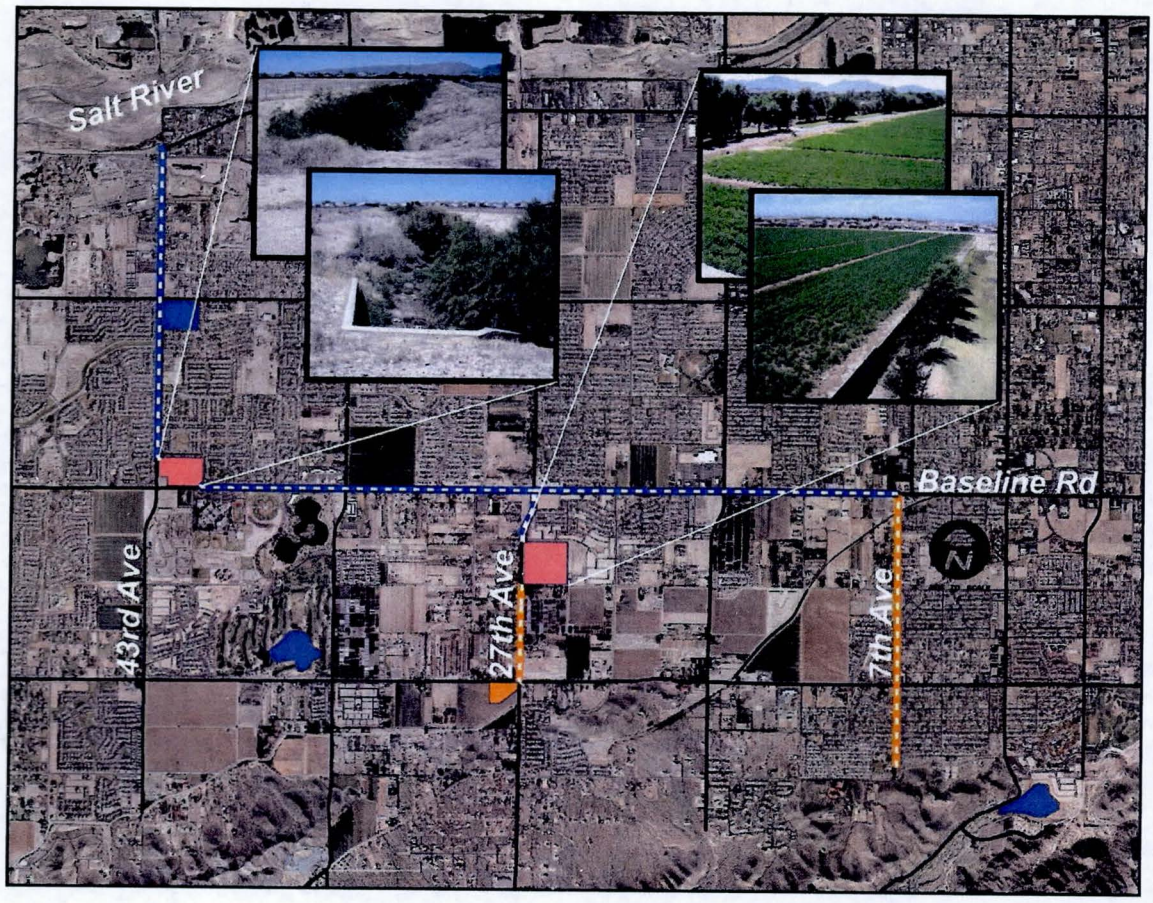
South Phoenix Two Basins Project

Contract
FCD 2011C008



Survey Report

Prepared by:

Stanley Consultants INC.

Prepared for:
Flood Control District of Maricopa County
and
City of Phoenix

May 2013

SCI Project No. 23621

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
35113
MICHAEL E.
FONDREN
Date Signed 5-14-13
ARIZONA U.S.A.
Exp 6-30-15

A117.930

SOUTH PHOENIX TWO BASINS PROJECT

FCD 2011C008

SURVEY REPORT

May 2013

TABLE OF CONTENTS

1.0 Introduction 1
2.0 Description of Survey Control 3
  2.1 Vertical and Horizontal Datum 3
  2.2 Vertical and Horizontal Control for Aerial Mapping 3
  2.3 Project Control and Benchmarks 4
3.0 Supplemental Field Survey 5

LIST OF FIGURES

Figure 1 – Project Location and Vicinity Map 1

LIST OF APPENDICIES

Appendix A: Aerial Mapping Panel Layouts
Appendix B: Survey Field Data Point Lists
Appendix C: Survey Field Books

Pocket inside back cover: Electronic report and appendix files on CD

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
35113
MICHAEL E.
FONDREN
Date Signed 5-14-13
ARIZONA U.S.A.
EXP 6-30-15

1.0 Introduction

The South Phoenix Two Basins Project is located in central Maricopa County in the South Phoenix / Laveen area. It includes design of two regional detention basins and an associated update of regional hydrology. The detention basin sites are located on the northeast corner of Baseline Road and 43rd Avenue and on the northeast corner of 27th Avenue and South Mountain Avenue. Figure 1 below shows the location and vicinity of this project. The proposed project improvements are based on concepts developed more than ten years ago as part of the South Phoenix / Laveen Drainage Improvement Project and are phased components of a regional drainage system.

This survey report covers the field survey data that was collected by Stanley Consultants for use in aerial mapping control and for preparation of a 'Record of Survey' for each of the two basin parcels. Supplemental field survey was also needed for certain existing drainage features, roadways and utilities for the design of the project and to evaluate and update regional hydrology and hydraulics. Field surveys of existing features performed by Stanley supplemented as-built data that was collected at the beginning of the project. A collection of as-built data is included as part of the South Phoenix Two Basins Project Design and Data Collection Report (under separate cover).

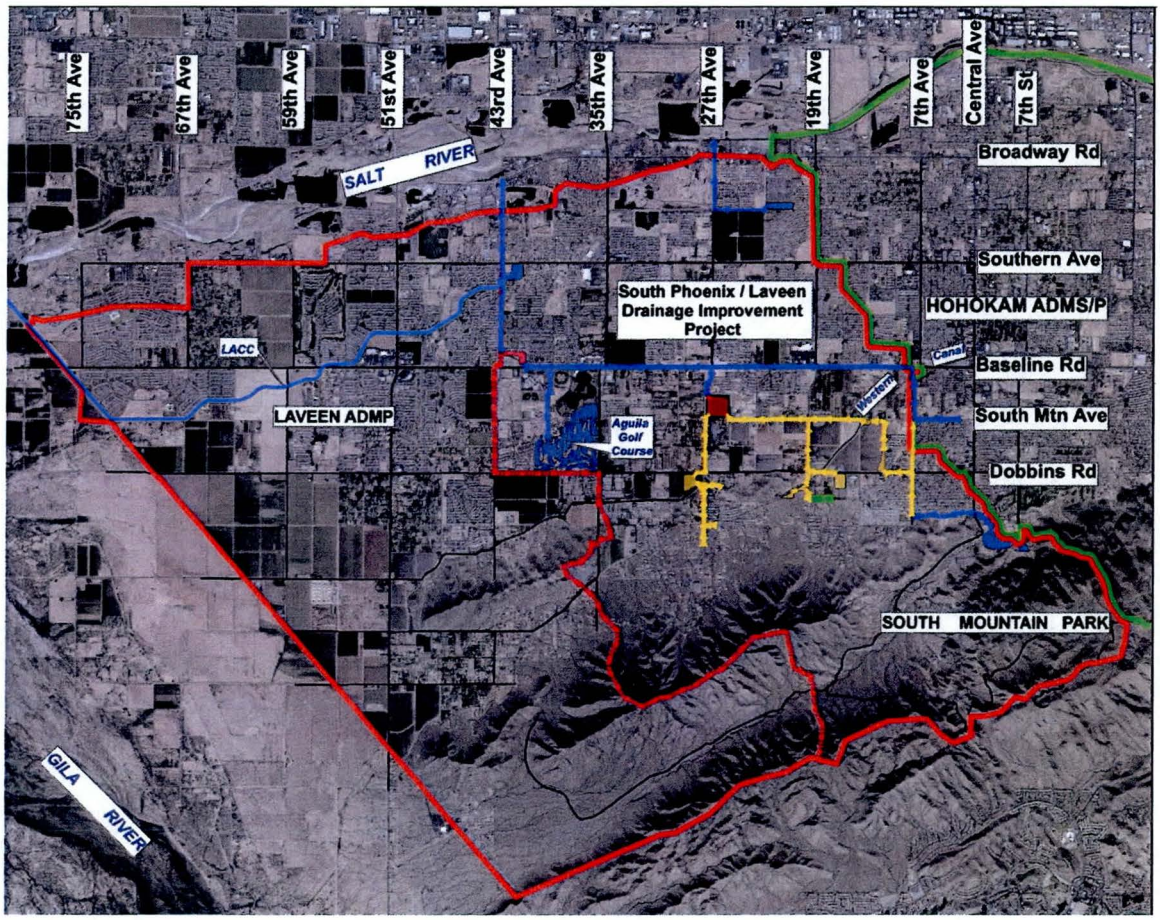


Figure 1 – Project Location and Vicinity Map
South Phoenix Two basins Project

All survey work performed for this study was done in accordance with Section 3.0 of the Flood Control District of Maricopa County's Consultant Guidelines dated December 1, 2003.

One of Stanley's first survey tasks was to set aerial mapping control panels. New one-foot contour mapping was developed for the 43rd Avenue / Baseline Road and 27th Avenue / South Mountain Avenue Basins for the design phase of the project. The topographic mapping generally covers the parcels in which the basins will be built. Additionally, new two-foot contour mapping was produced for the future 27th Avenue and Dobbins Road regional detention basin and for the existing South Mountain Park regional detention basin.

The aerial mapping was provided by Cooper Aerial Mapping Surveys, Inc. Aerial photogrammetric imaging technology was used to develop the new topographic mapping. The flight date for the 43rd Avenue / Baseline Road basin, the 27th Avenue / South Mountain Avenue basin and for the future 27th Avenue / Dobbins Road basin was August 31st, 2011. The one-foot mapping for the 43rd Avenue / Baseline Road basin and the 27th Avenue / South Mountain Road basin was provided at 1"=40' scale. The two-foot mapping for the future 27th Avenue / Dobbins Road basin was provided at 1"=100' scale. Cooper's project number for this work is 5060-1108031P.

Cooper Aerial also produced mapping that covers the existing South Mountain Park regional detention basin. The flight date for that mapping was April 10, 2012. Cooper produced two-foot mapping at 1"=100' scale for that work. Cooper's project number for that mapping is 5060-1204007.

Cooper Aerial can be reached at (602)-678-5111 and their address is: 11402 North Cave Creek Road, Phoenix, AZ 85020. The panel layout for each of the four locations described above can be found in Appendix A. The aerial mapping electronic files for this project were delivered to FCDMC by Stanley separate from this survey report shortly after each mapping product was completed by Cooper.

Survey points for this study were collected by Stanley Consultants using both GPS and total station survey equipment. Survey data point lists and copies of survey field books are included in Appendices B and C of this report, respectively. An electronic Excel spreadsheet file corresponding to the point list in Appendix B is included on disc in the pocket at the back of this report.

2.0 Description of Survey Control

The South Phoenix Two Basins Project survey was based on Maricopa County's Geodetic Densification and Cadastral Survey (GDACS) survey control network utilizing the section and 1/4 corners of the PLSS in the area per the GDACS plat.

2.1 Vertical and Horizontal Datum

Maricopa GDACS survey control network was utilized for the horizontal control system using published NAD83 State Plane Coordinate System with the international foot as the unit of measurement. A scale factor relating grid and ground horizontal coordinates for this project was calculated performing a localization to the existing ground control per GDCS. The grid to ground equation is as follows:

GRID x COMBINED SCALE FACTOR = GROUND
COMBINED SCALE FACTOR = 1.00014

All survey for this project was performed using ground coordinates. The vertical control for the survey was based on the same GDACS monuments as stated above using the published North American Vertical Datum of 1988 (NAVD 88).

As-built data was obtained from the Flood Control District of Maricopa County (FCDMC), from the Maricopa County Department of Transportation (MCDOT), the City of Phoenix (COP) and from various utilities including irrigation. The vertical datum for most of the as-builts from FCDMC, MCDOT and COP was generally NGVD 1929. This differs from the vertical datum for the South Phoenix Two Basins Project which is NAVD 1988. This presented the need for a general approximation of the relationship between the two vertical datums so that the previous and current hydrology and hydraulics could properly relate.

For example, Baseline Road improvement plans prepared by consultant URS were based on 1929 vertical datum (and also on Metric units instead of English units). 43rd Avenue roadway improvements were also based on 1929 vertical datum. Once the base hydraulic models were developed for the Baseline Road and the 43rd Avenue regional storm drain systems, they were converted to 1988 vertical datum using a 'VERTCON' conversion of +2.10 feet (NGVD 1929 + 2.10' = NAVD 1988) so they would be directly compatible with the design phase of the South Phoenix Two Basins Project.

2.2 Vertical and Horizontal Control Check for Aerial Mapping

Typically, blind panels are set to spot check the aerial mapping accuracy based on requirements per Consultant Guidelines Section 3.0. However, FCDMC survey staff did not feel that a formal blind panel check was needed due to the relatively small size of the mapping areas, low flight level and the relatively tight horizontal and vertical accuracy standard chosen for the project design at each of the two basin parcels (1' vertical, 40' horizontal).

The lesser map accuracy at the other two sites (2' vertical, 100' horizontal) also did not warrant formal blind panel map checks because it was only being used for feasibility purposes and hydrologic analysis. All mapping, however, was spot checked through the

course of design and analysis with points from Stanley's supplemental field surveys and found to be in agreement.

2.3 Project Control and Benchmarks

The following GDACS points were incorporated in the base control for the 43rd Avenue / Baseline Road Basin and the 27th Avenue / South Mountain Avenue Basin. Northing and easting coordinates are "ground" coordinates.

43rd Avenue / Baseline Road Basin:

- 1017 (BM1)
  Baseline Road and 43rd Avenue
  Northing (ft) 864,998.1350
  Easting (ft) 628,450.6210
  NAVD 88 ELEV (ft) 1,036.82

- 1009 (BM2)
  43rd Avenue and West Vineyard Road
  Northing (ft) 867,626.3350
  Easting (ft) 628,479.9530
  NAVD 88 ELEV (ft) 1,023.50

- 1016 (BM3)
  Baseline Road and 39th Avenue
  Northing (ft) 865,001.2050
  Easting (ft) 631,086.4240
  NAVD 88 ELEV (ft) 1,049.31

27th Avenue / South Mountain Avenue Basin:

- 1004 (BM1)
  27th Avenue and South Mountain Avenue
  Northing (ft) 862,339.8860
  Easting (ft) 638,667.1990
  NAVD 88 ELEV (ft) 1,096.08

- 1003 (BM2)
  27th Avenue and Baseline Road
  Northing (ft) 865,011.7710
  Easting (ft) 638,692.9520
  NAVD 88 ELEV (ft) 1,084.96

- 1019 (BM3)
  23rd Avenue and Baseline Road
  Northing (ft) 865,017.2520
  Easting (ft) 641,333.7380
  NAVD 88 ELEV (ft) 1,102.75

3.0 Supplemental Field Survey

Stanley Consultants' survey crew obtained field coordinate data for specific physical features within the project area that related to the design and hydrologic analysis. Survey shots were taken at and along roadways adjacent to the two basin design parcels and within each parcel at headwalls, wingwalls, irrigation structures and other points of interest. Points were also collected for above ground utilities like power poles, irrigation standpipes, culverts, fences, irrigation tailwater pipes, and visible surface features of underground utilities such as manhole covers, water valves, and utility marker paddles.

Survey point coordinates lists and copies of field books are found in Appendices B and C, respectively. All horizontal coordinates in Appendix B are "ground".