



Shephard ▲ Wesnitzer, Inc.

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Engineering an environment of excellence

MEMO

**HDR
RECEIVED**

DEC 08 2009

To: Linda Potter, P.E. – HDR ONE Company

From: Patrick Naville, RLS
Survey Department Manager

PROJ: _____
FILE: _____
DIST: _____

Date: December 7, 2009

Re: Tuzigoot Bridge – Verde River Flood Hazard Assessment Project
Yavapai County Flood Control (SWI Project #09114)

Linda:

For your files, I've enclosed a copy of the survey drawing we produced on the Tuzigoot Bridge and the two cross-sections shot at that location.

I've also included signed and sealed copies of the survey field notes; supplemental sketches that accompanied the field notes; a statement of our survey methodology and a disc which contains photos taken at the bridge, along with a pdf file of the survey drawing.

If you need any additional information or have any questions, please call me or James Crowley at 928-282-1061.

Thank you,

**HDR – VERDE RIVER FLOOD HAZARD ASSESSMENT PROJECT
YAVAPAI COUNTY FLOOD CONTROL
(SWI Project #09114)
Survey Methodology**

Tuzigoot Bridge and River Cross-Sections at that location

A combination of GPS equipment; electronic total station robotic measuring equipment and conventional measurement methods were utilized to gather the survey data. Field work was conducted on August 31, 2009 by Nick Naville and Shane Nauert.

The Basis of Bearings is true geodetic north.

Coordinate system for the survey is based on the following:

Linear Unit: International Feet

Geodetic Datum: NAD 1983 (CONUS)

Vertical Datum: Orthometric heights (elevations) were transferred to the site using from NGS brass disk in bedrock (PID# ES0478) stamped “R 18 1931” using GPS with NGS Geoid Model “GEOID03.” Elevations are referenced to published NAVD 88 elevation of this station.

System: US State Plane 1983

Zone: Arizona Central 0202

Two cross-sections were shot. One 10-feet up-stream and one 10-feet down-stream from the bridge at the locations as requested by Linda Potter, P.E. (HDR)

For the river cross-sections, a 2-man survey crew was utilized. Electronic total station robotic measuring equipment was employed. One man worked the total station taking measurements while the other man used a reflector prism on a survey pole and physically waded across the river taking shots at grade changes in the cross-section/channel bottom.

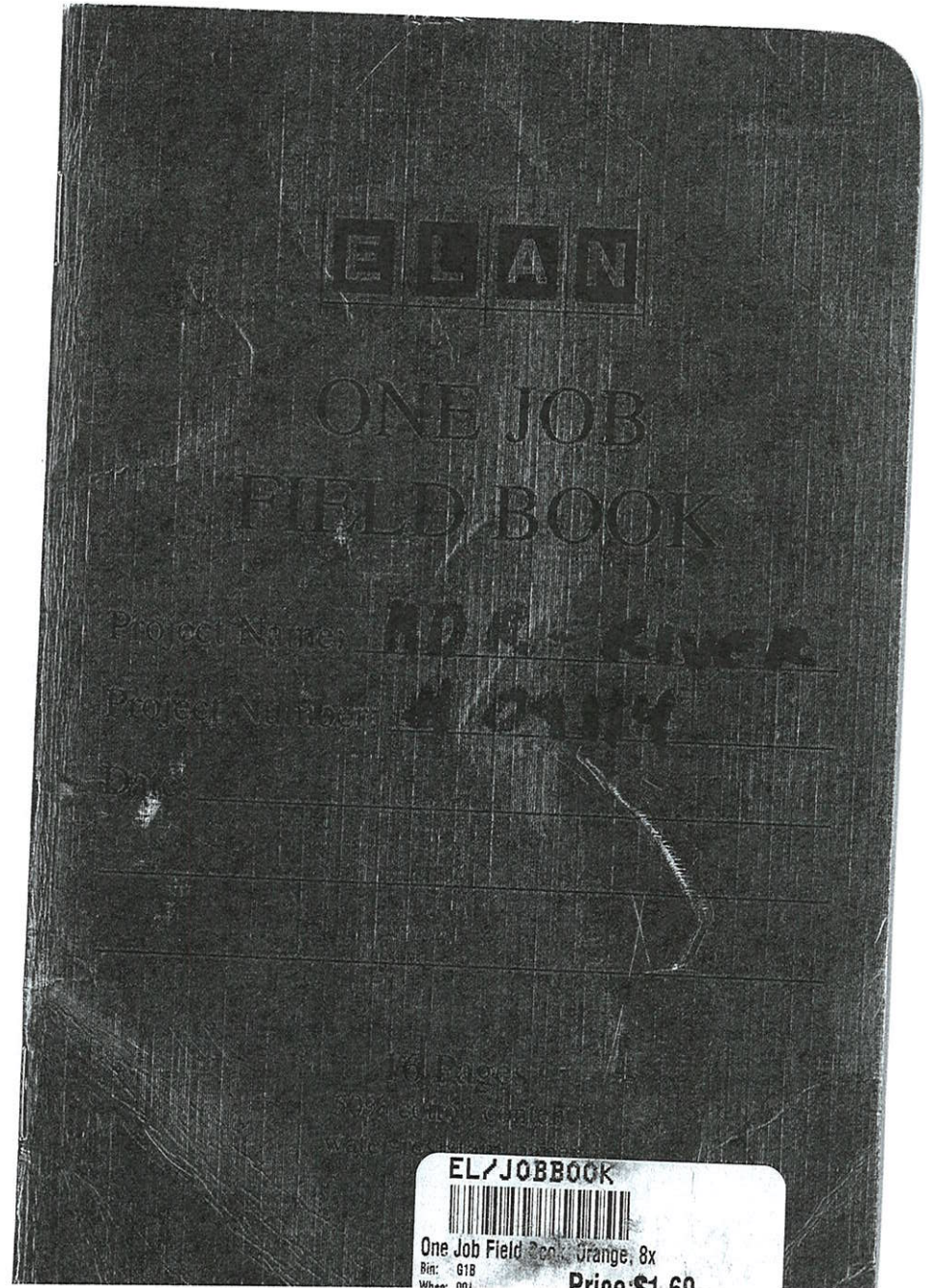
Measurements on the bridge and supports were taken using a combination of GPS; electronic total station and conventional survey equipment.

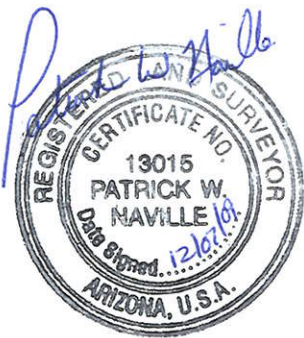


Expires 9 / 30 / 2012



Expires 9 / 30 / 2009





Expires 9/30/2009

#09114

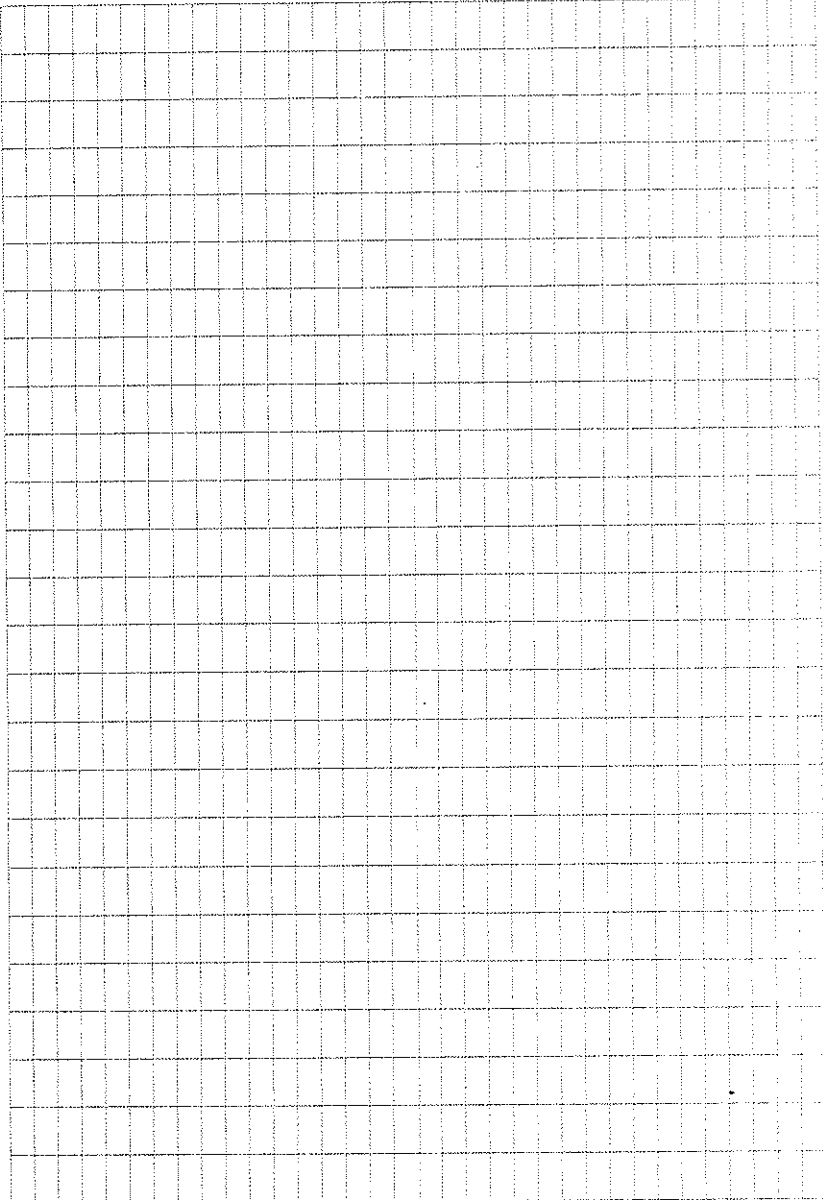
HDR-TUZIGOOT BRIDGE
CONTROL

08/31/09

N. NAVILLE
S. NAVERT

TRIMBLE 4800 BASE
TRIMBLE 5300 ROVER
TRIMBLE 5600 ROBOT
TRIMBLE TSC2

- 2000 FOUND A00T ALUMINUM CAP IN SOUTH-WEST ABUTMENT OF THE BRIDGEPORT BRIDGE "EL=3274.41"
- 2001 " " NORTH-EAST " " "ELEVATION 3275.04"
- 2002 SET CHISELED "X" IN NORTH-EAST CORNER OF OUTHOUSE PAD AT PRAIRIE LANE RIVER ACCESS
- 2003 SET 1/2" REBAR AND SWI ALUMINUM "CP" CAP, WEST OF 260 ACROSS FROM THOUSAND TRAILS ROAD.
- 2004 SET CHISELED "X" IN Σ TOP OF CURB 147'± SOUTH OF SOUTH END OF BEAD HORSE BRIDGE, ON THE ~~NORTH~~ WEST SIDE OF ROAD
- 2005 SET 1/2" REBAR AND SWI ALUMINUM "CR" CAP. 80'± SOUTH OF OLD VERDE VALLEY JUSTICE CENTER ENTRANCE 20'± EAST OF APS BOXES
- 2006 SET 600 NAIL OFF NELSON LANE RIVER ACCESS 65'± SW OF CONCRETE ~~DAMN~~ DAMN, 18.2' SE OF PUMP/WELL HEAD 33.2' NE OF POWER POLE
- 2007 SET 1/2" REBAR AND ALUMINUM SWI "CP" CAP ON THE KNOLL OF SAINT FRANCES (A BRINI) CHURCH, 65'± SW OF



ASPHALT PARKING LOT ON SW SIDE
OF CHURCH

(2008) SET CHISELED "X" ON CONCRETE
MEDIAN OF WHITE BRIDGE, 3.6'
SOUTH OF THE NORTH END @ E

(2009) FOUND ADOT BRASS CAP IN E TOP OF
ABUTMENT AT THE EAST SIDE OF THE
SOUTH END OF BLACK BRIDGE
"ELEV. 3095.63"

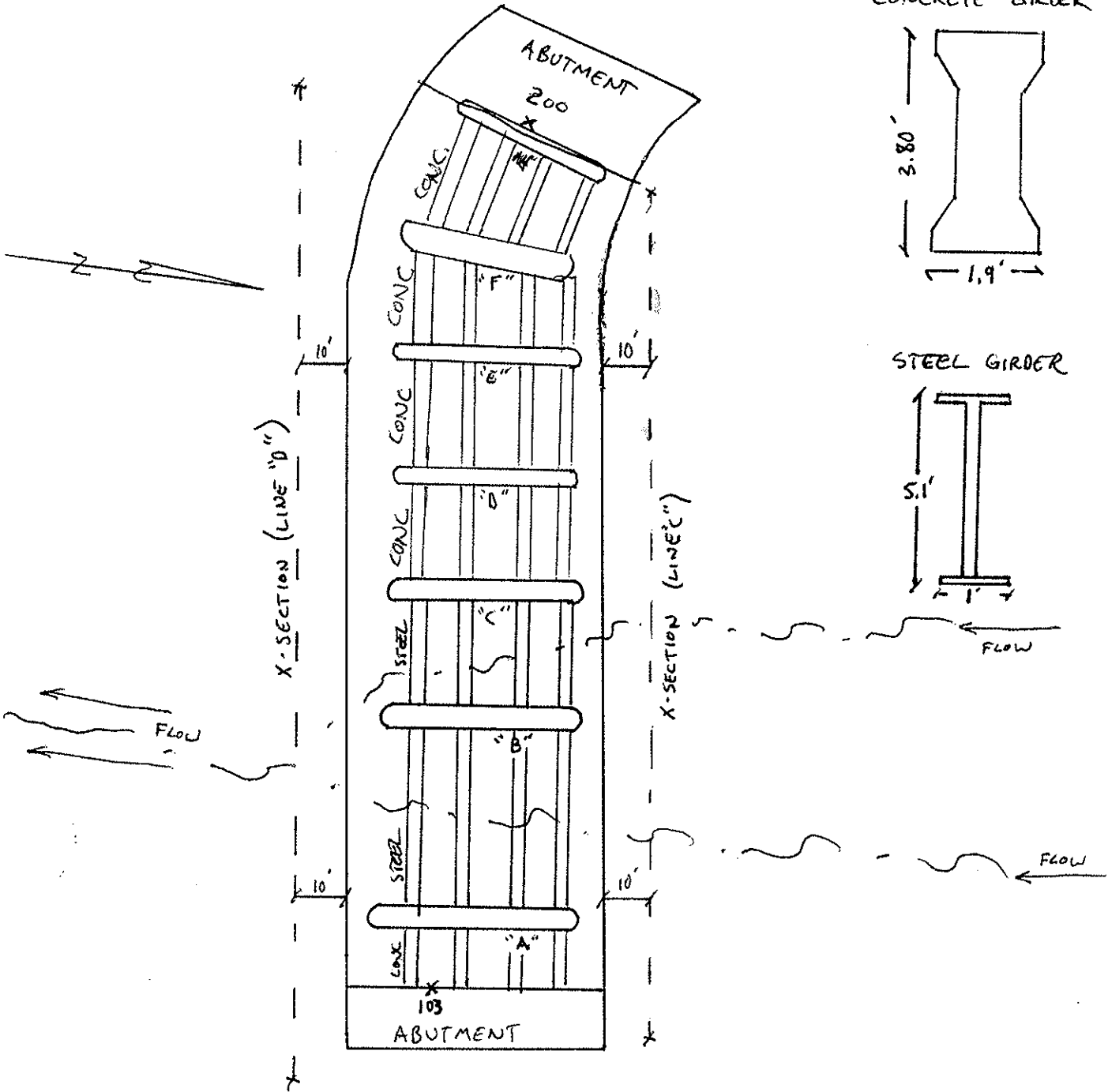
(2010) FOUND ADOT BRASS CAP IN E TOP OF
ABUTMENT AT THE EAST SIDE OF
THE NORTH END OF BLACK
BRIDGE "ELEV 3095.64"

(2)

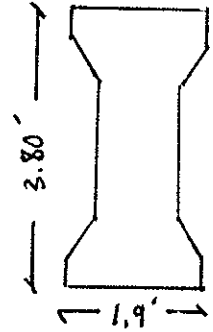
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Job No. 09114
Date At 8/31/09
By NN
Sheet No. 1 of 7

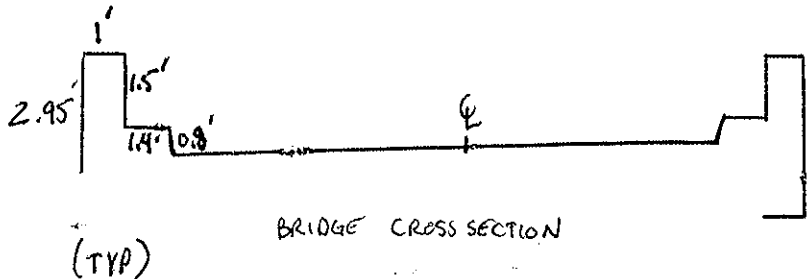
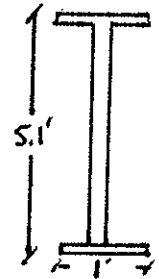
Subject TUZIGOOT BRIDGE ASBUILT



CONCRETE GIRDER



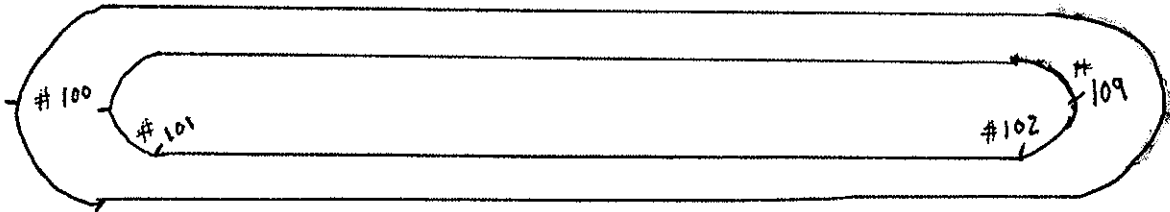
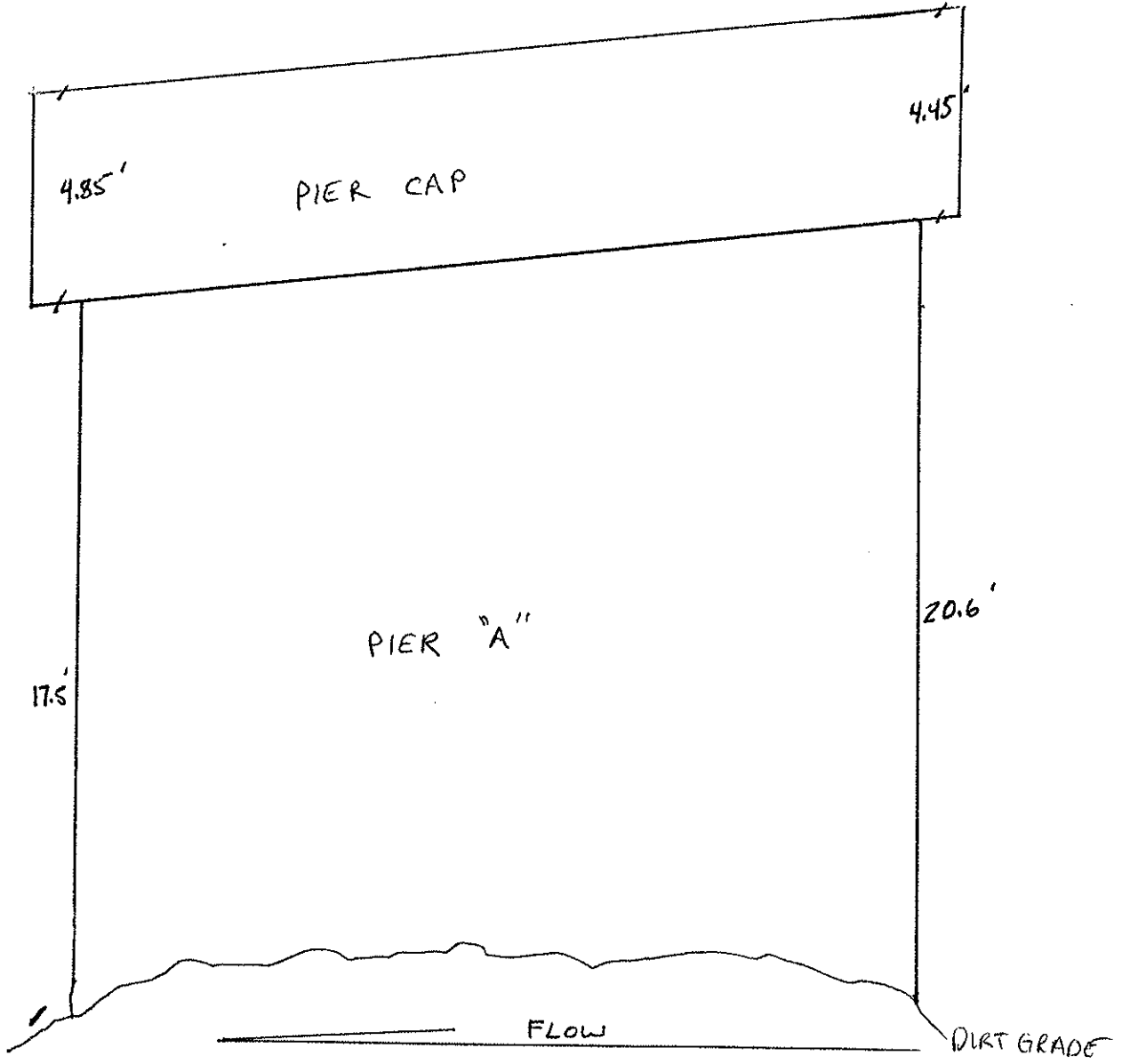
STEEL GIRDER



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Date	08/31/09
By	NN
Sheet No.	2 of 7

Subject PIER "A" TUZIGOOT BRIDGE

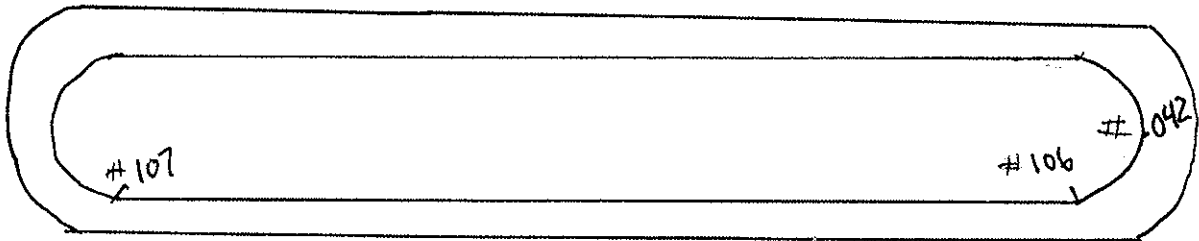
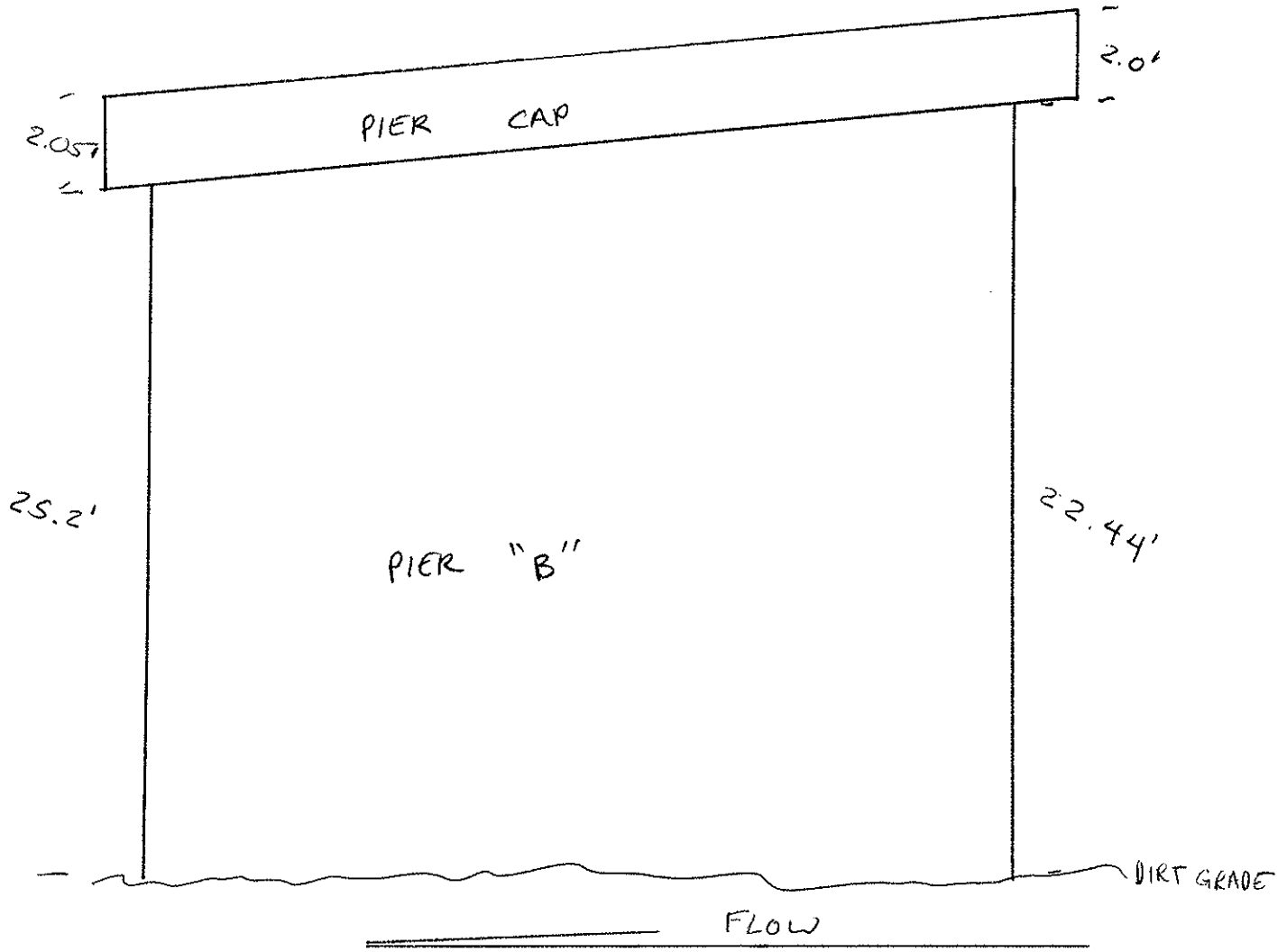


PLAN VIEW PIER "A"

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Date	08/31/09
By	NN
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Subject PIER "B" TUZIGOOT BRIDGE

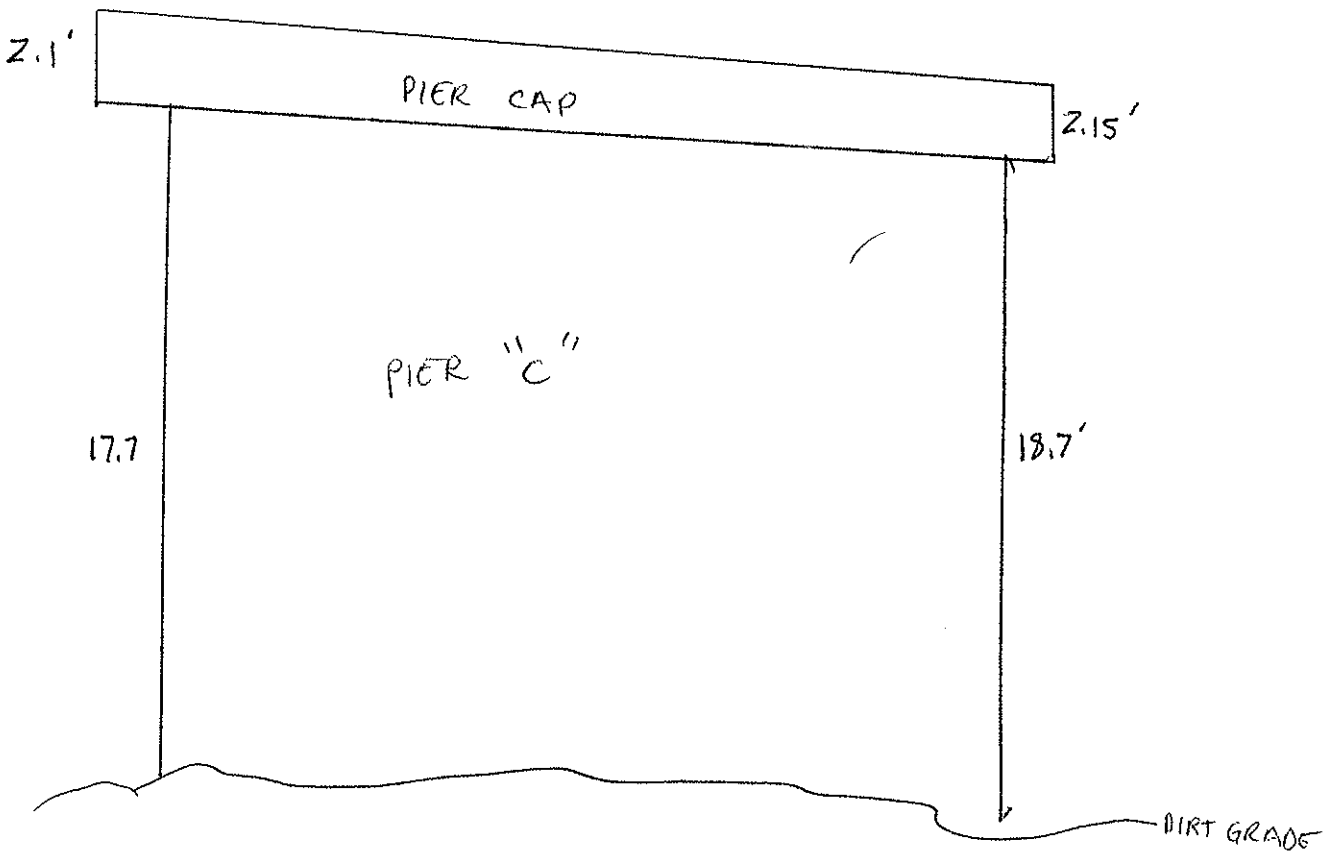


PLAN VIEW PIER "B"

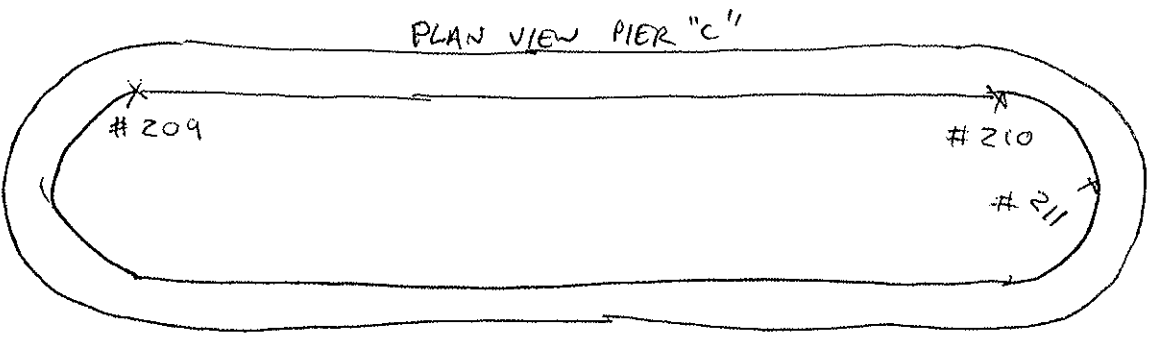
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Date	08/31/09
By	NN
Sheet No.	4 OF 7

Subject PIER "C" TUZIGOOT BRIDGE



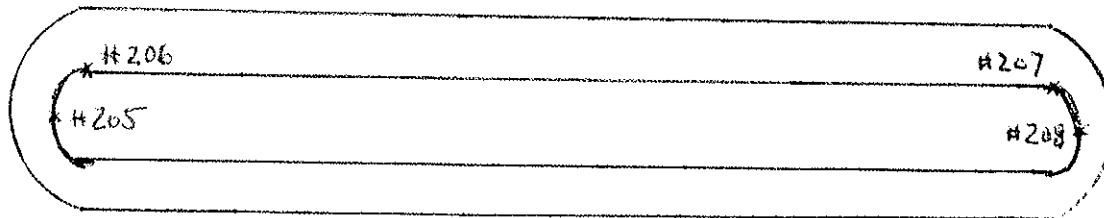
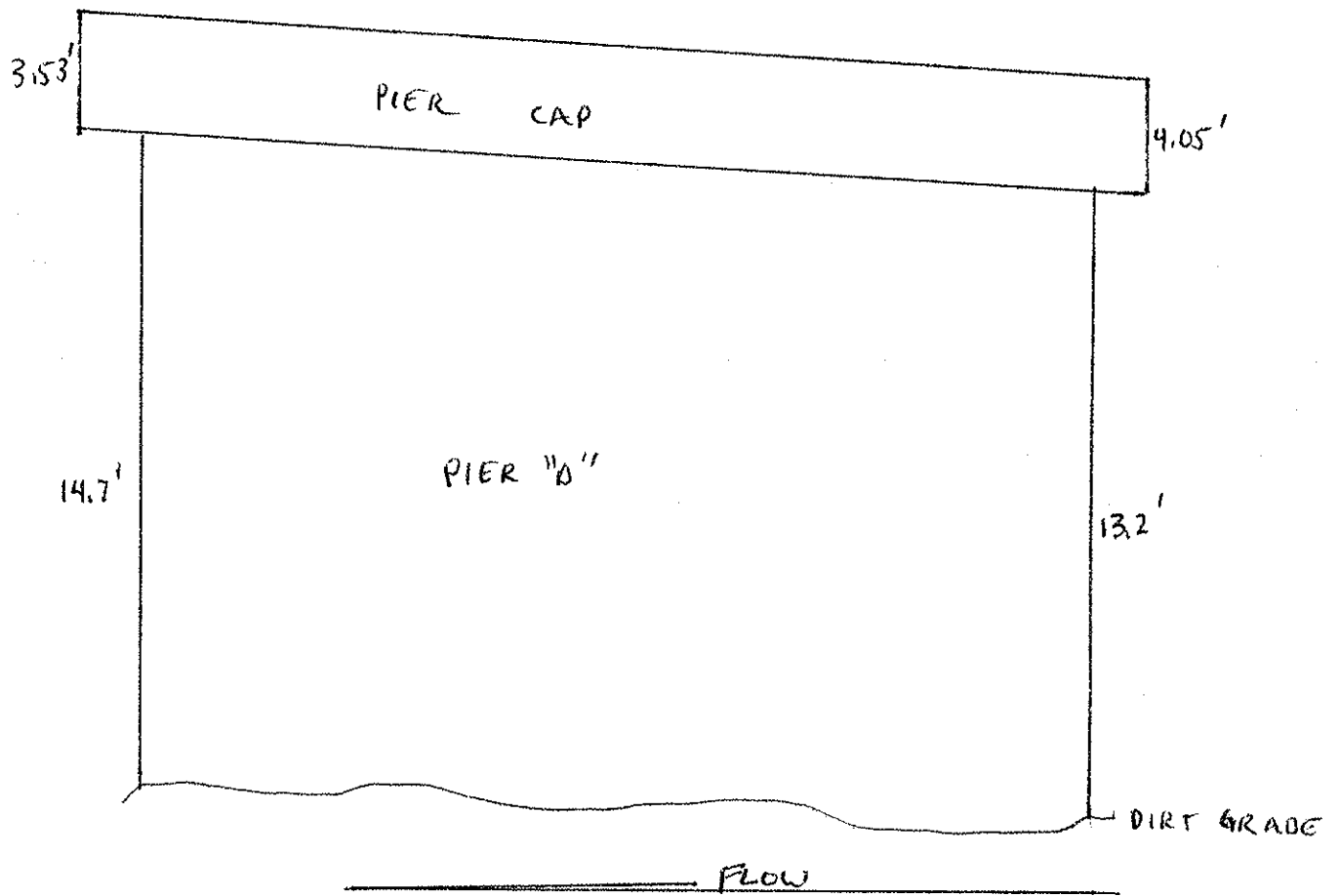
FLOW



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Date 08/31/09
By NN
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Subject PIER "D" TUZIGOOT BRIDGE



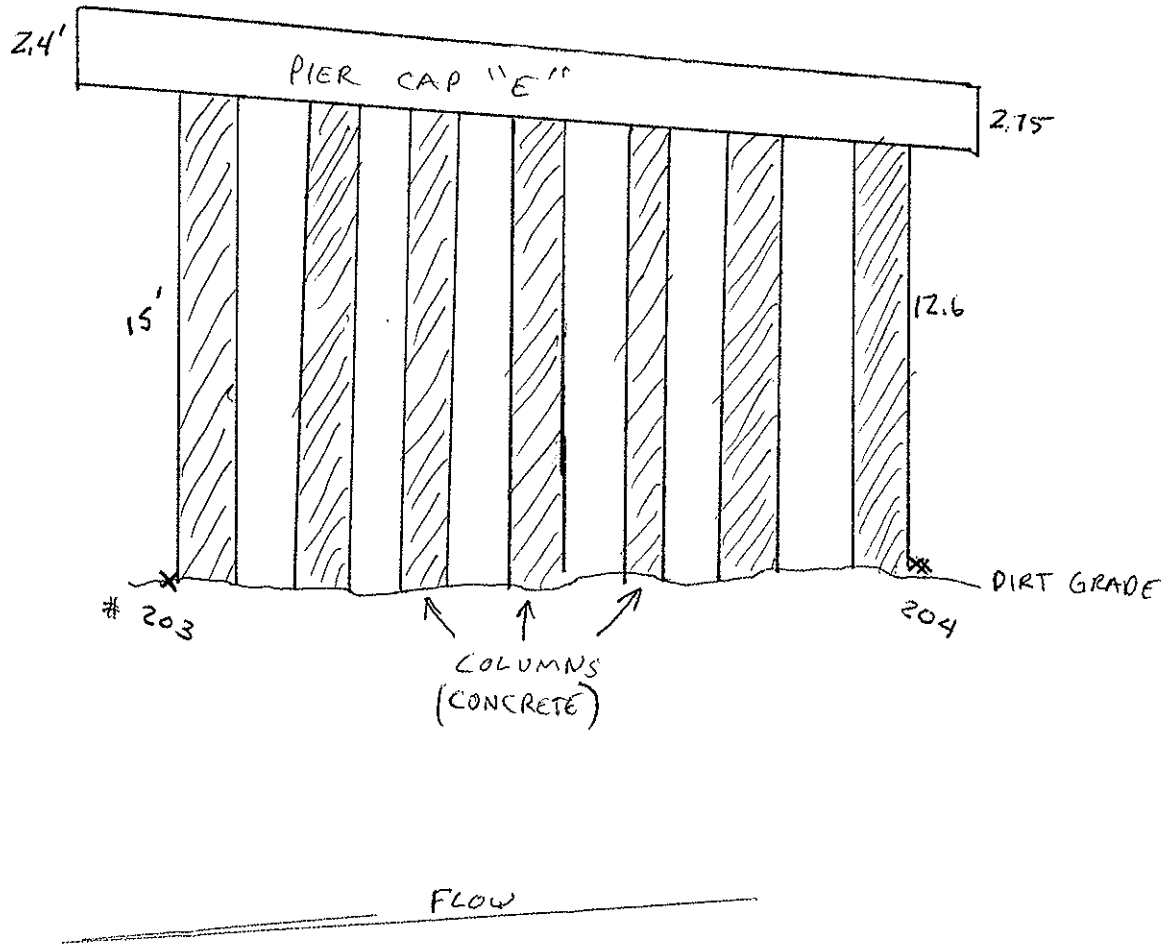
PIER "D" PLANVIEW

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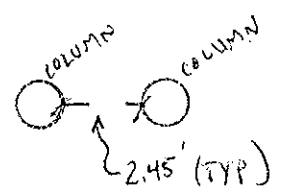
Job No. 09114
Date 08/31/09
By NN
Sheet No. ~~7 of 7~~

Subject PIER "E" TUZIGOOT BRIDGE

6 of 7



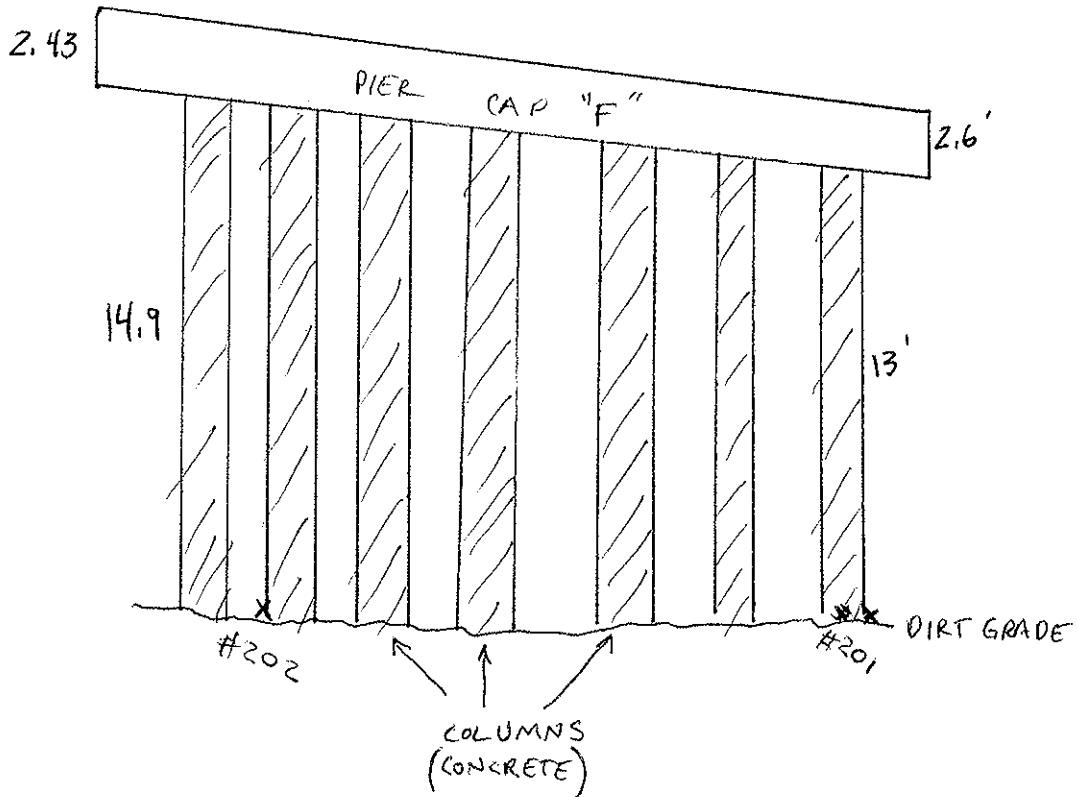
3.2' WIDE CAP (TOP OF COLUMNS)



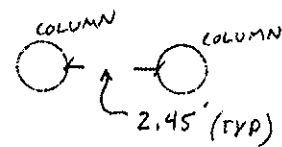
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Job No.	09114
Date	08/31/09
By	NN
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Subject PIER "F" TUZIGOOT BRIDGE



3.2' WIDE CAP (TOP OF COLUMNS)



PLOTTED: Dec 07, 2009-12:34pm

TUZIGOOT BRIDGE AND ADJACENT VERDE RIVER CROSS SECTION SURVEY

SECTION 21, TOWNSHIP 16 NORTH, RANGE 3 EAST,
GILA AND SALT RIVER MERIDIAN,
YAVAPAI COUNTY, ARIZONA

COORDINATE SYSTEM DETAIL:

LINEAR UNIT: INTERNATIONAL FEET
 GEODETIC DATUM: NAD 1983 (CONUS)
 VERTICAL DATUM: (SEE BELOW)
 SYSTEM: US STATE PLANE 1983
 ZONE: ARIZONA CENTRAL 0202
 PROJECTION:
 TRANSVERSE MERCATOR
 LATITUDE OF GRID ORIGIN: 31° 00' 0" N
 LONGITUDE OF CENTRAL MERIDIAN: 111° 55' 0" W
 NORTHING AT GRID ORIGIN: 0.00 FT
 EASTING AT CENTRAL MERIDIAN: 700,000.00 FT
 CENTRAL MERIDIAN SCALE FACTOR: 0.9999 EXACT

ALL MEASURED DISTANCES AND BEARINGS SHOWN HEREON ARE GRID VALUES BASED ON THE PRECEDING PROJECTION DEFINITION. THE PROJECTION WAS DEFINED SUCH THAT GRID DISTANCES ARE EQUIVALENT TO "GROUND" DISTANCES IN THE PROJECT AREA.

THE BASIS OF BEARINGS IS TRUE GEODETIC NORTH. NOTE THAT THE MEASURED GRID BEARINGS SHOWN HEREON (OR IMPLIED BY GRID COORDINATES) DO NOT EQUAL GEODETIC BEARINGS DUE TO MERIDIAN CONVERGENCE.

ORTHOMETRIC HEIGHTS (ELEVATIONS) WERE TRANSFERRED TO THE SITE FROM R18 NGS (PID# ES0478) USING GPS WITH NGS GEOID MODEL "GEOID03". ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE PUBLISHED NAVD 88 ELEVATION OF THIS STATION.

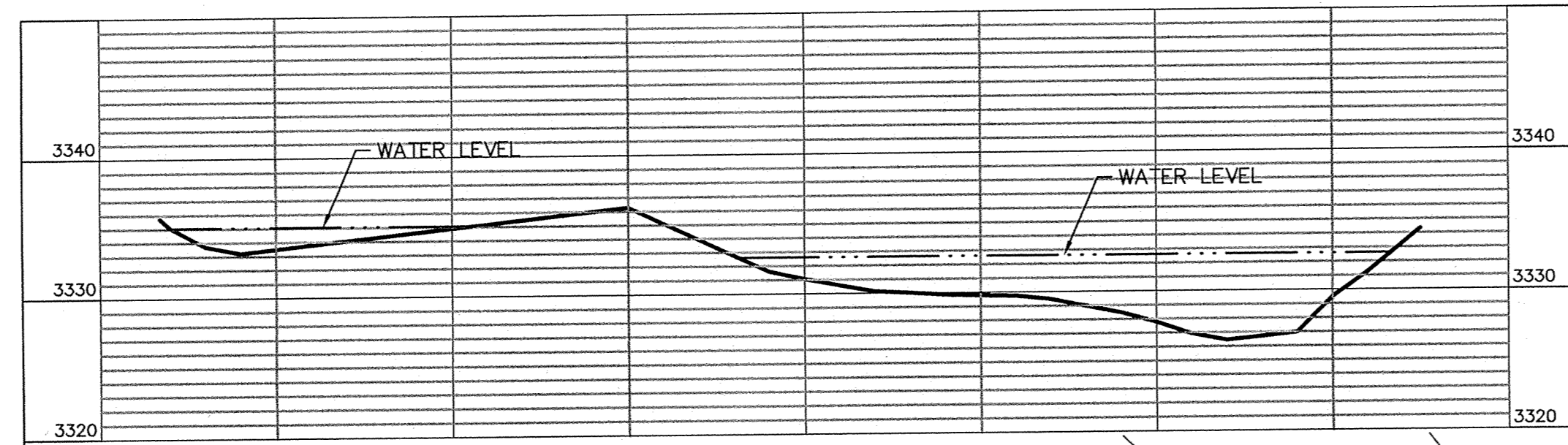
THE SURVEY WAS CONDUCTED USING GPS REFERENCED TO THE NATIONAL SPATIAL REFERENCE SYSTEM. A PARTIAL LIST OF POINT COORDINATES FOR THIS SURVEY IS GIVEN BELOW (ADDITIONAL COORDINATES ARE AVAILABLE UPON REQUEST). LOCAL NETWORK ESTIMATES ARE GIVEN AT THE 95% CONFIDENCE LEVEL AND ARE BASED ON AN APPROPRIATELY CONSTRAINED LEAST-SQUARES ADJUSTMENT OF OVER-DETERMINED AND STATISTICALLY INDEPENDENT OBSERVATIONS.

POINT #23 CP VERDE (1992) 3-1/4" SWI ALUM DISK IN CONCRETE STAMPED "VERDE" (DH5794)
 LATITUDE = 34°38'11.63440"N NORTHING = 1,323,031.34 FT ESTIMATED ACCURACY
 LONGITUDE = 111°56'10.17109"W EASTING = 694,137.01 FT HORIZ = FIXED
 ELLIPSOID HEIGHT = 3,155.512 FT ELEVATION = 3,240.43 FT VERT = FIXED

POINT #24 CP R 18 (1992) 3-3/4" USGS BRASS DISK IN BEDROCK STAMPED "R 18 1931" (ES0478)
 LATITUDE = 34°43'41.84276"N NORTHING = 1,356,417.55 FT ESTIMATED ACCURACY
 LONGITUDE = 111°58'50.37059"W EASTING = 680,773.11 FT HORIZ = FIXED
 ELLIPSOID HEIGHT = 3,283.301 FT ELEVATION = 3,367.35 FT VERT = FIXED

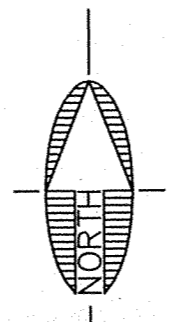
POINT #60 CP K 344 (1992) 3-1/2" CGS BRASS DISK IN CONC MON STAMPED "K 344 1959" (ES0586)
 LATITUDE = 34°34'13.02899"N NORTHING = 1,298,911.37 FT ESTIMATED ACCURACY
 LONGITUDE = 111°53'35.25648"W EASTING = 707,086.18 FT HORIZ = FIXED
 ELLIPSOID HEIGHT = 3,204.232 FT ELEVATION = 3,289.47 FT VERT = FIXED

POINT #64 CP PANORAMA (1992) 3-1/4" SWI ALUM DISK IN CONCRETE NO STAMPING (DH5792)
 LATITUDE = 34°45'39.99532"N NORTHING = 1,368,390.84 FT ESTIMATED ACCURACY
 LONGITUDE = 112°04'13.19670"W EASTING = 653,848.06 FT HORIZ = FIXED
 ELLIPSOID HEIGHT = 3,852.986 FT ELEVATION = 3,936.58 FT VERT = FIXED

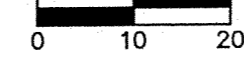


UPSTREAM PROFILE

SCALES:
 1" = 20' HOR
 1" = 10' VER



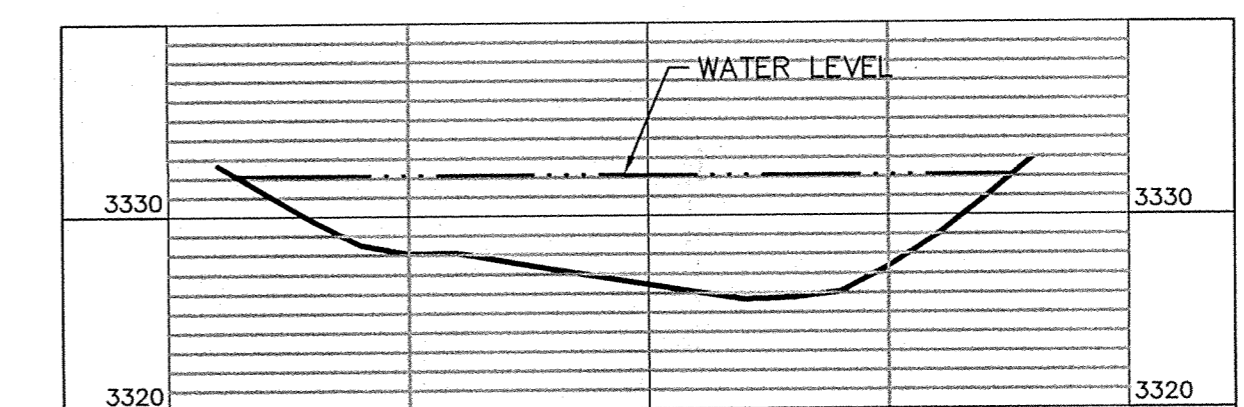
SCALE: 1" = 20'



RIVER

VERDE

VERDE RIVER



DOWNSTREAM PROFILE

SCALES:
 1" = 20' HOR
 1" = 10' VER

LEGEND

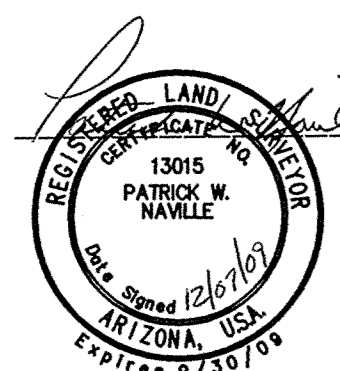
- ASPHALT EDGE
- CENTERLINE
- CONCRETE
- WATER LINE
- XXXX.X ELEVATION

SURVEY NOTES:

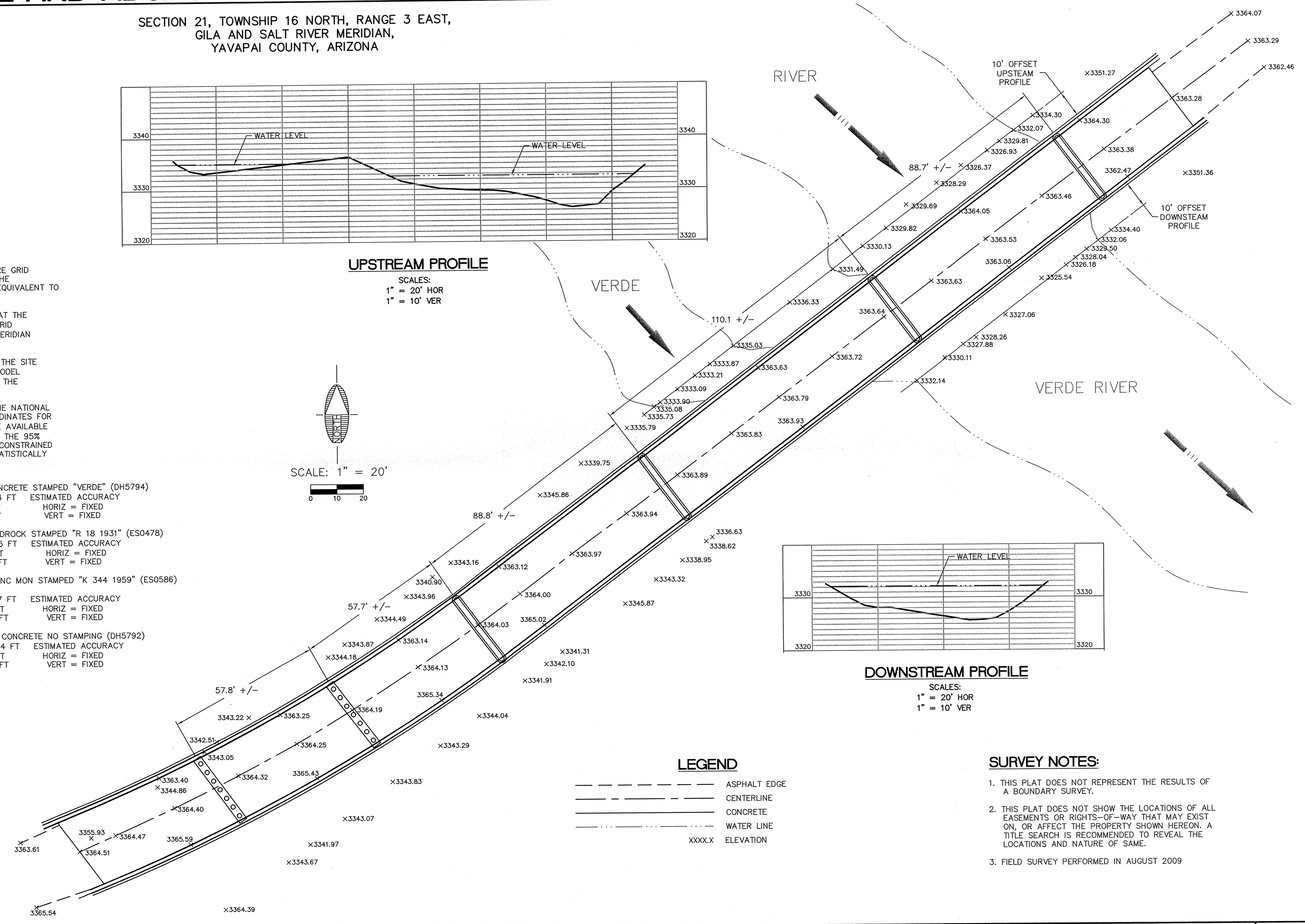
1. THIS PLAT DOES NOT REPRESENT THE RESULTS OF A BOUNDARY SURVEY.
2. THIS PLAT DOES NOT SHOW THE LOCATIONS OF ALL EASEMENTS OR RIGHTS-OF-WAY THAT MAY EXIST ON, OR AFFECT THE PROPERTY SHOWN HEREON. A TITLE SEARCH IS RECOMMENDED TO REVEAL THE LOCATIONS AND NATURE OF SAME.
3. FIELD SURVEY PERFORMED IN AUGUST 2009

CERTIFICATE OF LAND SURVEYOR

I HEREBY CERTIFY THAT THE SURVEY SHOWN HEREON WAS DONE UNDER MY DIRECT SUPERVISION AND IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.



Patrick W. Naville, RLS 13015



REVISIONS			
NO.	DESCRIPTION	DATE	BY

SWI
 Shephard Wesnitzer, Inc. www.swiaz.com
 75 Kallof Place
 Sedona, AZ 86336
 928.282.1061
 928.282.2058 fax

JOB NO:	09114
DATE:	DEC. 2009
SCALE:	1" = 20'
DRAWN:	JMK
DESIGN:	N/A
CHECKED:	PWN

HDR-YC FLOOD CONTROL EXHIBIT

YAVAPAI COUNTY ARIZONA

DRAWING NO.	
1	
SHT NO.	OF
1	1

CALL TWO WORKING DAYS BEFORE YOU DIG
 1-800-STAKE-IT

FILE: P:\2009\09114 SURVEY\SPCS EXHIBIT\09114_SPCS_TUZIGOOT.DWG MKK