channel has only minor cracking with the exceptions above. Some voids at the top edge of channel.

0+00 Edge of new concrete channel to east of Sun City property line.

0+15 Temporary security fence.

See Photo #4 Station 1+00 looking east to Station 0+00

0+00 to

1+26 Bottom is blown out and broken, 126'x18' mostly bad. North side 50'x12' is bad.

See Photo #5 Station 1+00 mark and blow out at bottom looking to west.


6


7

1+26 Expansion joint separating on north slope. See Photo #6.

1+04 to

1+26 North wall cracked and blown out.

1+60 Expansion joint. South one-half of bottom is blown out and scaling, 2'x9'.

Note: All expansion joints are rough with minor chipping but still strong.

3+30 Crack on south side with vegetation.

6+26 to

6+84 Cracking along south slope with vegetation and blown out areas.

6+82 Pipe to north.

7+86 Gunite abuts concrete slab and flairs out.

8+00 End concrete slab. Begin dirt bottom.

8+75 Begin concrete slab. See photos #7 and #8.

8+89 Begin Gunite.

±8+80 to

8+95 Gunite on north wall is cracked.

Note: Gunite slopes in the whole area adjacent to concrete slabs on both sides. On both sides material has washed out from behind and is jagged and cracked for a large part.


8


9

9+60 to

9+77 Pipe from northwest. Break in gunite, may be due to channel access point. See photo #9.

10+53 to

10+92 Excessive cracking on north slope.

10+57 Pipe to south.

11+12 Expansion joint. Scaling and excessive cracking, 2'x15'.

13+20 to

13+57 Excessive cracks on south slope.

13+32 Pipe to north.

15+50 Pipe to north.

15+53 Pipe to north.

16+35 Expansion joint. Blow out in bottom 2'x4'.

18+13 Scaly surface chipping but sound base.

18+56 Pipe to north.

18+95 to

19+53 Shows minor excessive cracking in bottom, but still very sound.

19+53 to

19+66 4' wide cracked sink spot.

19+98 Expansion joint. 7'x2' blow out. Cracked loose but not out.

20+57 Pipe to north.

22+39 Small hole 1'x1'.

22+90 Pipe to north.

23+96 Cracked hole 2'x3'.

24+15 Scabby patch full section. Looks bad, but feels sound.

25+30 Begin box culvert under 99th Avenue.

Generally, the failure of this channel is due to the migration of run-off generated within the railroad right-of-way. This water collects and ponds at the edge of the lining on the south side of the channel and washes under the lining, leaving large voids. The water travels downstream where it enters through cracks or blow-out areas. Some expansion joint failure has also occurred.

Recommended repair of this segment includes removal and replacement of all gunite broken up at blow-out areas. Voids created by migration of water should be pressure grouted. Scuppers should be installed along the south edge of the channel at intervals of not more than 200 feet. Minor grading at the top of the channel is recommended to direct flows into the scuppers and discourage ponding adjacent to the channel edge.

From stations 8+00 to 8+89, the banks should be reshaped and new gunite lining installed. The existing concrete slabs can remain in place.

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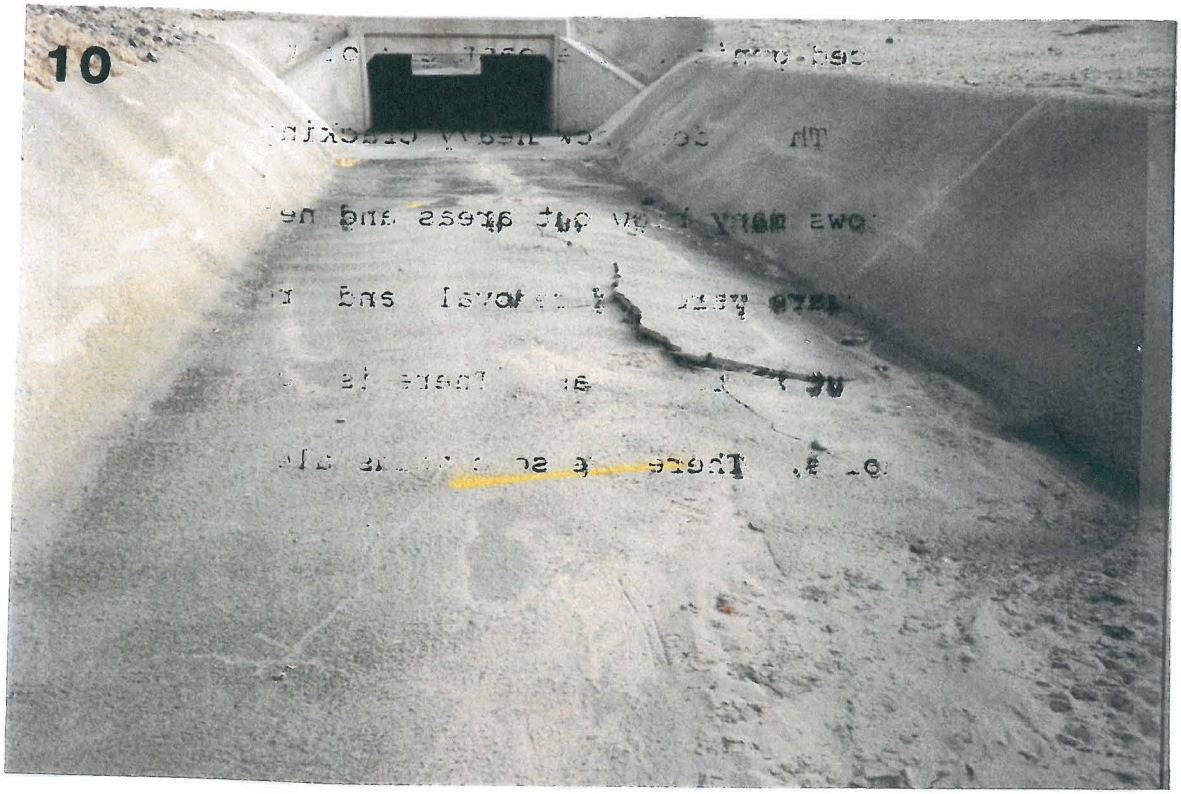

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4. 99TH AVENUE TO 103RD AVENUE

This reach is 2964 feet long with approximately 8560 square yards of wire reinforced gunite. The east end of this section is in very poor shape. The sides show heavy cracking, but seems sound. The bottom shows many blow out areas and needs much work. Approximately 700 square yards of removal and replacement is needed for the blow out bottom areas. There is also excessive cracking and small holes. There are some voids along the top of the channel.

26+46 End box culvert under 99th Avenue.

26+62 Scabby patch between box culvert approach and channel. Looks bad, but feels sound.

26+75 to
28+50 Bottom blow out most of this area. Small palm trees and debris covering any good bottom. See photo #10.

26+75 to
30+00 Minor wall cracks have been patched. Bottom and sides have minor cracking too numerous to mark or mention individually.

27+49 North side expansion joint blow out, 3'x6'. See photo #11.

27+74 Pipe to south.


12


13

28+00 Voids behind south slope. See Photo #12.

28+00 Looking East at 99th Avenue. See Photo #13.

28+50 to
28+93 Excessive bottom cracks, still feels sound. Sides have wash out areas along top edge that need filling. See Photo #14.

29+25 to
29+52 Bottom blow out.

29+52 to
29+90 Excessive bottom cracking.

29+90 to
30+58 Bottom blow out. See Photo #15.

30+64 Pipe to north.

30+58 to
31+44 Bottom under sand, so status cannot be determined.

31+50 to
32+63 Bottom has a mix of excessive cracking and blow out areas.

32+82 to
33+90 Bad bottom cracks and blow outs.

33+12 North wall blow out at expansion joint.

34+29 Holes along expansion joint, 1'x15'.


14


15

33+90 to

34+72 Excessive cracking at bottom.

34+72 to

34+95 Bottom blow out.

35+12 Cracked at expansion joint, 1'x20'.

35+51 to

35+73 Broken up bottom.

36+43 to

36+96 Broken up bottom.

36+75 Shattered edges at expansion joint, 1'x23'.

39+52 Pipe to north.

39+60 3 - 48" diameter pipe culvert under railroad.

40+20 End of pipe culvert under railroad.

40+52 Excessive cracks in north wall.

40+81 Scupper from south.

42+03 Pipe from north with bad patch in wall.

40+20 to

42+00 Bottom under sand.

43+09 Expansion joint with loose patch on north wall.

45+44 Scupper from south.

45+60 Pipe to south, loaded with debris.

46+30 Expansion joint blow out in bottom, 2'x6'.

46+30 to

46+62 Blow out and cracked bottom.

47+51 Hole in bottom to dirt, 1'x1' to dirt.

51+12 Hole in bottom, 1'x1'.

51+36 to

51+60 Blow out in bottom with excessive cracks.

52+26 to

52+37 Excessive cracks.

52+72 to

52+78 Blow out in bottom.

53+10 Expansion joint broken up on both sides, 13'x3'.

53+51 Scabby cracks.

55+32 Area of vertical separation in north wall, 3'x4'.

55+58 Pipe from south.

55+79 4'x12' blow out in bottom.

56+10 3 - 48" pipe culvert under 103rd Avenue.

56+91 End of pipe culvert under 103rd Avenue.

57+08 Centerline 8' scupper from north.

59+21 Centerline scupper south.

59+88 Centerline scupper north, 8' wide, 180' dip, 3' high.

61+68 Centerline scupper south 60' dip section in wall 3' high.

62+76 Expansion joint, 6" vertical separation with palm tree, 6'x6'.

64+62 Scupper from south.

65+80 to

65+90 Blow out in bottom.

67+27 Scupper from south.

67+90 to

71+60 Centerline 69+42 street drain 20' scupper.

68+70 Pipe from north.

69+58 Scupper from south.

71+95 to

72+42 72+15 Centerline 0 high.

72+08 Cracked transition in north wall, 4'x3'.

Note: Station 72+42 to 80+20 bottom under muck and sand, hard to tell condition. Most of remainder under dirt and sand. Side cracks previously repaired.

83+55 Centerline Channel on east side of 107th Avenue.

83+95 Begin channel to east from 107th Avenue.

This channel has the same failure problems as experienced in segment 3. Repairs should consist of:

A. Removing blown-out area, drying out and reshaping the base, and reguniting.

B. Pressure grouting voids created behind the side slopes.

C. Install additional scuppers on south side so interval is approximately one per 200 linear feet.

D. Epoxy fill structural cracks and small holes.

E. Gunite large holes.

F. Latex or silicone caulk temperature cracks.

16

17

5. 107TH AVENUE TO 111TH AVENUE

This channel is 2704 feet long, the east 1288 feet of which is a graded, unlined channel. Area of gunite is approximately 4410 square yards. From Station 98+66 to 99+22 approximately 44 square yards of lining is missing on the north side. About 5 square yards of removal and replacement is necessary. Other than minor cracking, the channel segment is in good shape. There are some small voids at the top of the channel.

84+92 Back of walk on west side of Del Webb Blvd.

84+92 to

97+80 This area is graded dirt channel.

97+80 Begin gunite to west. See photo #16.

97+98 Centerline double 4′ x 8′ box culvert from north

98+66 to

99+22 No gunite on north bank. See Photo #17.

99+87 Scupper from south.

Note: Bottom is nearly dirt lined. Side cracks have been previously repaired.

100+25 Hole in wall at expansion joint. 1′x2′.

101+84 Two bad areas on expansion joint. 3′x3′, 2′x4′.

101+90 Scupper from south.

104+25 to

104+75 104+50 centerline 5' high.

109+39 Hole in north slope, 1'x1'.

109+40 Scupper from south.

109+78 Hole in north side, 1'x1'.

110+80 Scupper from south.

111+71 Pipe from south.

111+96 Two, 52" pipe culverts under 111th Avenue.

This channel appears to have a very flat longitudinal slope. Because of this, a lot of muck and sand has collected in the bottom and should be removed in order to properly evaluate the condition of the bottom.

The missing gunite between stations 98+66 to 99+22 should be replaced and tied into the existing gunite at the bottom and sides.

Voids should be pressure grouted and cracks repaired similar to segments 3 and 4.

18

19

6. 111TH AVENUE TO WEST PROPERTY LINE

This reach is 1395 feet long. This channel appears to have had an overlay on top of the original channel bottom which makes for a horizontal crack the majority of the channel length at approximately six feet from the bottom along the north wall. Approximately 50 square yards of removal and replacement of holes and bottom blow out is required. Numerous small cracks are present but channel is quite solid. There are some voids present along the top of the channel.

112+85 End of pipe culverts under 111th Avenue.

112+91 to

113+27 Scab overlay on north.

113+98 Pipe from north. Scabby patch around pipe.

See Photo #18.

114+25 to

117+65 Crack 5-1/2′ from bottom on north wall due to gunite overlay. This crack is major and appears in several places but is above the visible high water mark. See Photo #19.

116+25 to

116+58 South wall tapers 14′ to 12′.

116+83 12′ to 8′ high south wall.


20


21

117+12 to

117+48 Blow out bottom. See Photo #20.

119+00 2'x5' hole with vegetation.

119+10 2'x3' hole with vegetation.

119+14 2'x3' hole with vegetation.

120+06 2 holes in north wall, 2'x4', 1'x3'.

120+52 1'x3' hole with vegetation.

123+00 Typical scab overlay, north wall. See Photo #21.

123+03 Conduit at 5' above channel bottom.

123+89 Hole in north wall $\pm$ 6 feet below top with vegetation.
Hole 5 feet above bottom on south bank, 1'x2'.

124+67 1'x1' hole high on north wall.

126+05 1'x1' hole in bottom with vegetation.

126+48 1'x1' hole in bottom with vegetation.

126+80 West property line.

127+00 View of bank transition and channel section from west property line looking east. See Photo #22.

127+30 8' scupper from north.

127+63 to

127+86 Blow out in bottom.


22


23

128+00 View of channel to west from west property line. See Photo #23.

128+86 End of gunite.

The horizontal crack on the north slope of the channel appears to be the result of the top portion of gunite being placed after the original channel had been constructed. It is not known whether or not steel between the two segments has been tied together. This entire crack should be filled with epoxy in order to produce a rigid joint.

The remainder of the repairs should be completed as recommended for the rest of the Grand Avenue channel, including the blow-out areas on the channel bottom.

7. CHANNEL EAST OF AND THROUGH UNIT 10A

This channel is 2674 feet long and contains an area of approximately 11500 square yards of gunite. There are no expansion joints in this channel so a lot of expansion cracking is evident the full length. Approximately 38 square yards of gunite removal and replacement is needed. Extensive cracking and some structural cracking is evident.

0+00 Channel turns east to river and is unlined. Station is at north end of new development adjacent to Grand Avenue ± 1000 feet north of Grand Avenue channel.

0+26 Pipe from west. Bottom has sand and rock.

1+40 to

1+80 Excessive cracking in east wall.

2+36 Excessive cracking in east wall.

2+88 Pipe from west.

4+20 Separating crack in east wall, 2'x8'.

4+70 Excessive cracking in east wall, 4'x8'.

5+05 Pipe from west.

5+80 Excessive bottom crack.

6+35 Centerline of 10' vertical separation in west wall.

7+00 Area of excessive cracking along west wall 12' long.

24

7+88 Small hole in west wall 3'x3'.

8+23 Pipe from west.

8+70 to

8+83 Excessive cracking in bottom.

9+50 Centerline 12' seepage area in west wall.

9+68 Excessive cracking. Channel curves from north to west.

11+30 to

11+60 Evidence of seepage in south wall.

12+74 Excessive cracking in 12' section of north wall.

13+00 Looking east towards bend to south. See Photo #24.

14+00 to

14+30 Seepage along north wall.

14+92 Edge of double 5'x9' box culvert under 97th Avenue.

15+55 Edge of double 5'x9' box culvert under 97th Avenue.

22+70 to

23+12 Excessive cracking in south wall.

27+37 End of channel at double 5'x9' box culvert to 99th Avenue.

Although this channel was constructed without expansion joints, temperature cracking seems to have been controlled by and closely aligned with the expansion joints provided in the

property line walls. The vertical cracks produced by this action require no repair work. Other cracks noted will require repair by sealing with epoxy.

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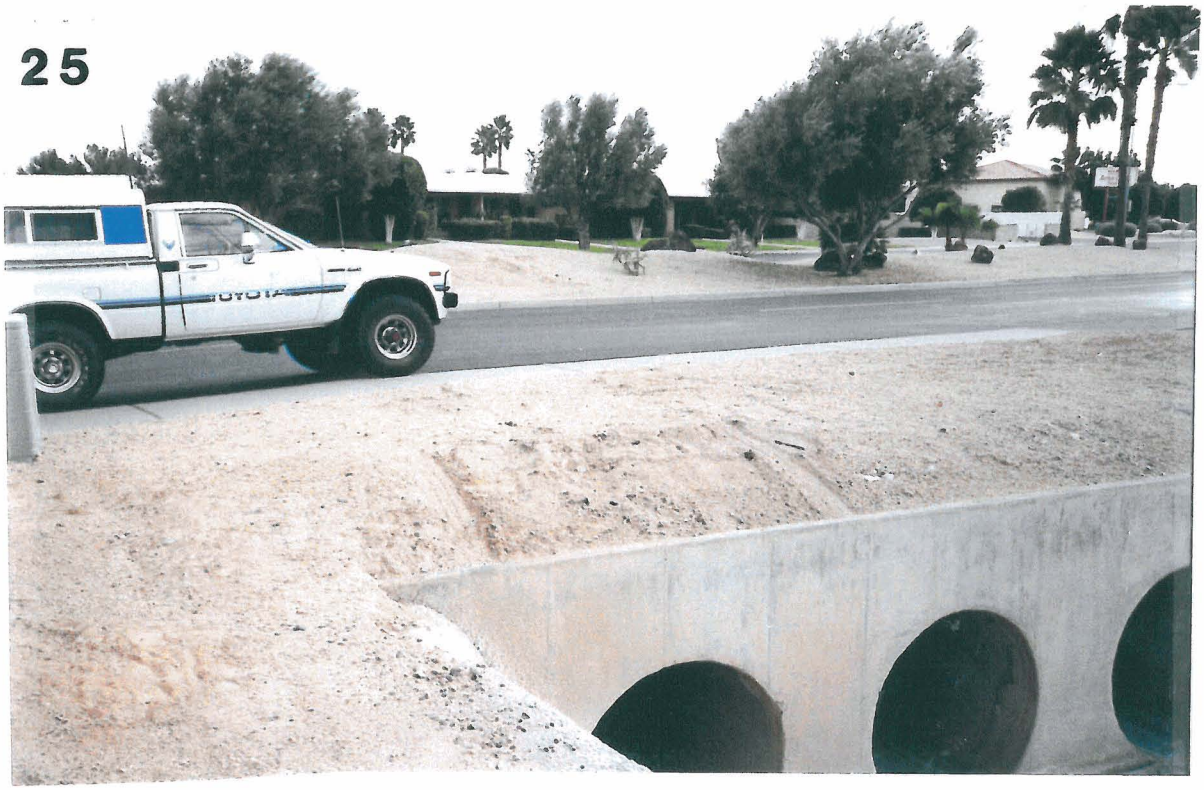

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8. CHANNEL NORTH OF BELL ROAD

107TH AVENUE TO WEST PROPERTY LINE

This channel segment is 4010 feet long. Area of existing wire reinforced gunite is approximately 16050 square yards. Approximately 50 s.y. of this needs to be removed and replaced. This channel has areas of excessive cracking and some structural cracking. There are also numerous holes. Portions of the lining have a thin overlay and show considerable flaking away of the overlay. There are some small voids at the top of the channel. A guardrail is recommended on the top of box at 107th Avenue. The channel segment continues west past the west boundary of Sun City.

0+00 West face of headwall with 5 - 48" diameter pipes. See Photo #25.

0+00 View of channel looking west. See Photo #26.

0+75 Overlay on bottom is flaking up.

2+76 to

3+13 Flaking along south wall.

2+94 Flaking and weak area in bottom, 2'x4'.

3+07 Weak area cracked, 2'x2'.

Note: Bottom has intermittent cracks that appear to be weak and have possible seepage.

3+73 3'x3' weak cracked area.

4+50 3'x3' weak cracked area.

6+40 3'x3' weak cracked area.

6+62 2'x2' cracked area.

8+07 2'x2' cracked area.

8+11 5'x4' cracked area.

8+10 to

8+32 Crack along south wall. Wall has shifted.

8+73 6'x4' weak cracked area.

9+60 to

9+73 Bottom cracked up with wire and dirt exposed.

9+66 Pipe north wall.

10+44 to

12+75 Excessive cracks and poor patching along east wall.

11+42 2'x2' cracked area.

13+50 6'x2' cracked area with exposed dirt.

13+66 Pipe west side.

13+95 Bad joint with cracking and flaking.

14+70 Area 16'x2' cracked and flaking along north wall near bottom.

15+15 Excessive cracking 1'x8'.

17+15 Hole in north wall 1'x1'.


27

17+47 1'x3' cracked area.

17+54 2'x2' cracked area.

18+00 to

18+35 Excessive cracks and flaking along south wall. Typical hole with cracking. See Photo #27.

18+56 2'x3' weak cracked area.

18+84 to

18+94 Area along base of north wall is flaking, dirt is exposed.

19+24 2'x3' flaked area on south wall near base.

19+44 to

19+52 2' wide flaked area at base of north wall.

19+65 1'x2' flaked area at base of north wall.

19+71 1'x2' flaked area at base of north wall.

20+06 to

20+14 1'x8' flaked area along south wall.

20+12 2'x2' weak cracked area.

20+69 2'x3' flaked area at base of north area.

21+06 1'x2' flaked area to north wall.

21+67 1'x2' flaked area at north wall.

22+31 2'x5' area flaked out on north wall.


28

22+41, 22+45, 22+48 1'x2' areas cracked and flaking along base of north wall.

27+89 Pipe on north side.

29+20, 20+24 2'x4' area cracked and flaking on north wall.

31+73 1'x1' area cracked on north wall.

31+94 Centerline 2'x13' area cracked and flaking on north wall.

32+12 2'x5' area cracked and flaking on north wall.

33+49 2'x3' area cracked on north wall with vegetation.

33+62 Joint cracked and flaking across bottom, 1'x15'.

33+98 Centerline 1.5'x6' area flaking on north wall.

34+93 Centerline 2'x16' area flaking at base of north wall.

35+36 2'x6' area cracked out at base of north wall.

35+86, 35+92, 36+26 2'x3' areas cracked in north wall.

36+34 2'x9' area cracked at base of north wall.

39+91 Centerline double 3'x7' box culvert.

40+00 4'x4' hole in bottom.

40+10 West boundary of Sun City. See Photo #28.

44+88 Scupper from south side.

44+92 1'x3' hole in south side at base of wall.

45+19 1'x2' hole

45+73 16′ depression on both sides.

46+20 Channel bottom in very poor condition, cracked up, buckled and missing.


29


30

9. CHANNEL ON EAST PROPERTY LINE

BELL ROAD TO GREENWAY ROAD

This channel is 4966 feet in length and contains approximately 11580 square yards of wire reinforced gunite. It has numerous holes and broken edges from vehicular traffic on the east wall. The bottom is also under sand and gravel for a good portion of its length and under water with sparse to dense vegetation on the south end. Approximately 120 square yards of gunite removal and replacement will be necessary to fix the holes and the missing section at Bell Road. The bottom of the channel is rough the entire length, and appears to be dirt, but is actually discolored gunite. Overall condition is rough. Several small trees have pushed the wall away from the adjacent property fence. Some voids are visible at the top of the channel.

0+00 Southeast corner of well site wall extended to channel.

0+58 Pipe from well site not patched in. 3'x6' patch needed.

1+00 Hole in east wall, 2'x6'.

1+38 Pipe from well site seeping.

Note: Bottom under water and weeds to station 2+25±.

3+67 6'x2' hole in west wall.


31


32

3+96 Centerline 18′ wide scupper from west. Poor cracked condition around sides of scupper.

4+49 Hole in bottom. 4′x4′ crack on east wall.

8+87 Hole in east wall 2′x2′.

9+19 to

9+38 Top of east wall broken out, 1′ - 4′ wide.

9+78 Small hole in west wall 1′x1′.

10+16 2′x2′ hole in west wall.

10+26 1′x2′ hole in west wall.

10+31 1′x1′ hole in west wall.

10+68 to

10+83 Piece missing west wall 3′ high.

1+50 to

14+32 Tree separated west wall 3′ high. See Photo #29.

17+00 Typical condition of channel looking south. See Photo #30.

17+26 2′ scupper from west. Up to this point there has been water and debris covering most of bottom. Bottom was obscured or looked scaly and bad to this point.

18+38 to

18+64 East wall broken and pieces missing 1′ to 3 1/2′ high. See Photo #31.


33


34

19+00 to

19+15 Hole in bottom 2'x15'.

19+25 to

19+58 Hole in bottom 2' to 6' wide.

19+81 Scupper from west.

22+11 Scupper from west.

23+56 Hole west wall 1'x1'.

31+00 Typical view of channel looking south. See Photo #32.

33+02 Broken place at top of east bank, 1'x2'.

33+14 Broken place at top of east bank, 3'x5'.

33+54 Broken place at top of east bank, 4'x7'. See Photo #33.

35+04 Broken place at bottom of east bank, 1'x2'.

35+53 Broken place at bottom and top of east and west bank, 2 - 1'x2' and 1'x1'.

Note: Top of east bank edge broken from equipment travel along top of bank.

35+60 View of channel looking north. See Photo #34.

35+80 2 small holes 6"x6" east wall and scupper with wall.

36+04 Hole east wall 1'x1'.

38+00 Hole in east wall 2'x2'.

38+19 to

38+29 2' wide hole in bottom.

38+96 Wide crack in east wall 7' long.

39+31 Scupper from west.

40+40 1'x1' hole in east wall.

42+06 1'x6' crack up on east wall.

42+35 Scupper from west.

44+30 Hole in east wall.

48+20 Hole in east wall, 1'x1'.

49+10 No sides to channel.

49+45 Gate.

49+50 Start gunite west.

49+53 Start gunite east slope.

49+66 End of channel at edge of pavement on Bell Road.

10. CHANNEL 1/2 BLOCK NORTH OF BELL ROAD

98TH AVENUE TO 99TH AVENUE

This channel is 1210 feet long, approximately 4700 square yards of wire reinforced gunited channel. The overall condition is good with a sound base. There is some excessive cracking and minor voids at the top of the channel.

0+49 Scabby patch where channel joined to next segment. Possibly expansion joint.

Note: Channel has 2′ valley gutter.

2+10 to

2+20 Excessive cracking on north wall.

3+56 Drain pipe from south.

5+05 Drain pipe from north. Excessive cracks.

5+21 Centerline 6′ wide scupper.

5+37 Pipe from North.

7+29 Cracking south wall.

10+38 Pipe from north.

10+55 Centerline 6′ wide scupper.

12+10 2 - 3′x12′ box culverts at 99th Avenue.

11. CHANNEL WEST OF AGUA FRIA DR. AT END OF WAIKIKI

This channel is 550′ long, then continuing 30′+ beyond property line, approximately 1285 square yards of wire reinforced gunite. This channel has several cracks and small holes and is in good condition.

12. CHANNEL AT WEST END OF SUMMERSET DR. AND 111TH AVE.

This channel is 132′ long, approximately 224 square yards of concrete, flat bottom. With the exception of minor cracking, it is in excellent shape. The rear portion seems to be ponding water as the golf course is several inches higher than the bottom of the channel.

13. CHANNEL AT WEST END OF EDGEWOOD DR.

This channel is 191′ long, approximately 538 square yards of concrete flat bottom. Expansion joints are rough and there are some minor cracks but channel is excellent.

14. CHANNEL S.W. OF CRESTBROOK AND 111TH AVE.

This channel is 260′ long, approximately 450 square yards of concrete flat bottom. Some minor cracks and 2 small chip holes. Channel in excellent condition.

15. CHANNEL TO GOLF COURSE OFF WHITE MT. RD. W. OF MEADE

This channel is 131' long, approximately 155 square yards of concrete flat bottom. Channel shows minor cracking, but is in excellent condition.

16. CHANNEL S.E. OF LONG HILLS AND MEADOW PARK

This channel is 190' long, approximately 350 square yards concrete flat bottom. With the exception of minor cracking, the channel is in excellent condition.

17. CHANNEL SOUTH OF FOOTHILLS DR.

This channel is 130 feet long, approximately 173 square yards of wire reinforced gunite. Large crack around manhole, needs structural repair, otherwise minor cracks and minimal repair. Channel in good shape. Channel has scab of concrete in bottom or poorly patched hole.

18. CHANNEL SOUTH END OF APPALOOSA DR.

This channel is 132' long, approximately 165 square yards wire reinforced gunite. No excessive or large cracks. Channel in excellent shape.

19. CHANNEL WEST END OF GRANADA DR.

This channel is 162′ long, 470′ square yards of wire reinforced gunite. Channel has a lot of minor cracks and is cosmetically rough but sound. Concrete valley gutter looks to be added later and some patching was done.

20. CHANNEL WEST OFF WILLOWBROOK DR.

This channel is 126′ long, approximately 435 square yards of wire reinforced gunite. Channel extends west a few feet off property. Some minor cracking, channel is in very good shape.

21. CHANNEL WEST OF CAROB DR. TO 107TH AVE.

This channel is 167′ long, approximately 500 square yards of wire reinforced gunite. Shows normal cracking and area of excessive cracking on north side. Structurally sound.

GENERAL RECOMMENDED PROCEDURES FOR REPAIR OF CHANNELS

Cracks:

1. For cracks 1/8" and larger that are due to expansion and contraction and not structural failures, these should be filled with a non-hardening permanent caulking to allow expansion and contraction to continue.
2. For structural cracks, these areas to be filled with a permanent hardening "epoxy" type bond.

Holes:

1. Large holes to be sawcut out, reinforcing wire doweled and fixed to existing gunite then re-gunited.
2. Small holes to be patched back in with permanent hardening "epoxy" type bond.

Missing Segments of Channel:

Earth to be shaped to match existing channel configuration, reinforcing to be doweled into existing channel edge and install gunite.

Where there is insufficient backing sandbags are to be used to build up surface and fill in all remaining voids.

Voids at Top of Channel:

Coarse sand to be filled in and water settled to handle smaller voids. Sand bags to be added if necessary for stabilization.

In structurally unsound areas where side loading could cause traffic hazard, pressure grouting is recommended.

NOTE: All type classification to be done in the field, using a "Matter of Practicality" determining factor. All repair areas to be determined in field prior to construction.

Expansion Joints:

For channels with insufficient expansion joints, after expansion/contraction, cracking failures are corrected, it is recommended that new expansion joints be constructed by sawcutting the entire width of the cross section to a depth of 1/4 the lining thickness. Joint spacing should be equal to the top width of the channel lining section.