
REEMS ROAD CHANNEL AND BASIN

FINAL DESIGN REPORT



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REEMS ROAD CHANNEL AND BASIN

FINAL DESIGN

REPORT

PROJECT PHOTOS

II. WEIR

III. CHANNEL





**Control District of Maricopa County
FCD Project No. 470-12-31
REEMS ROAD CHANNEL AND BASIN
FINAL DESIGN REPORT**

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
PICTURE COVER SHEET.....	I-III
TABLE OF CONTENTS	IV-V
FIGURES AND APPENDICES.....	V
1.0 PROJECT DESCRIPTION.....	1
1.1 Background	1
1.2 Location.....	1
1.3 Rights-of-Way	3
1.4 Utilities.....	6
2.0 SELECTED CHANNEL ALTERNATIVE	8
2.1 Low Flow Channel.....	8
2.2 Typical Section.....	8
2.3 Slope Protection	10
2.4 Grade Control Structures.....	10
2.5 Side Weir Protection	12
2.6 Maintenance Road.....	12
2.7 Detention Basin.....	14
3.0 HYDROLOGIC ANALYSIS.....	16
4.0 HYDRAULIC ANALYSIS.....	16
5.0 CONSTRUCTION COST ESTIMATE	17
6.0 CONSTRUCTION SPECIAL PROVISIONS	17

7.0 SUPPLEMENTARY GENERAL CONDITIONS.....	17
8.0 CONSTRUCTION PLANS	17

LIST OF FIGURES

	<u>Page</u>
Figure 1 - Project Location Map.....	2
Figure 1A - Project Location Map.....	3
Figure 2 – Twelve Oaks Preliminary Plat	5
Figure 3 – Typical Section	9
Figure 4 – Grade Control Structure.....	11
Figure 5 – Weir Structure.....	13
Figure 6 – Detention Basin Plan.....	15

LIST OF APPENDICES

- Appendix I - Hydraulic and Hydrologic Calculations (14 pages + files on CD listed below)
- Appendix II – Construction Cost Estimate (2 pages)
- Appendix III –Construction Special Provisions (35 pages)
- Appendix IV – Supplementary General Conditions (24 pages)
- Appendix V – Construction Plans (59 sheets 8 1/2” x 11”)

Enclosed CD contains the entire design report and Hydraulic and Hydrologic files and Geotechnical Report.

1.0 PROJECT DESCRIPTION

1.1 Background

The purpose of this report is to document the design and preparation of final construction drawings, special provisions, and engineer's estimate for the construction of the Reems Road Channel and Basin from the Falcon Dunes Golf Course to Peoria Avenue. The Project is approximately 8,000 feet in length and the Basin area is approximately 44.5 acres with a capacity of approximately 215 acre-feet.

The improvements are consistent with the recommendations from the Loop 303 Corridor/White Tanks Area Drainage Master Plan Update (2002 – 2005).

The Project from Luke Air Force Base to Peoria Avenue was funded, designed and constructed by the Flood Control District. The District operates and maintains the project except for Box Culverts Nos. 1 and 3, which are owned and maintained by Maricopa County Department of Transportation (MCDOT). The Reems Channel improvements from Peoria Avenue north including the culvert crossing tying into the Reems Road channel south of Peoria Avenue were designed, constructed, and are maintained by the City of Surprise. IGA's FCD 2002A014, 2002A014A, 2004A019 and 2004A019A defines responsibilities for the District, MCDOT, and the City of Surprise.

1.2 Location

The project is located in unincorporated Maricopa County and the City of Glendale. The Reems Road Channel is located along the west side of Reems Road. The channel begins approximately one half mile north of Northern Avenue at the north side of the Falcon Dunes Golf Course and extends north approximately 8,000 feet to the south side of Peoria Avenue. The City of Glendale has annexed Olive Avenue and the adjacent ROW south of Olive Avenue along the area west of the Reems Road Monument Line. The Project area south of Olive and west of Reems Road is within the City of Glendale and the rest



Figure 1-A
(Project Location Map)

The area east of Reems Road is farmland the entire length of the project. The area immediately west of the Reems Road Channel is farmland south of Olive Avenue. The property west of the Reems Road Channel and Basin between Olive Avenue and Peoria Avenue has been farmland in the past and is now transitioning to residential land use and is being developed in phases as market conditions dictate. The Victoria Ranch Development (Phase 2) lies west of the project and lies close to the channel. Much of this area may still be used as farmland contingent upon development. The Victoria Ranch Plat is currently being revised. The grading plan for the Twelve Oaks PH II development (which is superseded by Victoria Ranch) is shown by **Figure 2** for reference purposes.

1.3 Rights-of-Way

The Project requires 220 feet of right-of-way from the basin north to Peoria Avenue and 200 feet of right-of-way from Falcon Dunes Golf Course north to the basin. This includes ROW needed for the future Reems Road expansion, which has been transferred to MCDOT. In addition, the basin requires approximately 44.5 acres of right-of-way.

MCDOT will be acquiring a 300-foot wide strip of right-of-way for the Northern Avenue Parkway. This Parkway will run east west adjacent to the north side of the Falcon Dunes Golf Course. ROW acquired for the Project that is within the boundaries of the future Northern Parkway has been transferred to MCDOT. Box Culverts One and Three have been transferred to MCDOT, per IGA FCD 2004A019 and 2004A019A.

Box Culverts Two and Four have been lengthened for future roadway requirements at the request and cost of the landowners, per Agreements 2006G005 and 2007G003.



Figure 2

(Twelve Oaks – Grading Concept)

1.4 Utilities

The Reems Road Channel crosses the tracks of the Burlington Northern and Santa Fe Railroad (BNSFRR) just north of Olive Avenue. The culvert under the tracks is designed to meet Coopers E-80 loading and is precast concrete construction to meet the installation time constraints of the railroad. The District has obtained a permit from BNSFRR to construct improvements within the Railroad right-of-way. The District will also transfer permit rights and conditions to MCDOT for roadway maintenance associated with Box Culvert #3.

Fiber optic lines crossing in Olive Avenue conflicted with proposed improvements. These lines were lowered by Cox Communications to clear the box culvert. (See plan sheet 27.)

Maricopa Water District (MWD) has facilities that conflicted with the project. The first conflict is located near the south end of the project along Reems Road Channel Station 8+40 +/- . A new 30-inch concrete pipe (16 feet +/- below the surface) was installed that extends 10 feet beyond each edge of the proposed Concrete Box Culvert (CBC) #1. This pipe will be available if a siphon structure is needed by MWD in the future. The existing concrete lined ditch was rebuilt during the box culvert construction. (See plan sheets 24 and 38.) Another MWD conflict was near the north end of CBC #1 at Reems Road Channel Station 12+91+/- . A new driveway for District maintenance vehicle access was built. The existing concrete ditch remains in place and a precast concrete slab (bridge) 48 feet in width was built bridging this ditch. (See sheet 25 and 38.)

Another MWD conflict was located at Reems Road Channel Station 23+30 +/- near CBC #2. Again, a new driveway for District maintenance vehicle access was built. The existing concrete ditch and pipe remains in place and a precast concrete slab (bridge) 24 feet +/- in width was built. (See sheet 26.) Another MWD conflict was located approximately 25 feet +/- south of Olive Avenue. A new 30-inch concrete pipe (17 feet +/- below the surface) was installed that extends 10 feet beyond each edge of the

proposed CBC #3. This pipe will be available if a siphon structure is needed in the future. The existing concrete lined ditch was rebuilt during the box culvert construction. (See sheet 40.)

There are several private irrigation ditches that run east west along the project. Unless otherwise noted, these ditches were removed and taken out of service. A private irrigation ditch approximately 63 feet +/- south of Olive Avenue was rebuilt. A new 30-inch concrete pipe (16.5 feet +/- below the surface) was installed that extends 10 feet beyond each edge of proposed CBC #3. This pipe will be available if a siphon structure is needed in the future. The existing concrete lined ditch was rebuilt during the box culvert construction.

A power pole was relocated on the east side of Reems Road near CBC #1 where it connects to the Falcon Dunes Golf Course Concrete Channel. A portion of two concrete lined irrigation ditches that lie east of Reems Road adjacent to Falcon Dunes Golf Course were removed and reconstructed to match the new Reems Road Channel improvements.

2.0 SELECTED CHANNEL ALTERNATIVE

The selected cross section for this project is an 8-foot deep earthen trapezoidal section with a 20-foot bottom (minimum except along the weir which is 10 feet wide) and side slopes that varies between 4:1 and 8:1. The Toe of Slope (TOS) varies thereby increasing the channel bottom width up to 60 feet +/- at some locations. The side slopes are not steeper than 4:1 and the Top of Bank (TB) distance from channel centerline was increased but not decreased at some locations. The bottom and sides of the channel are earthen and hydro seeded with native seed mixes and planted with native trees to prevent local erosion and rilling. Tall pot trees are planted along the channel slopes. The channel at the weir is concrete and transitions to the earthen channel with riprap at the upstream and downstream ends of the concrete weir.

2.1 Low Flow Channel

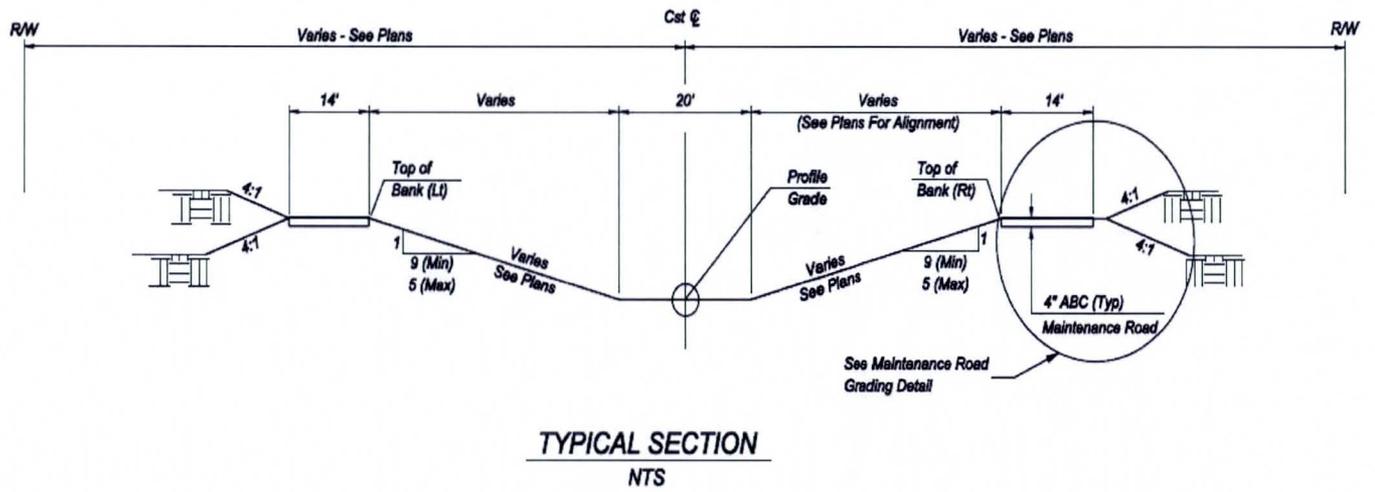
A low flow channel is not required because nuisance flows are intercepted upstream by tail water ditches and/or ponds used by the existing farm fields; or by detention areas of current and future developments.

2.2 Typical Section

The typical section for this project is described above. A 14-foot maintenance road is provided on each side of the channel. The project also includes a 4-strand smooth wire fence around the perimeter of the channel and the basin. The typical section for the channel is shown by **Figure 3**.

(Typical Section)

Figure 3



2.3 Slope Protection

The channel is designed as a natural channel with native vegetation. Additional rip rap protection is provided (3-foot blanket depth of $D_{50} = 18$ -inches material) at the grade control structure locations, immediately upstream and downstream of the weir structure, downstream of the box culvert structures, and at critical locations subject to erosion.

2.4 Grade Control Structures

The grades for the channel are flat to control the velocity to less than 5 feet per second +/- . This requires a series of drops and drop structures to prevent grade cutting from occurring. These structures do not project above the finish grade, thus blending in with the natural conditions and effectively hidden from view. Riprap, as described above, extends to the surface from the top of the drop to the bottom of the drop (from top of bank to top of bank) and upstream (10 foot minimum) and downstream (20 foot minimum) of the drop. See **Figure 4**.

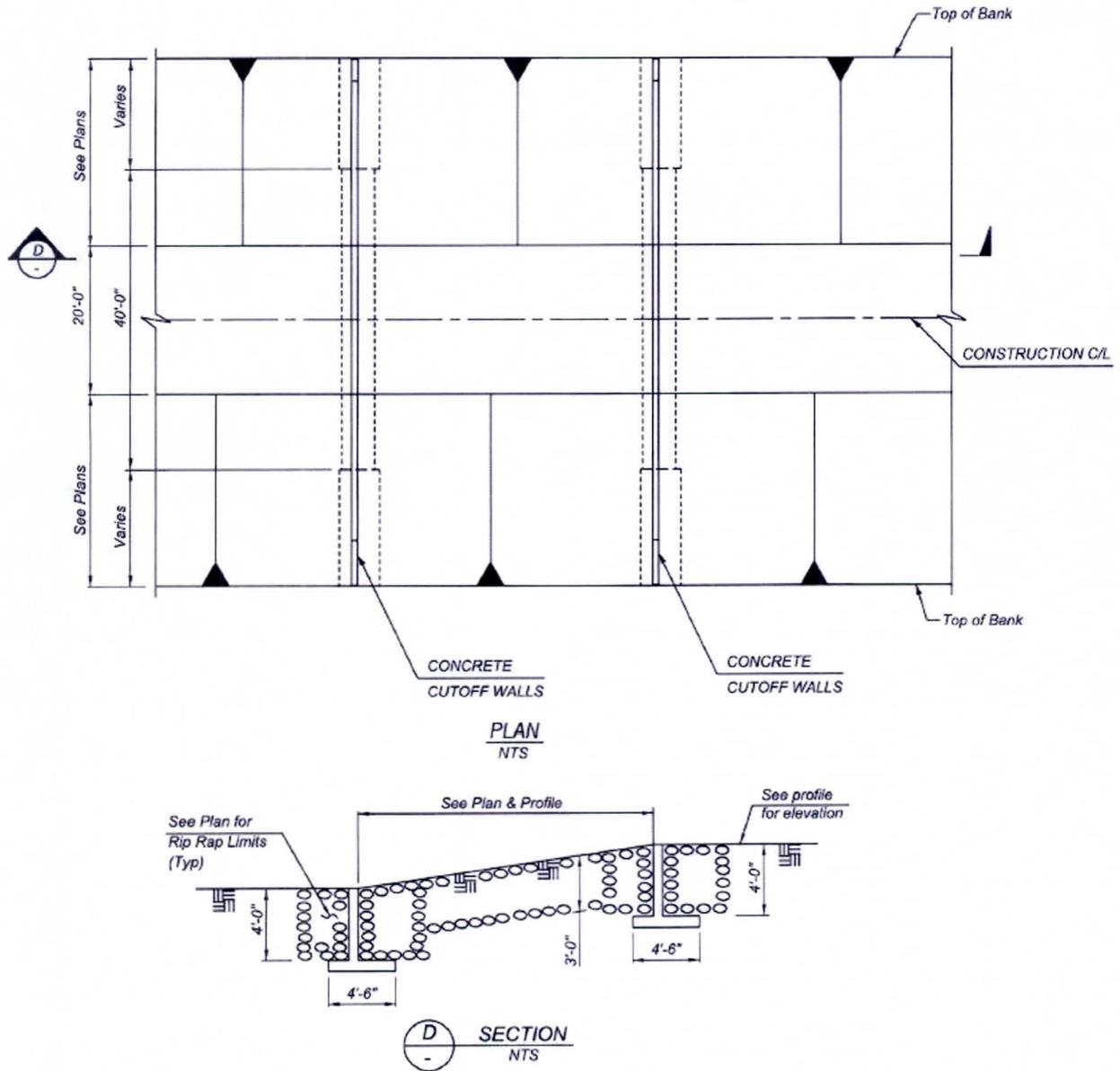


Figure 4
(Grade Control Structure)

2.5 Side Weir Protection

This project includes a side weir to direct flow from the Reems Road Channel into the basin. This structure allows the basin to be offline and thus improves its efficiency. The weir is 397.3 feet in length and will have riprap a minimum of thirty feet upstream and downstream of the weir structure – channel structure. The channel at the weir is constructed of concrete to prevent erosion in the channel and basin where the flow leaves the channel and flows over the weir into the basin. Rip rap is located along the north, south, and west edges of the weir to control erosion. See **Figure 5** for weir layout.

2.6 Maintenance Road

The project includes an ABC maintenance road (4-inches in depth) on both sides of the channel and around the top of the basin. Maintenance access ramps with a maximum grade of 5% +/- are constructed along the channel where needed.

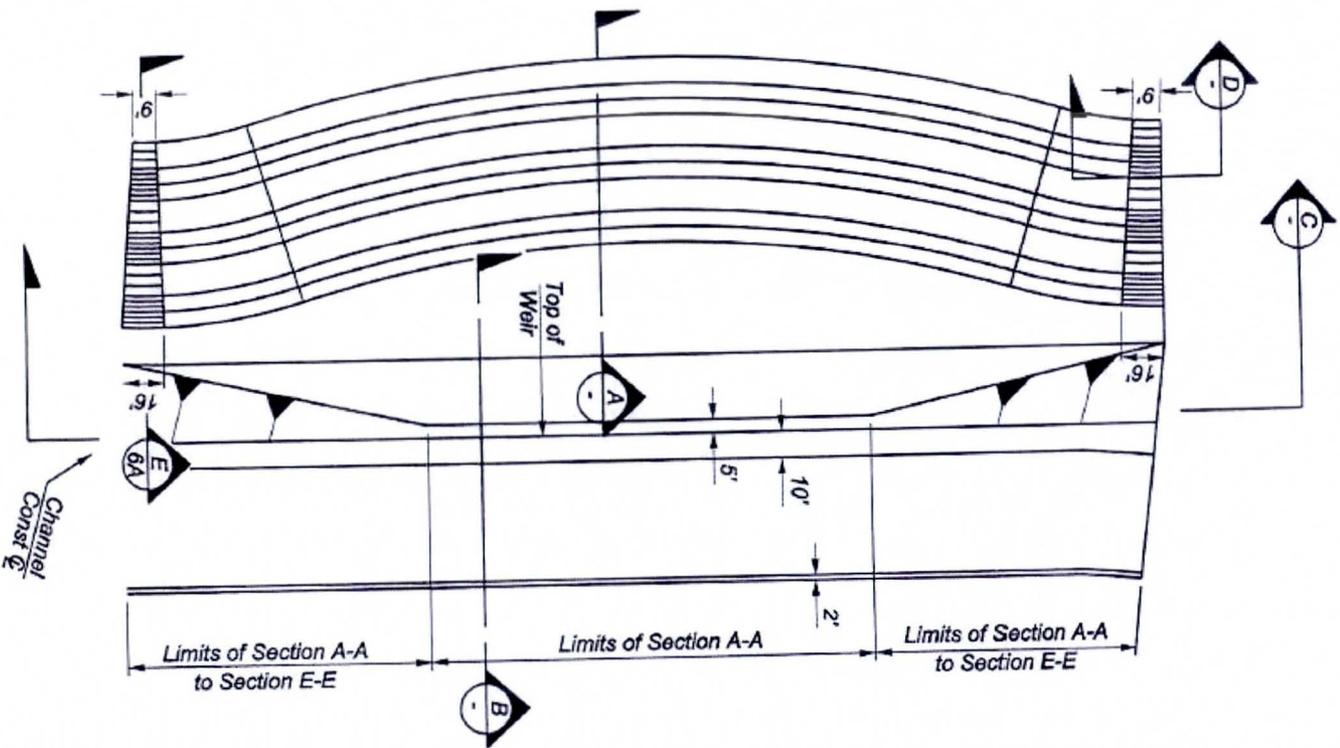


Figure 5
(Weir Structure)

2.7 Detention Basin

Approximately 215 Ac-feet of storage is provided. A 30-inch concrete pipe serves as the discharge pipe for the basin into the channel. An emergency spillway is located approximately 100 feet north of the 30-inch pipe. The bottom and sides of the basin are planted with native grasses. Tall pot trees are planted along the bottom and slopes of the basin. A total of approximately 1220 trees are placed in the basin and channel. An overflow spillway is located approximately 100 feet north of the 30-inch pipe.

While it has been determined that a low flow channel is not required for the main channel, a trickle channel is constructed within the basin to minimize standing water due to the flat grades and to provide a visual element to the basin.

The plan of the selected basin alternative is shown in **Figure 6**. The development of basin alternatives and cost alternatives is covered in a separate report prepared by Olsson and Associates, who were under contract with the District to provide Landscape and Aesthetics consulting services.

3.0 HYDROLOGIC ANALYSIS

The Hydrology for the Project is designed to convey the existing (assuming CIP Projects are in place) 100-year flow identified in the Loop 303 Corridor/White Tanks Area Drainage Master Plan Update. The existing total flow in the channel from Peoria Avenue south to the basin is 2,179 cfs. The existing flow diverted to the basin is 1,752 cfs. The total flow in the channel from the basin south to Olive Avenue is 639 cfs. The total flow in the channel from Olive Avenue south to the Falcon Dunes Golf Course is 818 cfs. The requirement at the Dysart Drain is to not exceed 1000 cfs.

The Hydrology for the Project is designed such that the basin and channel will convey/detain the future 100-year flow identified in the Loop 303/White Tanks Area Drainage Master Plan Update. This flow will not exceed 1000 cfs flowing into the Dysart Drain at the Falcon Dunes Golf Course.

This is discussed in more detail in Appendix I - "Scour Protection Design and Unsteady-State Hydraulic Modeling for the Lateral Weir Design" dated August, 2008. This report is in a CD which is included with this report.

4.0 HYDRAULIC ANALYSIS

The proposed channel improvements have been analyzed using HECRAS and the output is shown in **Appendix I** - "Scour Protection Design and Unsteady-State Hydraulic Modeling for the Lateral Weir Design" dated August, 2008. Calculations and models are contained in a CD included with this report titled "**Reems Road Basin and Channel Hydraulics**".

5.0 CONSTRUCTION COST ESTIMATE

Construction cost estimates and the bid tabs are included in **Appendix II**.

6.0 CONSTRUCTION SPECIAL PROVISIONS

The Construction Special Provisions are included in **Appendix III**.

7.0 SUPPLEMENTARY GENERAL CONDITIONS

The Supplementary General Conditions are included in **Appendix IV**.

8.0 CONSTRUCTION PLANS

The Construction Plans are included in **Appendix V**.

APPENDIX I

**Scour Protection Design and Unsteady-State
Hydraulic Modeling for the Lateral Weir Design**

Reems Road Channel and Basin

Scour Protection Design and Unsteady-State Hydraulic Modeling for the Lateral Weir Design

by

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August, 2008



Table of Contents

Table of Contents	i
List of Figures	ii
List of Tables	ii
Introduction	3
Initial Design	3
Design Constraints	3
Hydrology	3
Hydraulics	4
<i>Sizing of Lateral Weir</i>	4
<i>Maximum Stage in Basin</i>	5
<i>Freeboard in the Channel</i>	7
<i>HEC-RAS Modeling Changes</i>	8
Final Design	9
Background	9
Hydrology	9
Hydraulics	10
Scour and Scour Protection	11
Drop Structures	11
Culverts	13
Basin Riprap at End of Weir Structure	13
Summary	15
References	16
Attachment	See attached CD

List of Figures

Figure 1: Initial design hydrograph.....	4
Figure 2: Flow hydrograph at outlet culvert of the basin (version 4.0.0)	6
Figure 3: Plot of stage versus time (retention basin) with maximum stage highlighted.....	7
Figure 4: Comparison of initial design hydrograph (!RM5) and final design hydrographs (!RM4 and 11179)	10

List of Tables

Table 1: Design constraints for the Reems Road Channel	4
Table 2: Original design constraints for the Reems Road Basin	4
Table 3: Weir stationing and elevations.....	6
Table 4: Comparison of required top of bank with actual top of bank for the design condition	8
Table 5: Final geometry of lateral weir.....	11
Table 6: Total scour calculations for each drop structure (negative values not used).....	12
Table 7: Culvert outlet protection calculated with HEC-14 (FHWA, 2006).....	13

Introduction

In support of the Civil Structures Branch, the Engineering Application Development and River Mechanics (EADRM) Branch developed unsteady HEC-RAS models to size the lateral weir and basin for the Reems Road Channel and Basin project. Additionally, the EADRM Branch developed a steady HEC-RAS model to be used in the Conditional Letter of Map Revision (CLOMR) submittal and another steady HEC-RAS model to show containment of the final design flows.

For clarity, in the following sections of this document, two designs will be discussed. The first design is the "Initial" design, which was developed by the EADRM branch from October, 2007 to June, 2008 and was based on the original design hydrology supplied by PPM Division. The second design is the "Final" design, which was developed by the EADRM branch from June, 2008 to August, 2008 and is based on the final design hydrology.

Initial Design

Design Constraints

The design constraints for the basin and channel were developed in the Loop 303 ADMP Update and were given by email (file name: "FW Reems Road Hydrology" on the attached CD) to the Civil Structures Branch from the PPM Division. The design constraints for the channel are shown in Table 1, while the original design constraints for the basin are shown in Table 2. In the 90% design plans for the Reems Road Channel and Basin, the basin is sized with a volume of 202.274 acre-feet (AF), which corresponds to an elevation of 1136 ft.

Hydrology

To verify that the basin has adequate storage, the correct hydrograph must be used to calculate the volume of water diverted for storage. This hydrograph was obtained from the White Tanks/Loop 303 Update Study in the existing conditions HEC-1 model with Capital Improvement Projects in place at concentration point CP179 (file name "L33PE4h.dat"). In this file, the concentration point (CP179) is renamed "!RM5", so when searching for the hydrograph, "!RM5" is the text associated with the correct hydrograph. This concentration point is at the intersection of Reems Road and Olive Avenue, rather than at Reems Road and Peoria Avenue. This point was selected based upon the design constraints given by the email from the PPM Division to the Civil/Structures Branch. However, the use of this hydrograph results in a conservative design because the peak is higher in this hydrograph than it is in the one at Reems Road and Peoria Avenue.

Total discharge in channel just before basin	=	2,179 cfs
Total discharge remaining in channel (flow-by)	=	639 cfs
Total (routed/attenuated outflow) discharge flow out of basin	=	198 cfs
Total combined discharge (flow from basin combined with channel flow) downstream of basin	=	818 cfs

Table 1: Design constraints for the Reems Road Channel

Volume into the basin	=	189 AF
The Peak Storage Volume	=	165 AF
The Basin Volume Provided	=	165 AF

Table 2: Original design constraints for the Reems Road Basin

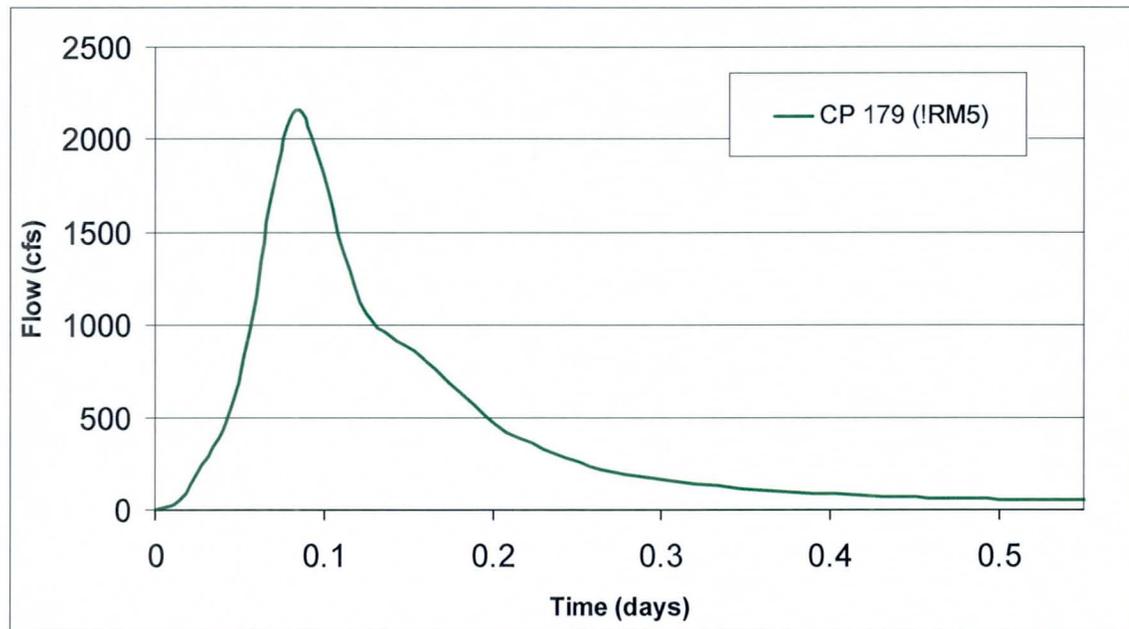


Figure 1: Initial design hydrograph

The hydrograph from the HEC-1 model was discretized into 20 min intervals and manually entered into HEC-RAS. The peak from this discretized hydrograph was 2158.39 cfs, which correlates very well with the required design flow rate of 2179 cfs. The hydrograph, as entered into HEC-RAS, is shown in Figure 1.

Hydraulics

Sizing of Lateral Weir

In the design, the lateral weir must divert ~1360 cfs to reduce the peak flow rate of 2179 cfs to ~800 cfs in the channel downstream of the basin. Therefore, to adequately

size the weir, an unsteady HEC-RAS model was developed from the initial steady-state 90% design model and the discretized hydrograph shown in Figure 1.

To simplify the unsteady model, two changes to the geometry were made. First, the study reach was shortened to contain only the section of channel with the lateral weir, the basin and the culvert (from the basin to the channel) at the downstream portion of the basin. This section of reach ranged from cross-section 8724.268 to cross-section 4895.000. Second, the drop structures were modeled as inline weirs. With these changes, the model converged to a realistic, reasonable result.

To adequately size the lateral weir, a realistic weir coefficient needed to be developed. This was accomplished by using the new version of HEC-RAS (version 4.0.0, released as a final version March, 2008), which has an automatic internal iteration of Hager's Equation for lateral weirs (Hager, 1987). The internal iteration converged to a weir coefficient around 2.15. The new version of the software is included on the attached CD with all electronic files.

In the 90% design, the initial weir design had a total top length of 295 feet (includes the 20:1 side slopes) and a crest length of 195 feet with an average crest elevation of 1138.88 feet. The main channel slope at the lateral weir was 0.001083, and the Manning's n was 0.013 to represent the finished concrete of the weir. Also, the outlet culvert for the basin had a diameter of 5 feet, and did not have a flap gate. However, with this configuration, the lateral weir could not be sized to divert the necessary flow.

In order to divert enough flow to reduce the peak to ~800 cfs, the following changes were made. First, to reduce the flow velocity at the lateral weir, the slope of the channel between the two upstream and downstream drop structures was changed to 0.000042. This was done by increasing the elevation for the downstream drop structure from 1133.46 feet at station 65+40 to 1134.46 feet at station 65+40. Second, the Manning's n at the side weir was increased to 0.02 to represent unfinished concrete or concrete with a rough broom finish. Third, the total top length of the weir was increased to 397 feet (includes the 20:1 side slopes) with a crest length of 161.1 feet. Fourth, the crest elevation was reduced to 1136 feet; and finally, the outlet culvert for the basin was reduced to a diameter of 2.5 feet with a flap gate.

With these design changes, the lateral weir was able to divert the necessary flow and reduce the peak discharge to 781.18 cfs in the channel downstream of the outlet culvert of the basin. The final lateral weir stationing and elevation is shown in Table 3. The flow hydrograph downstream of the outlet culvert is shown in Figure 2. From this figure, it is seen that the peak flow downstream of the culvert is 781.18 cfs, which meets the design constraint of ~800 cfs downstream of the basin. The final unsteady model for the initial design can be found on the attached CD.

Maximum Stage in Basin

To reach the downstream flow of 781.18 cfs, a great portion of the upstream flow in the Reems Channel is diverted to the basin. Therefore, the maximum stage in the basin was also analyzed.

In the final design, the basin top bank is raised from 1136 ft to 1137 ft for most of the perimeter except at one overflow area (near the drop structure at station 55+00), which has an elevation of 1136.6 ft. The original elevation-capacity rating curve stopped

at 1136 ft; however, HEC-RAS linearly extrapolated this rating curve to obtain the maximum stage in the basin. The maximum stage in the basin was then calculated to be 1136.53 ft, which is less than the overflow elevation of 1136.6 ft.

RAS Station (ft)	Station	Elevation (ft)
0	72+01.87	1142.08
121.5	70+80.37	1136
282.6	67+97.77	1136
397	64+00.77	1141.72

Table 3: Weir stationing and elevations

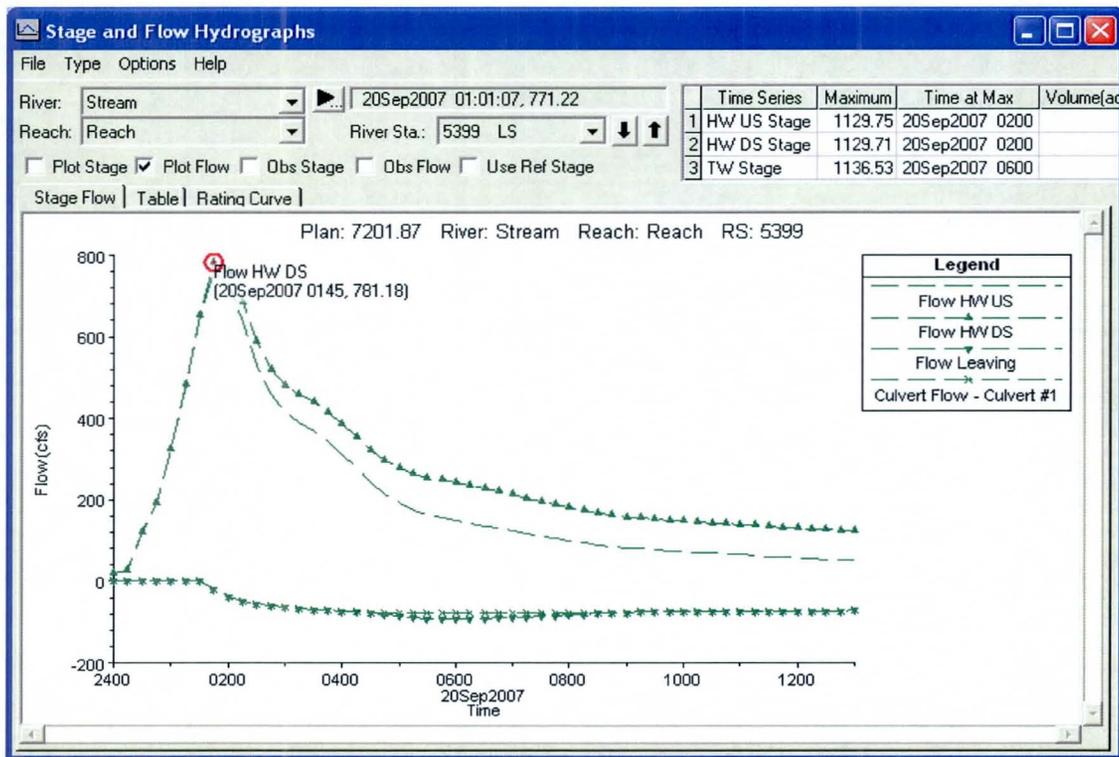


Figure 2: Flow hydrograph at outlet culvert of the basin (version 4.0.0)

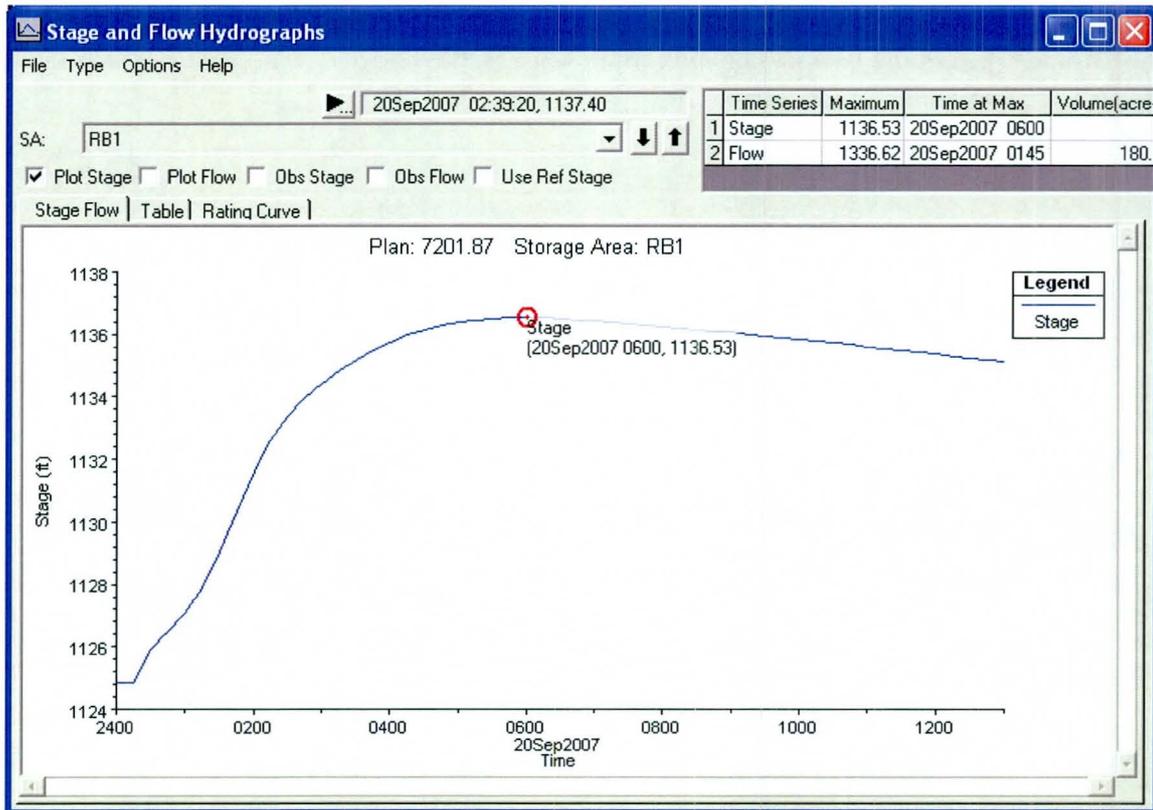


Figure 3: Plot of stage versus time (retention basin) with maximum stage highlighted

Freeboard in the Channel

From the Hydraulics Manual (FCDMC, 2003), the necessary freeboard in an open channel is given by

$$FB = 0.25 \left(y + \frac{V^2}{2g} \right) \quad (1)$$

where FB is the calculated freeboard (ft), y is the maximum channel depth (ft), V is the average channel velocity (ft/s) and g is the gravitational acceleration of 32.2 ft/s^2 . When the flow is subcritical, the required freeboard is the greater of 1 foot or the results of Equation 1. When the flow is supercritical, the required freeboard is the greater of 2 feet or the results of Equation 1. With the flows derived from the unsteady model and the final design configuration (with a channel Manning's n value of 0.035), the FCD freeboard from Equation 1 was maintained for most cross-sections except at two cross-sections, stations 7500 and 7400.000 (Table 4). The actual freeboard that is provided at these cross-sections is 0.71 ft for cross-section 7500 and 0.98 ft for cross-section 7400.000, which is shown in Table 4. From internal FCD meetings, it was decided that this provided freeboard will be adequate, since the water is contained in a beneath-grade channel, rather than behind an above-grade levee.

River Station	Required Top of Bank (ft)	Actual Top of Bank (ft)	Difference from Required (ft)	Actual Provided Freeboard (ft)
7500	1143.65	1142.50	1.15	0.71
7400.000	1143.35	1142.50	0.85	0.98

Table 4: Comparison of required top of bank with actual top of bank for the design condition

HEC-RAS Modeling Changes

For the final design conditions, a final steady-state model needed to be developed. This final steady-state was developed using the flow rates from the sizing of the weir in the unsteady model and the basic geometry from the 90% steady-state model. However, to accurately model the true conditions in the channel, some modeling changes from the 90% steady-state model were made.

The first change was that, for simplicity, the lateral weir and basin were not modeled in the steady model. Instead, only the channel and the culverts were modeled in the geometry.

The second change was that in the 90% model, the culvert at RAS station 1070 was modeled with the internal HEC-RAS culvert routines. However, this routine should not be used for this culvert because it is a broken-back culvert with an almost 90 degree bend. Therefore, in the final model, the modeling approach for the culvert at station 1070 has been changed from culvert modeling to an open channel modeling with a lid. A Manning's n value of 0.012 was used to simulate concrete. This change from a culvert to an open channel with a lid allowed HEC-RAS to simulate the broken-back portion of the culvert. Based on the simulation results, it was found that the flow in the culvert is open channel flow (no pressure flow), and there is hydraulic jump inside the long culvert. If there was any pressure flow, the lid approach would handle it.

Also, to account for the bend losses in this culvert (at station 1070), two cross-sections (926.2 and 879.09) in the open channel with lid section were given a Manning's n value of 0.014, an increase of 0.002 from plain concrete since HEC-RAS can not directly model the bend losses. This increase was recommended by Chow (1959) on page 103.

The third change from the 90% model was that the ineffective flow limits were added (instead of using the blocked areas as in the old RAS model) at the upstream and downstream cross-sections for each culvert. They were aligned using the expansion ratio from the HEC-RAS manual and given a height; such that when water started flowing over the culvert they would deactivate.

Another change from the 90% model was that the contraction and expansion ratios were changed to 0.3 and 0.5, respectively, as compared with 0.1 and 0.3 in the old RAS model, for a length of two cross-sections both upstream and downstream of all culverts (this includes the open channel with lid culvert). This was done to account for the contraction and expansion which occurs at the wing walls of the culverts.

The final change in the steady-state model, which was made to accurately depict final design plans, was that the reach upstream of cross-section 7800.000 was straightened. In previous plans, the channel upstream of station 78+00 had a slight meander, but in the final plans this section of the channel was straightened in order to

meet right-of-way constraints. Therefore, to model the straight channel in the steady-state model, the downstream reach lengths for both the right and left overbanks for all cross-sections upstream of cross-section 7800.000 were modified to match the channel downstream reach lengths, so that all three reach lengths (the channel, the left overbank and the right overbank) were the same. This modification allowed model to accurately depict the straightened channel. However, since the geometry schematic is only a visual representation and does not affect the calculations, the reach schematic was not modified and still reflects a slight meander.

After making all these changes, the steady-state model was checked and verified. It is included on the attached CD.

Final Design

Background

In June of 2008, it was discovered that the conservative hydrograph from concentration point CP179 would not work for design because the use of this hydrograph did not account for the inflow at Olive Avenue draining directly to the Reems Road Channel. Rather, the use of this hydrograph assumed that the inflow at Olive Avenue would drain directly to the basin. However, based on an internal permit review, this inflow will drain directly to the channel and not the basin. Therefore, this inflow needed to be accounted for in the model. When this direct inflow (to the channel) is modeled, the initial configuration of the weir (shown in Table 3) did not divert enough water for the channel downstream of the basin to contain the entire combined flow. Therefore, the use of the hydrograph from CP179 resulted in a conservative design in the sense of a higher peak flow rate as an upstream boundary condition, but was not technically correct.

Hydrology

In Figure 4, a comparison of the hydrographs used for the initial design and the final design is shown. The hydrograph for the initial design is from CP179, which corresponds to a location at the intersection of Olive Avenue and Reems Road. This hydrograph is from the existing conditions with all projects in place HEC-1 model (file name "L33PE4H.dat"), and the concentration point, CP179, is renamed "!RM5" in the model. For the final design, two hydrographs were used. One hydrograph is at the upstream boundary of the channel at the intersection of Reems Road and Peoria Avenue and is labeled "CP165 (!RM4)" in Figure 4. The other hydrograph is the inflow to the channel at Olive Avenue and is labeled "Inflow at Olive (1I179)" in the figure. Both of these hydrographs were also taken from the existing conditions with all projects in place HEC-1 model (file name "L33PE4H.dat" on the CD), and were named "!RM4" and "1I179", respectively, in the HEC-1 model (L33PE4F.dat).

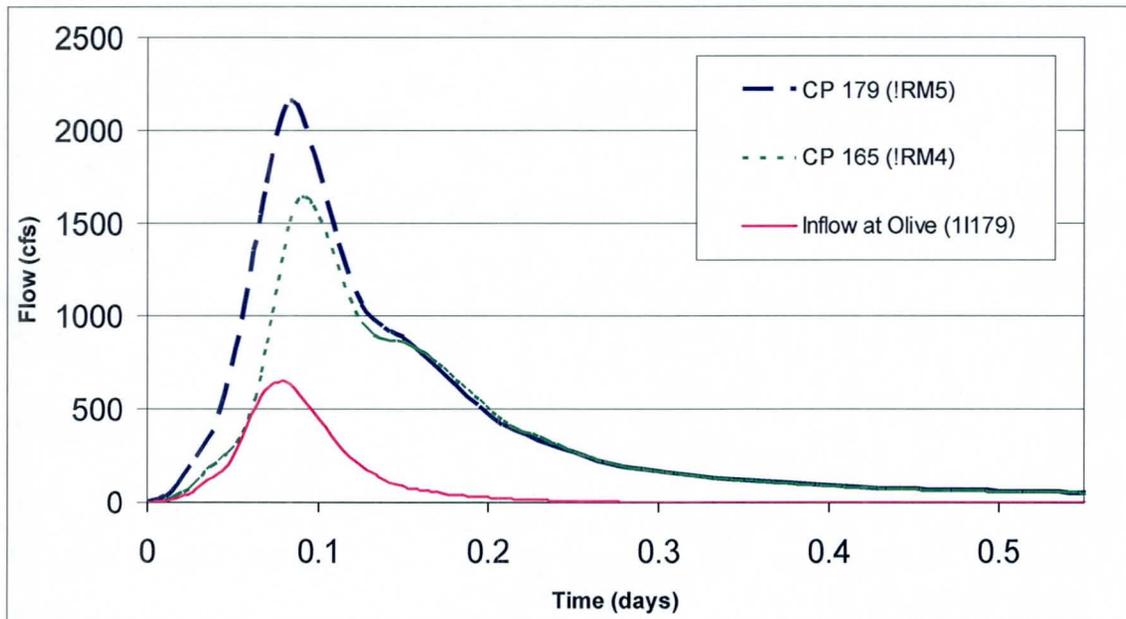


Figure 4: Comparison of initial design hydrograph (!RM5) and final design hydrographs (!RM4 and I1179)

Hydraulics

When these two hydrographs (!RM4 and I1179) are used in the unsteady HEC-RAS model, the configuration of the lateral weir changes. Basically, the lateral weir is lowered in order to divert more flow into the basin. However, the length of the weir remains the same. The final geometry of the lateral weir is shown in Table 5. Also, some other changes were made in the final design. These changes were

- 1) the slope of the channel at the weir is 0.00055 ft/ft,
- 2) the channel at the weir has been constricted to a 10-ft bottom width,
- 3) the top of bank (at the weir location) has moved in to keep the previously designed side slope, and
- 4) the low-flow channel has been removed.

The final HEC-RAS models can be found on the attached CD. As a note, there are a total of four HEC-RAS models on the CD – two steady models (for the existing and design conditions) and two unsteady models (for the existing and design conditions). For further information regarding the models, please see the Reems Road Channel and Basin CLOMR submittal.

RAS Station (ft)	Station	Elevation (ft)
0	72+01.169	1142.08
121.5	70+79.669	1135.27
282.6	69+18.569	1135.18
397	68+04.169	1141.72

Table 5: Final geometry of lateral weir

Scour and Scour Protection

Drop Structures

In the design of the Reems Road Channel, there are ten drop structures. The structures are designed to be sloping drop structures made of loose rock with a D_{50} of 18 inches. Therefore, these structures are analyzed for downstream scour potential and to ensure stability of the 18 inch rock.

To check the stability of the rock on the slope, an equation to size the D_{50} of a rock chute was used (Robinson, Rice and Kadavy, 1998). For slopes less than 0.10, the equation has the form

$$q = 9.76E - 7(D_{50}^{1.89})(S_o^{-3/2}) \quad (2)$$

which can be rearranged

$$D_{50} = \left[\frac{(qS_o^{3/2})}{9.76E - 7} \right]^{1/1.89} \quad (3)$$

where D_{50} is the particle size for which 50% of the sample is finer (mm), q is the highest stable unit discharge ($m^3/s/m$), and S_o is the decimal slope (dimensionless). Then by using equation (3) and the results from a steady-state HEC-RAS model with the flow rates derived from the unsteady model, a stable D_{50} can be calculated for all drop structures. The maximum rock size which was calculated was 7 inches, which is smaller than the designed rock size of 18 inches. Therefore, the 18-inch rock should be stable on the sloping face of the drop structures.

To estimate total scour downstream of the drop structures, a steady-state model, with the peak flow rates from the unsteady model, was used to calculate the hydraulic variables for the drop structure local scour equations. The three equations, used in this analysis, were the Schoklitsch, Veronese and Zimmerman and Maniak equations, which are the Type D equations from the U. S. Bureau of Reclamation (USBR) manual, *Computing Degradation and Local Scour* (USBR, 1984a).

After calculating the local scour, this estimate was added to the other scour components (long-term scour, low-flow incisement, bedform scour, bend scour and general scour) to give a total scour estimate downstream of the drop structures. The total reach average scour for the other components (with a 1.3 safety factor) was 5.70 feet,

where the long-term was 1.24 ft, the low-flow incisement was 1.00 ft, the bedform scour was 0.21 ft, the bend scour was 0.00 ft and the general scour was 1.94 ft; and the recommended local scour estimate (without a safety factor) was 5 feet for a total scour estimate of 11 feet. The total scour for drop structures is shown for each drop structure in Table 6. In Table 6, the average value for the local drop structure scour is based on the average of the three local scour equations, except where the local scour equations gave a negative number. In these cases, only the positive numbers were averaged. All scour calculations are included on the attached CD.

In the 90% plan sheets, the downstream scour protection is designed as 4-foot thick, 30-40 foot long layer of loose riprap with a D_{50} of 18 inches. The D_{50} was verified with the USBR chart for the sizing of riprap downstream of stilling basins, which is shown as Figure 165 in *Hydraulic Design of Stilling Basins and Energy Dissipators* (USBR, 1984b). To be conservative, the highest velocities, which occur at the toe of the drop structures, were used in the analysis. With these conservative velocities, the D_{50} for all of the drop structures was calculated to be well below the design value of 18 inches (the maximum was 7 inches); and for these locations the rock size is adequate.

With the estimated total scour depth of 11 ft, the scour protection layers size also needs to be verified. Using a launchable riprap design, the volume of launchable rock needs to be equal to 1.5 times (to account for loss) the volume of rock for a toedown design extended to the 10.5 scour depth at a 2:1 (H:V) slope. To match the sloped toedown design, the scour protection needs to extend to a total of 20 feet. Therefore, the recommended scour protection is a 4-ft thick layer of loose riprap with a length of 20 feet and a D_{50} of 18 inches. With this result, the length of the riprap protection can be reduced from 30-40 feet to only 20 feet downstream of the drop structures.

Starting River Station	Veronese ft	Zimmerman and Maniak ft	Schoklitsch ft	Average ft	Other Scour Comp. ft	Total Scour ft
7540	0.79	6.72	4.87	3.09	5.70	8.79
6540	4.38	4.16	10.85	4.85	5.70	10.55
6340	3.16	6.28	12.35	5.45	5.70	11.15
5740	2.89	6.18	11.64	5.18	5.70	10.88
5500	0.30	8.03	6.76	5.03	5.70	10.73
4740	3.53	7.06	13.70	6.07	5.70	11.77
4040	3.40	2.47	4.60	2.62	5.70	8.32
3840	(0.26)	3.09	0.63	1.86	5.70	7.56
2640	0.56	8.97	7.62	5.72	5.70	11.42
1640	(3.52)	10.09	(3.52)	10.09	5.70	15.79
Average	2.37	6.30	8.11	4.99	5.70	10.69

Table 6: Total scour calculations for each drop structure (negative values not used)

Station	Basin D_{50} in	Pool Depth ft	Basin Required?	Apron D_{50} in	Apron Length ft	Apron Thickness ft
5000	6	-2.66	No	8	30	1.6
3638	6	-4.58	No	6	24	1.7
2345	6	-3.74	No	6	24	1.7

Table 7: Culvert outlet protection calculated with HEC-14 (FHWA, 2006)

Culverts

At the downstream exit of a culvert, there is a transition from the concrete surface of the culvert to the natural surface of the channel. Therefore, these locations are subject to local scour. Using the methodology given in Chapter 10 of HEC-14 (FHWA, 2006), the culverts in the Reems Channel design were analyzed for potential scour. Only three of the culverts, specifically the ones at river stations 5000, 3638 and 2345, require a riprap apron (shown in green in Table 7). The culvert at station 1070 outlets into an existing concrete channel does not require outlet protection. The calculated riprap outlet protection for the three culverts at river stations 5000, 3638 and 2345 is shown in Table 7. Therefore, recommended outlet protection at station 5000 is a D_{50} of 9 inches with an apron length of 30 feet and an apron thickness of 2 feet, at station 3638 a D_{50} of 6 inches with an apron length of 24 feet and an apron thickness of 2 feet, at station 2345 a D_{50} of 6 inches with an apron length of 24 feet and an apron thickness of 2 feet. The final design of the culvert outlet protection for all three culverts was a plain riprap apron with a 30-foot length, a 3-foot depth and a D_{50} of 18 inches. The scour calculations for the culvert outlet protection are included on the attached CD.

Basin Riprap at End of Weir Structure

In the final design of the Reems Road Basin, the lateral weir outlets into the basin over a nine-step drop structure. At the end of this structure, a riprap layer was designed to protect the soil at the end of this structure. This riprap protection is designed as a riprap layer 3 feet thick with a minimum length of 10 ft and a D_{50} of 18 inches. To verify that this design is adequate, a HEC-RAS model was developed to calculate the velocity at the end of the stepped weir structure. This model can be found on the attached CD.

In order to make a valid but still conservative model, one major assumption was made. This assumption was that the stepped structure was assumed to be a stepped channel that had a width equal to the width of the weir crest. This is different from reality in that once water flows over the weir it is not contained in a channel but rather spreads out as it flows down the nine steps. Therefore, having the water contained in a channel is conservative because this containment will result in a higher velocity on the stepped structure.

To obtain the highest velocity on the structure, the model should be run in a mixed flow regime, so that both supercritical and subcritical velocities are calculated. However, to run the model in a mixed flow regime, both the upstream and downstream boundary conditions must be specified. At the upstream limit, a critical depth boundary

condition was used because the flow must pass through critical depth as it spills over the weir down the structure. At the downstream limit, a known water surface elevation was used when possible and when that was not possible a critical depth boundary condition was used. The only known water surface elevation which was used in the model was for the peak flow over the weir. At the peak, the unsteady model calculated a water surface elevation in the basin about three feet above the bottom elevation of the structure, which results in a backwater effect and thus a very low velocity on the riprap protection. However, for lower flows on the rising limb of the hydrograph over the lateral weir, the unsteady model calculated a water surface elevation lower than the bottom elevation of the structure (the low point in the basin does not correspond to the bottom of the structure). Therefore, to be conservative, a critical depth boundary condition was used for lower flows over the structure.

With the critical depth boundary condition, the highest velocity at the beginning of the riprap protection (cross-section 2.99 in the HEC-RAS model) was 13.46 ft/s, while at the minimum length of 10 feet (cross-section 2) the velocity was only 3.04 ft/s, which results in an average velocity of 8.25 ft/s on the riprap protection (an average was used so that an over-estimated rock size was not calculated due to the conservative channel geometry). From the USBR chart for sizing of riprap downstream of stilling basins (USBR, 1984b), the velocity of 8.25 ft/s results in a D_{50} size of 10.3 inches – a size smaller than the design D_{50} of 18 inches. Therefore, in summary, the designed riprap protection at the end of the stepped drop structure in the basin is adequate.

Summary

In the review of the Reems Road Channel and Basin, several aspects of the project were optimized, verified or designed. These aspects include

- the lateral weir geometry was optimized to:

RAS Station (ft)	Station	Elevation (ft)
0	72+01.169	1142.08
121.5	70+79.669	1135.27
282.6	69+18.569	1135.18
397	68+04.169	1141.72

- the basin stage was analyzed,
- the channel freeboard was analyzed,
- a final steady-state HEC-RAS model was developed,
- the stability of rock on the drop structure slope was verified,
- the design of the riprap protection at the end of the structure in the basin was verified,
- the scour protection downstream of drop structures was designed to a 4-ft thick layer of loose riprap with a length of 20 feet and a D_{50} of 18 inches,
- the scour protection for culvert outlets was designed to:

Station	Apron D_{50} in	Apron Length ft	Apron Thickness ft
5000	9	30	2
3638	6	24	2
2345	6	24	2

All files used in the review have been placed on an accompanying CD. These files include a copy of the email which gives the design constraints, all Excel files, all HEC-RAS models, and the new version of HEC-RAS 4.0.0. The files are organized into two folders, one folder for the initial design (as documentation) and one folder for the final design.

References

- Chow, V.T. (1959). *Open-channel Hydraulics*. New York: McGraw-Hill, 680 p
- Federal Highway Administration (FHWA). (2006). *Hydraulic Design of Energy Dissipators for Culverts and Channels, Hydraulic Engineering Circular Number 14*. Arlington, VA: P. L. Thompson and R. T. Kilgore.
- Flood Control District of Maricopa County (FCDMC). (2003). *Drainage Design Manual, Volume II, Hydraulics*, draft revisions to the 1996 edition.
- Hager, W. H. (1987). Lateral Outflow Over Side-Weirs. *Journal of the Hydraulics Division*, 113 (4): 491-504.
- Robinson, K. M., Rice, C. E., and K. C. Kadavy. (1998). Design of Rock Chutes. *Transactions of the ASAE*, 41 (3): 621-626.
- United States Bureau of Reclamation (USBR). (1984a). *Computing Degradation and Local Scour*, Denver: E. L. Pemberton and J. M. Lara.
- United States Bureau of Reclamation (USBR). (1984b). *Hydraulic Design of Stilling Basins and Energy Dissipaters*. Denver: A. J. Peterka.

APPENDIX II

Construction Cost Estimate and Low Bidder Bid Tab

BID TAB

Contract FCD 2005C018, Reems Road Channel and Basin Project

Bid Opening: 2/28/2008 - 2:00 P.M.

				ENGINEER'S		Carson Construction	
				ESTIMATE		Firm	
				ESTIMATE		Address	
ITEM #	DESCRIPTION	UNIT	QTY	UNIT PRICE	BID TOTAL	UNIT PRICE	BID TOTAL
105-1	Partnering Allowance	LS	1	\$ 15,000.00	\$ 15,000.00	\$ 15,000.00	\$ 15,000.00
105-2	BNSF Contractor Support Allowance	LS	1	\$ 25,000.00	\$ 25,000.00	\$ 25,000.00	\$ 25,000.00
105-3	BNSF Remove/Replace Track Allowance	LS	1	\$ 25,000.00	\$ 25,000.00	\$ 25,000.00	\$ 25,000.00
105-4	BNSF Flagman Allowance	LS	1	\$ 25,000.00	\$ 25,000.00	\$ 25,000.00	\$ 25,000.00
107-1	AZPDES / SWPPP Permits	LS	1	\$ 10,000.00	\$ 10,000.00	\$ 212,091.00	\$ 212,091.00
107-2	Public Information and Notification Allowance	LS	1	\$ 15,000.00	\$ 15,000.00	\$ 15,000.00	\$ 15,000.00
107-3	Project Signs Allowance	LS	1	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00
107-4	Water Management	LS	1	\$ 25,000.00	\$ 25,000.00	\$ 63,342.00	\$ 63,342.00
107-5	Vandalism Allowance	LS	1	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00
201-1	Clearing and Grubbing	LS	1	\$ 115,425.00	\$ 115,425.00	\$ 31,672.00	\$ 31,672.00
202-1	Mobilization	LS	1	\$ 300,000.00	\$ 300,000.00	\$ 107,683.00	\$ 107,683.00
211-1	Final Aesthetic Grading	LS	1	\$ 150,000.00	\$ 150,000.00	\$ 36,982.00	\$ 36,982.00
215-1	Channel Excavation	CY	173,282	\$ 2.75	\$ 476,525.50	\$ 1.29	\$ 223,533.78
215-2	Basin Excavation	CY	437,800	\$ 2.75	\$ 1,203,950.00	\$ 1.29	\$ 564,762.00
220-1	Plain Riprap	CY	19,483	\$ 58.00	\$ 1,130,014.00	\$ 47.41	\$ 923,689.03
310-1	4-Inch Aggregate Base Course Maintenance Road	SY	39,966	\$ 3.60	\$ 143,877.60	\$ 4.00	\$ 159,864.00
336-1	Pavement Replacement (T-Top)	SY	330	\$ 60.00	\$ 19,800.00	\$ 23.36	\$ 7,708.80
336-2	Pavement Connections (not T-Top)	SY	944	\$ 55.00	\$ 51,920.00	\$ 21.83	\$ 20,607.52
350-1	Remove Concrete Lined Ditch	LF	2,529	\$ 24.00	\$ 60,696.00	\$ 1.40	\$ 3,540.60
350-2	Removal and Disposal of Inert Material Allowance	TON	600	\$ 45.00	\$ 27,000.00	\$ 13.18	\$ 7,908.00
350-3	Removal and Disposal of Non-Inert Material Allowance	TON	200	\$ 80.00	\$ 16,000.00	\$ 24.06	\$ 4,812.00
401-1	Traffic Control	LS	1	\$ 50,000.00	\$ 50,000.00	\$ 63,342.89	\$ 63,342.89
421-1	4 Strand Smooth Wire Fence	LF	20,108	\$ 5.00	\$ 100,540.00	\$ 3.48	\$ 69,975.84
421-2	Install Gate	EA	17	\$ 1,000.00	\$ 17,000.00	\$ 506.00	\$ 8,602.00
430-1	Native Seed Mix A (Top Area)	SY	127,390	\$ 0.17	\$ 21,656.30	\$ 0.60	\$ 76,434.00
430-2	Native Seed Mix B (Side Slopes)	SY	115,349	\$ 0.10	\$ 11,534.90	\$ 0.60	\$ 69,209.40
430-3	Native Seed Mix C (Channel Bottom Area)	SY	28,227	\$ 0.06	\$ 1,693.62	\$ 0.60	\$ 16,936.20
430-4	Native Seed Mix D (Basin Bottom Area)	SY	76,393	\$ 0.16	\$ 12,222.88	\$ 0.60	\$ 45,835.80
430-5	Blue Palo Verde Planting	EA	492	\$ 125.00	\$ 61,500.00	\$ 76.00	\$ 37,392.00
430-6	Foothills Palo Verde Planting	EA	114	\$ 125.00	\$ 14,250.00	\$ 76.00	\$ 8,664.00
430-7	Ironwood Planting	EA	182	\$ 125.00	\$ 22,750.00	\$ 76.00	\$ 13,832.00
430-8	Velvet Mesquite Planting	EA	389	\$ 125.00	\$ 48,625.00	\$ 76.00	\$ 29,564.00
430-9	Desert Willow Planting	EA	43	\$ 125.00	\$ 5,375.00	\$ 76.00	\$ 3,268.00
505-1	Box Culvert Type A (2 BBL 10' x 6')	LF	377	\$ 1,844.00	\$ 695,188.00	\$ 827.68	\$ 312,035.36

BID TAB

Contract FCD 2005C018, Reems Road Channel and Basin Project

Bid Opening: 2/28/2008 - 2:00 P.M.

				ENGINEER'S		Carson Construction	
				ESTIMATE		Firm	
				ESTIMATE		Address	
ITEM #	DESCRIPTION	UNIT	QTY	UNIT PRICE	BID TOTAL	UNIT PRICE	BID TOTAL
505-2	Box Culvert Type B (1 BBL 10' x 6') (Auxiliary for 30' fill load)	LF	415	\$ 1,380.00	\$ 572,700.00	\$ 523.39	\$ 217,206.85
505-3	Box Culvert Type C (1 BBL 10' x 6' Precast)	LF	112	\$ 1,691.00	\$ 189,392.00	\$ 1,610.29	\$ 180,352.48
505-4	Box Culvert Type D (2 BBL 10' x 6') (for 30' fill load)	LF	524	\$ 2,785.00	\$ 1,459,340.00	\$ 832.24	\$ 436,093.76
505-5	Concrete Retaining Walls	EA	10	\$ 30,594.00	\$ 305,940.00	\$ 14,428.86	\$ 144,288.60
505-6	Concrete Retaining Walls at Olive Avenue	EA	4	\$ 39,565.00	\$ 158,260.00	\$ 17,318.03	\$ 69,272.12
505-7	South Concrete Retaining Walls	EA	2	\$ 24,500.00	\$ 49,000.00	\$ 17,699.73	\$ 35,399.46
505-8	Concrete Grade Control Structure	EA	20	\$ 36,728.00	\$ 734,560.00	\$ 16,362.46	\$ 327,249.20
505-9	Concrete Inlet Structure	EA	1	\$ 33,501.00	\$ 33,501.00	\$ 58,899.83	\$ 58,899.83
505-10	Concrete Outlet Structure	EA	1	\$ 23,487.00	\$ 23,487.00	\$ 63,194.08	\$ 63,194.08
505-11	Concrete Weir Structure	EA	1	\$ 1,451,200.00	\$ 1,451,200.00	\$ 533,375.37	\$ 533,375.37
505-12	Concrete Lined Irrigation Ditch	LF	139	\$ 100.00	\$ 13,900.00	\$ 78.32	\$ 10,886.48
505-13	Concrete Channel Lining	SY	500	\$ 125.00	\$ 62,500.00	\$ 215.29	\$ 107,645.00
505-14	Concrete Headwall (MWD STD DWG 723 & 724)	EA	2	\$ 3,500.00	\$ 7,000.00	\$ 14,703.05	\$ 29,406.10
505-15	20 Mil PVC Sheet Vinyl Waterproofing	SF	3,837	\$ 1.00	\$ 3,837.00	\$ 0.73	\$ 2,801.01
505-16	Concrete Pipe Plug (MWD STD DWG 541)	EA	6	\$ 800.00	\$ 4,800.00	\$ 253.37	\$ 1,520.22
505-17	Concrete Test Panels	EA	3	\$ 4,000.00	\$ 12,000.00	\$ 1,266.86	\$ 3,800.58
505-18	FCD Precast Bridge Crossing	EA	1	\$ 22,500.00	\$ 22,500.00	\$ 16,188.63	\$ 16,188.63
515-1	30-Inch Flapgate	EA	1	\$ 4,500.00	\$ 4,500.00	\$ 1,266.87	\$ 1,266.87
515-2	Access Barrier Box Culvert	EA	4	\$ 4,000.00	\$ 16,000.00	\$ 443.40	\$ 1,773.60
515-3	Access Barrier 30-inch Pipe	EA	1	\$ 2,000.00	\$ 2,000.00	\$ 316.72	\$ 316.72
520-1	Steel Handrails	LF	1,410	\$ 75.00	\$ 105,750.00	\$ 63.34	\$ 89,309.40
618-1	24-Inch Pipe	LF	24	\$ 250.00	\$ 6,000.00	\$ 95.95	\$ 2,302.80
618-2	30-Inch Pipe	LF	236	\$ 150.00	\$ 35,400.00	\$ 95.02	\$ 22,424.72
TOTAL DOLLARS					\$ 10,186,110.80		\$ 5,598,261.10
DIFFERENCE IN DOLLARS FROM ENGINEER'S ESTIMATE							\$ (4,587,849.70)
DIFFERENCE IN DOLLARS FROM LOW BID							

APPENDIX III

Construction Special Provisions



SPECIAL PROVISIONS

CONTRACT FCD 2005C018

REEMS ROAD CHANNEL AND BASIN PROJECT

PCN: 470-12-31

- B. Heating & Cooling - Adequate electrically powered equipment to maintain an ambient air temperature of 72 degrees F plus or minus 8 degrees.
- C. Telephone, answering, and FAX machine – Two separate outside telephone lines for the exclusive use of the Engineer. The Contractor will pay for the cost of the line and local calling charges. The District will pay for long distance charges made on this line.
- D. Toilet - A commode and wash sink in a separately enclosed room within the building or mobile trailer, properly ventilated and complying with applicable sanitary codes. Contractor shall provide water service.
- E. Maintenance - The contractor shall maintain all facilities and furnished equipment in good working condition.
- F. Fire Extinguisher - Two non-toxic, dry chemical, fire extinguishers meeting Underwriters Laboratories, Inc. approval for Class A, Class B, and Class C fires with a minimum rating of 2A: 2B: 10C.
- G. Electricity - Contractor shall provide electric power and pay for all electric services.
- H. Furnishings - Two office desks with drawers, five office chairs (padded, swivel type), one drafting table (adjustable height 3 feet by 6 feet), three 8 foot conference tables, twelve folding chairs, one draftsman's stool, and two four drawer legal file cabinets. All furnishings shall be in good working order.
- I. Copier - Copier for 8-½ inch by 11 inch and 11 inch by 17-inch paper with minimum 10 copy capacity.
- J. Potable Water Supply – Contractor shall provide a potable water supply and pay for all water service.
- K. A high-speed/broad band internet connection will be provided for the use of FCD personnel. All costs and equipment (i.e. modem) associated with this service will be born by the Contractor.

The office shall be fully equipped and made available for the Engineer's use and occupancy prior to the start of any Contract work and not later than 10 days after the date of notice to proceed. The Engineer will notify the Contractor, in writing, of the acceptability of the Field Office provided. The Contractor shall maintain the field office in operating condition until seven (7) days after acceptance of the Contract work.

The Contractor shall maintain all facilities in good operating condition and appearance for the designated period, after which all portable buildings or trailers, fencing, surfacing, and utilities shall be removed from the site, the areas cleaned and seeded if required and left in a neat and acceptable condition.

Subsection 202.1 - Payment

Add the following subsection:

Payment shall be made on the basis of the lump sum price bid. This price shall be full compensation for supplying and furnishing all materials, facilities, and services and performing all work involved as specified herein. The lump sum price bid shall not exceed three (3) percent of the total project bid amount exclusive of mobilization. No additional payment will be made for occupancy and services during periods of contract extension of time due to engineering changes. Payment of the mobilization bid line item will be at the discretion of the Engineer.

ITEM 202-1 - MOBILIZATION

SECTION 206 - STRUCTURE EXCAVATION AND BACKFILL

Structure excavation and backfill shall conform to Section 206 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 206.2 - Foundation Material Treatment

Add the following to this subsection:

Foundation bearing surfaces shall be free of debris and water softened materials prior to placing concrete and reinforcing steel. Any loose or disturbed zones should be removed and replaced with compacted fill or lean concrete.

Subsection 206.4 - Structure Backfill

Add the following to this subsection:

Compaction of structure backfill soils against embedded footings, walls, and headwall structures shall be accomplished to a minimum 95 percent of the maximum ASTM D698 density.

Compaction against wing walls or within 3 feet of the walls shall be accomplished using non-wheeled, hand operated compaction equipment only.

Backfill behind subsurface walls designed to support utilities, pavement, channels, or other facilities should be compacted to density criteria from Section 211. Backfill shall consist of free draining granular soils that exhibit low expansive potentials. The material shall be free of vegetation, debris, organic contaminants, and fragments larger than 4 inches in size.

Compaction operations shall be accomplished by mechanical methods. Water settling or jetting shall not be permitted.

On-site soils may be used in structural fills or backfill except for high plasticity on-site soils (P.I. > 12) that may not be used in structure fills or backfill. Imported soil used for fills under pavements, or channels, backfill around structures should be granular soils conforming to the following requirements:

Sieve Size	Percent Passing
3"	100
3/4"	60-80
#8	35-80
#200	0-12

(Arizona Test Method 201)

Note: Maximum size may be reduced at the Engineer's direction to satisfy trenching and landscape requirements, etc.

Subsection 206.5 - Payment

Replace this subsection with the following:

No payment will be made for structure excavation and backfill as such. The cost thereof shall be included in the bid price for the construction or installation of the items to which such excavation and backfill is incidental or appurtenant.

SECTION 211 – FINAL AESTHETIC GRADING

Fill construction shall conform to Section 211 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 211.1 - Description

Add the following to this subsection:

Work under this item shall consist of constructing landscape mounds and finish grading as shown on the landscaping plans. Landscape mounds shall be placed outside the channel prism (top of bank to top of bank) and outside the basin top of bank perimeter. Finish grading shall be constructed within 0.10 foot as

indicated on the landscape plans. The material excavated from the channel construction is suitable material for this operation.

Subsection 211.3 – Compacting

Add the following to this subsection:

Compaction of exposed site soil, backfill, fill, and base course materials shall be accomplished to the following density criteria:

<u>Material</u>	<u>Minimum Percent Compaction (ASTM D698)</u>
Subgrade Soil:	
Below structural elements	95
Railroad Subgrade	95
Below Pavement	95
All other locations (Including landscape mounds)	85
Backfill:	
Restoration of channel bank	95
Against structures	95
All other locations	85

On site undisturbed soils or compacted soils subsequently disturbed or removed by construction operations shall be replaced with materials compacted as specified above. Saturated soil shall be removed and replaced with materials compacted as specified above.

Subsection 211.5 - Measurement

Replace this Subsection with the following:

No field measurement for fill will be made for fill material.

Subsection 211.6 - Payment

Replace this Subsection with the following:

Payment for final aesthetic grading per drawings LP0 to LP8 including landscape mounds and final finish grading, shall be made at the lump sum price bid and includes all equipment, labor, and material required to achieve final grades as shown on the plans.

ITEM 211-1 FINAL AESTHETIC GRADING

SECTION 215 - EARTHWORK FOR OPEN CHANNEL AND BASIN

Earthwork for open channels and basin shall conform to Section 215 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 215.1 - Description

Replace this subsection with the following:

The work in this section consists of excavation, grading, and disposal of excavated and removed material for the construction of the channel and the basin as shown on the plans.

All material excavated and not used as fill elsewhere on the project shall become property of the Contractor. It shall be the Contractor's responsibility to dispose of any excess or unsuitable material in an appropriate and acceptable manner.

Subsection 215.3 - Excavation

Add the following to this subsection:

The Contractor is encouraged to make a field visit and review the soil boring logs and geotechnical report

included in **Appendix A** of the Supplementary General Conditions. Existing ground conditions may be different from that represented in the plans. The plans and bid quantities reflect the ground conditions as they existed as of October, 2007. Some advance grading by others may have occurred. The Contractor will be required to have these limits resurveyed in order to determine excavation quantities for the basis of payment. Difference in quantities will not be reason to renegotiate the unit price as specified in MAG Section 109.4.

Contractor shall provide dust control as required to meet all local and federal requirements.

The top eight (8) inches of soil shall be removed and salvaged for topsoil for this Project. The contractor shall overexcavate the channel and basin by eight (8) inches and backfill the overexcavated areas with the salvaged topsoil to final gradelines. The Contractor shall propose his plan for temporary stockpiling of the topsoil to the Engineer for review and approval.

Finished channel and basin surfaces shall be graded to drain.

Subsection 215.7 - Measurement

Replace this subsection with the following:

Replace with the following:

Measurement for payment for excavation of the channel will be made according to the quantity of material excavated from natural ground to finished grade as shown in the plans and computed using the average end area method as follows:

- A. Contractor shall obtain cross sections after clearing and grubbing and prior to any excavation.
- B. Cross sections shall be taken at a minimum spacing sufficient to accurately represent the volume of material removed and with a sufficient number of points to describe the existing ground surface.
- C. Cross sections shall be taken at a minimum of 50-foot stations for the channels, at angle points and at the beginning and ending of curves.
- D. After excavation the Contractor shall obtain new cross sections at the same locations as the existing ground cross sections were taken.
- E. The Contractor shall plot the cross sections where taken as described above showing both the original and final grades, and shall provide volumetric calculations.
- F. The Contractor shall submit the cross sections in electronic format, in either .dgn or .dxf format, and in hard copy form sealed by a Registered Land Surveyor.

Grading and subgrade excavation required for O&M access roads and access ramps, and for riprap placement will be considered incidental to the roads and ramps as per Section 301 and 310, and riprap per Section 220. The Engineer will verify the quantities for excavation.

Subsection 215.8 - Payment

Replace this subsection with the following:

Payment for excavation of material for the channel and basin will be made on the basis of the price bid per cubic yard of excavation. Payment shall include excavation, backfill, unsuitable material removal and backfill, fill work which is required for and incidental to the channel and basin construction, salvage and stockpile of topsoil, over excavation of basin and channel for the topsoil, and backfill to final grade with topsoil, compaction, grading (except for final aesthetic grading as paid for in Section 211), hauling, removal, additional survey as required, dust control, disposal of excess material, and all other miscellaneous items necessary to accomplish the work in conformance with the plans.

ITEM 215-1 - CHANNEL EXCAVATION

ITEM 215-2 - BASIN EXCAVATION

SECTION 220 - RIPRAP CONSTRUCTION

Riprap construction shall conform to Section 220 of the MAG Uniform Standard Specifications except as modified herein:

Subsection 220.1 - Description

Replace this subsection with the following:

The construction of riprap shall consist of furnishing and placing stone in the bottom of the detention basin, box culvert inlet and outlet locations and at the drop structure locations in the channel.

Subsection 220.4 - Plain Riprap

Replace this subsection with the following:

The construction of plain riprap shall consist of furnishing and placing the stones as shown in the plans and as specified in these special provisions.

Riprap Gradation Table (D₅₀ = 18") (ANGULAR)	
Stone Size (in)	Percent Passing
1.5 d ₅₀	100
1.2 d ₅₀	85
1.0 d ₅₀	50
0.4 d ₅₀	15

Subsection 220.7- Measurement

Replace this subsection with the following:

Riprap shall be measured by the cubic yard of the rock placed to the depth and neat lines as shown on the plans. No measurement will be made for riprap placed beyond the neat line as shown on the plan unless directed by the Engineer.

Subsection 220.8 - Payment

Replace this subsection with the following:

Payment for plain riprap (angular) shall be made on the basis of the price bid per cubic yard in place; within the limits of dimensions shown on the plans for bid items 220-1. Payment shall include labor, preparation of ground surfaces, excavation, riprap, riprap staining (as noted by Section 530 – Painting), replacement of damaged areas, samples provided for the Engineer's approval and all other miscellaneous items required for riprap construction.

ITEM 220-1 - PLAIN RIPRAP

SECTION 301 - SUBGRADE PREPARATION

Subgrade preparation shall conform to Section 301 of the MAG uniform Standard Specifications except as modified herein.

Subsection 301.8 - Payment

Replace this subsection with the following:

No payment for subgrade preparation shall be made as such; the cost thereof shall be included in the bid price for the construction of the items that subgrade preparation is incidental or appurtenant.

SECTION 310 - UNTREATED BASE

Replace Section 310 of the Standard Specifications with the following:

Subsection 310.1 - Description

Replace this subsection with the following:

Aggregate base course, also referred to as ABC, shall be placed for the maintenance roads and maintenance access ramps, where shown on the construction plans.

Subsection 310.2 - Placement

Replace this subsection with the following:

The ABC may be placed and compacted in a single layer. After distributing, the base material shall first be watered and then immediately bladed to a uniform layer that will net, after rolling, the required thickness. If the materials deposited are not uniformly blended together, the blading operation shall be continued to such extent as may be necessary to eliminate segregation. The quantity of water applied shall be that amount which will assure proper compaction resulting in a relative density of not less than 100 percent as determined under Section 301 of the Standard Specifications. Care shall be exercised in connection with watering operations to avoid wetting the subgrade or any lower base course to detrimental extent.

Upon completion, the base surface shall be true, even and uniform, conforming to the grade and cross-section shown on the design plans.

ABC may vary not more than one-half inch (1/2") above or below required grade and cross-section.

Subsection 310.3 - Measurement

Replace this subsection with the following:

Aggregate base course shall be measured by the square yard, based upon the dimensions shown on the design plans. No allowance is made for spalling or waste beyond those limits.

Subsection 310.4 - Payment

Replace this subsection with the following:

No payment will be made for the aggregate base course used for the asphalt pavement replacement. The cost thereof shall be included in the cost of pavement replacement.

Payment will be made for aggregate base course used for surface treatment at the unit cost bid per square yard. Such payment shall be compensation in full for items including but not limited to materials, transportation, subgrade preparation, miscellaneous earthwork, labor, equipment, placement, watering, and roller compaction.

ITEM 310-1 – 4-INCH AGGREGATE BASE COURSE MAINTENANCE ROAD

SECTION 336 - PAVEMENT MATCHING AND SURFACING REPLACEMENT

Pavement matching and surfacing replacement shall conform to Section 336 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 336.1 – Description

Add the following to this subsection.

This item is for the re-construction of the pavement cuts or construction of pavement connections in Reems Road, Peoria Avenue, and Olive Avenue for the construction of the concrete box culverts and any other project improvements in the roadway.

Subsection 336.2.2 -Pavement to be Removed

Add the following to this subsection.

All pavement to be removed shall first be sawcut.

Subsection 336.3 - Types and Locations of Pavement and Surfacing Replacement

Replace this subsection with the following:

MAG 200 Type "B" with T-Top will be utilized for pavement replacement on Reems Road and Olive Avenue. Pavement connections shall not be T-Top. The pavement replacement shall consist of at least two layers of asphalt pavement over 12" of aggregate base course.

Reems Road and Olive Avenue

The pavement replacement shall be a minimum of 8" (compacted thickness). The base courses of the asphalt pavement shall be lifts not exceeding 3" when compacted of C-3/4 and the surface course shall be 2" of D-1/2 and shall match the grades of the existing pavement.

The materials shall conform to MAG Sections 702 and 710, and the following:

Asphaltic Concrete Type	C-3/4, D-1/2
Mineral Filler	Portland Cement (1-1/2% by weight)
Asphalt Cement	AC-20

Subsection 336.4 - Measurement

Replace this subsection with the following:

Measurement for payment and surfacing replacement will be by the square yard, based upon actual field measurement of the area covered along the finished surface of the ground rounded up to the nearest foot, and shall be computed to the nearest square yard.

Subsection 336.5 - Payment

Replace this subsection with the following:

Payment for pavement replacement will be made on the basis of the unit price bid per square yard. Such payment shall be compensation in full for items including but not limited to saw-cut, removal, and disposal of existing asphalt, asphalt, subgrade preparation, aggregate base course material, transportation, placement, labor, equipment, and roller compaction. Any pavement replacement in excess of this amount shall be considered incidental and included in the cost of the bid item for such work that the work is incidental or appurtenant.

ITEM 336-1 – PAVEMENT REPLACEMENT (T-Top)

ITEM 336-2 – PAVEMENT CONNECTIONS (not T-Top)

SECTION 350 - REMOVAL OF EXISTING IMPROVEMENTS

Removal of existing improvements shall conform to Section 350 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 350.1 - Description

Add the following to this subsection:

The work includes the removal and disposal of any obstacle to construction, including concrete structures, pipes, concrete irrigation ditches, piles of trash and debris encountered within the right-of-way, unless it is specifically called out on the plans to be removed and salvaged or protected in place. Holes, cavities and trenches resulting from the removal of structures shall be backfilled if necessary in accordance with Sections 206 and 211. The disposal of all waste material removed under this item shall be the responsibility of the Contractor. The disposal site shall be approved by the Engineer prior to disposal.

The Contractor is responsible for obtaining a refuse hauling permit from Maricopa County Environmental Services Department (602) 506-0719.

Subsection 350.4 – Payment

Replace this subsection with the following:

No payment shall be made for miscellaneous removals. Any removal items noted on the plans, other than concrete lined ditch, shall be incidental to and paid by the associated contract bid item.

Payment for removal of concrete irrigation ditches shall be made on the basis of the price bid per lineal foot. Such payment shall be full compensation for all construction equipment, labor, materials, disposal, disposal fees, and all incidentals necessary to accomplish the work in conformance to the plans.

ITEM 350-1 – REMOVE CONCRETE LINED DITCH

Payment for the removal and disposal of miscellaneous inert items and materials, such as fences, concrete slabs and rubble, pipes, debris, furniture and appliances, and scrap metal shall be made on the basis of the price bid per ton as an allowance which use shall be approved by the Engineer, and shall include all labor, materials, disposal fees and equipment necessary to remove and dispose of the material. Removal of vegetation including shrubs, trees of all sizes, and other plants and objectionable material is covered under Section 201 – Clearing and Grubbing and will not be included under this item.

ITEM 350-2 – REMOVAL AND DISPOSAL OF INERT MATERIAL ALLOWANCE

Payment for the removal and disposal of non-inert material shall be made on the basis of the price bid per ton as an allowance which use shall be approved by the Engineer, and shall include all labor, materials, disposal fees, and equipment necessary to remove and dispose of the material.

ITEM 350-3 – REMOVAL AND DISPOSAL OF NON-INERT MATERIAL ALLOWANCE

SECTION 401 - TRAFFIC CONTROL

Traffic control shall conform to Section 401 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 401.1 – Description

Add the following to this subsection:

All traffic control shall conform to the Construction Specifications for this project, Part IV of the “Manual On Uniform Traffic Control Devices For Streets And Highways” (U.S. Department of Transportation, Federal Highway Division) and all revisions thereto, and the request of the Engineer.

It shall be the Contractor’s responsibility to provide, erect and maintain, and remove after completion of the work all necessary signs, barricades, barriers, berms, lights, high level warning devices, delineators, and any other required devices, uniformed officers, and flagmen necessary to properly mark and control the construction area for safe and efficient movement of traffic.

Temporary traffic control devices shall be installed as required prior to the start of work. The approval of Contractor’s traffic control method shall not relieve Contractor of his responsibility to protect the work, Contractor’s personnel, or the general public.

Subsection 401.5 – General Traffic Regulations

Add the following to this subsection:

The Contractor shall provide a traffic control plan for review and approval, to the Engineer, and to the Maricopa County Department of Transportation (MCDOT). The traffic control plan shall include proposed haul routes and proposed street detours and/or closures.

A Reems Road closure of thirty (30) calendar days will be permitted for construction of Box Culvert No. 1, and an Olive Avenue closure of thirty (30) calendar days will be permitted for construction of Box Culvert No. 3. A separate 72-hour road closure of Olive Avenue will be permitted for construction of the pre-cast section of Box Culvert No. 3, which crosses the railroad tracks. These closures will not be permitted to occur at the same time. The Contractor shall submit his proposals for the road closures to the District and MCDOT and show how he can accomplish the work in the limited amount of time. It may be necessary to use early high-strength concrete and include extra shifts to accomplish the work during the limited road closures. Such measures would be incidental to the work and at the expense of the Contractor.

If the Contractor does not complete the work on Box Culvert No. 1 within the 30-day time period allotted for the Reems Road closure, liquidated damages will be assessed on a daily basis, per MAG 108.9, for Box Culvert No. 1. If the Contractor does not complete the work on Box Culvert No. 3 within the 30-day time period allotted for the Olive Avenue closure, liquidated damages will be assessed on a daily basis, per MAG 108.9, for Box Culvert No. 3.

If the Contractor does not complete the work on the pre-cast section of Box Culvert No. 3 within the 72-hour time period allotted for the railroad and Olive Avenue closure, liquidated damages will be assessed based on direct damages to the railroad, as determined by the BNSF Railroad Company.

The Contractor shall furnish all signs, cones, and other traffic control devices and all equipment necessary for the control of traffic. The Contractor shall be responsible for maintaining the necessary traffic control devices until the project is complete.

The Contractor shall submit a certification statement signed by the Contractor and the barricade subcontractor stating that they certify and warrant that the barricades will be erected and maintained in compliance with the barricade manual.

The Contractor shall employ a "designated" person who will be responsible for ensuring that all barricades, signs, barricade lights, signals, and other traffic control devices are established and maintained in strict compliance with the "Manual On Uniform Traffic Control Devices For Streets And Highways" The designated person shall:

1. Inspect all barricading and traffic control devices on a regular, recurring basis and submit a daily (including weekends and holidays) report, in writing, to the inspector of such inspections the next workday;
2. Ensure that existing traffic signals do not conflict with barricades and signs or give misleading signals to pedestrians and motorists. He/she shall immediately bring conflicting conditions to the attention of the inspector. The inspector will coordinate with the County's Traffic Signals Group for any required changes to traffic signal sequencing, timing, or outages;
3. Ensure that flagmen, when employed, are trained in accordance with the O.S.H.A. regulations (29 CFR 1926.201 Signaling); and,
4. Immediately respond to all call-outs by the inspector, the Stand-by inspector, or Base Operations; cooperate with Police or Fire Department Investigators; and, on his/her own responsibility, re-establish barricades and traffic control devices, as necessary.

The "designated" person required by this section may be the same as the "competent" person required for trench safety (O.S.H.A. Regulations- 29 CFR 1926.650(i)) provided such person is qualified in accordance

with O.S.H.A. Regulation (29 CFR 1926.21(1)) for these duties.

The Contractor shall certify, by letter, that the designated person has read and will comply with the requirements of the "Manual On Uniform Traffic Control Devices For Streets And Highways". The Safety Certification letter shall be provided to the City at the preconstruction conference. The Safety Certification should include the name of the "designated" person, the name of the "competent" person (if different from the designated person), telephone numbers where they can be reached 24-hours per day, and any restrictions or limitations on their duties and authorities.

Channelization, including "KEEP RIGHT" signs, shall be provided whenever traffic is moved across the street centerline, the existing center line is removed or opposing traffic is maintained in other than the normal traffic lanes.

All temporary traffic control devices shall be ballasted with sandbags or other approved ballast.

Access to all adjacent properties shall be maintained. When access cannot be maintained, Contractor shall notify the adjacent residents at least 48 hours in advance of the access closure. In no case shall the access be closed for more than four (4) hours. Access for fire stations, hospitals, police stations, and schools shall be maintained at all times. The Contractor shall notify Maricopa County Department of Transportation (MCDOT), fire departments, and transit authority of any road closures at least two (2) days in advance of the closure.

Contractor shall maintain or relocate all existing signal indications, warning signs, STOP, YIELD, and street name signs erect, clean and in full view of the intended traffic at all times. Portable signs should be used to supplement blocked or removed signs. In the event the Contractor removes any permanent signing, which will not be reinstalled immediately, the Contractor shall store permanent signs in a secure location at the project site and request removal by City or County forces. Contractor will reset all permanent signing removed or relocated during construction at Contractor's expense. The Contractor is responsible for all costs incurred in replacing lost or damaged traffic control devices.

Rope, flagging, fencing, and woven plastic tape may be used between barricades and channeling devices to provide additional safety.

Contractor shall install deceleration sand berms in the blocked traffic path or at other hazardous sites in order to prevent vehicles from entering the construction and/or hazard areas. The deceleration sand berms shall be constructed of washed sand and shall be approximately five (5) feet high.

Construction shall not commence or proceed without a Traffic Control Plan approved by MCDOT. At the preconstruction conference, the Contractor shall submit for review his plan for the sequence of construction, any planned lane closures, signing for construction, and the traffic flow. A Traffic Control Plan (TCP) covering the signing and staging shall be submitted and approved prior to the start of each stage of construction. The Traffic Control Plans shall address all construction staging and special provision requirements, including any flagging to be used on the project.

At the time of the Pre-Construction conference, the Contractor shall designate an employee, other than the Project Superintendent, who is well qualified and experienced in construction traffic control and safety, to be available on the project site during all periods of construction to set up, maintain and coordinate safe barricading whenever construction restricts traffic. This individual shall be authorized to receive and fulfill instructions from the Engineer and shall supervise and direct the work. Instructions and information given by the Engineer to this individual shall be considered as having been given to the Contractor.

See SGC_105.6.2 for requirements for working within railroad right-of-way.

Subsection 401.7 - Payment

Replace this subsection with the following:

Payment for traffic control including all mobilization, equipment, signage, materials, jersey barriers, flagging operation, and maintenance shall be made on the basis of the lump sum price bid. This price shall be full compensation for all construction equipment, labor, permits, materials, and all incidentals necessary to accomplish the work in conformance to the plans, except for those items paid for under allowances 105-2, 105-3, and 105-4.

ITEM 401-1 – TRAFFIC CONTROL

SECTION 421 - WIRE FENCES

Add this section in its entirety to the MAG Uniform Standard Specifications

Subsection 421.1 - Description

Add the following subsection:

The work under this section shall consist of furnishing all materials and constructing plain wire fence and gates at the location and in accordance with the details shown on the plans. Fence shall be of the type and size shown on the plans and shall be constructed in accordance with the requirements of these specifications.

Subsection 421.2 - Materials

Add the following subsection:

Plain wire shall be 12-1/2 gauge steel wire and shall be either zinc-coated or aluminum coated. Zinc-coated steel wire shall conform to the requirements of ASTM A 121, Class 1 coating. Aluminum-coated steel wire shall conform to the requirements of ASTM A 585, Type 1, Class 1 coating.

Posts, rails, braces, and bars shall conform to the requirements of Section 772.

Portland cement concrete shall conform to the requirements of Section 725.

Subsection 421.3 - Construction

Add the following subsection:

The Contractor shall clear the fence lines of all earth trees, brush, and other obstructions that interfere with the proper construction of the fences. Clearing the fence line shall be along and within the project right-of-way. Disposal of removed material shall be in accordance with the requirements of Section 201.

Fence shall be constructed as shown on the plans.

Fence posts shall be spaced at the intervals and set to the depths shown on the plans.

In determining the post spacing, measurements shall be made parallel to the ground slope, and all posts shall be placed in a vertical position, except in unusual locations where the Engineer may direct that the posts be set perpendicular to the ground surface.

Line posts may be driven into undisturbed earth provided driving does not damage the posts. All voids around the post shall be backfilled and the material thoroughly tamped.

End, corner, pull, posts, and braces shall be set in concrete footings and crowned at the top to shed water.

Any high points that interfere with the placing of fence wire shall be excavated to provide the clearance shown on the plans.

Changes in the horizontal alignment of the fence line where the angle of deflection is fifteen (15) degrees or more shall be considered as corners and a corner post assembly shall be installed. Changes in fence alignment where the angle of deflection is less than fifteen (15) degrees, but more than five (5) degrees shall be considered as alignment angles and diagonal tension wires shall be installed. The diagonal tension wires shall consist of two (2) twisted steel wires and shall be attached to the adjacent posts.

Intermediate post assemblies shall be installed at not more than five hundred (500) foot intervals between other braced posts. After post assemblies have been placed, the wire shall be pulled taut to the satisfaction of the Engineer, and each longitudinal wire shall be cut and securely fastened to the braced post with devices suited for the purpose. Wire shall not be carried past a post assembly, but shall be cut and fastened to the post independently of the adjacent spans. A maximum of two (2) splices of wire will be permitted between post assemblies, but not on the same wire. No splice shall be placed closer than one hundred (100) feet to any post assembly.

After the tensioning of the wire between the post assemblies, all longitudinal wires shall be attached to each intervening line post at the height and spacing as shown on the plans. The distance from the bottom wire to the ground may vary at one point from that shown on the plans four (4) inches plus or minus. Where abrupt changes occur in the fence line grade, intermediate line posts may be required to maintain proper distances between the bottom wire and the ground.

Spacing of the twisted vertical wire stays shall be as shown on the plans for each type of fence. The vertical wire stays shall be woven into every horizontal wire.

At all grade depressions where stresses tend to pull the posts from the ground, the affected fence posts shall be anchored in concrete or the fence wires shall be weighted with concrete sag weights.

The volume of concrete required to anchor the posts shall be not less than one (1) cubic foot. Fence sag weights shall weigh not less than one hundred (100) pounds and shall be made with a wire loop hanger embedded in the concrete. A double strand of wire shall be attached to each horizontal line of wire and tied to the wire loop hanger of the sag weight.

Subsection 421.4 - Measurement

Add the following subsection:

Wire fence shall be measured on the fence line along the top of the completed fence from center of end posts.

Subsection 421.5 - Payment

Add the following subsection:

Payment for wire fence shall be made on the basis of the price bid per lineal foot. This price shall be considered full compensation for furnishing and installing the wire fence as specified, including removal of obstructions and all incidental costs not specifically covered in other items.

ITEM 421-1 – 4 STRAND SMOOTH WIRE FENCE

Payment for gates shall be made on the basis of the price bid per each. This price shall be considered full compensation for furnishing and installing the gate as specified, including removal of obstructions and all incidental costs not specifically covered in other items.

ITEM 421-2 – INSTALL GATE

SECTION 430 - LANDSCAPING AND PLANTING

Landscaping and planting shall conform to Section 430 of the MAG Uniform Standard Specifications.

Subsection 430.1 - Description:

Delete this subsection in its entirety and replace with the following:

This section shall govern the preparation and planting of native seeding areas and tall pot planting, as required in the plans and these special provisions. All materials and products shall conform to the requirements of MAG Specifications Section 795 or as modified herein.

Unless otherwise provided, all native seeding shall be performed after fine grading has been completed to meet the finish grading requirements shown on the plans and indicated in Section 211

Subsection 430.2 - General:

Add the following to this subsection:

Unless approved by the District's Landscape Representative, hydroseeding shall occur between October and March. Water and related electrical costs are the Contractor's responsibility until Final Acceptance.

SUBSECTION 430.5.8 – TALL POT PLANTING:

Add this section to the MAG Standard Specifications:

General

The work under this item consists of furnishing all equipment, materials, and labor necessary to complete the planting operation of tall pot plants, and maintaining the tall pot plants during the establishment period in accordance with plans and these technical specifications.

The Contractor shall be responsible for the transport of plants from the Flood Control District Nursery (2801 West Durango Street, Phoenix, Arizona 85009) to the site. For further information contact Diana Stuart (602-506-4766). Installation to include planting of tall pot plants with DriWATER Irrigation Supplement, and doing all work required to install the tall pot plants in strict compliance with the Plans and Specifications. The Engineer and Flood Control District shall approve all equipment and methods prior to performing the work. It is the contractor's responsibility to assure that the correct equipment to properly perform the work is on site and the properly trained personnel are present to operate that equipment.

The Flood Control District will furnish all tall pot plants. Tall pot plants shall remain at the Flood Control District nursery until twenty-four (24) hours prior to installation. Plants shall be placed by tall pot pit **only** when pit has been properly augured, watered, and approved by Engineer and the Flood Control District. Tall pot material shall not be transported from the Flood Control District nursery prior to tall pot pits being approved. Tall pot containers and racks shall be returned to the Flood Control District Nursery. Contractor is certifying that pit is proper depth and properly watered within last 24 hours if a tree is placed by the hole.

Tall Pot Pit Excavation and Preparation

Tall pot pits shall be sized per the details, unless otherwise indicated in the Plans and Specifications.

Tall pot pit backfill may utilize on-site native soil as long as the soil meets the specifications for Native Planting Backfill Mix.

In rocky site conditions, on-site soils to be used for backfill may be screened to meet the specifications for maximum aggregate content in topsoil. Refer to Section 430.2 for removal of sub-surface conditions impacting the installation or health of plants.

Nested or layered aggregate or other infertile materials located beyond the limits of the plant pit or within the potential root growth zone of the plants shall be considered a subsurface obstruction and removed as specified.

In areas of caliche or in hard dig conditions, tall pot pits shall be over-excavated to a minimum depth of thirty-six (36) inches and a minimum width of forty-eight (48) inches, 20 pounds of gypsum shall be evenly added to the bottom of the pit, and the pit backfilled with native planting backfill mix compacted to between eighty-five (85) percent and ninety (90) percent compaction prior to auguring of tall pot pit. The tall pot pit shall be filled with water and allowed to drain twice prior to installation of tall pot plant. Contractor shall notify Engineer if pit does not drain within 48 hours.

Existing vegetation shall be grubbed and cleared from within the tall pot plant basin to a distance no less than three (3) foot diameter or as indicated on the plans. All pits shall be excavated to the detailed dimensions with the sides of pit roughened or scarified. Prior to installing tall pot plants, the Engineer is to visually inspect the tall pot pits for proper size and depth. The Contractor shall make all necessary arrangements with the Engineer to have the tall pot pits inspected. The Engineer may reject any tall pot pits, which shall be re-excavated/prepared by the Contractor.

In areas of very soft, sandy, or cobble soils where the tall pot pit caves in as the augur is removed, filling the hole with water prior to planting is not necessary. The tall pot pit shall be augured 8"-12" in diameter to the depth dimensioned on the plans and specifications to loosen the soil column. The pit shall then be cleared to the width dimensioned on the plans and specifications, and the tall pot plant placed into the pit. The pit shall then be backfilled with Native Backfill Mix while lifting the tall pot tube and filling the pit with water creating a Native Backfill Mix slurry. The tall pot pit shall be thoroughly soaked at the end of each day's planting session. Where no irrigation system is provided, one (1) quart of DriWATER Irrigation Supplement shall be poured into the bottom of the pit before backfilling, and four (4) quarts of DriWATER Irrigation Supplement shall be installed at grade level per the plans and specifications and the manufacturer's recommendations.

Tall Pot Plant Watering

Tall Pot Plants shall be thoroughly "soak watered" until water drips out the bottom of the tube in the nursery one day prior to delivery to project site, and at the project site just after delivery.

Once the Tall Pot Plant is in the pit and the pit has been back filled, the plant must be "soak watered" to remove all air pockets in the planting pit per the Plans and Specifications. Use of a water sprayer at the base of the plant is NOT acceptable for this step. At the end of each day's planting session, all Tall Pot Pits with Tall Pot Plants installed must be thoroughly soak watered.

It is recommended that tall pot plants be planted between October and February. If they are planted after February, the Contractor shall add four (4) additional quarts of DriWATER Irrigation Supplement to each tree every thirty (30) days, during the maintenance period.

Tall Pot Plant Protection

At the end of each day's planting session, and after final watering, all Tall Pot Plants planted that day must be sprayed with Liquid Fence Deer and Rabbit Repellent per manufacturer's recommendations. In addition chicken wire cages shall be installed during planting. Chicken wire cages shall be two (2) feet in diameter and three (3) feet tall with open tops. Bottom three (3) inches of cages shall be buried below finished grade of Tall Pot Plant Basin. Cages shall be marked with flagging

Tall Pot Plant Root Barriers

A five-foot diameter root barrier shall be provided and installed per the manufacturer's specifications surrounding Tall Pot Plants where shown on the plans on the downstream berm of the retention basin to help prevent piping of water in the embankment due to root growth and degeneration. Root barrier shall be DWS Series: DWS24-20, 90 degree root deflecting ribs connected with root impervious joiner strips, manufactured by Century Products, 1144 North Grove Street, Anaheim, CA 92808, (714) 632-7083, (or equivalent approved

by District).

Root barriers shall be installed prior to installation of the tall pot plants they are surrounding. Connect ends of roll stock material with one root impervious joiner strip and install encircling the root ball. Vertical 90-degree root deflecting ribs are always facing the root ball. Always install the root barriers ½ inch above grade to prevent root penetration above the barrier. Recommended backfill around outside of root barrier for surrounding planting applications is gravel or crushed rock. Avoid backfill less than ¾-inch or greater than 1 ½ inch. Finish to grade. Do not distort barrier during installation.

Tall Pot Plant Inspection

A pre-maintenance inspection will be performed upon substantial completion of all tall pot plant planting work under this contract. The Contractor shall be present at the inspection and a punch list of items requiring remedial work shall be generated. Upon completion of the punch list items and approval by the Engineer, the ninety (90) day maintenance/establishment period will begin.

Final Maintenance Inspection

At the end of the ninety (90) day maintenance/establishment period a final inspection will be performed. If, after this inspection, the Engineer agrees that all planting areas are weed free and plant materials are in satisfactory growing condition, written Notice of Acceptance will be given to the Contractor for tall pot plant installation.

Tall Pot Plant Maintenance

Unless otherwise authorized, the Contractor shall maintain and be responsible for all landscape areas and materials on a continuous basis as installations are completed during the course of work and until final project acceptance.

All existing and new plants shall be kept in a healthy, growing condition by application of DriWATER, liquid fence spraying, weeding, and any other necessary operations or maintenance. Tall pot basins and beds shall be kept free of weeds, and other undesirable vegetation. Plants shall be inspected at least once per 45 days and appropriate maintenance performed including reconstruction of tall pot plant basins.

Maintenance inspections will occur at 45 day intervals. If landscape areas are improperly maintained, if appreciable plant replacement is required, or other corrective work becomes necessary, the Contractor shall continue to maintain the entire site until all items are corrected and accepted at no cost to the Owner.

All corrective work disturbance, repairs, or replacements completed during the ninety (90) day maintenance/establishment period shall be subject to an additional ninety (90) day maintenance/establishment period from the time of acceptance of the corrective work.

It is recommended that tall pot plants be planted between October and February. If they are planted after February, the Contractor shall add four (4) additional quarts of DriWATER Irrigation Supplement to each tree every thirty (30) days, during the maintenance period.

SUBSECTION 430.5.9 – NATIVE PLANT BACKFILL MIX

Add this section to the MAG Standard Specifications:

Native Planting Backfill Mix shall consist of 'native' site topsoil (no caliche in backfill). Remove all inorganic material greater than 1 inch in size. Soil mix shall be water settled without pooling.

SUBSECTION 430.6– HYDROSEED

SUBSECTION 430.6.1– GENERAL

The work under this item consists of furnishing all materials, preparing the soil, applying seed-mulch mixture and maintaining seeded areas during establishment period in accordance with plans and these technical specifications. Areas to be seeded include areas indicated on plans. The Engineer may adjust the schedule and the locations of the seeding operations within the limits of the project. The Engineer shall establish exact dates to commence seeding and reserves the right to postpone seeding until conditions are suitable. Seeding shall be accomplished in two stages. The first stage shall consist of topsoil tillage and applying chemical fertilizer at specified rates. Second shall consist of application of specified seed mixes, wood fiber mulch, and tacking agent.

The Contractor shall provide, upon request to the Engineer, past performance data that indicates the Contractor's equipment and procedure are suitable or shall demonstrate the Contractor's performance. The Engineer has final approval as to equipment and procedure.

Hydroseeding of native grass and shrub species is best done during the fall and winter rainy seasons when the seeds are most likely to germinate and come up in spring. Alternatively, summer monsoon rains will help to germinate warm season species, so some cover can be expected to emerge if hydroseeding takes place just prior to monsoon rains. However, all native grass and shrub seeds are able to stay dormant in the soil until optimum conditions are present for germination, so long as the mulch cover is adequate enough to protect the seed bed.

SUBSECTION 430.6.2– MATERIALS

Seed: Seed shall consist of materials, application rates, and quantities as indicated on plans and these special provisions.

		Mix A (Top Area)	Mix B (Side Slope)	Mix C (Channel Bottom)	Mix D (Basin Bottom)
Scientific Name	Common Name	PLS/ Acre	PLS/ Acre	PLS/ Acre	PLS/ Acre
Forbes/Wildflowers					
<i>Balyea multiradiata</i>	Desert Marigold	1	1	0.5	0.5
<i>Escholtzia mexicana</i>	Mexican Gold Poppy	2	2	1	1
<i>Lesquerella gordonii</i>	Gordon Bladder Pod	1	1	0.5	0.5
<i>Orthocarpus purpurascens</i>	Owl Clover	1		0.5	0.5
<i>Phacelia crenulata</i>	Desert Phacelia	1	1	1	1
<i>Sphaeralcea ambigua</i>	Globe Mallow	1	1	1	1
Grasses					
<i>Aristida purpurea</i>	Purple Three-awn	2	2		
<i>Digitaria californica</i>	Arizona Cottontop			0.5	0.5
<i>Sporobolus airoides</i>	Alkali Sacaton			1	1
<i>Sporobolus cryptandrus</i>	Sand Dropseed			1	1
Shrubs/Small Trees					
<i>Acacia constricta</i>	Whitethorn	1.5			2
<i>Acacia greggii</i>	Catclaw Acacia	2			4
<i>Ambrosia deltoidea</i>	Triangle-leaf Bursage	3	3		3
<i>Atriplex canescens</i>	Four-wing Saltbush	2			2

<i>Atriplex polycarpa</i>	Quailbrush	1			1
<i>Celtis pallida</i>	Desert Hackberry				2
<i>Encelia farinose</i>	Brittlebush		1		
<i>Larrea tridentata</i>	Creosote Bush	4.5			
<i>Psilostrophe cooperi</i>	Paper Daisy	1	1		1
Trees					
<i>Cercidium floridum</i>	Blue Palo Verde	3			3
<i>Chilopsis linearis</i>	Desert Willow	1			1
<i>Olneya tesota</i>	Ironwood	1			2
<i>Prosopis velutina</i>	Velvet Mesquite	1			2
Total PLS/Acre		30	13	7	30

Application rates of seed as specified are for Pure Live Seed (PLS). PLS is determined by multiplying the sum of the germination and hard or dormant seed by the purity.

The seed source shall be from elevations within 1,000 feet of elevation of project site, and for regulatory mitigation site, shall be from within 50 miles of project site. The seed shall be delivered to the project site in standard, sealed undamaged containers. Each container shall be labeled in accordance with Arizona Revised Statutes and the U.S. Department of Agriculture rules and regulations under the Federal Seed Act. Labels shall indicate the variety or strain of seed, the percentage of germination, purity and weed content and the date of analysis, which shall not be more than nine months prior to the delivery date. Weed content of seed shall not exceed 0.5 percent.

Wood Fiber Mulch: The wood fiber shall be natural wood fiber having the property of dispersing readily in water, heat processed in such a manner so that it does not contain any growth or germination inhibiting factors and shall have no toxic effect when combined with the seed or other materials. The fiber shall be dye free.

Wood fiber shall be delivered in undamaged containers labeled and bearing the name of the manufacturer and showing the air-dry weight content, the maximum being twelve (12) percent plus or minus three (3) percent at the time of the manufacture, and with a pH range of 4.5 to 6.5.

Tackifier: Tackifier shall consist of organic muciloid liquid concentrate diluted with water and a psyllium base containing no agents toxic to seed germination. Addition of fertilizer to the slurry mix shall not change the properties of the tackifier. When applied, tackifier shall form a transparent crust permeable by water and air.

Water: Water shall be free of oil, acid, salts, or other substances harmful to plants. The source shall be approved by the Engineer prior to use.

SUBSECTION 430.6.3—CONSTRUCTION REQUIREMENTS/EXECUTION

Perform seeding work only after other work affecting ground is complete. All **areas intended for native seeding shall not be treated with a pre-emergent control**. Protect existing utilities, walls, paving, irrigation systems, and other facilities from damage caused by seeding operations.

Where equipment can operate, the area to be seeded (that has been disturbed) shall be prepared by disking, harrowing, or by other approved methods of loosening the surface topsoil to a minimum depth of four (4) inches. Remove and dispose of all sticks, roots, rubbish, and other deleterious material. All native rock material, which does not interfere with seeding operations, may remain on ground surface. Finish grade and surface appearance shall attempt to match finish and texture of natural desert areas.

On slopes too steep for equipment to operate, the area shall be prepared by hand raking to a minimum depth of four inches. On sloping areas, all disking, harrowing and raking shall be directional and parallel to the contours of the areas involved. All areas, which are eroded, shall be restored to the specified condition, grade, and slope as directed prior to seeding.

Seeding operations shall also be performed on undisturbed soil outside the clearing and grubbing limits of the project. Seeding operations shall not be performed when wind would prevent uniform applications of materials or would carry seeding materials into areas not to be seeded.

All non-paved, non-roadway areas disturbed by construction operations, which are not designated to receive riprap or other installations, shall receive seed mix.

The homogeneous mixture shall be applied to the seeding area by means of hydraulic-type equipment, which shall provide continuous mixing, and agitation action to the mixture of water, seed, and wood fiber. The mixture shall be applied through a pressure-spray distribution system providing a continuous, non-fluctuating discharge and delivery of the mixture in the prescribed quantities.

Contractor may propose alternative means of applying seed depending on area to be seeded. Alternative method (other than by means of hydraulic equipment) must be approved by Engineer prior to start of operation.

The application rates for seed mix materials shall be applied as specified.

<u>Materials</u>	<u>Pounds Per Acre</u>
Seed Mix	Per plans
Wood cellulose fiber	1500
Tackifier	125
Water	Sufficient amount to form a homogeneous mixture capable of being applied by commercial hydromulching equipment.

Apply fertilizer, seed, mulch, and tackifier in a two-step process.

Mix seed and water. Apply slurry mix of one hundred twenty-five (125) pounds per acre of tackifier, one thousand five hundred (1500) pounds per acre of wood fiber mulch, and water Hydroseed areas designated.

Contractor shall provide maintenance of all seeded areas for a minimum of one hundred twenty (120) days.

The Contractor shall provide protective devices as required to protect seeded areas from traffic for a minimum of one hundred twenty (120) days. Repair and reseed areas damaged by traffic, erosion, or poor germination.

Subsection 430.8 - PLANT GUARANTEE AND MAINTENANCE:

Add the following to this section:

Unless otherwise authorized, the Contractor shall maintain and be responsible for all landscape areas and materials on a continuous basis as installations are completed during the course of work during the plant maintenance period, and until final project acceptance.

All plants shall be kept in a healthy, growing condition by watering, spraying, weeding and any other necessary operations or maintenance. Plant basins and beds shall be kept free of weeds, and other undesirable vegetation. Plants shall be inspected at least once per week and appropriate maintenance performed.

A pre-maintenance inspection will be performed upon substantial completion of all landscape work under this contract. The Contractor shall be present at the inspection and a punch list of items requiring remedial work shall be generated. Upon completion of the punch list items and approval by the Owner, the one hundred twenty (120) day maintenance/establishment period will begin.

Final Maintenance Inspection: At the end of the one hundred twenty (120) day maintenance/establishment period a final inspection will be performed. If, after this inspection, the Owner agrees that all planting areas are weed free and plant materials are in satisfactory growing condition, written Notice of Acceptance will be given to the Contractor for landscape installation.

Maintenance inspections will occur periodically. If landscape areas are improperly maintained, if appreciable plant replacement is required, or other corrective work becomes necessary, the Contractor shall continue to maintain the entire site until all items are corrected and accepted at no cost to the Owner.

Any corrective work disturbance, repairs, or replacements completed during the ninety- (90) day maintenance/establishment period shall be subject to an additional ninety- (90) day maintenance/establishment period from the time of acceptance of the corrective work.

The cost of plant establishment, maintenance, and warranty shall be included in the Hydroseed and Tall Pot Planting Bid Items. Thirty (30) percent landscape retention will be paid at the end of the successful completion of the one hundred twenty (120) day plant establishment period

Subsection 430.10 - Measurement and Payment

Add the following to this subsection:

Payment for native seed mix shall be made on the basis of the unit price of each type bid per square yard. This price shall be full compensation for all labor, materials, equipment, and all other items necessary and incidental to the application of the native seed mix, and the 120-day establishment and maintenance period.

The accepted quantities for Seeding, measured as provided above, will be paid in two phases corresponding to the application stage and the 120 calendar-day maintenance stage.

Upon completion of the application stage tall pot planting, and acceptance by the District, the contractor will be paid 70 percent of the contract bid price for the completed work. Such price will be considered full compensation for furnishing and applying the contract-specified seed mix, planting trees, soil amendments, tillage, mulch materials, and tacking agent, all required testing, and all equipment and labor required to complete the work as specified herein.

Upon completion of the 120 calendar-day maintenance stage, and acceptance by the Engineer, the contractor will be paid 30 percent of the contract bid price for the completed work. Such price will be considered full compensation for seeding maintenance and tree maintenance, including all equipment, labor, and materials required to correct deficiencies in seeded, mulched areas, as specified herein.

No measurement or payment will be made for the mobilizations required to apply and stabilize the seeding for each area or sub-area, as specified herein, the cost being considered as included in the contract price for Seeding.

An adjustment to the contract will be made if a contractor-requested seed substitution is approved as specified in section 430.3.6) above.

Payment for tall pot planting for each tree species shall be made at the unit price bid for each for tall pot

planting, and shall be full compensation for planting and maintaining the tall pot plants per the plans and specifications, including all equipment, labor, and materials, transportation of plants, pots, and racks, loading, unloading, clearing, excavating and preparing pit, planting, watering and/or applying Dri-WATER Irrigation supplement, applying Liquid Fence, and maintaining the planted tall pots throughout the maintenance period, and replacement of plants as needed and returning empty pots and racks to the District nursery at 2801 West Durango Street.

ITEM 430-1 - NATIVE SEED MIX A, (TOP AREA)

ITEM 430-2 – NATIVE SEED MIX B, (SIDE SLOPES)

ITEM 430-3 – NATIVE SEED MIX C, (CHANNEL BOTTOM AREA)

ITEM 430-4 – NATIVE SEED MIX D, (BASIN BOTTOM AREA)

ITEM 430-5 - BLUE PALO VERDE PLANTING

ITEM 430-6 – FOOTHILLS PALO VERDE PLANTING

ITEM 430-7 – IRONWOOD PLANTING

ITEM 430-8 – VELVET MESQUITE PLANTING

ITEM 430-9 – DESERT WILLOW PLANTING

SECTION 505 - CONCRETE STRUCTURES

Concrete structures shall conform to Section 505 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 505.1 - Description

Add the following to this subsection:

The work under this section shall consist of furnishing all labor, materials and equipment for the construction of all cast-in-place and other concrete structures including the concrete box culverts, precast concrete box culvert sections at Olive and Reems, wing walls, headwalls, grade control structure walls, irrigation ditches, and retaining walls as located and indicated on the plans.

Concrete shall conform to the requirements of Section 725 of the MAG Uniform Standard Specifications, and mix designs shall additionally meet the requirements of Chapter 5, Section 5.3 of ACI STANDARD 318-89. The Contractor shall submit mix designs and certifications of conformance with the above requirements for the written approval of the Engineer.

The use of Class F fly ash will be permitted in all concrete mixes, subject to approval of mix design by Engineer.

Transit Concrete mixes used on the project must carry current certification from ADOT or Arizona Rock Products Association.

The reinforcing steel shall conform to Section 727, Grade 60, of the MAG Uniform Standard Specifications.

Shop Drawings shall be submitted for the following:

- Product Data: Admixtures, stains, and patching materials.
- Placement Drawings:
 - a. Concrete, identifying location of each type of construction joint.
 - b. Reinforcing steel.
- Plastic Type Water Stops: Details of splices to be used and method of securing water stop in the forms and supporting water stop so as to maintain proper orientation and location during concrete placement.

Do not backfill against walls until concrete has obtained 28-day compressive strength. Place backfill simultaneously on both sides of wall, where required, to prevent differential pressures.

The plans provide for part pre-cast, part cast-in-place for Box Culvert No. 3 (Olive and Reems). The pre-cast section is required because the BNSF railroad will only allow a 72-hour shut-down of the tracks. The Contractor may propose to extend the precast section, at no cost to the District, and shall submit any revisions with his shop drawing submittal, for review and approval by the Engineer. See SGC section 105.6.2 for restrictions and requirements.

Subsection 505.3 –Forms

Add the Following:

Subsection 505.3.1 - Description

This work consists of furnishing and using elastomeric form liners in accordance with these specifications and the lines, grades and dimensions as shown on the Plans, or established by the Engineer / Landscape Architect. Rigid form liners shall not be considered as an ‘or equal.’

Subsection 505.3.2 - Materials

Elastomeric Form liners shall be furnished and installed to achieve the finish detail shown in the Plans and approved by the Engineer / Landscape Architect. Samples shall be submitted by the Contractor for approval by the Engineer / Landscape Architect. The master mold and the subsequent form liners are to be manufactured by Scott System, Inc (303) 373-2500, 10777 East 45th Avenue, Denver, CO 80239, or approved equal. The Contractor shall include in the cost of elastomeric form liners the cost to purchase from the manufacturer of elastomeric form liner panels using each elastomeric master mold, as required to meet the project schedule. The shop drawings for each wall shall identify the locations and use of each panel. The Engineer / Landscape Architect reserves the right to review and relocate the various patterns on each wall during the shop drawing review process.

The elastomeric master molds and or elastomeric form liners created for this project shall remain the property of the Flood Control District. The elastomeric master mold shall remain on file at the facility of manufacture for two years, unless otherwise agreed upon by the manufacturer or the Engineer / Landscape Architect. The elastomeric form liners produced for this project may not be used beyond the scope of work specified in the contract without the permission of the Engineer / Landscape Architect. The manufacturer of the elastomeric form liners shall certify that the design will not be reproduced for any other use without the express permission of the Engineer / Landscape Architect.

Subsection 505.3.3 - Elastomeric Form Liners

The Contractor shall be responsible for coordinating the final aesthetic design of the elastomeric form liner pattern with the Engineer, Landscape Architect, Elastomeric Form Liner Manufacturer, Design Team Representative, and the Project Artist. The cost to perform the coordination for the final design shall be incidental to the cost of the elastomeric form liners.

Fabricate elastomeric form liners as required to reproduced master patterns on the wall surfaces of the project. The number and size of the liners shall be determined by the Contractor. The intent is to have the wall relief conform to the layout of the patterning shown on the Plans. The liners are to be large linear pieces. Patchwork liners will not be accepted. All liner fabrication is to be pre-approved by the Engineer / Landscape Architect.

In areas where elastomeric form liners are to be seamed to accommodate dimensions of the forms or intent of the design, the seam shall be placed in areas that will be less noticeable. Clean, straight cuts are required on all edges. All chamfered edges and cuts are to be replaced. Unless otherwise indicated on the Plans, the Contractor may not seam through a pattern’s face unless approved by the Engineer, Landscape Architect, Artist or Design Team Representative.

The Contractor shall comply with the elastomeric form liner manufacturer's Complete Use and Application Guide for the methods of securing liners to supporting formwork and the use of elastomeric form liner releasing agents. All form liners may be re-used multiple times. All joint material, fasteners and care and cleaning of liners shall be per manufacturer's Complete Use and Application Guide.

Elastomeric form liner release shall be Scott 440 Elastomeric Form Release or Cresset Chemical 880 Elastomeric Form release as noted in the manufacturers Complete Use and Application Guide or equal. The Elastomeric form liner release shall be worked into all areas, especially pattern recesses.

The Contractor shall be responsible for replacing, at the Contractor's expense; any elastomeric form liner panels damaged during construction operations.

Subsection 505.3.4 - Construction Methods

As part of this contract, Contractor shall provide a full-sized, cast-in-place, painted mock-up of the area identified on the Plans incorporating graphics on one face of the wall utilizing elastomeric form liners, form-ties, seams, and horizontal and vertical edges. Included in the mock up shall be the painted steel railing. Review as-cast surfaces with the Engineer, Landscape Architect and Design Team Representative for approval. The contractor is responsible for providing a mock up that represents the intent of the drawings. The contractor will be responsible for making adjustments as necessary to conform to the plan intent. Contractor shall account for up to (3) full size mock up panels 10' X 10' in size. A bid item for three test panels (505-17) will be employed. The second and third test panels will be used if the client request changes. Mock-up is to remain in place throughout the term of the project and shall be used as a reference standard for quality. The mock up shall be painted per rusticated headwalls shown in the plans and specifications. The mock up **may not** be considered part of the final construction. Contractor will be required to remove and properly dispose of the mock-up at the completion of construction as directed by the Engineer / Landscape Architect.

Fabricate formwork to support the elastomeric form liners and the related accessories with minimum deflection. Provide method of sealing form joints to prevent loss of water from wet concrete based on manufacturer's Complete Use and Application Guide. Design and fabricate forms to facilitate the placement of concrete and the desired textures. Take necessary steps to insure no damage to joints or cast surfaces occurs during stripping operations.

Concrete shall be deposited and consolidated to minimize air and water pockets per the special provisions of the project.

Handle, clean and store forms and elastomeric form liners for re-use so as not to damage form liner edges or surfaces. Conform to manufacturer's Complete Use and Application Guide.

Notify Engineer if any surface defects are found upon removal of forms. Patch only as directed by the Engineer.

Clean and repair surfaces of forms to be re-used in the work. Split, frayed, delaminated or otherwise damaged form facing materials are not to be re-used. Repair and replace elastomeric form liners as recommended by manufacturer.

The Engineer and Design Team Representative are required to be on the job site for the mock-up and first production use of graphic artwork panels and forms. These representatives shall review the preparation of the graphic art and elastomeric form liners prior to concrete pouring. Their recommendations shall be followed by the Contractor at all times to assure the continued acceptance of the graphic art formed concrete pouring.

Periodic visits by these individuals shall be required to assure compliance with the intent, methodology, use and care of the elastomeric form liners.

As the job progresses, and questions related to the integrity of the elastomeric form liners and attached graphics shall be directed immediately to the Engineer for clarification.

Multiple textures and graphics may occur on a single panel. It shall be the Contractor's responsibility to field verify that all graphics and texturing are included and aligned per the details and elevations prior to wall construction. The texture types shall be Scott System #124 Large Striated, #160 Rock Mountain Flagstone, and #166-1 3/4" Chiseled Limestone or equal. Substitutions shall only be approved in writing by the Engineer/Landscape Architect. A substituted pattern will not be permitted. A substitution must resemble the patterns specified with a tolerance of 5% or less visual and measurable difference in pattern, layout, and/or depth of form liner.

Elastomeric Form liner layout may need to be adjusted to adapt to wall features such as blockouts, etc. If such a condition will impact the alignment of the graphics, the Contractor shall immediately notify the Engineer / Landscape Architect.

Concrete surfaces shall be finished in accordance with the requirements in these specifications, and MAG standards and specifications.

Subsection 505.6 - Placing Concrete

Add the following to this subsection:

Place concrete in accordance with ACI 301-89. Prior to placing concrete, remove loose soil and water from excavation and subgrade and debris and foreign material from forms. Obtain Engineer's approval of subgrade before placing reinforcing steel. Check reinforcing steel for proper placement and correct discrepancies. Before depositing new concrete on old concrete, clean surface using sandblast or bushhammer or other mechanical means to obtain a 1/4-inch rough profile. Maximum vertical drop to final placement shall be 6 feet, when not guided with chutes or other devices to prevent segregation caused by impact with reinforcing. Do not use aluminum pipe or aluminum conveying devices.

Steps performed in preparation for placing concrete shall meet requirements and recommendations of ACI 304R-89 and ACI 301-89, except as modified herein. Ends of chutes, piping, hopper gates, and other points of concrete discharge throughout the conveying, hoisting, pumping, and placing system shall be designed and arranged for concrete to pass without becoming segregated. Do not use chutes longer than 50 feet. The minimum slopes of chutes shall be angled to allow concrete to readily flow without segregation. Conveyor belts shall be approved by Engineer, wiped clean with a device that does not allow mortar to adhere to belt, and conveyor belts and chutes covered. Provide standby pump, conveyor system, crane and concrete bucket, or other system onsite during placing, for adequate redundancy to ensure completion of concrete placement without cold joints in case of a primary placing equipment breakdown. Minimum pump hose (conduit) diameter shall be 4 inches. Replace pumping equipment and hoses (conduits) that are not functioning properly.

Limit size of each placement to allow for strength gain and volume change caused by shrinkage. Minimum time between adjacent placements for construction of the spillway floor slab shall be seven (7) days.

Consolidate concrete with internal vibrators with minimum frequency of 8,000 cycles per minute and amplitude required to consolidate concrete in section being placed. Provide at least one standby vibrator in operable condition at placement site prior to placing concrete. Consolidation equipment and methods shall conform to the requirements of ACI 309R-87. Provide sufficient windows in forms or limit form height to

allow for concrete placement through windows and for visual observation of concrete. Vibration consolidation shall not exceed a distance of 5 feet from point of placement. Vibrate concrete in vicinity of joints to obtain impervious concrete there.

When vibrating concrete, apply approved vibrator at points spaced not farther apart than vibrator's effective radius. Apply close enough to forms to vibrate surface effectively but not damage form surfaces. Vibrate until concrete becomes uniformly plastic. Vibrator must penetrate fresh placed concrete and into previous layer of fresh concrete below.

Subsection 505.6.1 - Joints

Add the following to this subsection:

Construction joints shall be constructed as straight joints and made either vertical or horizontal. Concrete placement shall commence after the joint preparation is complete.

For construction joints, prior to placement of abutting concrete, clean contact surface by removing laitance and spillage from reinforcing steel and dowels. Then roughen surface to a minimum of 1/4-inch amplitude by either sandblasting after the concrete has fully cured, water blasting after the concrete has partially cured, or if the concrete is green, cutting the fresh concrete with high pressure water and hand tools. Perform cleaning so as not to damage water stop, if one is present. Joints for the precast sections shall conform to the manufacturer recommendations.

The Contractor shall provide details for water-proofing joints between the CIP and precast sections in his shop drawings.

Subsection 505.8 - Curing

Add the following to this subsection:

Use one of the following methods as approved by Engineer.

Walls and any other surfaces to be stained shall have only water curing procedures used. Method 1: Leave concrete forms in place and keep entire surfaces of forms and concrete wet for 10 days. Method 2: Continuously sprinkle with water 100 percent of exposed surfaces for 10 days starting immediately after removal of forms.

Slabs shall use one of the following methods: Method 1: Protect surface by water ponding for 10 days; Method 2: Cover with burlap or cotton mats and keep continuously wet for 10 days; Method 3: Cover with 1-inch layer of wet sand, earth, or sawdust, and keep continuously wet for 10 days; or Method 4: Continuously sprinkle exposed surface for 10 days. Other agreed-upon methods that will keep moisture present and uniform at all times on surface of slabs. Curing compounds are not permitted.

Subsection 505.9 - Finishing Concrete

Add the following to this subsection:

All vertical surfaces not receiving form liner shall receive a smooth sandblast finish as specified on plans.

All exposed surfaces of the retaining walls, box culvert, all exposed surfaces of the concrete structures, and the nose and interior of the box culvert piers within (10) ten feet of the inlet/outlets shall be stained with colors per these specifications and plans and as approved by the Engineer. The underside of the box culvert, the interior of the box culvert piers greater than (10) ten feet from the inlet/outlets, and any other structures not specified herein shall not receive any stain.

The colors shall conform to the color requirements with respect to hue, value, and chroma. All color stains

shall be applied to the appropriate form type on the concrete test panel, and all colors will be approved by the engineer prior to use. The cost for the concrete test stain is incidental to the cost of the concrete test panel. Concrete stain remaining after the completion of construction shall be provided to the Flood Control District. At least one 5-gallon container of each color shall be provided to the District by the completion of the contract.

Prior to starting patching work, obtain quantities of color-matched patching material and manufacturer's detailed instructions for use to provide a structural patch with finish to match adjacent surface. Develop patching techniques with epoxy manufacturer on mockup panel. Dress surface of patches that will remain exposed to view to match color and texture of adjacent surfaces. Patching of concrete shall provide a structurally sound surface finish, uniform in appearance or upgrade finish by other means until acceptable to Engineer.

For tops of walls, screed surfaces to true level planes. After initial water has been absorbed, float with wood float and trowel with steel trowel to smooth finish free from trowel marks.

Spray evaporation retardant onto surface of fresh flatwork concrete immediately after screeding to react with surface moisture. Reapply as needed to ensure a continuous moist surface until final finishing is completed.

Subsection 505.9.6 - Finishing and Patching Surfaces

Add the following subsection:

When patching defective areas, remove defective concrete to a depth of sound concrete. Small shallow holes caused by air entrapment at surface of forms shall not be considered defective unless amount is greater than 3/4 inch in diameter or as stipulated by the Engineer. Obtain Engineer's approval of chipping work.

Cut out honeycombed and defective areas. Cut edges perpendicular to surface at least 1 inch deep. Do not feather edges. Soak area with water for 24 hours. Patch with non-shrink grout as specified in Section 776. Finish surfaces to match adjacent concrete. Keep patches damp for a minimum of 7 days.

To patch form tie holes, fill with Category I grout as specified in Section 776. Use only enough water to dry pack. Compact grout using steel hammer and steel tool to drive grout to high density. Cure grout with water. Finish and stain surfaces to match adjacent concrete.

Subsection 505.10 - Payment

Add the following to this subsection:

Payment for concrete box culvert cells shall be made on the basis of the price bid per linear foot. A reduction in the concrete box culvert quantities will not be reason to renegotiate the unit price as specified in MAG Section 109.4. This price shall be full compensation for all labor, materials, reinforcing steel, equipment, excavation, railroad subballast, and backfill, color stain, protective coating, paint, aesthetic treatment, and all other items necessary and incidental to construct the box culvert cells and headwalls, complete in place according to the plans and these Special Provisions.

ITEM 505-1 - CONCRETE BOX CULVERT Type A (2 BBL 10' x 6')

ITEM 505-2 - CONCRETE BOX CULVERT Type B (1 BBL 10' x 6') (AUXILIARY FOR 30' FILL LOAD)

ITEM 505-3 - CONCRETE BOX CULVERT Type C (1 BBL 10' x 6' Precast)

ITEM 505-4 - CONCRETE BOX CULVERT TYPE D (2 BBL 10' X 6' FOR 30' FILL LOAD)

Payment for concrete retaining walls shall be made on the basis of the unit price bid for each. This price shall be full compensation for all labor, materials including bulkheads, reinforcing steel, equipment, excavation and backfill, formwork, color stain, painting, protective coating, formliner and aesthetic treatment, additional

concrete required for form liner as shown on landscape details and all other items necessary and incidental to construct the structures complete in place according to the plans and these Special Provisions.

ITEM 505-5 – CONCRETE RETAINING WALLS

ITEM 505-6 – CONCRETE RETAINING WALLS AT OLIVE AVENUE

ITEM 505-7 – SOUTH CONCRETE RETAINING WALLS

Payment for concrete grade control structures shall be made on the basis of the price bid for each. This price shall be full compensation for all labor, materials, reinforcing steel, equipment, excavation and backfill, color stain, protective coating, and all other items necessary and incidental to construct the structures complete in place according to the plans and these Special Provisions. Riprap is paid by item 220-1 PLAIN RIPRAP.

ITEM 505-8 – CONCRETE GRADE CONTROL STRUCTURE

Payment for concrete inlet structure and for concrete outlet structure shall be made on the basis of the price bid for each. This price shall be full compensation for all labor, materials, reinforcing steel, equipment, excavation and backfill, formwork, color stain, protective coating, painting, formliner and aesthetic treatment, additional concrete required for form liner as shown on landscape details and all other items necessary and incidental to construct the structures complete in place according to the plans and these Special Provisions.

ITEM 505-9 – CONCRETE INLET STRUCTURE

ITEM 505-10 – CONCRETE OUTLET STRUCTURE

Payment for concrete weir structure shall be made on the basis of the price bid for each. This price shall be full compensation for all labor, materials, reinforcing steel, equipment, excavation and backfill, formwork, color stain, protective coating, painting, Reems Road Channel concrete lining, formliner and aesthetic treatment, additional concrete required for form liner as shown on landscape details, and all other items necessary and incidental to construct the structure complete in place according to the plans and these Special Provisions.

ITEM 505-11 – CONCRETE WEIR STRUCTURE

Payment for concrete lined irrigation ditch shall be made on the basis of the price bid per linear foot. This price shall be full compensation for all labor, materials, reinforcing steel, equipment, excavation and backfill, protective coating, joints as required by Engineer, and all other items necessary and incidental to construct the ditch complete in place according to the plans and these Special Provisions.

ITEM 505-12 - CONCRETE LINED IRRIGATION DITCH

Payment for concrete channel lining (located on the east side of box culvert adjacent to Falcon Dunes Golf Course) shall be made on the basis of the price bid per square yard. This price shall be full compensation for all labor, materials, reinforcing steel, equipment, excavation and backfill, protective coating, joints as required by Engineer, aesthetic treatment including painting, additional concrete required for form liner as shown on landscape details, and all other items necessary and incidental to construct the lining complete in place according to the plans and these Special Provisions.

ITEM 505-13 - CONCRETE CHANNEL LINING

Payment for concrete headwall shall be made on the basis of the price bid for each. This price shall be full compensation for all labor, materials, reinforcing steel, equipment, excavation and backfill, formwork, , and all other items necessary and incidental to construct the structure complete in place according to the plans and these Special Provisions.

ITEM 505-14 – CONCRETE HEADWALL (MAG DET 501-4)

Payment for 20 MIL PVC sheet vinyl waterproofing shall be made on the basis of the price bid per square foot. This price shall be full compensation for all labor, materials, equipment, and all other items necessary and

incidental to install the PVC waterproofing complete in place according to the plans and these Special Provisions.

ITEM 505-15 – 20 MIL PVC SHEET VINYL WATERPROOFING

Payment for concrete pipe (for 30-inch pipe) plugs shall be made on the basis of the price bid for each. This price shall be full compensation for all labor, materials, reinforcing steel, equipment, excavation and backfill, and all other items necessary and incidental to construct the structure complete in place according to the plans and these Special Provisions.

ITEM 505-16 – CONCRETE PIPE PLUG (MAG DET 427)

Payment for concrete test panels shall be made on the basis of the price bid for each. This price shall be full compensation for all labor, materials, reinforcing steel, steel handrail, equipment, excavation and backfill, formwork, color stain, protective coating, formliner and aesthetic treatment, additional concrete required for form liner as shown on landscape details, removal and disposal of the test panel upon project completion, and all other items necessary and incidental to construct the test panel complete in place according to the plans and these Special Provisions.

ITEM 505-17 – CONCRETE TEST PANELS

SECTION 515 - STEEL STRUCTURES

Steel Structures shall conform to Section 515 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 515.1 - Description

The work under this section shall consist of supplying and installing Waterman Model F-10 or approved equivalent flapgates and access barriers and associated embedments for the concrete structures according to the plans and these Special Provisions.

All material for the access barrier shall be A36 steel. The access barriers and associated embedments shall be galvanized in accordance with MAG Section 771.

Subsection 515.7 - Payment

Payment for the flapgate shall be made on the basis of the price bid for each item and shall be full compensation for all labor, materials, painting, equipment, and all other items necessary to complete the work in place according to the plans and these Special Provisions.

ITEM 515-1 – 30-INCH-FLAP GATE

Payment shall be made on the basis of the price bid for each type of access barrier and associated embedment angles, and shall be full compensation for all labor, materials, painting, equipment, and all other items necessary to complete the work in place according to the plans and these Special Provisions.

ITEM 515-2 – ACCESS BARRIER BOX CULVERT

ITEM 515-3 – ACCESS BARRIER 30-INCH PIPE

SECTION 520 - STEEL HANDRAILS

Steel handrails shall conform to Section 520 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 520.1 - Description

Add the following to this subsection:

The work under this section shall include providing and erecting steel handrails as shown in the plans.

All steel handrails (non-galvanized) shall be painted in accordance with MAG Section 790. Apply one coat of Benjamin Moore CM33 Polyimide Epoxy Metal Primer, or equal, per manufacturer's specifications. The finish coat shall be minimum 2 coats of DunnEdwards Neutral Valley DE6119, applied per manufacturer's specifications.

All independent sections of handrail require grounding.

Subsection 520.5 - Payment

Add the following to this subsection:

Payment for handrails shall be made on the basis of the price bid per linear foot. Payment shall be full compensation for all labor, materials, equipment, and painting, and all other items necessary to complete the work in place according to the plans and these Special Provisions.

ITEM 520-1 - STEEL HANDRAILS

SECTION 530 - PAINTING

Painting shall conform to Section 530 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 530.1 - Description

Add the following to this subsection:

The work under this section shall also include furnishing all materials, equipment and labor necessary for the painting of concrete surfaces, and the application of a penetrating desert varnish stain to rip rap installations, or other surfaces as directed by the Engineer, and in accordance with the requirements of the Standard Specifications and these Special Provisions. The Engineer will determine if any slopes or rock areas require staining once the excavation work is complete.

All exposed surfaces of the retaining walls, wingwalls, handrails, and headwalls of box culverts, and the side weir, concrete channel section, and inlet/outlet structure, and the nose and interior of the box culvert piers within (10) ten feet of the inlet/outlets shall be painted in accordance with these specifications and the plans. The underside of the box culverts, and the interior of the box culvert piers greater than (10) ten feet from the inlet/outlets, and any other structures not specified herein shall not receive any paint

For the purposes of this project, a freshly exposed rock surface is any non-weathered rock surface that is exposed as the result of the contractor's operations.

The colors selected for this project include DunnEdwards NEUTRAL VALLEY DE6119, DunnEdwards RUSTIC TAUPE DE6129, DunnEdwards STORM CLOUD DE6362, DunnEdwards LAKE LUCERNE DE5808.

Test panels measuring 10' x 10' of each of the selected colors shall be applied by the contractor on the concrete surfaces of each structure for final color approval by the Engineer, and the Flood Control District.

All panels shall have two coats of paint applied. The paint shall be applied using the same methods that will be used to paint the concrete structures.

The contractor shall match the final color(s) selected for each structure and provide final 8" x 10" fully covered paint draw downs; no paint shall be ordered, purchased or applied until the final draw downs and samples for each structure have been approved by the Flood Control District.

Subsection 530.2 - Materials

Add the following to this subsection:

Acrylic emulsion paint shall be applied to the exposed concrete surfaces described by these Special Provisions. Paint shall conform to the requirements of Section 790 MAG Standard Specifications, unless otherwise specified.

Subsection 530.2.1 -Desert Varnish Stain:

Add the following subsection:

(A) General Requirements:

The Desert Varnish Stain material shall meet the requirements specified herein. Prior to application of the stain, the contractor shall provide the Engineer with a Certificate of Analysis in accordance with Subsection 106.05 of the Standard Specifications. Submittal of product data sheets listing the application or use requirements, and the types and proportions of stain constituents, and Materials Safety Data Sheets (MSDS) is required for the stain material supplied. Approval of the stain material will not occur until all required documentation has been received by the Engineer.

The contractor shall prepare sample tests of the selected stains for approval. The contractor shall not acquire the stain materials until written notification of the final color selection from the Engineer has been received.

The desert varnish stain shall be ready-mixed at the manufacturer's plant. The contractor shall submit the name of the manufacturer of the desert varnish stain he proposes to use, along with three sets of the manufacturer's specifications for mixing and application, to the Engineer for written approval.

The stain shall be furnished in new, airtight containers, clearly labeled with the exact title of the stain, Federal Specifications Number when applicable, name and address of the manufacturer and lot or batch number. The containers shall meet the U.S. Department of Transportation Hazardous Materials Shipping Regulations when applicable to the product.

Precautions concerning the handling of the stain shall be shown on the label of the stain containers. Stain shall be stored at temperatures in accordance with the manufacturer's written recommendations and shall not be opened until ready for use.

(B) Physical and Chemical Requirements:

The desert varnish material shall be an aqueous solution containing salts of iron and manganese, built-in oxidizers and other trace elements including copper and zinc. The desert varnish stain shall involve applying a stable one-step or two-step component solution directly to the rock cut surface.

(C) Performance Requirements:

The projected life expectancy of the stain shall be 50 to 100 years. The stain shall develop full coloration within two weeks after the application. The final color of the stain shall be controlled or modified by custom blending of the basic ingredients, application techniques, dilution rate of the color concentrate with water, or a combination of these methods.

Chemical components within the stain shall have no adverse reactions or effects on soils, plants or animals. No corrosive by-products shall be present once the stain has been applied. Only nitrate fertilizer products may be present as soluble residues.

Subsection 530.2.2 -Application

Add the following subsection:

Painting shall be accomplished in a neat and workmanlike manner by an Arizona licensed painting contractor

that is acceptable to the paint manufacturer and the Engineer.

Prior to application of the paint, the contractor shall provide the Engineer with three original copies of Certificate of Compliance for each lot or batch of paint supplied, in accordance with Subsection 106.1. The Certificate of Compliance shall certify compliance of the paint with each of the specified physical, chemical, and performance requirements for acrylic emulsion paint listed herein. In addition, product data sheets listing the paint constituents and their proportions as well as materials safety data sheets are required for any paint materials supplied.

Subsection 530.2.3 –Desert Varnish Stain

Add the following subsection:

(A) General Requirements:

The Engineer, in consultation with the Flood Control District, shall select and determine the areas and surfaces to be stained prior to application of any desert varnish stain. Surfaces will include rock rip-rap.

The stain shall be applied by an Arizona licensed painting contractor or manufacturer's representative applicator, which has a minimum of one year of experience in the application of desert varnish stains under similar project conditions, as approved by the Engineer.

The method of application, the rate of application, and the surface temperature range of application shall be in accordance with the manufacturer's written recommendations.

The contractor shall cover or protect all adjacent existing and new surfaces which are to remain unstained, including vegetation, from the application of the stain.

The preliminary stain test panels shall be within the project limits, and the samples shall measure at least 24" x 24" in size. The surfaces shall be aged and textured similar to that to be encountered on the work. The stain shall be applied using the same methods that will be used for the work. For each major rock type, the preliminary test panels shall be approved by the Engineer before further stain application may proceed.

After the preliminary test panel sample has been approved by the Engineer, full-scale test panels shall be prepared. The full-scale test panels shall be 10' x 10' in size, or as directed by the Engineer. The full-scale test panels shall use the same application rates, methods, and dilutions as were approved for the preliminary panels. The test panels shall be prepared as specified herein and shall be located at the project site for the duration of the project. One full-scale test panel shall be provided for each of the major rock types encountered on the project. The full-scale test panels may remain as part of the finished work as approved by the Engineer.

If, in the opinion of the Engineer, the results of any test panel are not satisfactory, the Engineer may require that additional test panels be performed in these or other rock types.

For any given major rock type, the contractor shall not begin full-scale staining until final approval of the products and test panels in that rock type is received from the Engineer.

Shade and tone adjustments shall be made in accordance with aesthetic considerations, and final approval may require such adjustments.

All surfaces to be stained shall be cleaned, prior to the stain applied, in accordance with the manufacturer's written recommendations for the removal of all dirt, dust, blasting residue, scale or other foreign substances that could be detrimental to the stain penetration or color. All surfaces to be stained shall be clean and

completely dry at the time of the application of the stain.

After all surfaces have been prepared for the application of stain, the contractor and a representative of the stain manufacturer shall inspect the surfaces to be stained and, if in agreement, shall notify the Engineer in writing that the surfaces are satisfactory for the stain to be applied. The contractor shall not commence application of the stain without specific direction from the Engineer.

Subsection 530.11 – Measurement and Payment

Add the following to this subsection:

In addition to painting and staining as described above, the Contractor shall provide one (1) five-gallon container of each paint color and varnish to the Engineer. No measurement or payment will be made for painting, staining, staining edges, ledges, crevices, or surface relief in the rock face. This cost of this work is included in the stated bid items of Section 220, Section 505, Section 515, and Section 520.

SECTION 601 - TRENCH EXCAVATION, BACKFILLING AND COMPACTION

Trench excavation, backfilling and compaction shall conform to Section 601 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 601.4.2 – Bedding

Add the following to this subsection:

Bedding material may be 1/2 sack CLSM and shall conform to the requirements set forth in MAG Section 728. CLSM shall have a slump of 7 +/- 1 inch and have a minimum of 50-psi compressive strength and a maximum of 100 psi based on a 28-day test.

CLSM bedding material shall be placed in a uniform manner that will prevent voids in, or segregation of, the bedding material, and will not float or shift the pipe. CLSM bedding material shall be placed from bottom of pipe-to-pipe springline. No backfilling above the CLSM shall be commenced until 24 hours after the cement-treated slurry has been placed.

Bedding material above the springline of the pipe shall be granular material containing no pieces larger than 1-1/2 inches and free of broken concrete, broken pavement, wood or other deleterious material.

No water consolidation will be permitted.

Where mechanical compaction is used, the moisture content shall be such that the specified compaction can be obtained. Bedding lifts shall not exceed 12 inches loose and extreme care will be taken to prevent damage to or movement of the conduit by the compaction equipment.

The Contractor may opt to use cement-treated slurry from the pipe springline to the within one foot from the top of the pipe.

Subsection 601.6 - Payment

Add the following to this subsection:

No payment will be included in the proposal, nor direct payment made for trench excavation, foundation, bedding, backfilling, compaction, or placement of temporary pavement, the cost thereof shall be included in the price for the construction or installation of the items to which such trenching is incidental or appurtenant.

SECTION 618 – STORM DRAIN CONSTRUCTION

The work under this section shall conform to Section 618 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 618.1 – Description

Add the following to this subsection:

The work under this section shall consist of furnishing and installing Rubber Gasket Reinforced Concrete Pipe (RGRCP) or other approved alternate pipe at the locations and to the grades and slopes indicated on the plans.

Subsection 618.2 – Materials

Add the following to this subsection:

Concrete pipe, joints, gaskets, and testing shall be according to MAG Section 735.

Subsection 618.6 – Payment

Replace this subsection with the following:

Payment for storm drain construction shall be made at the unit price bid per linear foot, to the nearest foot for each size of pipe. This price shall be full compensation for furnishing and installing the pipe and fittings complete in place, as specified, including excavation, backfilling, compaction, shoring, sheeting and bracing, testing and all incidental work not specifically covered in other pay items.

ITEM 618-1 - 24-INCH PIPE

ITEM 618-2 - 30-INCH PIPE

SECTION 725 - PORTLAND CEMENT CONCRETE

Portland cement concrete shall conform to Section 725 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 725.6 - Admixtures

Add the following to this subsection:

When an air-entraining agent is authorized, the amount used will be limited to the extent that the amount of air by volume shall not be less than 4 percent or more than 6 percent. Air-entraining agents complying with AASHTO M-154 or ASTM C-260 will be permitted as long as strength requirements are met. Any admixture shall be measured accurately by mechanical means into each batch by equipment and in a method approved by the Engineer.

APPENDIX IV

Supplementary General Conditions



SUPPLEMENTARY GENERAL CONDITIONS

CONTRACT FCD 2005C018

REEMS ROAD CHANNEL AND BASIN PROJECT

PCN: 470-12-31

**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
REEMS ROAD CHANNEL AND BASIN
CONTRACT NO. FCD 2005C018
PCN 470-12-31**

SUPPLEMENTARY GENERAL CONDITIONS

SPECIFICATIONS

Except as otherwise amended in these Supplementary General Conditions and the Construction Special Provisions, this project shall be constructed in accordance with all applicable Maricopa Association of Governments (MAG) Uniform Standard Specifications and Uniform Standard Details, dated 1998 including all revisions through 2005.

PRECEDENCE OF CONTRACT DOCUMENTS

This Contract and its designated documents, whether taken separately or together, are to be interpreted according to full intent, meaning, and spirit, and shall be deemed to mutually explain each other and to be descriptive of any materials to be furnished and the work to be performed under this Contract. In cases of any difference or discrepancy between the Contract documents, the order of precedence shall be a) Addendum to the Invitation for Bids, b) the Contract form, c) Supplementary General Conditions, d) Construction Special Provisions, e) Project Plans, f) MAG Uniform Standard Specifications and Uniform Standard Details, and g) ADOT Standard Specifications for Road and Bridge Construction.

Subsection 101.2 - Definitions and Terms:

1. Change the definition of the phrase "Board of Supervisors" to being the Board of Directors acting under the authority of the laws of the State of Arizona and in their capacity of the Board of Directors of the Flood Control District of Maricopa County.
2. Change the definition of the phrase "Budget Project" to being a project financed by funds set aside in the annual budget or otherwise approved by the Flood Control District of Maricopa County Board of Directors.
3. Add to the definition of the phrase "Contract Documents," the phrase "Supplementary General Conditions."
4. Change the definition of the term "Engineer" to being the person appointed by the Flood Control District of Maricopa County Board of Directors to the office of Chief Engineer and General Manager of the Flood Control District of Maricopa County acting directly or through its authorized representative, the Chief of the Flood Control District of Maricopa County Planning and Project Management Division.
5. Change the definition for the phrase "Notice of Award" to a letter from the Flood Control District of Maricopa County advising Contractor that it is the successful bidder and the Flood Control District of Maricopa County has accepted its proposal.
6. Change the definition of the term "Owner" to the Flood Control District of Maricopa County, acting through it's legally constituted officials, officers, or employees.
7. Whenever the word "District" is used in these Specifications, it shall mean the Flood Control District of Maricopa County.

8. Add the definition for the Maricopa County Small Business Enterprise Program as being the Program adopted by the Board of Supervisors effective December, 2006.

Subsection 102.4 - Examination of the Plans, Special Provisions, and Site Work:

Add the following:

The Geotechnical Report including soil boring logs and groundwater conditions is in Appendix A of these SGC's. Existing moisture conditions shall be no basis for claim for additional money or time extensions. The Contractor shall manipulate the existing soil as required to achieve stable soil conditions and the required densities, as well as safe and stable side slopes during construction activities.

There is the possibility that seepage of groundwater and/or perched water may be encountered during excavation. The Contractor should be prepared to deal with nuisance groundwater and surface water.

Subsection 102.5 - Preparation of Proposal:

Add the following:

Proposals, including the Bidding Schedule, must be legibly written in ink or typed, with all prices given in numerals. In case of a conflict between the unit bid price and the extension, the unit bid price will govern.

It shall be the responsibility of prospective bidders to determine, prior to submission of a bid, if any addenda have been issued by the Flood Control District. This may be accomplished by calling 602-506-1501. Any addendum issued, if not already bound into the Special Provisions, **must be attached and included as part of the Specifications** and any quantities on the Bidding Schedule requiring change shall be adjusted to the new figure by pen and ink. The bidder's Arizona State Contractor's License number and the classification under which it proposes to perform the work shall be shown on the proposal. An "A" **General Engineering License** is required for this contract.

Allowances as shown on the Bid Schedule shall cover the cost of the materials, handling, equipment, labor costs, permits, and fees to complete the disposal of the items. The Contractor's taxes, bonds, insurance, overhead, profit, and other expenses contemplated for the original Allowance amount shall be included in the Base Bid, and not in the Allowance. Whenever the costs are more than or less than the Allowance, the Contract Sum shall be adjusted accordingly by Change Order, the amount of which will recognize proportionate changes, if any, in handling costs on the site, labor, installation costs, taxes, bonds, insurance, overhead, profit, and other expenses. Contractor's Application for Payment shall include supporting documentation of Allowance funds.

Subsection 102.6 - Subcontractors' List:

Add the following:

A list of subcontractors to be employed on the project shall be submitted with the bid, on the form provided in the Proposal. Following Notice of Award, no change of the subcontractors named therein will be made unless first approved in writing by Owner.

Subsection 102.7 - Irregular Proposals:

Add the following:

- (G) If any addenda are not acknowledged and attached.
- (H) If the entire book of Construction Documents (less the plans) is not returned.

Subsection 103.6 - Contractor's Insurance:

Add the following:

Concurrently with the execution of the contract, Contractor shall furnish a Certificate of Insurance, using the included Certificate that names the additional insureds as set out in the Certificate. The Certificate

shall also name the additional insureds as Certificate Holders. The types of insurance and the limits of liability shall be as indicated on the included form

Subsection 103.6.1(D) - Contractor's Insurance:

Add the following:

Include additional insureds as indicated on the included Certificate of Insurance. The Contractor expressly agrees to name the Maricopa County Department of Transportation (MCDOT) and Luke Air Force Base (LAFB) as additional insureds on such insurance policies as required by the Contract and the District.

Subsection 103.6.2 – Indemnification of the Contracting Agency against Liability:

Add the following:

Additionally, Contractor shall execute the Indemnification found in the Contract Documents. The Contractor expressly agrees to hold MCDOT and LAFB harmless under same terms and conditions as District. The Contractor expressly agrees that MCDOT and LAFB are express third party beneficiaries of the construction contract and shall be entitled to assert against the Contractor all of the District's claims, rights, warranties, and privileges under the construction contract.

Subsection 104.1 - Work to be Done:

Add the following to 104.1.1:

All water for construction purposes, drinking water, lighting, temporary electric power, heat and telephone service shall be arranged and provided for as per requirements of the work by Contractor at his expense.

All construction activities will occur in an area that is subject to flooding. Flows can occur at any time. The Contractor will remove all equipment from the construction area whenever flows could occur that would inundate the equipment or equipment storage areas. Protection from flooding of Contractor's equipment and construction items to be furnished by the Contractor is the Contractor's responsibility.

The major facilities to be constructed include the 40 acre basin construction, 1 ½ miles of channel construction, four concrete box culverts, one concrete weir structure (and concrete lining for channel adjacent to weir structure), twenty (20) concrete grade control structures, one concrete inlet structure, one concrete outlet structure, drainage pipes, native seeding, tall pot planting, removal and replacement of irrigation ditches, and maintenance roads and ramps.

The Contractor is required to salvage the top eight (8) inches of topsoil from the basin and channel, per Special Provisions Section 215. The Contractor is required to use some of the excavated materials to shape land forms within the basin area, and for structural backfill.

All utilities near the site are to be protected in place. All existing water and sewer lines in the Project area will be maintained in operating condition during construction.

The Contractor will be required to coordinate with other Contractors working in the area. The box culvert at Peoria Avenue just west of Reems Road may be under construction at the time this contract is awarded. The Contractor shall maintain access to all farms, private homes, and businesses in the area.

The Contractor shall be responsible for all water management and diversions needed for construction of the Project. The Contractor shall submit his plans for diversion of irrigation water to the Engineer and to Maricopa Water Conservation District No. 1 (MWD) for review, prior to diversion of the water. Plastic-lined ditches will not be acceptable for diversions; the Contractor shall construct either shotcrete-lined diversions or use plastic pipe for diversions. Payment for management of all water for the Project, including diversion of farm irrigation delivery ditches, relocation and/or diversion of tailwater ditches,

diversion of drainage from adjacent developments, and diversion of flood water and nuisance water, including labor, equipment, pumps, electricity, diversion ditches and pipes, removal and/or backfill of diversion ditches, and materials needed for diversion, is made on the basis of the lump sum price bid for such water management and diversion, see Supplementary General Conditions (SGC) Section 107.10 and Bid Item 107-4.

All birds, except pigeons, house sparrows, European starlings, doves and quail, are protected by the Migratory Bird Treaty Act (16 U.S.C. 703-712; Chapter 128; as amended). It is especially important to avoid disturbing active bird nests (those with eggs or hatchlings present) during Arizona's breeding bird season (roughly February through June in Maricopa County, however an individual nest is only active for 30-45 days). Additionally, burrowing owls are present in many project sites where vegetation is sparse. The District in advance of construction has had a biologist assess the potential impact of the project on bird species, and where necessary, has taken action to minimize the impact. However, it is the responsibility of the Contractor to be aware of the existence of nesting birds and burrowing owls, and to notify the Engineer immediately if they are found within the project limits. The Contractor will also notify the Engineer in advance of any planned removal of vegetation where such birds or owls may be present.

Most wildlife species are able to move away from on-coming construction activity, although some incidental loss of underground-dwelling small mammals and reptiles can be expected. However, two species are of concern in the state, the Gila monster, and the desert tortoise. Because the presence of these two species is not always obvious during a biological assessment, the Arizona Game and Fish Department has guidelines for handling these two species when encountered at construction projects, and those guidelines will be provided to the Contractor prior to the start of the project.

Inspection and Testing:

The Contractor will be responsible for all quality control for the project and will provide the Engineer with copies of the results of all tests performed by the Contractor Quality Control. The Owner and Engineer will provide quality assurance for the project.

104.2.3 - Changes:

The Owner may at any time, by written order, and without notice to the sureties, if any, make changes within the general scope of this contract in any one or more of the following:

- A) Drawings, designs, or specifications;
- B) Method or manner of performance of the work;
- C) Owner-furnished facilities, equipment, materials, services, or site;
- D) Directing acceleration in the performance of the work.

Any other written or oral order from the Owner that causes a change shall be treated as a change order under this section provided that the Contractor gives the Owner written notification within two working days after receipt of such direction stating:

- A) The date, nature, and circumstances of the conduct regarded as a change;
- B) The particular elements of the contract performance for which the Contractor is seeking an equitable adjustment under this section, including any price or schedule adjustments;
- C) The Contractor's estimate of the time by which the Owner must respond to the Contractor's notice to minimize cost, delay, or disruption of performance.

The Contractor shall diligently continue performance of this contract to the maximum extent possible in accordance with its provisions. Except as provided in this section, no order, statement, or conduct of the Owner shall be treated as a change or entitle the Contractor to an equitable adjustment. If any change under this section causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the work under this contract, the Owner shall make an equitable adjustment

and modify the contract in writing. The equitable adjustment shall not include increased costs or time extensions for delay resulting from the Contractor's failure to provide notice or to diligently continue performance. No proposal for the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this contract.

Subsection 104.2.4 - Cost Estimates or Price Proposals:

The Contractor and any lower-tier subcontractors shall submit itemized cost estimates or price proposals for any owner-directed change order or Contractor-initiated claim.

Cost estimates or pricing proposals shall be itemized to include direct labor by man-hours, individual craft, hourly wage rate and verifiable labor burden. Other direct costs shall include rental and operator rates for rented or owned equipment, material trucking expenses and other costs clearly identified and directly allocable to contract performance. Material costs shall be itemized by item description, quantity for each item, unit price per item, including applicable sales tax markup, and extended total price per item. The Contractor shall provide copies of material supplier quote sheets, invoices or purchase orders, as appropriate.

Lump sum cost estimates or price proposals shall be rejected and returned to the Contractor for itemization as described above. Failure of the Contractor to submit properly itemized cost estimates or price proposals shall not constitute an excusable delay and will result in a change order being unilaterally priced at the Owner's fair estimated price.

Subsection 104.2.6 - Value Engineering:

A) **General.** The Contractor is encouraged to voluntarily develop, prepare, and submit value engineering change proposals (VECPs). The Contractor shall share in any instant contract savings realized from accepted VECPs, in accordance with paragraph (f) below. The Owner reserves the right to make alterations to the contract, in accordance with procedures elsewhere within this contract. Such alterations will not be eligible for inclusion in any VECP.

B) **Definitions.**

Contractor's development and implementation costs means those costs the Contractor incurs on a VECP in developing, testing, preparing, and submitting the VECP as well as those costs incurred by the Contractor to make the changes required by the Owner's acceptance of the VECP.

Owner costs means those owner costs that result directly from developing and implementing the VECP, such as any net increases in the cost of testing, operations, maintenance, and logistical support. The term does not include the normal administrative costs of processing the VECP.

Instant contract savings means the estimated reduction in Contract cost of performance resulting from acceptance of the VECP, minus the allowable Contractor's development and implementation costs, minus subcontractors' development and implementation costs (see paragraph (g) below).

Value engineering change proposal (VECP) means a proposal that (1) requires a change to the contract; (2) results in reducing the contract price or estimated cost without impairing essential functions or characteristics; and (3) does not involve a change in deliverable end item quantities, schedule, or a change to the contract type.

C) **VECP Preparation.** As a minimum, the Contractor shall include in each VECP the information described in subparagraphs (1) through (7) below. If the proposed change affects contractually required schedule and cost reporting, it shall be revised to incorporate proposed VECP modifications. The VECP shall include the following:

- (1) A description of the difference between the existing contract requirement and that proposed, the comparative advantages and disadvantages of each, a justification when an item's function or characteristics are being altered, and the effects of the change on the end item's performance. All design changes must be submitted on 24"x 36" standard drawing sheets along with supporting calculations. Each drawing sheet and at least the content sheet of the calculations shall be sealed by an Engineer registered in the State of Arizona.
 - (2) A list and analysis of the contract requirements that must be changed if the VECP is accepted, including any suggested specification revision.
 - (3) A separate, detailed cost estimate for the affected portions of the existing contract requirements and the VECP. The cost reduction associated with the VECP shall take into account the Contractor's allowable development and implementation costs, including any amount attributable to subcontracts under paragraph (G) below.
 - (4) A description and estimate of costs the Owner may incur implementing the VECP, such as test and evaluation and operating and support costs. This is an estimate based only on the Contractor's understanding of additional efforts to be expended by the Owner, should the VECP be accepted. The final cost will be determined by the Owner.
 - (5) A prediction of any effects the proposed change would have on collateral costs to the agency, i.e., costs of operation or maintenance.
 - (6) A statement of the time by which a contract modification accepting the VECP must be issued in order to achieve the maximum cost reduction, noting any effect on the contract completion time or delivery schedule.
 - (7) Identification of any previous submissions of the VECP, including the dates submitted, the agencies and contract numbers involved and previous Owner actions, if known.
- D) **Submission.** The Contractor shall submit VECPs to the Owner's Engineer.
- E) **Owner Action.**
- (1) The Owner shall notify the Contractor of the status of the VECP within 15 calendar days after receipt from the Contractor. If additional time is required, the Owner shall notify the Contractor within the 15-day period and provide the reason for the delay and the expected date of the decision. The Owner will process VECPs expeditiously; however, it shall not be liable for any delay in acting upon a VECP.
 - (2) If the VECP is not accepted, the Owner shall notify the Contractor in writing, explaining the reasons for rejection.
 - (3) The Contractor may withdraw any VECP, in whole or in part, at any time before it is accepted by the Owner.
 - (4) Any VECP may be accepted, in whole or in part, by the Owner's award of a change order to this contract, citing this subsection. The Owner may accept the VECP, even though an agreement on price reduction has not been reached, by issuing the Contractor a notice to proceed with the change. Until a notice to proceed is issued or a change order incorporates a VECP to this contract, the Contractor shall perform in accordance with the existing contract. The Owner's decision to accept or reject all or any part of any VECP shall be final and not subject to disputes or otherwise subject to litigation.
- F) **Cost Sharing.**
- (1) **Rates.** The Owner's share of savings is determined by subtracting the Owner's costs from instant contract savings and multiplying the result by 50 percent. The Contractor's share shall be the remaining 50 percent.
 - (2) **Payment.** Payment of any share due the Contractor for use of a VECP on this contract shall be authorized by a change order to this contract to accept the VECP, reduce the contract price or

estimated cost by the amount of instant contract savings, and provide the Contractor's share of savings by adding the amount calculated to the contract price.

- G) **Subcontracts.** The Contractor may include an appropriate value engineering clause in any subcontract. In computing any adjustment in this contract's price under paragraph (f) above, the Contractor's allowable development and implementation costs shall include any subcontractor's allowable development and implementation costs clearly resulting from a VECP accepted by the Owner under this contract, but shall exclude any value engineering incentive payments; provided that these payments shall not reduce the Owner's share of the savings resulting from the VECP.

Subsection 105.1 - Authority of Engineer:

Add the following:

105.1.1 - Engineer's Evaluation: Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to subsections 105.3.1 and 106.4. Engineer will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized without Engineer's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any "or-equal" or substitute. Engineer will record time required by Engineer and Engineer's Consultants in evaluating substitutes proposed or submitted by Contractor pursuant to subparagraphs 105.3.1 and 106.4(B) and in making changes in the Contract Documents (or in the provisions of any other direct contract with Owner for work on the project) occasioned thereby. Whether or not Engineer accepts a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer and Engineer's Consultants for evaluating each such proposed substitute item.

Subsection 105.2.1 – Plans and Shop Drawings:

Add the following:

- A) Shop drawings means drawings, submitted to the Engineer by the Contractor pursuant to the contract, showing in detail (i) the proposed fabrication and assembly of structural elements and (ii) the installation (i.e., form, fit and attachment details) of materials or equipment. It includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the Contractor to explain in detail specific portions of the work required by the contract.

Product Data is information on manufactured items, either stock or modified, and includes descriptive literature, operating data, performance curves, certified dimensional drawings, wiring or schematic control diagrams, piping, instrumentation, parts lists, and operating, maintenance and lubrication manuals.

Subsection 105.3 - Conformity with Plans and Specifications:

Add the following:

105.3.1 - Substitute Construction Methods or Procedures: If a specific means, method, technique, sequence or procedure of construction is shown or indicated and expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence or procedure of construction acceptable to Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by Engineer will be similar to that provided in subparagraph 106.4(B).

Subsection 105.5 - Cooperation of Contractor:

Add the following:

105.5.1 - Partnering

The Owner intends to encourage the foundation of a partnering relationship with the Contractor and its subcontractors. This partnering relationship will be structured to draw on the strength of each organization to identify and achieve reciprocal goals. The objectives are effective and efficient contract performance, intended to achieve completion within budget, on schedule, and in accordance with plans and specifications.

This partnering relationship will be bilateral in makeup. Any cost associated with effectuating partnering will be covered by the Bid Item. The initial partnering workshop shall be scheduled after award of the contract, and prior to the Notice to Proceed, and shall be facilitated by a third party competent in the fundamentals of partnering, and mutually acceptable to Contractor and Owner. The Contractor shall be responsible for scheduling, coordinating, and hiring the third party facilitator, and planning all of the partnering meetings in consultation with the Engineer. The Owner will be responsible to notify and coordinate attendance at the partnering meetings by other agencies. To achieve the desired partnering relationships, the Contractor will need to encourage attendance by its major subcontractors on the project. Follow-up workshops will be held periodically throughout the duration of the contract as agreed to by the Contractor and Owner.

An integral aspect of partnering is the resolution of disputes in a timely, professional, and non-adversarial manner. Alternative dispute resolution (ADR) methodologies will be encouraged in place of the more formal dispute resolution procedures. ADR will assist in promoting and maintaining an amicable working relationship to preserve the partnering relationship. ADR in this context is intended to be a voluntary, non-binding procedure available for use by the parties to this contract to resolve any dispute that may arise during performance.

Payment for the Partnering Allowance will be made on the basis of invoices of actual costs, and will be for a total amount not to exceed the amount shown in the bid schedule for the item.

ITEM 105-1 – PARTNERING ALLOWANCE

105.5.2 – Pre-Construction Meeting

Add the following:

After award of the contract, a pre-construction meeting shall be scheduled at a location and time (prior to mobilization and start of construction) to be agreed upon between the Owner and the Contractor. The Contractor shall make all necessary arrangements to have key personnel of his company and of his principal subcontractors present at the meeting. Each representative shall have authority to make commitments and act for his firm. The purpose of the pre-construction meeting is to discuss any specific concerns or potential problems that the Contractor is aware of, to provide general information appropriate to the contract, to identify responsible individuals for various functions within each organization, and to develop tentative dates for the start of construction.

The Contractor shall submit to the Engineer during the pre-construction meeting the following documents:

1. Material data safety sheets
2. Manufacturers certificates for all materials
3. Shop drawings
4. Preliminary survey layout, staking and excavation plans
5. Preliminary work schedule
6. Preliminary traffic control plan
7. Emergency telephone numbers

8. Signing authority letter
9. Name and telephone number of the certified safety professional
10. Any other documents specified in the SGC's and SP's
11. Preliminary water diversion plan
12. Proposed pavement mix design composition
13. Contractor's bid item cost breakdown as noted in the SP's.

The pre-construction meeting will cover topics such as critical elements of the work schedule, payment application and processing of invoices. Additionally, a scheduled start date for the work shall be determined.

The Contractor shall be responsible to take minutes of the pre-construction meeting and distribute copies to all meeting participants. The meeting minutes shall be distributed within 48 hours of the meeting. At the subsequent construction progress meeting, the minutes will be attested or revised, as appropriate. The cost for attendance at the pre-construction meeting, and preparation and distribution of meeting minutes shall be incidental to the project and no extra payment will be made.

105.5.3 –Construction Progress Meetings

Construction progress meetings shall be scheduled weekly, or as considered necessary by the Owner. The Contractor shall make all arrangements to have key personnel of his company and of his principal subcontractors present at all progress meetings; representatives shall have authority to make commitments and act for their firms. The Contractor shall assume full responsibility to act for and commit any subcontractor employed by the Contractor, whether or not such subcontractor is represented at the meeting.

During the construction progress meeting the Owner's representative will act as chairman and will advise the Contractor of any administrative matters connected with the contract. The Contractor shall submit for review his two-week rolling schedule. The Contractor's representative at these meetings shall be prepared to discuss and resolve construction problems and concerns, material delivery and vendor data submittals status, construction progress as measured against the Contractor's approved construction schedule and the Contractor's short range construction activities as provided on his two-week rolling schedule. The Contractor shall not be relieved of his responsibility to fulfill all of the terms of the contract as a result of any inferences drawn or suggestions made available at these meetings.

The Contractor shall be responsible to take minutes of the construction progress meetings and distribute copies to all meeting participants. The meeting minutes shall be distributed within 48 hours of the meeting. At the subsequent construction progress meeting, the minutes will be attested or revised, as appropriate. The cost for attendance at meetings, and preparation and distribution of meeting minutes shall be incidental to the project and no extra payment will be made.

Subsection 105.6 - Cooperation with Utilities:

Add the following:

An attempt has been made to determine the location of all underground utilities, drainage pipes, and structures; however, it shall be the Contractor's responsibility to cooperate with the pertinent utility companies so that any obstructing utility installation(s) may be adjusted. The location of the underground and overhead utilities as shown on the plans is based on the best available information. The Contractor shall not assume that this represents an exact location of the line. No guarantee is made to the accuracy of the location shown on the plans. The Contractor shall determine for himself the exact location of all utilities. Should Contractor's operations result in damage to any utility, he shall assume full responsibility for such damage. There also exists the strong likelihood that other abandoned older and undocumented underground utility and irrigation lines exist within the project area. Contractor shall contact Arizona

Blue Stake (telephone number 602 263-1100) a minimum of two (2) working days before beginning any underground work. In addition, Blue Stake notification(s) shall be maintained on a current basis.

The following phone numbers should put the Contractor in contact with the proper personnel:

APS Mr. Bobby Garza	(602) 371-7989
Burlington Northern Santa Fe Railroad Mr. Walter Arend, Roadmaster	(602) 382-5803
Cox Communications, Inc. Mr. Terran Guterrez	(623) 328-3514
Falcon Dunes Golf Club Mr. Chris Bowles	(623) 535-8355
City of Glendale – Development Services Ms. Jaime E. Chapin, P.E.	(623) 930-3197
Luke Air Force Base Mr. Zane Hoit	(623) 856-7634
Maricopa Municipal Water Conservation District No. 1 Ms. Carol Uraine	(623) 546-8266
Qwest Communications Mr. Matt Phillips	(602) 630-1393

It shall be the responsibility of the Contractor to verify the location of all utilities prior to any construction activities in a particular area where such facilities may exist. All existing overhead and underground utilities shall be Protected-in-Place (P.I.P.) unless noted otherwise on the plans, these Supplementary General Conditions, and the Special Provisions.

At all times during construction, the Contractor shall comply with all laws, ordinances, rules, regulations, and safety requirements, including but not limited to the National Electric Safety Code, and the Occupational Safety and Health Standards for General Industry when working in the vicinity of utilities.

NOTE: The cost for the repair of any damage to utilities, and any loss of revenue due to the loss of service of a utility that is in any way caused by the Contractor's actions shall be the sole responsibility of the Contractor at no cost to the project.

Cox Communications: - Cox has two cable lines that run east-west along Olive Avenue, and these lines have been relocated to go under the future box culvert. The Contractor shall protect these lines in place. Cox has also abandoned cable lines in Olive Avenue, and the Contractor shall remove these lines.

Luke Air Force Base (LAFB): - The Contractor shall obtain passes for any employee or sub's employee that will be accessing the LAFB rights-of-way, prior to doing any work within these rights-of-way.

Maricopa Municipal Water Conservation District No. 1 (MWD): The Contractor shall submit his water diversion plans to MWD and the Engineer for review and approval, prior to doing any work on the MWD delivery ditches. This includes the siphon work at Olive Avenue and the delivery ditch removal and reconstruction at Box Culvert No. 1. The Contractor shall coordinate with MWD to install and remove his diversion facilities during an MWD water dry-up period.

Subsection 105.6.2 - Work Within a Railroad Right-of-way:

Add the following:

Burlington Northern Santa Fe (BNSF) owns the BNSF spur track that will be crossed by the Olive Avenue box culvert. The District has applied for a permit from BNSF that will allow the box culvert to be installed. The Contractor will be required to obtain a Right-of-Entry (ROE) agreement with the BNSF as a condition of the License agreement as defined in Section 107.2. Owner must receive a copy of the executed agreement from the BNSF before Contractor ROE application can be submitted and any construction is commenced within the BNSF Right-of-Way. The Contractor shall delay making application for the ROE permit until notification is received from the Owner that the License agreement has been approved. The Contractor shall prepare the bid assuming that construction will not proceed on the Olive Avenue box culvert open-cut crossings of the track, as described in the following specifications, until after May 1, 2008. Construction will either proceed after May 1, 2008, or the Owner may further delay or cancel the BNSF bid items depending upon the status of the License.

The Contractor shall prepare detailed shop drawings for the Olive Avenue box culvert (Box Culvert Number 3), and submit the drawings and supporting calculations to the District and BNSF for review and approval, prior to commencing any work on Box Culvert Number 3. All design components for the part of the box culvert within the railroad easement, including bedding and bedding foundation, must be in accordance with American Railway Engineering and Maintenance Association (AREMA) requirements. The box culvert must support E-80 railroad loading requirements within the entire 50-foot railroad easement. The design must include details of joints and specifications for joint filler. The design must include mechanical heavy duty bolted connections between the box sections. Please note that BNSF does not typically accept dry cast unless the precaster has testing and data to show air entrainment.

The Olive Avenue box culvert crossing of the railroad includes Bid Item 505.3. By prior agreement between the BNSF and the Owner, the Contractor will have 72 hours to install the box culvert across the track R/W as shown on the plans. The 72 hours does not include the time that the BNSF requires to remove the track before installation of the box culvert and to replace the track after the installation.

The Contractor shall provide labor, equipment, and materials to assist the BNSF in operations to remove and replace the track. These activities include providing equipment, operators and riggers to lift the track and to remove and replace ballast material under the track in accordance with these specifications. Equipment and operators to be provided, as a minimum, are a track hoe(1), front-end loader(1) and grader(1). The Contractor shall assist the BNSF during track and ballast removal (1-2 hours duration), and ballast and track replacement (6-8 hours duration). The Contractor will dispose of all material removed. There will be no salvage. The BNSF will remove, and the Contractor shall assist in removing, two 39-foot long sections of track to allow the open-cut installations. The BNSF will supply track replacement material, including such items as ballast, rail, plates, ties and spikes.

BNSF Standard Plan Drawing No. 1000, Sheet 3, is included in the plans and this drawing shows the required subgrade, sub-ballast, and ballast cross-sections (thickness, limits, slopes, etc.) applicable for the railroad construction.

The Contractor shall coordinate with the BNSF Trainmaster, Mr. Brent Conlin, to schedule the time period that train operations will cease to allow installation of the Olive Avenue box culvert precast

sections. The Contractor shall coordinate with and assist, as required, the BNSF Roadmaster, Mr. Walter Arend, for track work coordination. A preconstruction meeting shall be held at least 45 days prior to the date that the Contractor plans to install the railroad crossings to arrange for the 72 hour shut-down. The dates for the 72 hour shut-down of the railroad must be approved by all parties at least 30 days in advance of the construction. **All Olive Avenue box culvert precast sections shall be installed in one 72-hour period.** Completion of pre-cast box culverts within the 72-hour window shall include installation of the pre-cast box culverts, all backfilling and compaction of the box culverts, and completion of subgrade and sub-ballast construction.

The Contractor may be required by BNSF to have flagging services. The BNSF will supply the flagging services, as required, at rate of approximately \$1,000 per day. Flagging is generally required whenever the Contractor is working within 25 feet of the track centerline. The Contractor shall notify the Engineer and the BNSF at least 48 hours in advance of any time the Contractor will have equipment or personnel working within 25 feet of the track. NOTE: Any construction crews performing work within BNSF rights-of-way will need to complete BNSF Contractor Orientation training. This training can be completed on-line and will inform the Contractor's crews on safe work practices adjacent to BNSF tracks.

If the Contractor obtains a temporary crossing permit, flagging will normally be required when the Contractor vehicles and equipment are crossing the track. The BNSF has indicated that it may close the track during the day when the trains are not operating, and therefore flagging would not be required. The flagging allowance, Item 105-4, is based upon flagging services not normally being required except when the Contractor is actually working within 25 feet of the track.

NOTE: Any loss of service or revenue to the BNSF beyond that covered by these Specifications that is in any way caused by the Contractor actions shall be the sole responsibility of the Contractor at no cost to the project. This includes, but is not limited to the Contractor not completing all construction activities and required installations of the Olive Avenue box culvert precast sections by open-cut methods within the allotted 72-hour time period.

All Contractor costs for coordination with the BNSF and work within the BNSF right-of-way, including provision of labor, equipment, materials, flagging services, and others, shall be paid for as allowances.

Payment for providing Contractor support to the BNSF for the removal and replacement of track and ballast shall be made according to the allowance in the Bidding Schedule, with payment to be made based on actual invoices for time, material, labor, and equipment for such removal and replacement activities as required by the BNSF.

ITEM 105-2 - BNSF CONTRACTOR SUPPORT ALLOWANCE

Payment for labor, equipment and materials provided by the BNSF for the removal and replacement of track shall be made according to the allowance in the Bidding Schedule, with payment to be made based on actual invoices from the BNSF for time, material, labor, and equipment for such removal and replacement activities as required by the BNSF.

ITEM 105-3 - BNSF REMOVE/REPLACE TRACK ALLOWANCE

Payment for the BNSF Flagman shall be made according to the allowance in the Bidding Schedule, with payment based on Flagman usage as required only by the BNSF and as approved by the Engineer, and based on actual invoices from the BNSF for such Flagman usage.

ITEM 105-4 - BNSF FLAGMAN ALLOWANCE

Subsection 105.6.3 – Work within Luke Air Force Base Property:

Any person who will be working within the Luke Air Force Base Property is required to obtain written permission from Luke Air Force Base prior to any work within their property.

APS Power Distribution:

APS has overhead and underground electric distribution facilities along Reems Road, Olive Avenue, and Peoria Avenue, that are in close proximity to the project. These are to be protected in place and the Contractor shall use caution in the adjacent areas.

At all times during construction, the Contractor shall comply with all laws, ordinances, rules, regulations, and safety requirements, including but not limited to the National Electric Safety Code, and the Occupational Safety and Health Standards for General Industry when working in the vicinity of electrical lines.

NOTE: The cost for the repair of any damage to these facilities, and any loss of revenue by APS due to the loss of service of the overhead or underground electric cables that is in any way caused by the Contractor's actions shall be the sole responsibility of the Contractor at no cost to the project.

Qwest Communications:

Qwest maintains facilities on both the north and south sides of Olive Avenue. There is an existing 25 pair aerial cable on the south side on joint use power poles with APS. On the north side of Olive Avenue Qwest has a 50 pair buried cable located approximately 25-feet north of the centerline that will be relocated to an appropriate depth below the proposed box culvert, by others. Qwest requires a minimum vertical and horizontal clearance of 12-inches between their facilities and other structures.

Subsection 105.6.4 – Irrigation Facilities:

Add the following Subsection:

Maricopa County Municipal Water Conservation District Number One (MWD) provides irrigation water to several farmers in the Project area. The Contractor shall construct ditches and other facilities as shown on the plans, and diversions as required and approved, in order to maintain the irrigation water supplies and tailwater drainage at all times during construction.

NOTE: The Contractor shall exercise caution and care when working around these facilities. The costs for the repair and any damage to neighboring property and any loss of water conveyance or revenue by MWD that is in any way caused by the Contractor's actions shall be the sole responsibility of the Contractor and shall be corrected to the satisfaction of the MWD solely at the Contractor's expense and at no cost to the Project.

Subsection 105.6.5 – Coordination with Farmers:

Add the following Subsection:

Farming activities adjacent to the Project area will continue throughout construction of the Project. Certain Project features will cut through farm fields, and the Contractor shall maintain the farmer's access, irrigation delivery, and tailwater flows during construction. This will require construction of irrigation facilities as shown on the plans, and temporary diversions. The Contractor shall ensure that all Project activities occur within the Project right-of-way as shown on the plans, and the Contractor shall not disturb the adjacent farming activities outside Project rights-of-way.

Subsection 105.6.6 – Construction Water:

Add the following:

Possible sources of construction water in the area are privately owned agricultural wells and MWD. If the Contractor wishes to use these sources of water for construction purposes, it will be his responsibility to contact the private owners and/or MWD regarding availability, cost and permitting requirements. All costs associated with obtaining construction water and associated permits are incidental to the Project and no extra payment will be made.

Subsection 105.7 – Cooperation Between Contractors:

Add the following:

The Contractor will be required to coordinate with other Contractors working in the area. A box culvert at Peoria Avenue and west of Reems Road may be under construction, or may be starting construction, during this Project, and the Contractor shall coordinate access with the box culvert contractor. The Contractor shall maintain access through the Project, especially at the Hatcher Road alignment and at farm roads.

Subsection 105.8 - Construction Stakes, Lines, and Grades:

Add the following:

- A) The Engineer will furnish a Benchmark that the Contractor will use to set line and grade for all construction. All other surveying required for the project shall be the Contractor's responsibility. The Engineer will not set any construction stakes.
- B) Before any construction work is started, the Contractor shall perform all base surveys and cross sections of existing conditions that may be required as a basis for quantity determination.
- C) The Contractor shall submit original construction surveyor's notes duly signed by a Registered Land Surveyor to the Engineer at the end of the project. Copies of the survey notes shall be submitted to the Engineer during construction as and when requested.
- D) Record Drawings shall be prepared by the Engineer of Record utilizing red-line working drawings maintained on the project site by the Contractor. The paper red-line working drawings shall be maintained by the Contractor in a current condition at all times, and updated at least weekly until completion of the work and shall be available for review by the Engineer and the Engineer of Record at all times. The final red-line working drawings shall be provided by the Contractor to the Engineer prior to project close out and prior to the final contract payment. Final contract payment may be delayed if it is found that the red-line working drawings are incomplete or inaccurate, and until appropriate corrections are made by the Contractor to the red-line working drawings.

Subsection 106.1 - Source of Materials and Quality:

Add the following:

Select Material, Aggregate Base, Mineral Aggregate, concrete, steel products and pipe shall be obtained from commercial sources. Contractor shall pay all royalties, or any other charges or expenses, incurred in connection with the securing and hauling of the material. Contractor will be required to furnish Engineer with a list of its proposed commercial sources prior to use, and shall present certificates stating that the material produced from any commercial sources is in accordance with the Uniform Standard Specifications and these Supplementary General Conditions.

Subsection 106.4 - Trade Names and Substitutions:

Replace with the following:

Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function and quantity required. Unless the specification or description contains or is followed by words reading that no like, equivalent or "or-equal" item or no substitution is permitted, other items of material or equipment of other Suppliers may be accepted by Engineer under the following circumstances:

- A) "Or-Equal": If in the Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for acceptance of proposed substitute items.
- B) Substitute Items: If in Engineer's sole discretion an item does not qualify as an "or-equal" item under subparagraph 106.4 (A), it will be considered a proposed substitute item. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefore. The procedure for review by Engineer will include the following and may be supplemented in the Special Provisions and as Engineer may decide is appropriate under the circumstances. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor. If Contractor wishes to furnish or use a substitute item of material or equipment, Contractor shall first make written application to Engineer for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified and be suited to the same use as that specified. The application will state the extent, if any, to which the evaluation and acceptance of the proposed substitute will prejudice Contractor's achievement of completion on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for work on the project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other Contractors affected by the resulting change, all of which will be considered by Engineer in evaluating the proposed substitute. Engineer may require Contractor to furnish additional data about the proposed substitute.
- C) Contractor's Expense: All data to be provided by Contractor in support of any proposed "or-equal" or substitute item will be at Contractor's expense.
- D) If the final placement of a product will remain the property of the municipality or utility and/or owned by the municipality or utility, that entity is responsible for issuing written approval for any equivalent or "or-equal" products. The Contractor or Supplier will submit to that entity the request and documentation for written approval of a product substitution. The Contractor will provide the entity's written approval to the Engineer at the Pre-Construction Meeting.

Subsection 106.5 - Contractors Marshaling Yards:

Add the following:

The Contractor may establish a Contractor Work Area (CWA) within the Project right-of-way. If the Contractor wishes to establish a CWA at the site, he must submit his plans for use of the site to the Engineer for approval.

The Contractor shall obtain approval of the Engineer when using property outside of the CWA, or outside of the Project limits, to park and service equipment and store materials for use. The Contractor shall obtain prior written approval of the property owner for use of property outside of Project limits, and submit a copy of the approval to the Engineer prior to use of the property.

The Contractor understands that use of Project property or private property for a CWA is solely at his own risk. No compensation will be made to the Contractor for any damage to or loss of equipment within the CWA.

The Contractor will monitor on a daily basis all activities in the CWA that may result in the leakage of oils, fluids, fuels, etc. that may contaminate soils, and promptly report any suspected leaks to the Engineer.

The Contractor shall grade all construction yards, easements and limits of construction which are disturbed by construction or construction related activities to the lines and grades shown on the plans; or as a minimum, where no line or grade is shown, to a condition similar to or better than the pre-existing condition.

Subsection 107.2 - Permits:

Replace with the following:

Contractor shall obtain all permits and licenses, including those required by the City of Glendale, City of Surprise, Maricopa Water District, BNSF, Maricopa County, or any other local or federal agency, and shall pay all charges, fees, taxes, and provide all notices necessary and incidental to the due and lawful prosecution of the work.

Subsection 107.2.1 - AZPDES Permit Requirements:

Add the following:

- A. This project is subject to the Arizona Pollutant Discharge Elimination System (AZPDES) storm water requirements for construction sites under the Arizona Department of Environmental Quality's (ADEQ's) General Permit for Arizona. Under provisions of that permit, the Contractor shall be designated as permittee, and shall take all necessary measures to assure compliance with the AZPDES General Permit for Arizona as well as all other applicable Federal, State and local laws, ordinances, statutes, rules and regulations pertaining to Storm water discharge. As the permittee, the Contractor is responsible for preparing, in a manner acceptable to the ADEQ, all documents required by this regulation, including but not necessarily limited to:
 1. Storm water Pollution Prevention Plan (SWPPP) for the project, including certification of compliance form. Contractor shall be required to develop, implement, update and revise the SWPPP, as necessary, in order to assure compliance with the ADEQ permit requirements. The SWPPP shall be retained on the project site at all times during construction.
 2. Notice of Intent (NOI) to assure compliance with the AZPDES General Permit for Arizona, including certification of signatures.
 3. Notice of Termination (NOT) of coverage under AZPDES General Permit for Arizona.
- B. Preliminary copies of the NOI and the SWPPP shall be submitted to Owner during the pre-construction meeting and shall be subject to review by Owner prior to implementation.
- C. Contractor shall submit the completed and duly signed NOI forms no later than forty-eight (48) hours under most circumstances (however, if the discharge is to an Impaired or Unique Water or is in or near endangered species habitat as identified by ADEQ's smart NOI permitting system, applicants are not authorized under this permit for a minimum of 32 business days following the receipt of the NOI and SWPPP. ADEQ may notify operators within this timeframe that there is cause for SWPPP amendment, or denial of coverage as specified in Parts 1.D.5 and 1.D.6. of the general permit) prior to the initial start of construction on the project to the following agencies:

Arizona Department of Environmental Quality
Water Permits Section/Stormwater NOI (5415B-3)
1110 W. Washington Street
Phoenix, Arizona 85007
or fax to (602) 771-4674

If the facility has the potential to discharge to a municipal separate storm sewer system (MS4), the applicant must also forward a copy of the completed NOI to the owner/operator of the MS4 system at the time it is submitted to the Department.

Storm Water Management Engineer
City of Phoenix
200 West Washington Street, 5th Floor
Phoenix, AZ 85003
(602) 495-5326

Failure by the Contractor (or Subcontractors of any tier) to submit NOI's within the mandated time frame shall result in delay of the construction start date, and no claim for extension of time will be granted for such delay. A copy of the completed NOI shall be posted at the construction site and a copy of the general permit and SWPPP should be on-site at all times.

- D. Inspections of all Storm water pollution control devices on the project shall be performed by Contractor every 7 days or at least once every 14 calendar days, and also within 24 hours of the end of a storm event of 0.50 inches or greater as required under provisions of the AZPDES General Permit for Arizona. A reduced inspection frequency may be used provided the conditions in Part IV.H.2. of the general permit have been met. Contractor shall prepare reports on such inspections and retain the reports for a period of three years after permit coverage expires or is terminated. Inspection reports shall be submitted monthly to Owner along with progress payment requests. Additionally, Contractor shall maintain all Storm water pollution control devices on the project in proper working order, which shall include cleaning and/or repair during the duration of the project.
- E. Contractor warrants that its employees and Subcontractors of any tier and their employees shall at all times comply with all applicable laws, ordinances, statutes, rules and regulations set forth by all federal, state and local governments and the ADEQ in connection with AZPDES Permitting requirements and laws and regulations pertaining to air, groundwater and surface water quality.

Fines and penalties imposed by the ADEQ against Owner or the Contractor for Contractor's failure to comply with any of the requirements of AZPDES General Permit of Arizona shall be borne by the Contractor.

- F. Upon project completion, acceptance and demobilization, Contractor shall submit its completed, duly executed NOI form to the ADEQ at the address listed in Section (C) above, thereby terminating all AZPDES permit coverage for the project. Contractor shall then surrender to Owner copies of the SWPPP, inspection information and all other documents prepared and maintained by the Contractor in compliance of the AZPDES General Permit. Contractor shall retain the originals of such documents for a period of three (3) years following the completion of the project.
- G. The Lump Sum price for the SWPPP shall include all material, labor, and all other costs relating to the preparation, installation and maintenance of the SWPPP during project construction, including assuring proper operation of the pollution control devices installed, and all maintenance, cleaning, and disposal costs associated with clean-up and repair following storm events, runoff or releases on the Project. The Lump Sum price for the SWPPP shall be inclusive of all costs, and no additional claims shall be made by Contractor under any other specification provision of these documents, including Changed Conditions. Payment of fifty percent (50%) for this bid item shall be made at the beginning of the Project, and the remaining payment made upon final completion and acceptance of the Project, as per MAG Section 109.1.

H. Copies of all required forms and guidance for preparing the SWPPP are available in the "Drainage Design Manual for Maricopa County, Volume III Erosion Control." The manual is available at the Flood Control District, 2801 West Durango Street, Phoenix, Arizona 85009.

No payment shall be made for all licenses, permits, except for the AZPDES/SWPPP permit. Payment for all other licenses, permits, and fees shall be included in payment for other items of work. Payment for AZPDES/SWPPP permit requirements shall be made on the basis of lump sum for all work described in Subsection 107.2 .1 for:

ITEM 107-1 - AZPDES/SWPPP PERMITS

Subsection 107.4 - Archeological Reports:

Add the following:

Any cultural and/or paleontological resource (historic or prehistoric site or object) discovered by the Contractor, or any person working on his behalf, shall be immediately reported to the Engineer. The Contractor shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Engineer. An evaluation of the discovery will be made by authorized personnel and the Engineer to determine appropriate actions to prevent the loss of significant cultural or scientific resources. The Contractor shall prevent his employees from trespassing on, removing, or otherwise disturbing, such resources.

Subsection 107.5:

Add the following:

The entire construction site shall be considered a "Hard Hat Area" and all personnel in the area will be required to wear a hard hat.

Subsection 107.5.3 - Compliance with the Arizona Communication Standard:

Add the following:

Owner will provide Contractor with Material Safety Data Sheets (MSDS) for any products known to exist on the site that are deemed health hazards. Contractor will provide a copy of Owner-provided MSDS to all Subcontractors.

Contractor will provide Owner and all Subcontractors with MSDS for any products that have or are deemed health hazards that will be brought onto the site or created on the site either by Contractor or by any Subcontractors.

Contractor will provide Owner with a statement certifying that all personnel (Contractor and Subcontractor) employed by Contractor or by a Subcontractor on the job site have received the required Hazard Communication Standard training.

Subsection 107.6.3 - Public Information and Notification:

Add the following:

The Contractor shall employ a specialty public information service as a subcontractor to provide the community relations program for the project as described herein. Contractor shall work closely with his subcontractor in developing and carrying out the community relations program. Contractor shall submit a history of the subcontractor's qualifications and experience in public information services at the pre-construction conference for acceptance by the Engineer. The community relations program shall be designed to run the full length of calendar days in the contract for this project. The program will include but not be limited to:

1. Distributing a pre-construction information letter to all residents, business, etc. within a one-half mile radius of the PROJECT, in all directions. All printed materials must be in both English and Spanish.

2. Printing and distribution of public notices and/or newsletters.
3. All public involvement activities will be in accordance with the Owner's "Public Involvement and Public Information Guidelines, Latest Edition (August 2004)", a copy of which can be obtained from the Flood Control District Public Information Office at 602 506-2983.

The Contractor will use these or other means to inform the local citizens of necessary operations which create high noise levels, street closures, limited access, detour locations, haul route and material delivery routes, hours of construction and disruption of bus, trash, school bus and other delivery/pick-up routes.

The Contractor will be required to furnish a private line telephone to be used solely for receiving incoming calls from local citizens with questions or complaints concerning construction operations or procedures. The Contractor shall publish this phone number and maintain a 24-hour answering service. The answering service shall be operated by Contractor personnel during all hours that work is being performed on the job site. The Contractor shall maintain a log of incoming calls, responses, and action taken which shall be submitted to the Engineer weekly and/or upon request.

Prior to the start of work, the Contractor shall notify, by letter, all affected businesses and residents of construction plans and schedules within the geographic area identified above. In addition, all schools and emergency services which serve the geographic area will also be notified even though they may be located outside the geographic area described above. The letter shall contain, as a minimum, the following information:

1. Name of Contractor
2. 24-hour telephone complaint number
3. Brief description of the project
4. Name of Contractor Project Superintendent
5. Name of Engineer
6. Name of Area Supervisor
7. Construction schedule including anticipated work hours
8. Traffic regulations including lane restrictions

The Contractor shall submit a Public Information and Notification Plan to the Engineer at the pre-construction meeting. No payments shall be made for this item until the Engineer approves the plan.

The plan and work which is eligible for reimbursement shall include: meetings with impacted businesses, schools, emergency services, residents, etc.; scheduling; preparation and distribution of newsletter at least monthly; and maintaining a 24-hour telephone hot line for complaints.

The Contractor shall submit a final report/evaluation of the Public Information and Notification process performed for this project. This report shall be submitted before the Contractor receives final payment.

Payment will be based on invoices, and will be for a total amount not to exceed the amount shown in the bid schedule for the item, PUBLIC INFORMATION AND NOTIFICATION ALLOWANCE, for work performed in notifying and coordinating with the local population impacted by this project. To cover the cost for administration and supervision, the General Contractor may add an amount equal to not more than 5 percent of the accumulated total invoiced billing for actual public information services provided by a Subcontractor. This cost for administration and supervision will be considered included in the PUBLIC INFORMATION AND NOTIFICATION ALLOWANCE.

ITEM 107-2 - PUBLIC INFORMATION AND NOTIFICATION ALLOWANCE

Subsection 107.6.4 - Project Signs:

Add the following:

Contractor shall provide and install three project information signs, at locations to be determined by the Engineer, before beginning construction to inform the public of the forthcoming project and construction dates. Project signs shall include the names of all agencies participating in the project. The signs shall be in English and Spanish and include the 24-hour hot line complaint telephone number. Signs shall be constructed in accordance with the Project Sign Information drawing to be provided to the Contractor at the pre-construction meeting. The signs shall be installed at the location(s) approved by the Engineer. The Contractor shall maintain the signs as necessary, and update the information as requested by the Engineer. Payment shall be made according to the allowance in the Bidding Schedule in installments of 50% upon installation, and the remaining 50% upon final payment for the work.

ITEM 107-3 - PROJECT SIGNS ALLOWANCE

Subsection 107.8 – Use of Explosives:

Delete in its entirety and replace with the following:

Because of the proximity to residential and commercial areas as well as major utilities, the use of explosives will NOT be permitted for any construction activities on the project.

Subsection 107.9 - Protection and Restoration of Property:

Add the following:

The Contractor shall protect-in-place all existing structures and other features as identified on the plans, including but not limited to irrigation facilities, utilities, roadways, railroad tracks and signals, fencing, signs, and other structures and features near construction activities.

The Contractor shall limit all construction activities to the right-of-way limits shown on the plans including dedicated street right-of-way, and shall not disturb any areas other than as required for construction as shown on the plans. The Contractor shall avoid the pump station and not disturb or damage the fencing around the pump station.

The Contractor will grade all Temporary Construction and Permanent Easement areas, and project areas which are disturbed during construction to the lines and grades shown on the plans, or as a minimum, where no lines and grades are shown, to a condition similar to or better than the pre-existing condition.

Subsection 107.10 - Contractor's Responsibility for Work:

Add the following:

- A) Contractor is advised that the work area will be subject to flows of water of varying amounts. Owner assumes no responsibility for notifying Contractor of any anticipated flows, nor for any damages incurred by Contractor to its equipment or to any of the Contractor's work as a result of any flows of water.
- B) It is the Contractor's responsibility to divert any water flows from overland flow, groundwater, storm drains and tailwater/irrigation facilities as required to perform the work items included in this project. The Contractor shall coordinate installation and removal of diversion facilities with Maricopa Water Conservation District No. 1 (MWD). The Contractor shall submit his diversion plans to the Engineer and to MWD for their review and approval, prior to installation of any diversion facilities. Plastic-lined ditches will not be acceptable for diversions; the Contractor shall construct either shotcrete-lined diversions or use plastic pipe for diversions. Payment for management of all water for the Project, including water from farm irrigation delivery ditches, tailwater ditches, drainage from adjacent properties, and diversion of irrigation water, floodwater and nuisance water, including labor, pumps, electricity, diversion plans, ditches and pipes, ditch linings, backfill or removal of diversion ditches

and pipes and linings, and materials needed for diversion, is made on the basis of the lump sum price bid for such water management and diversion.

ITEM 107-4 – WATER MANAGEMENT

- C) No payment will be made for providing excavation protective works for such things as dewatering. The cost thereof shall be included in the bid price for the construction or installation of the items to which said excavation protective works are incidental or appurtenant.
- D) The Contractor shall take all necessary action to protect the public from the construction work area.
- E) The Contractor shall notify the Engineer of any unauthorized personnel in the Project area including the presence of the general public.
- F) The Contractor shall coordinate with BNSF for construction of the box culvert at Olive Avenue.
- G) The Contractor shall coordinate with MWD for construction impacting their facilities.
- H) The Contractor shall coordinate with other contractors working in or near the Project rights-of-way. A contractor will be constructing a box culvert at Peoria Avenue west of Reems Road, that ties into the north end of the Project channel, and this construction may be underway at the beginning of this contract.

Subsection 108.1 - Notice to Proceed:

Delete Paragraph (A) and replace with the following:

- (A) Contractor shall commence work within seven (7) calendar days after the Notice to Proceed and complete all work within **three hundred sixty five (365)** calendar days, plus **one hundred twenty (120)** calendar days for the landscape maintenance period, for a total of **four hundred eighty five (485)** calendar days, beginning with the date specified in the Notice to Proceed.

Subsection 108.2 - Subletting of Contract:

Add the following:

For this project, Contractor shall perform, with its own organization, work amounting to 50 percent or more of the total contract cost.

Subsection 108.4 - Contractor's Construction Schedule:

Delete in its entirety and replace with the following:

Contractor shall submit a proposed work schedule to Engineer for review before starting work using the Primavera or other similar software program that is acceptable to the Engineer. Weekly updates shall be submitted to Owner's Inspector at the weekly coordination meeting.

Contractor shall be solely responsible for the planning, scheduling, and execution of the work to assure timely completion of the project.

Subsection 108.4.1 - Contractor's Billing Schedule:

The Contractor shall furnish the Engineer an Estimated Billing Schedule that shall include the estimated amount of each billing for the total project at the pre-construction conference, and thereafter at monthly intervals as agreed to between the Contractor and Engineer.

Subsection 108.5 - Limitation of Operations:

Add the following:

The normal workweek shall be 40 hours, Monday through Friday, and the work hours will be determined at the pre-construction meeting. This does not imply that this contract can be completed on time utilizing normal working hours. The Contractor shall furnish sufficient forces and shall work such hours including night shifts and overtime operations as necessary to ensure the completion of the work within the time required. To work other than normal working hours, for other than emergency situations, the Contractor shall give the Engineer at least 24 hours advance written notification and receive written approval before

working. The notification shall include: the working hours, the type of work to be performed, and the name of and a phone number for the person in charge. Should the Contractor elect to perform any work after regular working hours, on weekends, or legal holidays, any charges incurred by the Owner for inspection of the work, surveys or tests of materials will be deducted from monies due or to become due to the Contractor.

Subsection 108.9 - Failure to Complete on Time:

Add the following:

The actual cost per calendar day incurred by the District for Administrative and Inspection Services on this project will be added to the daily charges as indicated by MAG TABLE 108, LIQUIDATED DAMAGES, and will be deducted from money due or to become due to the Contractor for each and every calendar day that work shall remain incomplete after the time specified for the completion of the work in the proposal, or as adjusted by the Engineer. Nothing contained in this provision shall prohibit the Owner from deducting from money due or to become due to the Contractor for any other costs incurred by the Owner directly attributable to the delay in completing this contract.

If the Contractor does not complete the work on Box Culvert No. 1 within the 30-day time period allotted for the Reems Road closure, liquidated damages will be assessed on a daily basis, per MAG 108.9, for Box Culvert No. 1. If the Contractor does not complete the work on Box Culvert No. 3 within the 30-day time period allotted for the Olive Avenue closure, liquidated damages will be assessed on a daily basis, per MAG 108.9, for Box Culvert No. 3.

If the Contractor does not complete the work on the pre-cast section of Box Culvert No. 3 within the 72-hour time period allotted for the railroad and Olive Avenue closure, liquidated damages will be assessed based on direct damages to the railroad, as determined by the BNSF Railroad Company.

Any loss of service or revenue to the BNSF beyond that covered by these Specifications that is in any way caused by the Contractor actions shall be the sole responsibility of the Contractor at no cost to the project. This includes, but is not limited to the Contractor not completing all construction activities and required installations of the Olive Avenue box culvert precast sections by open-cut methods within the allotted 72-hour time period.

Subsection 109.2 - Scope of Payment:

Add the following:

In addition to the contained provisions, the work under this section shall consist of preparatory work and operations, including but not limited to, the movement of personnel, equipment, supplies and incidentals to the project site; the establishment of all offices, buildings and other facilities necessary for work on the project, and for all other work operations that must be performed and costs incurred prior to beginning work on the various items on the project site.

The "complete-in-place" rate shall include but not necessarily be limited to all labor, material and equipment costs for preparation, installation, construction, modification, alteration or adjustment of the items, which shall include all costs for salaries and wages, all payroll additives to cover employee benefits, allowances for vacation and sick leave, company portion of employee insurance, social and retirement benefits, all payroll taxes, contribution and benefits imposed by any applicable law or regulation and any other direct or indirect payroll-related costs. The rate shall also include but not necessarily be limited to all costs for indirect charges or overhead, mileage, travel time, subsistence, materials, freight charges for material to Contractor's facility or project site, equipment rental, consumables, tools, insurance to the levels specified in Section 103.6 CONTRACTOR'S INSURANCE, all applicable taxes, as well as Contractor's fee and profit. This rate shall further include all site clean-up costs and hauling of construction debris to disposal sites designated by the Engineer.

Payment will be made for only items listed in the proposal and will not be made in accordance with the measurement and payment provisions of the MAG Standard Specifications where this differs from the items listed in the proposal. All materials and work necessary for completion of this project are included in proposal items. Any work or materials not specifically referred to in these items are considered incidental to the item and are included in the unit price. **Payment shall not be made for unused materials**, except for the additional paint that the Contractor will provide the Engineer, per these specifications.

It is the responsibility of the bidders to contact all municipalities in the area to determine if they will charge Contractor sales taxes or any fees for work on this project. Any such taxes or fees shall be paid by the Contractor.

Subsection 109.7 - Payment for Bond Issue and Budget Projects:

(A) To third paragraph, add:

Payment or release of retained funds shall be made to the Contractor within thirty (30) days following final payment to the Contractor [reference (B) following], and Contractor furnishing to Engineer satisfactory receipts for all labor and material billed and waivers of liens from any and all persons and Subcontractors holding claims against the work. Additionally, Contractor shall furnish completed and sealed As-Built plans and a completed Certificate of Performance to Engineer evidencing it has satisfactorily discharged all its duties in connection with the work to be performed under this Contract. The Certificate of Performance shall be provided to the Contractor by the Engineer.

(B) Add the following:

The final payment will be made to Contractor by Owner within thirty (30) days following receipt of the As-Built plans, Certificate of Performance, Engineer's final estimate and receipt by Owner of Consent of Contractor's Surety to said final payment. If payment will be longer than thirty (30) days as aforesaid, Owner will provide Contractor specific written findings for reasons justifying the delay in payment.

(C) Contractor's monthly pay estimates will be processed by Owner's Construction Branch during the last week of the month.

Subsection 110 – Notification of Changed Conditions and Dispute Resolution:

Delete in its entirety and replace with the following:

The Contractor and Owner will follow the established rules of the Maricopa County Procurement Code.

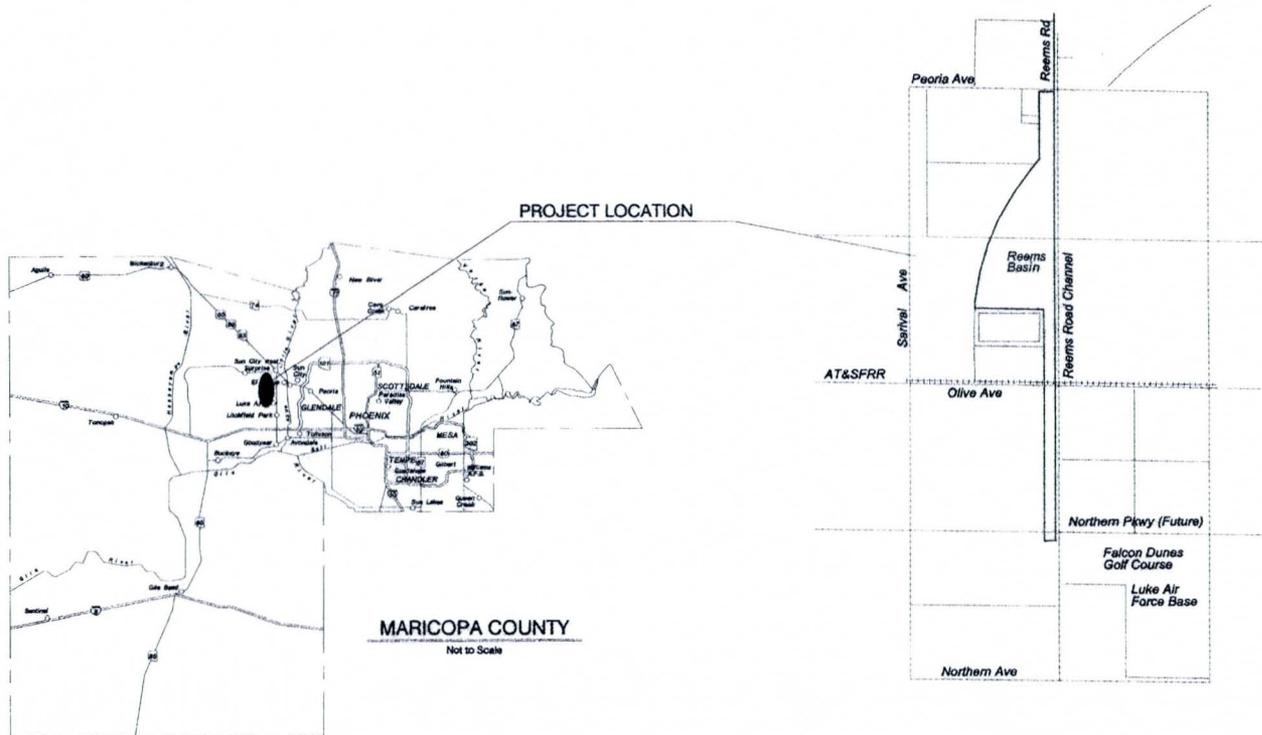
APPENDIX V

Construction Plans



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

IN COOPERATION WITH
 MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
 PLANS FOR THE CONSTRUCTION OF
 REEMS ROAD CHANNEL AND BASIN
 FCD PROJECT CONTROL NO. 4701231
 FCD CONTRACT NO. 2005CO18

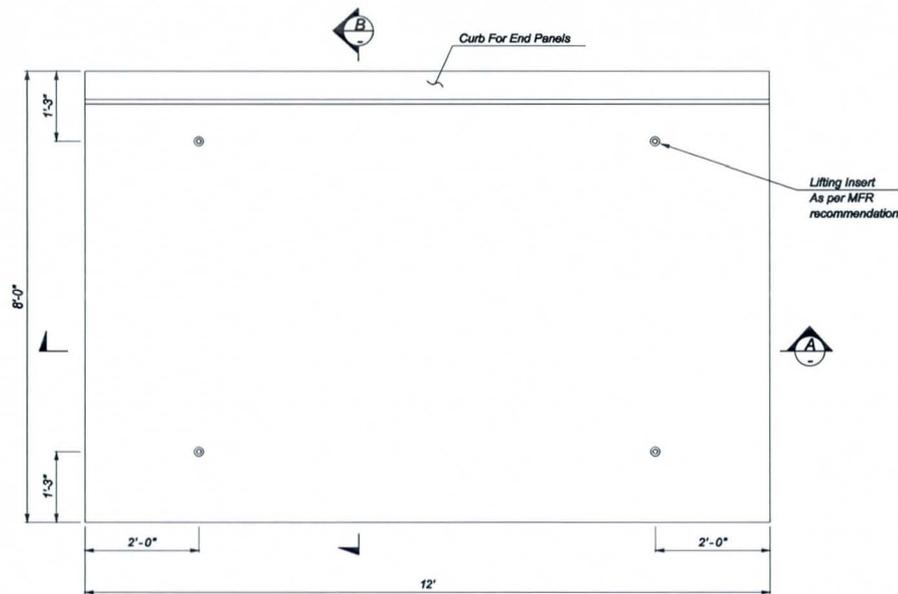


MARICOPA COUNTY
 Not to Scale

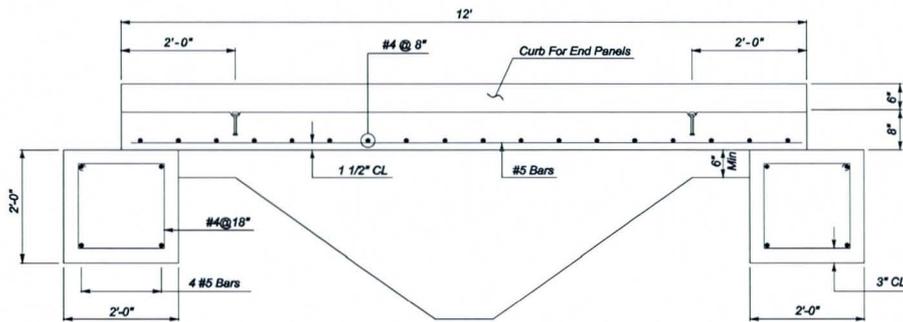
VICINITY MAP
 Not to Scale

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY	
ISSUE RECOMMENDED BY:	
<i>Barbara Okler</i>	1-22-08
PROJECT MANAGER	DATE
ISSUED FOR PUBLIC BIDDING BY:	
<i>T. S. R.</i>	1/23/08
CHIEF ENGINEER & GENERAL MANAGER	DATE
BOARD OF DIRECTORS OF THE FLOOD CONTROL DISTRICT	
ANDY KUNASEK - CHAIRMAN	
DISTRICT 1	FULTON BROCK
DISTRICT 2	DON STAPLEY
DISTRICT 3	ANDY KUNASEK
DISTRICT 4	MAX WILSON
DISTRICT 5	MARY ROSE WILCOX

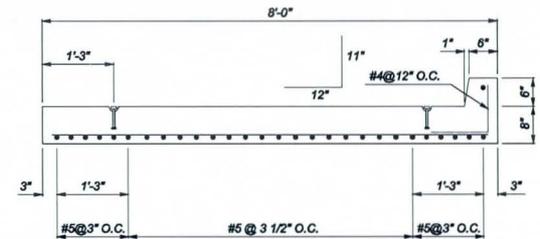
Andy Kunasek
 9-15-2008



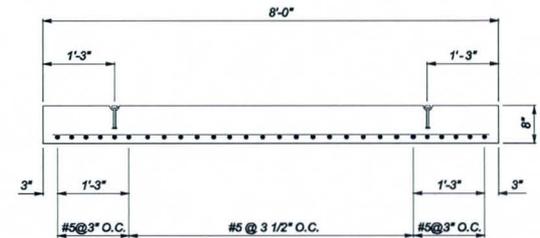
PLAN VIEW
PRECAST OPTION
NTS



A SECTION
NTS



B SECTION W/CURB
NTS



B SECTION W/O CURB
NTS

DESIGN CRITERIA:

LIVE LOAD H-20 Truck Loading

MINIMUM SOIL BEARING 2500 P.S.F.

CAPACITY:

DESIGN SPECS:

Concrete compressive strength shall be based on 28 day test shall reach F_c of 4500 P.S.I.

Reinforcing steel Grade 60 60 K.S.I.

DESIGN CODES:

American Association of State Highway and Transportation Officials (AASHTO) - 17th Edition 2002

GENERAL NOTES:

All reinforcing steel to have 2" cover unless otherwise noted.

LICENSE MWD SPECIFICATIONS
BRIDGE CROSSINGS OVER MWD LATERALS

An MWD License is required for the construction of a private bridge ("Bridge") over MWD's Laterals/Ditches. The License should be of recordable format and allow for an assignment to ensure successors in interest assume the Licensee's obligation. The design and construction of the Bridge should meet MWD's specifications and approval. MWD is in the process of developing a complete set of written specifications for Bridge crossings. In the interim, MWD has some primary specifications which can be used as follows:

The bottom of the Bridge shall be a minimum of six inches (6") above the top of the ditch lining.

To allow for removal in the future, the Bridge platform shall not be anchored to the footings.

The Bridge footings shall be adequate to support the weight of the Bridge and the contemplated traffic loads.

The Bridge footings shall be placed a minimum of twelve inches (12") from the edge of the ditch lining and shall not exceed twenty-four inches (24") below the top of the ditch lining.

The Bridge width which must be placed perpendicular to the flow of the ditch, shall not exceed Twelve feet (12').

The bridge design drawings must be stamped and signed by a registered engineer and submitted to MWD for approval.

MWD's approval of the Bridge and full execution of a License Agreement must be accomplished prior to commencement of any Bridge construction.

In recent years, MWD has licensed several Bridge crossings. The design of those Bridges has been approved by MWD and they have been constructed by the following contractor:

Stewart Concrete Pipe, Inc. Frank Moinire
22535 South Cooper Road
Chandler, AZ 85249
Phone: (480) 895-1213 Fax: (480) 895-0688

Note: The above specifications are to be used only for private access drives. The specifications for public bridge crossings may vary. In addition, the above specifications are subject to changes without notice. To obtain a License, submit drawings or direct any further questions, contact MWD Property Development at (623) 546-9266.

NO.	REVISION	BY	DATE
3			
2			
1			
NO.	DESIGNED	BY	DATE
	KVH		02/08
	DRAWN	FRC	02/08
	CHECKED	JRR	02/08

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018			
	DESIGNED	KVH	02/08
	DRAWN	FRC	02/08
	CHECKED	JRR	02/08
DRAWING NO.	FCD - PRECAST		SHEET OF
PBC	BRIDGE CROSSINGS		1 1

9-15-08

TWO WORKING DAYS
BEFORE YOU DIG CALL
602-263-1100
BLUE STAKE

GENERAL NOTES

1. ALL CONSTRUCTION TO BE PERFORMED ACCORDING TO APPLICABLE MAG STANDARD DETAILS AND MAG SPECIFICATIONS, DATED 1998 AND REVISIONS THROUGH 2007
2. FACILITIES WHICH ARE NOT SPECIFICALLY LOCATED WITH ACTUAL HORIZONTAL AND VERTICAL CONTROLS ARE APPROXIMATE AND TO THE BEST AVAILABLE INFORMATION. CONTRACTOR TO VERIFY HORIZONTAL AND VERTICAL LOCATIONS PRIOR TO CONSTRUCTION.
3. EXISTING UTILITIES AND OTHER FACILITIES HAVE BEEN PLACED ON THE PLANS FROM FIELD SURVEYS, EXISTING MAPS AND OTHER CURRENT PLANS WITHIN THE AREA OF THIS PROJECT. THE CONTRACTOR WILL DETERMINE THE EXACT LOCATION AND/OR ELEVATION OF EXISTING UTILITIES WHICH PERTAIN TO AND AFFECT THE CONSTRUCTION OF THIS PROJECT.
4. TWO (2) WORKING DAYS PRIOR TO EXCAVATING, THE CONTRACTOR SHALL CALL FOR BLUE STAKE AT THE BLUE STAKE CENTER (PHONE: 1-800-STAKEIT)
5. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS PRIOR TO CONSTRUCTION
6. THE FLOOD CONTROL DISTRICT IS NOT RESPONSIBLE FOR LIABILITY ACCRUED DUE TO DELAYS AND/OR DAMAGE TO UTILITIES IN CONJUNCTION WITH THIS CONSTRUCTION
7. ANY WORK PERFORMED WITHOUT THE APPROVAL OF THE FLOOD CONTROL DISTRICT AND/OR THE ENGINEER AND ALL WORK AND MATERIALS NOT IN CONFORMANCE WITH THE SPECIFICATIONS IS SUBJECT TO REMOVAL AND REPLACEMENT AT THE CONTRACTOR'S EXPENSE
8. THE ENGINEER WILL DETERMINE THE NUMBER AND LOCATION OF THE REQUIRED COMPACTION TESTS FOR STRUCTURAL BACKFILL
9. TRAFFIC CONTROL SHALL BE MAINTAINED IN ACCORDANCE WITH MAG SPECIFICATION 401, AND PART VI OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (2003 EDITION)
10. CONTRACTOR SHALL REPLACE PAVEMENT TO THE EXISTING GRADES SHOWN ON THE PLANS
11. EXACT POINT OF MATCHING TERMINATION AND OVERLAY WILL BE DETERMINED IN THE FIELD BY THE ENGINEER
12. NO JOB WILL BE CONSIDERED COMPLETED UNTIL CURBS, PAVEMENT AND SIDEWALKS HAVE BEEN SWEEP CLEAN OF ALL DIRT AND DEBRIS
13. PRIOR TO FINAL APPROVAL AND ACCEPTANCE OF THE WORK, THE CONTRACTOR WILL BE REQUIRED TO CLEAN ADJACENT (OFF-PROJECT) ROADWAYS USED DURING THE COURSE OF CONSTRUCTION



DESIGN DISCHARGES

Design Q = 2,179 CFS STA 75+00 To STA 87+00
 Design Q = 639 CFS STA 50+00 To STA 75+00
 Design Q = 818 CFS STA 7+00 To STA 50+00

PROJECT BENCHMARKS

FD BC IN HH OLIVE AVENUE AND REEMS ROAD
 ELEV = 1126.15

YOU KNOW DATE BEFORE YOU CALL
 802-263-1100
 BLUE STAKE

STRUCTURAL NOTES

1. ALL CONSTRUCTION SHALL CONFORM TO MAG STANDARDS DETAILS, SPECIFICATIONS, DATED 1998, INCLUDING ALL REVISIONS THRU 2007
2. DESIGN IS IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, DIVISION 1, 17TH EDITION, 2002.
3. REINFORCING STEEL SHALL CONFORM TO ASTM SPECIFICATION A615 GRADE 60
4. STRESSES - $f_s = 24,000$ PSI - GRADE 60 REINFORCING STEEL.
5. ALL REINFORCING STEEL PLACEMENT DIMENSIONS SHALL BE TO THE CENTER OF BARS UNLESS OTHERWISE NOTED.
6. ALL REINFORCING STEEL SHALL HAVE 2" CLEAR COVER UNLESS OTHERWISE NOTED.
7. STRUCTURAL STEEL SHALL CONFORM TO ASTM SPECIFICATION A36.
8. ALL WELDING SHALL CONFORM TO THE REQUIREMENTS OF THE AMERICAN WELDING SOCIETY, STRUCTURAL WELDING CODE, REVISION 1998
9. DIMENSIONS SHALL NOT BE SCALED FROM DRAWING
10. CHAMFER ALL EXPOSED CORNERS 3/4" UNLESS OTHERWISE NOTED
11. CONCRETE COMPRESSIVE STRENGTH SHALL BE 3,000 PSI PER MAG, UNLESS OTHERWISE NOTED

ABBREVIATIONS

- ACF ALUMINUM CAP FOUND
- ACH ALUMINUM CAP IN HANDHOLE
- BCH BRASS CAP IN HANDHOLE
- CJ CONSTRUCTION JOINT
- CST CONSTRUCTION
- DI DOUBLE
- DESC DESCRIPTION
- EJ EXPANSION JOINT
- EQ EQUAL
- FD FOUND
- FOC FIBER OPTIC CABLE
- MOD MODIFIED
- G GUTTER ELEVATION
- OP OVERHEAD ELECTRIC
- OPP OPPOSITE
- P PAVEMENT ELEVATION
- PG PAGE
- P/L PROPERTY LINE
- PRV PRIVATE
- SPG SPACING
- STR STRUCTURE
- UGT UNDERGROUND TELE CABLE
- TBM TEMPORARY BENCHMARK
- TBR TOP OF BERM
- TC TOP OF CURB ELEVATION
- TW TOP OF WALL ELEVATION
- TG TOP OF GRATE ELEVATION
- CLD CONCRETE LINED DITCH

INDEX OF SHEETS

DRAWING NO.	TITLE	SHEET NO.
G1	COVER SHEET & VICINITY MAP	1
G2-G3	GENERAL NOTES & INDEX OF SHEETS	2-3
G4	LEGEND SHEET	4
G5	HORIZONTAL & VERTICAL CONTROL	5
G6-G7	CST @ GEOMETRIC LAYOUT	6-7
G8-G9	TOP OF BANK GEOMETRIC LAYOUT	8-9
G10	TYPICAL SECTION	10
QS1-QS2	QUANTITY SUMMARY SHEETS	11-12
PSI	PIPE SUMMARY SHEET	13
D1-D10	DETAIL SHEETS	14-23
C1-C9	CIVIL/CONSTRUCTION SHEETS	24-32
SD1	STORM DRAIN	33
GB1	BASIN GRADING PLAN	34
GB2	BASIN ELEVATIONS	35
GB3	TOP OF BANK & CURVE DATA	36
GB4	TOE & CURVE DATA	37
IR1-IR3	IRRIGATION SIPHON PLAN & PROFILE SHEETS	38-40
B1.1-B3.2	BOX CULVERT DETAILS	41-45
LP0-LP6	LANDSCAPE AND SEEDING SHEETS	46-54
FL1-FL2	FORM LINER DETAILS	55-56
XS1-XS3	CROSS SECTION SHEETS	57-59

UTILITY NOTIFICATION

COMPANY	CONTACT NAME	PHONE NUMBER
APS	BOBBY GARZA	(602) 371-7989
BURLINGTON NORTHERN RAILROAD	TANITA THOMAS	(888) 498-6647-2631
COX COMMUNICATIONS, INC	TERRAN GUTTERREZ	(623) 328-3514
FALCON DUNES GOLF CLUB	CHRIS BOWLES	(623) 535-8355
LUKE AIR FORCE BASE	ZANE HOIT	(623) 856-7634
MARICOPA WATER DISTRICT	CAROL URAINE	(623) 546-8266
QWEST COMMUNICATIONS	MATT PHILLIPS	(602) 630-1393

DATUM: HORIZONTAL COORDINATES SHOWN ARE IN NAD 83 STATE PLANE COORDINATES. ELEVATIONS SHOWN ARE IN STATE PLANE NAVD 88.

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION
REEMS ROAD CHANNEL AND BASIN
FCD PROJECT: NO. 470-12-31
CONTRACT FCD 2005 C018

	BY	DATE
DESIGNED	WAG	11/07
DRAWN	FRC	11/07
CHECKED	JRR	11/07

DRAWING NO.	GENERAL NOTES INDEX OF SHEETS	SHEET OF
62		2 59

9-15-2008

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION (MCDOT)
GENERAL NOTES

1. All work shall conform to the most current Uniform Standard Specifications for Public Works Construction published by the Maricopa Association of Governments (MAG), together with the MCDOT supplement to the MAG Standard Specifications and the project Special Provisions. All work must also comply with Resolution 2001-01-Maricopa County Resolution for Permits to Work in Dedicated Right-of-Way and Resolution 2001-02-Maricopa County Resolution for Street Improvements, Installation of Utilities and Traffic Control. Any exceptions must receive explicit approval from MCDOT and shall be identified on the plans as having explicit approval from MCDOT.
2. The engineering designs on these plans are only approved by MCDOT in concept and not in detail. Construction quantities on these plans are not verified by MCDOT. Approval of these plans are for permit purposes only and shall not prevent MCDOT from requiring correction of errors in the plans where such errors are subsequently found to be in violation of any law, ordinance, health, safety, MCDOT Roadway Design Manual, or other design issues.
3. An approved set of plans shall be on the site during construction and available to MCDOT and other inspectors.
4. All box culverts constructed in the public Right-of-Way shall comply with Arizona Department of Transportation (ADOT) latest design specifications and standards. Minimum clear height of box culvert shall be 4 feet.
5. Contractor to obtain necessary MCDOT permits prior to construction within County Right-of-Way, and all necessary permits from local governments for work within their jurisdiction.
6. Contractor shall notify the MCDOT Inspection Department at least 24 hours in advance of any construction at (602) 506-8606.
7. Contractor performing construction or excavating operations is responsible for locating and relocating all utilities in conflict or within the clear zone, at no expense to Maricopa County. The Contractor shall contact "Blue Stake" at (602) 263-1100 prior to beginning construction.
8. The Contractor is responsible for obtaining any required permits for earth moving from Maricopa County Air Quality Department's Dust Compliance Division (602) 506-8010 prior to conducting excavation operations. A copy of the permit and dust control plan shall be submitted to the County Engineer prior to commencement of any earthmoving activities.
9. Prior to conducting excavation operations, the Contractor shall obtain from the Arizona State Historical Preservation Officer (602) 542-4009 recommendations regarding the need for cultural resources (archeological) clearance. All discoveries of human remains, cultural artifacts, or paleontological remains shall be reported to the Arizona State Museum and MCDOT. Upon discovery, Contractor shall cease operations in the vicinity of the find and protect the discovery area from further disturbance until the find can be professionally investigated by the Arizona State Museum and MCDOT.
10. Except under emergency conditions, roads shall not be closed for construction activity unless prior approval is obtained from the MCDOT Transportation Director or his representative.
11. Prior to moving or destroying protected native plant species, the Contractor shall file a formal Notice of Intent with the Arizona Department of Agriculture Native Plants (602) 542-6408.
12. Prior to installation of curb, gutter, sidewalk, base course and wearing surface, submit soil test(s) of sub-grade and revised pavement design calculations to MCDOT for review and approval. If sub-grade stabilization is required, the area stabilized shall be from back of sidewalk to back of sidewalk and match the stabilization depth of the pavement structure.
13. Asphalt mix design shall be submitted to MCDOT a minimum of 48 hours prior to placing any asphalt courses. (Tranch work excluded.) All paved turnouts shall have the same asphalt and base requirements as the adjacent roadway unless noted otherwise.
14. All compaction and backfill within County Right-of-Way shall conform to the MCDOT Supplement to MAG Specifications. Backfill under existing pavement, curb and gutter or within two feet (2') or less from the edge of pavement shall consist of one-half (1/2) sack CLSM.
15. All structures, such as manholes, valve box & covers, and monitoring well must be marked with at least two reflective yellow flag posts when structures are located outside the traveled way and within the Right-of-Way. (Applies only when there is no curb.)

16. Any saw cut along existing roadway edge which removes the edge of the roadway shall be a minimum of one foot (1') from the edge of the existing roadway. The cut distance may be greater, based on pavement conditions or roadway elevations but shall not be located within a lane wheel path, and if needed shall be in half lane increments.
17. All existing pavement marking, traffic signs and signal equipment that needs to be removed, replaced, relocated or repaired because of Contractor's work will be done by the Contractor at his expense. All salvaged signs shall be delivered to the Traffic Ops building at 2908 West Durango Street. Arrangements can be made for delivery by calling (602) 506-8662. All new street name signs shall be provided and installed by permittee at no expense to Maricopa County.
18. Pavement marking, signing and signal work will be inspected and shall meet County Standards before release of bond.
19. The Contractor shall restore all disturbed areas within the Right-of-Way to a condition equal to or better than existing improvements per MAG 107.9. Disposal of waste material will be the responsibility of the Contractor.

BNSF Railroad Subballast Notes

1. DESCRIPTION: Subballast construction of the BNSFRR near Reems Road and Olive Avenue as shown on the plans. Subballast shall be placed directly onto the finished subgrade in order to provide a roadbed finish such that preservative impregnated fibers on the under side of ties will not be penetrated or crushed during track construction. Two types of subballast are defined. Type 1 subballast is a coarse-grained pervious aggregate base material, while Type 2 subballast is a fine-grained impervious aggregate base material. See GSC Section 105.6 regarding coordination with utilities and payment.
2. Submittals to the engineer are required for a) the source of the subballast to be used on the project; b) Material Test results of the subballast proposed for use on the project. Test results must outline the material gradation and percentage of material with two fractured faces.
3. Subballast shall be crushed gravel or crushed stone with a minimum 75% of the material having two fractured faces. Subballast must meet the quality requirements of ASTM Destination : D 1241 and be approved by the Engineer.
4. Crushed Gravel shall be the product resulting from crushing by mechanical means, and shall consist entirely of particles obtained by crushing gravel, all of which before crushing will be retained on a screen with openings equal to or larger than the maximum nominal size of the resulting crushed material. If approved by the engineer, final product gradations may be obtained by screening or blending various sized of crushed gravel material.
5. Crushed Stone shall be the angular fragments resulting from crushing by mechanical means the following types of rock quarried from undisturbed, consolidated deposits: granite and similar phenocrystalline igneous rocks; limestone; dolomite; sandstone; massive metamorphic quartzite, or similar rocks.

6. Quality and Material Characteristics:
 - a. Coarse Aggregate Portion (Fraction retained on a No. 10 sieve):
 - NzCS4 Soundness (5 cycles) 25%
 - AASHTO T 104, Max. % Loss
 - Los Angeles Abrasion
 - AASHTO T96, Max. % Loss 45%
 - b. Fine Aggregate Portion (Fraction passing a No. 40 sieve)
 - Plasticity Index, Max.
 - AASHTO T30 10%
 - Liquid Limit, Max.
 - AASHTO T89 35%

7. Type 1 (pervious) subballast shall be uniformly graded and shall meet the following gradation requirements:

Sieve Size	Percent Passing
2"	100
1"	90-100
3/4"	50-84
No. 10	26-50
No. 40	12-30
No. 200	0-10

8. Type 2 (impervious) subballast shall be uniformly graded and shall meet the following gradation requirements:

Sieve Size	Percent Passing
3/4"	100
3/8"	90-100
No. 4	65-90
No. 16	20-50
No. 100	10-20
No. 200	7-15

9. If acceptable to the Engineer, the subballast may conform to the gradation specified for aggregate base by the MAG Standard Specifications which most nearly matches the gradation of Type 1 or Type 2 Subballast as specified.
10. Subballast shall be placed only when weather conditions do not detrimentally affect the quality of the finished subballast. Hauling and placing of subballast will not be permitted when doing so will rut or deform the finished subgrade.
11. Subballast shall be placed in uniform lifts of not more than 6 inches loose for the full width of the cross section. Each lift of subballast shall be compacted to a density on not less than 95% of the maximum dry density determined by ASTM Test Designation: D 698 (Standard Proctor).
12. The subballast shall be trimmed to the lines and grades shown on the plans and shall be maintained in a condition or manner acceptable to the Engineer until the final acceptance and completion of all work under this Contract. Any irregularities that develop in the subballast section during construction operations and prior to laying track shall be filled and compacted to a smooth and even surface true to the subgrade elevations without any additional cost to the Company.

9-15-2008

TWO WORKING DAYS
BEFORE YOU CALL
602-263-1100
BLUE STAKE

NO.	REVISION	BY	DATE
3			
2			
1			


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
 ENGINEERING DIVISION
REEMS ROAD CHANNEL AND BASIN
FCD PROJECT: NO. 470-12-31
CONTRACT FCD 2005 C018

	BY	DATE
DESIGNED	WAG	11/07
DRAWN	FRC	11/07
CHECKED	JRR	11/07



DRAWING NO.	GENERAL NOTES	SHEET OF
63		3 89

LEGEND SHEET

SYMBOLS

	Brass Cap in Hand Hole
	Benchmark
	Brass Cap
	Bush
	Cactus
	Catch Basin
	Chiseled Square
	Miscellaneous Control Point
	Check Shot
	Electric Manhole
	Electric Meter
	Elevation Reference Mark
	Fire Hydrant
	GDAC
	Gas Meter
	Gas Valve
	Iron Pipe
	Irrigation Manhole
	Light Pole
	Palm Tree
	Power Pole
	Rebar
	Rebar With Cap
	Section Corner
	Storm Drain Manhole
	Proposed Slope Indicator
	Existing Slope Indicator
	Sanitary Sewer Manhole
	Telephone Manhole
	Telephone Pole
	Tree
	Transmission Tower
	Well

SYMBOLS

	Flow Direction
	Proposed 4" ABC O&M Road
	Soil Cement
	Proposed Asphalt Pavement
	Asphalt Pavement Removal
	Grade Break
	Sewcut & Match
	Connector Pipe Profile No.
	Protect In Place
	Water Manhole
	Water Meter
	Water Valve
	Maintenance Access Ramp
	Gate
	Top of Berm
	Fiber Optic Cable

LINESTYLES

	Centerline
	Cut Line
	Fiber Optic Line
	Fill Line
	Forest/Indian Reservation Line
	High Pressure Gas Line
	Irrigation Line
	Proposed Chain Link Fence Line
	Proposed Fence Line
	Proposed Gas Line
	Proposed Overhead Power Line
	Proposed Overhead Telephone Line
	Proposed Retaining Wall
	Proposed ROW
	Proposed Sanitary Sewer Line
	Proposed Underground Power Line
	Proposed Underground Telephone Line
	Proposed Underground Cable Television Line
	Proposed Water Line
	Proposed Wood Fence Line
	Proposed Storm Drain (width varies 72" pipe shown)
	Section Line
	Temporary Construction Easement
	Tree Line
	Wash Flow Line
	Existing Water Surface Elevation (Profile Views Only)
	Proposed Water Surface Elevation (Profile Views Only)
	Existing Block Wall
	Existing Chain Link Fence Line
	Existing Fence Line
	Existing Gas Line And Size
	Existing Left Guardrail
	Existing Right Guardrail
	Existing Irrigation Line
	Existing Overhead Power Line
	Existing Overhead Telephone Line

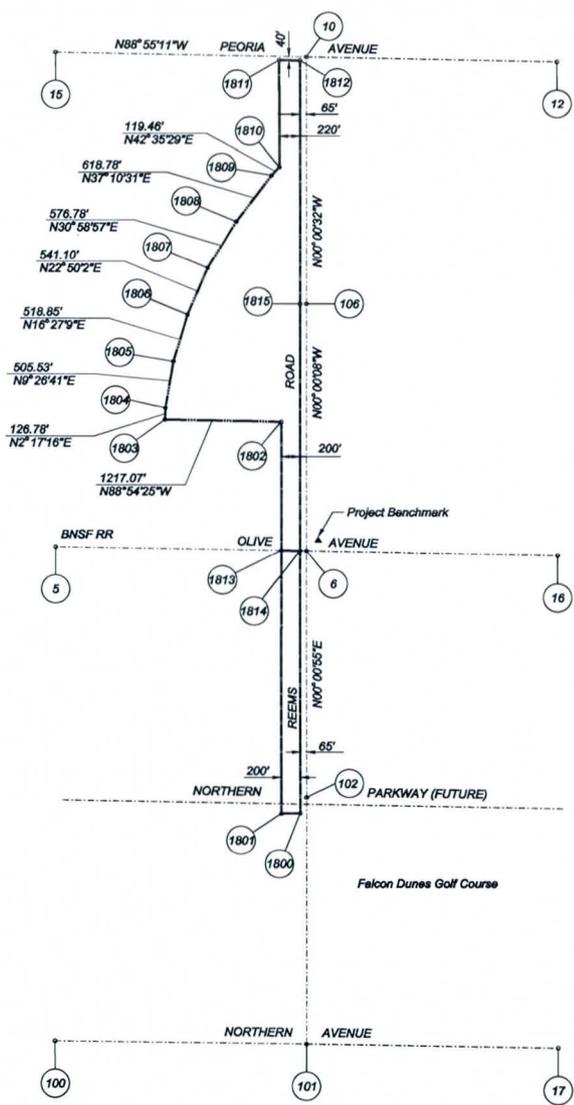
LINESTYLES

	Existing Retaining Wall
	Existing Edge Of Paved Road
	Existing ROW
	Existing Sanitary Sewer Line
	Existing Storm Drain Pipe And Size
	Existing Underground Power Line
	Existing Underground Telephone Line
	Existing Underground Cable Television Line
	Existing Water Line And Size
	Existing Wood Fence Line

TWO WORKING DAYS BEFORE YOU CAN CALL 602-263-1100 BLUE STAKE

9-15-2008

3			
2			
1			
NO.	REVISION	BY	DATE
	REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018		
		BY	DATE
	DESIGNED	WAG	11/07
	DRAWN	FRC	11/07
	CHECKED	JRR	11/07
	DRAWING NO.	LEGEND SHEET SYMBOLS AND LINESTYLES	
	04	SHEET OF 69	



TWO WORKING DAYS
 BEFORE YOU DRINK
 602-263-1100
 BLUE STAKE

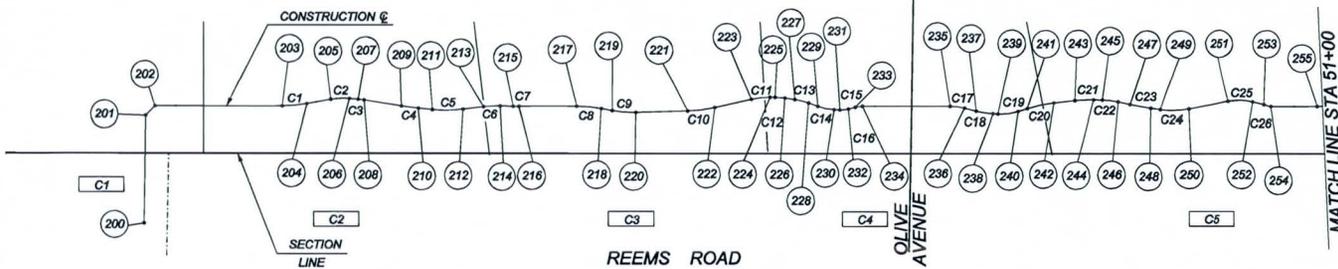
PROJECT CONTROL CHANNEL				
NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
100	928,594.44	552,079.26	1118.13	ACF Northern/Alsup
101	928561.28	554,719.16	1104.60	BCH Reems/Northern
102	931,191.20	554,722.80	1113.72	BCH Reems
106	936,458.74	554,723.40	1135.00	BCH Reems
5	933,867.48	552,088.19	1136.76	ACF Olive
▲ 6	933,823.38	554,723.51	1126.15	BCH Olive/Reems
10	939,094.17	554,722.99	1145.13	Peoria/Reems
12	939,042.11	557,358.35	1144.53	ACF Peoria
15	939,143.95	552,083.13	1158.86	Frnd AC-1.10
16	933,772.51	557,363.09	1118.71	ACH Olive
17	928,516.15	557,361.27	1100.13	BCH Northern/151 Align

PROJECT CONTROL - BASIN		
NO.	NORTHING	EASTING
1800	931,022.13	554,657.76
1801	931,019.41	554,457.76
1802	935,198.46	554,458.41
1803	935,221.72	553,241.53
1804	935,348.40	553,246.59
1805	935,847.08	553,329.55
1806	936,344.68	553,476.50
1807	936,843.38	553,686.48
1808	937,337.87	553,983.39
1809	937,830.91	554,357.29
1810	937,918.85	554,438.14
1811	939,059.54	554,438.00
1812	939,055.39	554,658.00
1813	933,827.82	554,458.51
1814	933,824.47	554,658.50
1815	936,459.67	554,658.30

NOTE:
 ALL COORDINATES SHOWN ARE GRID VALUES UNLESS
 OTHERWISE NOTED. USE CONVERSION FACTOR OF
 1.00016 TO CONVERT GRID TO GROUND COORDINATES.

3			
2			
1	REV BASIN BASIS OF BEARING & COORD'S	WAG	8-1-08
NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018			
DESIGNED		WAG	11/07
DRAWN		FRC	11/07
CHECKED		JRR	11/07
DRAWING NO. GSR		HORIZONTAL & VERTICAL CONTROL	SHEET OF 5 59

9-15-2008



1

CHANNEL GEOMETRY DATA				
PT #	DESC	STATION	NORTHING	EASTING
200	POB	5+00.00	931,104.10	554,970.14
201	PI	8+89.09	931,109.11	554,591.08
202	PI	9+26.20	931,142.43	554,557.78
203	PC	13+78.37	931,594.80	554,557.80
204	PT	14+85.75	931,681.10	554,549.78
205	PC	15+52.24	931,766.64	554,534.40
206	PT	16+18.26	931,832.39	554,531.38
207	PC	16+49.92	931,863.94	554,534.10
208	PT	16+71.34	931,885.20	554,536.70
209	PC	18+05.08	932,017.28	554,557.68
210	PT	18+66.12	932,077.82	554,565.41
211	PC	19+16.28	932,127.75	554,570.24
212	PT	20+24.44	932,235.69	554,568.98
213	PC	20+98.65	932,309.36	554,560.11
214	PT	21+57.63	932,368.23	554,557.39
215	PC	22+05.47	932,416.05	554,558.72
216	PT	22+25.09	932,435.67	554,558.87
217	PC	24+29.05	932,639.62	554,558.53
218	PT	25+15.40	932,725.48	554,566.63
219	PC	25+55.17	932,764.61	554,573.76
220	PT	26+38.40	932,847.45	554,580.10
221	PC	28+21.93	933,030.90	554,575.01
222	PT	29+18.77	933,126.85	554,583.00
223	PC	30+51.52	933,256.36	554,533.85
224	PT	31+19.49	933,323.79	554,526.63
225	PC	31+37.79	933,342.08	554,526.63
226	PT	31+72.29	933,376.46	554,529.18
227	PC	32+07.72	933,411.53	554,534.24

1

CHANNEL GEOMETRY DATA				
PT #	DESC	STATION	NORTHING	EASTING
228	PT	32+59.03	933,461.21	554,546.70
229	PC	32+93.02	933,493.16	554,558.31
230	PT	33+52.93	933,551.67	554,570.09
231	PC	33+73.00	933,571.72	554,571.07
232	PT	34+04.56	933,602.99	554,567.88
233	PC	34+29.19	933,626.79	554,561.57
234	PT	34+55.09	933,652.41	554,558.23
235	PC	37+65.75	933,963.06	554,558.16
236	PT	38+16.37	934,013.15	554,564.49
237	PC	38+59.80	934,055.21	554,575.32
238	PT	39+18.78	934,113.40	554,584.34
239	PC	39+37.30	934,131.89	554,585.37
240	PT	40+09.58	934,203.21	554,576.39
241	PC	40+42.69	934,234.78	554,566.42
242	PT	41+40.55	934,330.39	554,546.24
243	PC	42+15.67	934,405.05	554,537.98
244	PT	42+82.56	934,471.82	554,535.09
245	PC	43+12.34	934,501.60	554,535.80
246	PT	43+69.14	934,557.91	554,542.49
247	PC	44+12.38	934,600.18	554,551.63
248	PT	44+87.64	934,674.27	554,564.75
249	PC	45+21.50	934,707.81	554,569.40
250	PT	46+19.70	934,805.54	554,566.86
251	PC	47+63.94	934,947.19	554,539.67
252	PT	48+50.17	935,032.72	554,541.89
253	PC	49+90.88	935,072.26	554,551.63
254	PT	49+16.86	935,097.26	554,558.41
255	PC	50+81.84	935,262.24	554,558.01

1

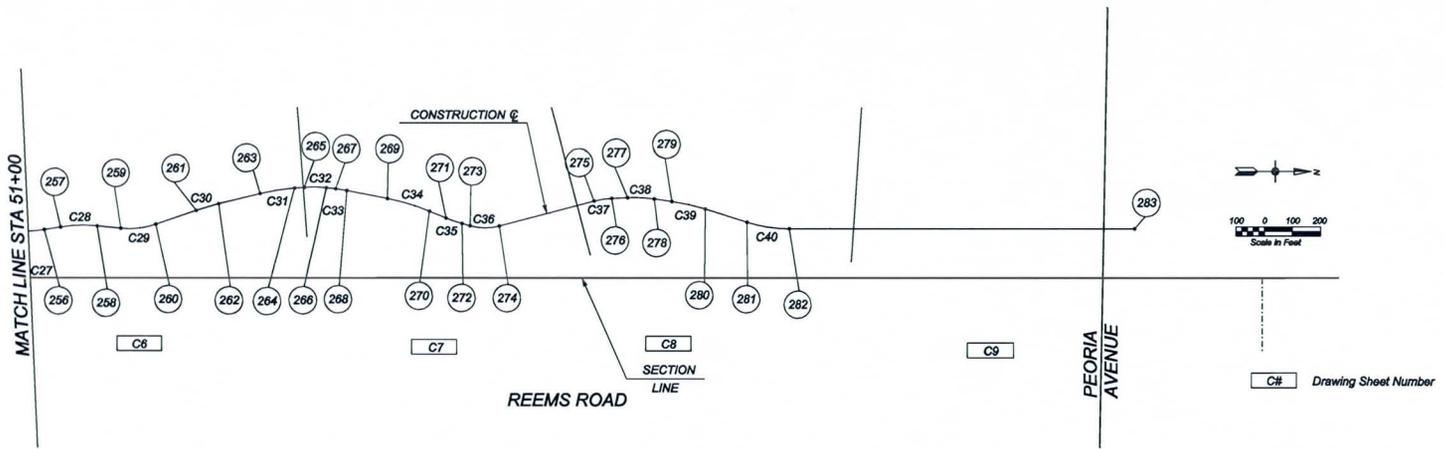
CHANNEL GEOMETRY CURVE DATA				
CV #	LENGTH	DELTA ANGLE	RADIUS	TANGENT
C1	87.38	10°00'46"	500.00	43.80
C2	66.02	15°07'48"	250.00	33.20
C3	21.42	4°05'27"	300.00	10.71
C4	61.04	3°29'50"	1000.00	30.53
C5	108.16	12°23'39"	500.00	54.29
C6	58.98	8°26'55"	400.00	29.54
C7	19.63	2°14'57"	500.00	9.81
C8	86.35	9°53'41"	500.00	43.28
C9	83.23	11°55'17"	400.00	41.76
C10	96.85	11°05'53"	500.00	48.58
C11	67.97	12°58'55"	300.00	34.13
C12	34.50	7°54'28"	250.00	17.28
C13	51.31	11°45'31"	250.00	25.74
C14	59.91	17°09'47"	200.00	30.18
C15	31.56	18°04'57"	100.00	15.91
C16	25.90	14°50'26"	100.00	13.02
C17	50.63	14°30'12"	200.00	25.45
C18	58.98	11°15'51"	300.00	29.58
C19	72.28	20°42'19"	200.00	36.54
C20	97.66	11°12'52"	500.00	49.09
C21	66.88	7°39'52"	500.00	33.49
C22	56.80	10°50'50"	300.00	28.48
C23	75.26	4°18'44"	1000.00	37.85
C24	98.20	18°45'15"	300.00	49.54
C25	86.23	24°42'11"	200.00	43.80
C26	25.98	14°52'58"	100.00	13.06

C# Drawing Sheet Number

TWO WORKING DAYS BEFORE YOU DIG CALL 802-263-1100 BLUE STAKE

9-15-2008

3			
2			
1	REVISED CHANNEL ALIGNMENT AND CONTROL	WAG	5-1-08
NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018			
	DESIGNED	WAG	11/07
	DRAWN	FRC	11/07
	CHECKED	JRR	11/07
DRAWING NO.	G6R	CST & GEOMETRIC LAYOUT	SHEET OF 6 59
		STA 5+00 TO STA 51+00	



△ 1

CHANNEL GEOMETRY DATA				
PT #	DESC	STATION	NORTHING	EASTING
256	PT	51+59.17	935,339.22	554,551.58
257	PC	52+17.44	935,396.74	554,542.25
258	PT	53+47.58	935,526.45	554,538.27
259	PC	54+31.82	935,610.27	554,546.64
260	PT	55+59.52	935,736.20	554,532.31
261	PC	57+11.60	935,880.27	554,483.58
262	PT	57+96.23	935,961.49	554,459.89
263	PC	59+45.98	936,106.88	554,424.08
264	PT	60+68.91	936,228.12	554,404.56
265	PC	61+03.95	936,263.06	554,401.85
266	PT	61+80.64	936,339.61	554,403.25
267	PC	62+14.34	936,373.09	554,407.08
268	PT	62+53.94	936,412.22	554,413.15
269	PC	64+00.26	936,555.81	554,441.26
270	PT	65+56.24	936,705.01	554,485.91
271	PC	66+19.98	936,764.00	554,510.05
272	PT	66+79.34	936,820.15	554,529.21
273	PC	67+09.68	936,849.39	554,537.29
274	PT	68+14.90	936,953.39	554,537.97

△ 1

CHANNEL GEOMETRY DATA				
PT #	DESC	STATION	NORTHING	EASTING
275	PC	71+62.00	937,289.14	554,449.92
276	PT	72+24.96	937,351.26	554,440.43
277	PC	72+81.48	937,407.72	554,437.79
278	PT	73+75.47	937,501.47	554,442.24
279	PC	74+38.48	937,563.85	554,451.11
280	PT	75+59.99	937,682.24	554,477.88
281	PC	77+16.04	937,831.16	554,524.49
282	PT	78+67.75	937,980.55	554,547.32
283	POE	90+95.22	939,208.02	554,547.24

△ 1

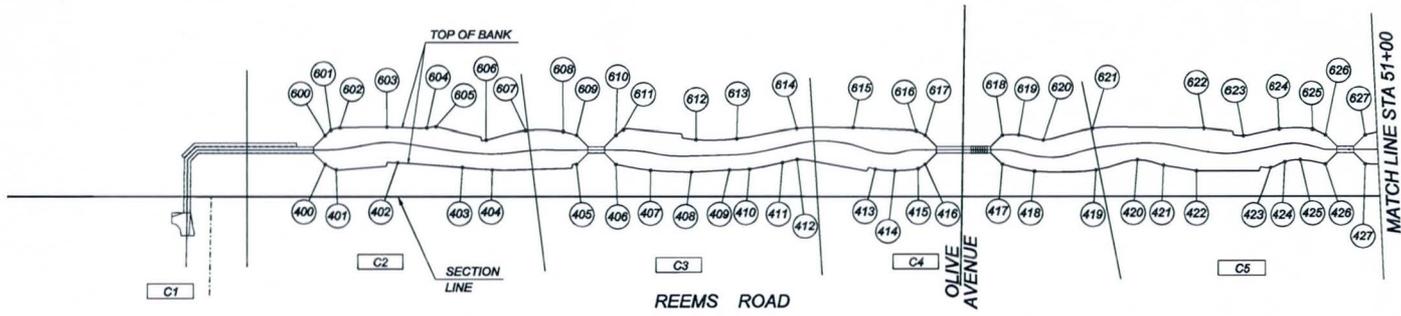
CHANNEL GEOMETRY CURVE DATA				
CV #	LENGTH	DELTA ANGLE	RADIUS	TANGENT
C27	77.32	8°51'38"	500.00	38.74
C28	130.13	14°54'43"	500.00	65.44
C29	127.70	24°23'18"	300.00	64.83
C30	84.63	4°50'56"	1000.00	42.34
C31	122.95	9°23'34"	750.00	61.61
C32	76.89	10°59'05"	400.00	38.46
C33	39.61	4°32'18"	500.00	19.81
C34	155.98	11°10'18"	800.00	78.24
C35	59.36	6°48'10"	500.00	29.72
C36	105.22	30°08'34"	200.00	53.86
C37	62.96	12°01'28"	300.00	31.60
C38	93.99	10°46'13"	500.00	47.13
C39	121.51	9°16'56"	750.00	60.89
C40	151.71	17°23'04"	500.00	76.44

FOR BASIN GRADING PLAN
SEE DRAWING NO. GB1

TWO WORKING DAYS
BEFORE YOU DRILL
802-283-1100
BLUE STAKE

9-15-2008

3			
2			
1	REVISED CHANNEL ALIGNMENT AND CONTROL	WAG	5-1-08
NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018			
		BY	DATE
		DESIGNED	WAG 11/07
		DRAWN	FRC 11/07
		CHECKED	JRR 11/07
DRAWING NO.	67R	CST & GEOMETRIC LAYOUT STA 51+00 TO POE	SHEET OF 7 59



CHANNEL GEOMETRY DATA				
PT #	DESC	NORTHING	EASTING	RADIUS
600	POB	931,590.85	554,506.80	N/A
601	PI	931,611.77	554,488.82	50.00
602	PI	931,642.87	554,481.42	200.00
603	PI	931,810.30	554,478.94	2000.00
604	PI	931,951.31	554,481.60	214.00
605	PI	931,982.48	554,477.59	50.00
606	PI	932,156.63	554,523.51	200.00
607	PI	932,294.03	554,490.32	400.00
608	PI	932,425.87	554,494.23	300.00
609	POE	932,471.55	554,506.88	N/A
610	POB	932,610.74	554,506.92	N/A
611	PI	932,636.70	554,487.58	50.00
612	PI	932,892.23	554,522.32	500.00
613	PI	933,034.54	554,518.94	800.00
614	PI	933,244.79	554,483.90	800.00
615	PI	933,441.95	554,481.44	3000.00
616	PI	933,662.85	554,492.51	100.00
617	POE	933,694.58	554,507.11	N/A
618	POB	933,965.68	554,507.24	N/A
619	PI	934,023.01	554,506.12	200.00
620	PI	934,108.95	554,524.05	100.00
621	PI	934,280.88	554,484.66	500.00
622	PI	934,671.29	554,483.75	100.00
623	PI	934,805.18	554,509.66	164.00
624	PI	934,935.83	554,486.01	500.00
625	PI	935,052.30	554,487.18	100.00
626	POE	935,097.26	554,507.31	N/A
627	POB	935,236.45	554,507.31	N/A

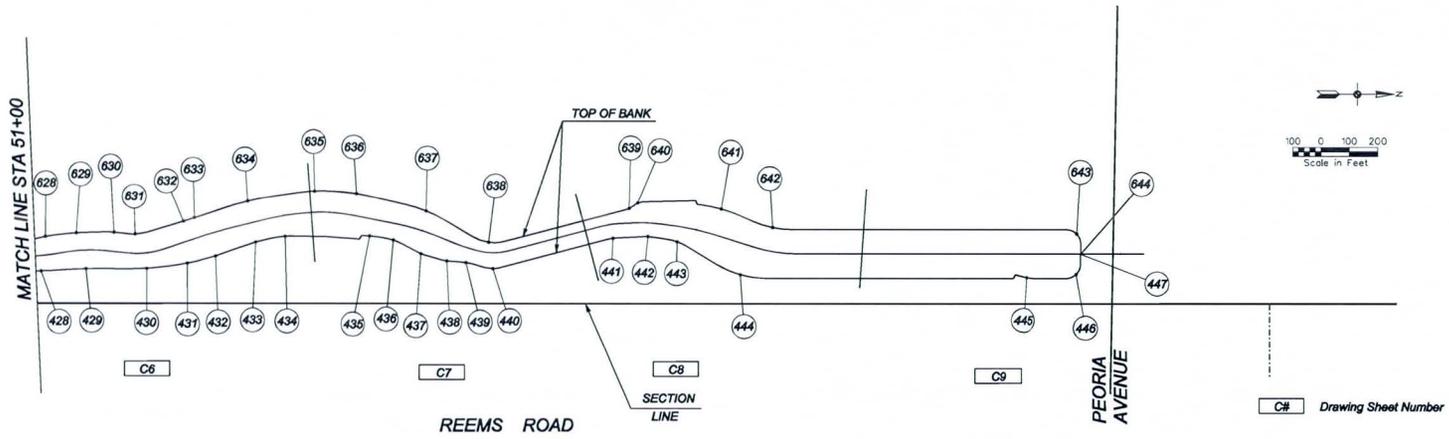
CHANNEL GEOMETRY DATA				
PT #	DESC	NORTHING	EASTING	RADIUS
400	POB	931,590.82	554,608.99	N/A
401	PI	931,630.18	554,627.43	50.00
402	PI	931,848.21	554,602.90	2000.00
403	PI	932,076.01	554,618.90	1000.00
404	PI	932,177.81	554,628.10	1000.00
405	POE	932,471.53	554,609.08	N/A
406	POB	932,610.72	554,609.11	N/A
407	PI	932,732.14	554,629.99	786.00
408	PI	932,875.65	554,636.42	500.00
409	PI	933,009.21	554,628.72	500.00
410	PI	933,079.92	554,626.19	350.00
411	PI	933,194.98	554,603.11	200.00
412	PI	933,246.06	554,592.21	150.00
413	PI	933,518.90	554,626.35	200.00
414	PI	933,587.99	554,631.83	400.00
415	PI	933,669.34	554,624.65	50.00
416	POE	933,694.47	554,609.15	N/A
417	POB	933,965.67	554,609.18	N/A
418	PI	934,077.65	554,634.43	500.00
419	PI	934,293.17	554,629.84	500.00
420	PI	934,438.13	554,594.43	150.00
421	PI	934,528.89	554,613.50	1000.00
422	PI	934,644.93	554,633.24	86.00
423	PI	934,902.00	554,621.70	100.00
424	PI	934,954.52	554,601.73	114.00
425	PI	935,008.73	554,594.42	200.00
426	POE	935,097.26	554,609.50	N/A
427	POB	935,236.46	554,609.51	N/A

C# Drawing Sheet Number

NO SURVEY DATA
BEFORE YOU DRILL
602-263-1100
BLUE STAKE

9-15-2008

3				
2				
1	REVISED TOP OF BANK ALIGNMENT AND CONTROL	WAG	BY	5-1-08
NO.	REVISION			DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018				
	DESIGNED	WAG	DATE	11/07
	DRAWN	FRC		11/07
	CHECKED	JRR		11/07
DRAWING NO.	TOP OF BANK GEOMETRIC LAYOUT		SHEET OF	
68R	STA 6+00 TO STA 51+00		8	



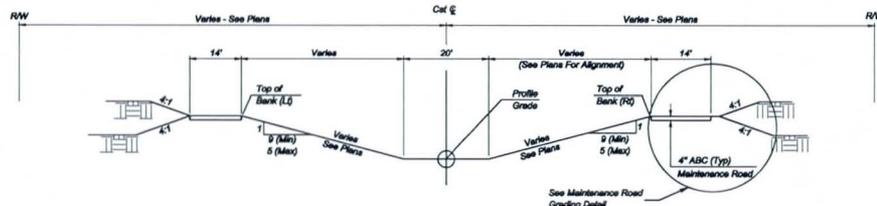
CHANNEL GEOMETRY DATA				
PT #	DESC	NORTHING	EASTING	RADIUS
628	PI	935,316.31	554,487.98	500.00
629	PI	935,425.86	554,475.19	1000.00
630	PI	935,580.33	554,472.96	1000.00
631	PI	935,634.92	554,479.09	200.00
632	POE	935,805.79	554,433.00	N/A
633	POB	935,843.69	554,421.45	N/A
634	PI	936,031.77	554,361.88	1000.00
635	PI	936,270.98	554,326.19	600.00
636	PI	936,419.00	554,334.72	600.00
637	PI	936,666.30	554,396.66	600.00
638	PI	936,886.18	554,507.04	160.00
639	PI	937,385.25	554,387.17	78.00
640	PI	937,415.68	554,367.95	50.00
641	PI	937,712.23	554,388.60	500.00
642	PI	937,893.05	554,454.16	350.00
643	PI	938,970.98	554,476.27	50.00
644	POE	938,984.51	554,548.29	N/A

CHANNEL GEOMETRY DATA				
PT #	DESC	NORTHING	EASTING	RADIUS
428	PI	935,301.57	554,610.04	1500.00
429	PI	935,460.65	554,601.52	1500.00
430	PI	935,675.71	554,600.29	1000.00
431	PI	935,819.37	554,581.60	1000.00
432	PI	935,919.32	554,556.63	600.00
433	PI	936,060.95	554,506.88	600.00
434	PI	936,165.84	554,486.63	300.00
435	PI	936,465.78	554,485.07	400.00
436	PI	936,549.74	554,499.60	200.00
437	PI	936,647.43	554,547.49	200.00
438	PI	936,739.10	554,573.05	200.00
439	PI	936,806.64	554,578.67	200.00
440	PI	936,901.01	554,599.84	100.00
441	PI	937,327.88	554,492.64	200.00
442	PI	937,452.38	554,486.41	200.00
443	PI	937,555.40	554,504.52	200.00
444	PI	937,779.60	554,620.45	350.00
445	PI	938,792.12	554,630.76	200.00
446	PI	938,968.78	554,618.98	50.00
447	POE	938,984.51	554,548.28	N/A

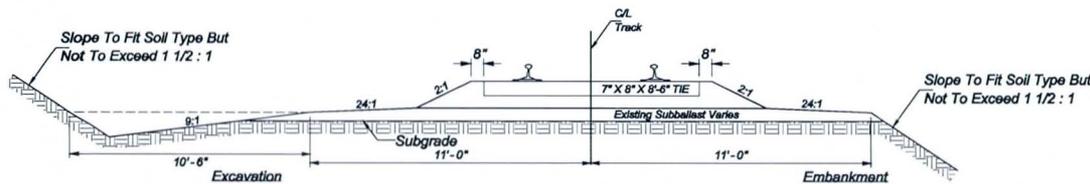
THE INFORMATION SHOWN
 BEFORE YOU DIG CALL
 802-263-1100
 BLUE STAKE

9-15-2008

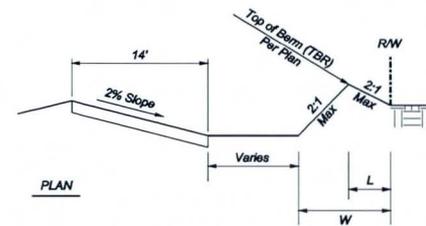
3			
2			
1	REVISED TOP OF BANK ALIGNMENT AND CONTROL	WAG	5-1-08
NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018			
	DESIGNED	WAG	11/07
	DRAWN	FRC	11/07
	CHECKED	JRR	11/07
	DRAWING NO. TOP OF BANK GEOMETRIC LAYOUT STA 51+00 TO POE SHEET OF 9 89		



TYPICAL SECTION
NTS

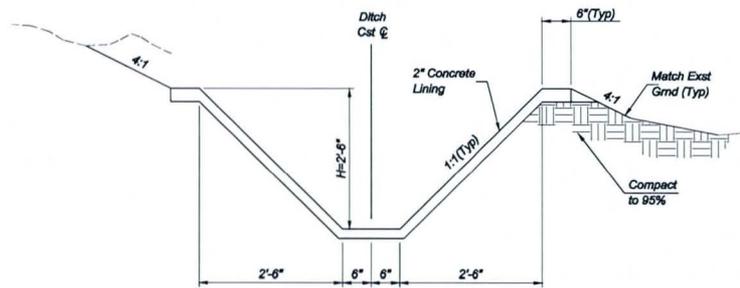


TANGENT TRACK LIGHT TRAFFIC LINES
AT OLIVE AVENUE



MAINTENANCE ROAD
GRADING DETAIL
STA 13+35 to STA 50+20 &
STA 76+50 to STA 88+00

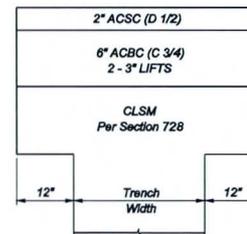
NTS



CONCRETE LINED DITCH
SECTION

NTS

See Sheet C1 & C2 & C4 (Modified), IR1, IR2, IR3.



TYPICAL SECTION
PAVEMENT REPLACEMENT
MAG DETAIL 200 "T-TOP"

NTS
See Sheets C1 & C4

TOP WORKING DATE
BEFORE YOU DIG CALL
263-1100
BLUE STAKE

9-15-2008

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 C018

DESIGNED	BY	DATE
WAG		11/07
DRAWN	FRC	11/07
CHECKED	JRR	11/07

DRAWING NO. 610 TYPICAL SECTION SHEET OF 10 62

QUANTITY SUMMARY

ITEM NO.	ITEM DESCRIPTION	UNIT	DRAWING NUMBERS													TOTAL QUANTITY		
			C1	C2	C3	C4	C5	C6	C7	C8	C9	GB1	IR1	IR2	IR3		IR4	LS4
215-1	CHANNEL EXCAVATION	CY		19,031	22,556	16,415	17,368	20,134	20,925	28,840	19,013							173,282
215-2	BASIN EXCAVATION	CY										437,800						437,800
220-1	PLAIN RIPRAP	CY		1,405	1,475	2,739	1,485	2,819	2,834	1,855			4,871					19,483
310-1	4" ABC MAINTENANCE ROAD	SY		4,362	4,751	3,774	5,486	3,616	3,407	3,983	3,735	6,852						39,866
336-1	PAVEMENT REPLACEMENT (T-TOP)	SY	195			135												330
336-2	PAVEMENT CONNECTIONS (NOT-TOP)	SY		248	143	250	143					160						944
350-1	REMOVE CONCRETE LINED DITCH	LF	220		180		210			380	270	1,140	43	43	43			2529
421-1	INSTALL 4 STRAND SMOOTH WIRE FENCE	LF		1,700	1,837	1,580	1,695	992	1,004	1,251	1,896	4,153						20,108
421-2	INSTALL GATE	EA		2	4	4	4				2							17
505-1	CONCRETE BOX CULVERT TYPE A (2 BBL 10' x 6')	LF	121		80	136	80											377
505-2	CONCRETE BOX CULVERT TYPE B (1 BBL 10' x 6') (AUXILIARY) (30' FILL)	LF	241	174														415
505-3	CONCRETE BOX CULVERT TYPE C (1 BBL 10' x 6') PRECAST	LF				112												112
505-4	CONCRETE BOX CULVERT TYPE D (2 BBL 10' x 6') (30' FILL)	LF	289	235														524
505-5	CONCRETE RETAINING WALLS	EA		2	4		4											10
505-6	CONCRETE RETAINING WALLS @ OLIVE AVENUE	EA				4												4
505-7	SOUTH CONCRETE RETAINING WALLS	EA	2															2
505-8	CONCRETE GRADE CONTROL STRUCTURE	EA		2	2	4	2	4	4	2								20
505-9	CONCRETE INLET STRUCTURE	EA										1						1
505-10	CONCRETE OUTLET STRUCTURE	EA						1					1					1
505-11	CONCRETE WEIR	EA																1
505-12	CONCRETE LINED IRRIGATION DITCH	LF			10								43	43	43			139
505-13	CONCRETE CHANNEL LINING	SY	500															500
505-14	CONCRETE HEADWALL (MWD STD DWG 723 & 724)	EA			2													2
505-15	20 MIL PVC SHEET VINYL WATERPROOFING	SF	1,075			2,762												3,837
505-16	CONCRETE PIPE PLUG (MWD STD DWG 541)	EA											2	2	2			6
505-18	FCD PRECAST BRIDGE CROSSING	EA											1					1
515-1	30" FLAPGATE	EA						1										1
515-2	ACCESS BARRIER BOX CULVERT	EA	2	2														4
515-3	ACCESS BARRIER 30" PIPE	EA										1						1
520-1	STEEL HANDRAILS	LF	92	134	268	268	268	100	70	70		140						1410
618-1	24" PIPE	LF			24													24
618-2	30" PIPE	LF						107					43	43	43			236

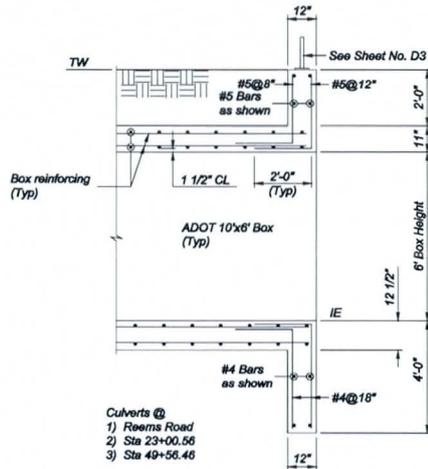
FCD - FLOOD CONTROL DISTRICT
MWD - MARICOPA WATER DISTRICT

THE WORKMAN OATH
BEFORE YOU BEGIN
602-263-1100
BLUE STAKE

9-15-2008

REVISED 2-14-08

3			
2			
1	UPDATED ITEM DESCRIPTION AND QUANTITY	WAG	2-14-08
NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018			
DESIGNED	WAG	BY	DATE
DRAWN	JGW		11/07
CHECKED	JRR		11/07
DRAWING NO.	QS1R	QUANTITY SUMMARY SHEET	SHEET OF 11 68

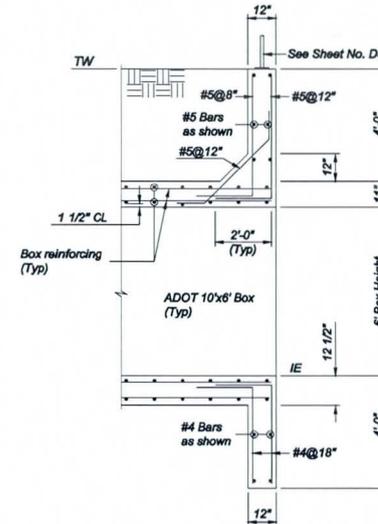


- Culverts @
 1) Reems Road
 2) Sta 23+00.56
 3) Sta 49+56.46

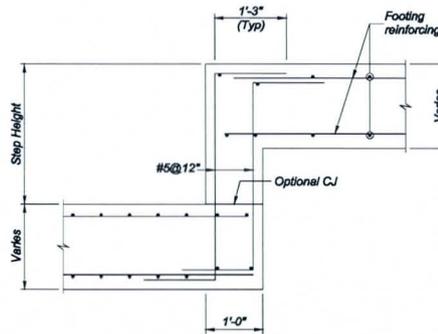
**DETAILS OF 2' HEADWALL
 & TOE DOWN (TYP)**
 NTS

NOTE:

Use 1 1/2\"/>



**DETAIL OF HEADWALL & TOE DOWN
 AT OLIVE AVENUE**
 NTS



FOOTING STEP DETAIL (TYP)
 NTS

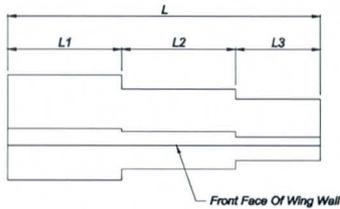
TYPICAL ALL WING WALLS
 (SEE SHEET D2)

FOR BOX CULVERT NO. 3
 SEE SHEET NO. B3.1, B3.2 & D2

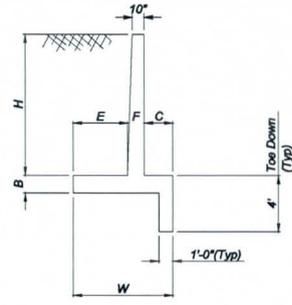
3			
2			
1			
NO.	REVISION	BY	DATE
REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018			
		BY	DATE
		DESIGNED KYH	11/07
		DRAWN FRC	11/07
		CHECKED JRR	11/07
DRAWING NO.	PLAN AND DETAIL VIEW		SHEET OF
D1			14 59

TWO WORKING DAYS
 BEFORE YOU BRICKL
 602-263-1100
 BLUE STAKE

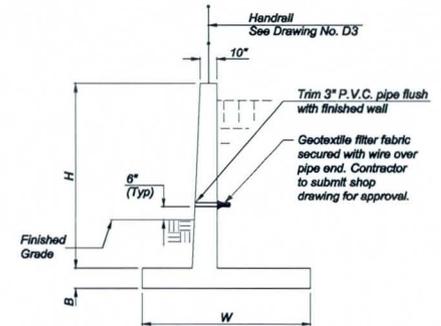
9-15-2008
 DETAIL **D1**



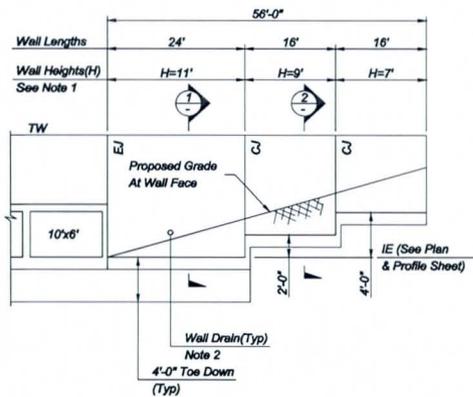
TYPICAL WING WALL PLAN
NTS



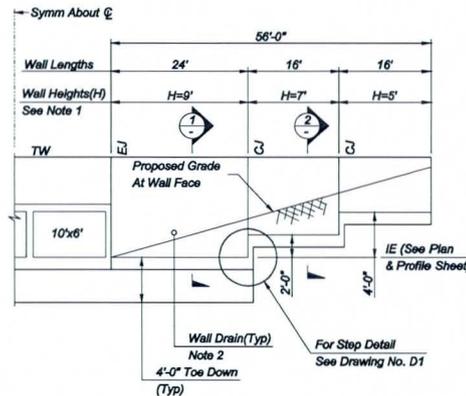
TYPICAL SECTION 1
NTS



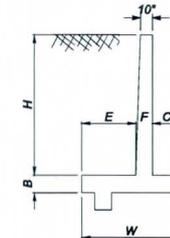
WALL DRAIN DETAIL TYPICAL 3
NTS



WING WALL ELEVATION
WITH 4' HEADWALL
NTS



WING WALL ELEVATION
WITH 2' HEADWALL
NTS



TYPICAL SECTION 2
NTS

H	B	C	F	E	W
11'	1'-4"	1'-10"	1'-2"	5'-3"	8'-3"
10'	1'-3"	1'-8"	1'-0"	4'-7"	7'-3"
9'	1'-3"	1'-6"	1'-0"	4'-0"	6'-6"
8'	1'-2"	1'-4"	10"	3'-7"	5'-9"
7'	1'-2"	1'-2"	10"	3'-0"	5'-0"
6'	1'-0"	1'-0"	10"	2'-4"	4'-2"
5'	1'-0"	1'-0"	10"	1'-8"	3'-6"

NOTE:

- For typical dimensions and reinforcement details refer to Case III Sloping fill of ADOT B-18.30 and B-18.10 for specified wall heights. Actual wall height may vary and depends on top of wall elevations shown. All reinforcing steel shall have 2" clear cover unless otherwise noted.
- Typical wall drains as shown are required.

NO.	REVISION	BY	DATE
3			
2			
1			

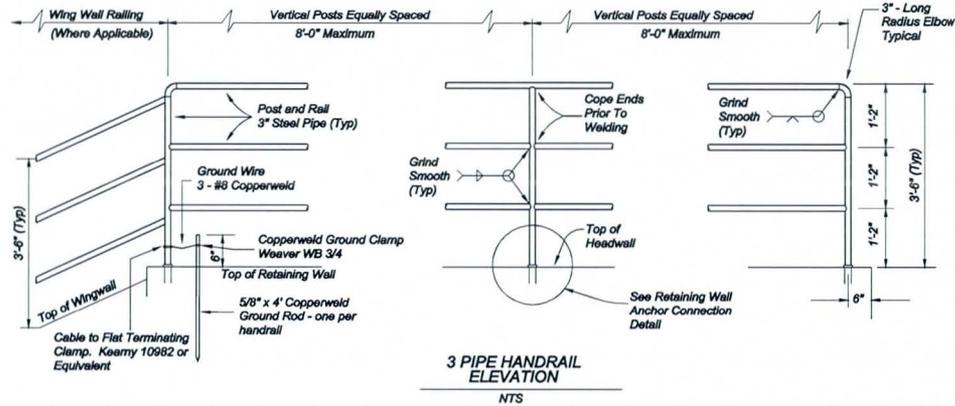
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
 ENGINEERING DIVISION
REEMS ROAD CHANNEL AND BASIN
 FCD PROJECT NO. 470-12-31
 CONTRACT FCD 2005 C018

DESIGNED	BY	DATE
KVH		11/07
DRAWN	BY	DATE
FRC		11/07
CHECKED	BY	DATE
JRR		11/07

DRAWING NO. D2 RETAINING WALL DETAILS SHEET OF 15 59

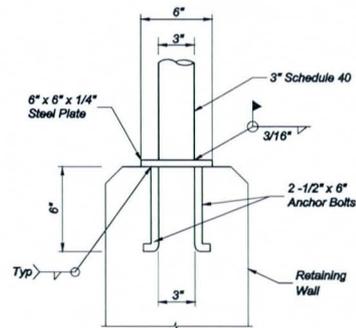
TWO WORKING DAYS BEFORE YOU DIG ONLY 602-263-1100 BLUE STAKE

DETAIL D2 9-15-2008



3 PIPE HANDRAIL
ELEVATION

NTS



RETAINING WALL
ANCHOR CONNECTION

NTS

CONSTRUCTION NOTES:

1. 3" Round Tube Steel (Schedule 40) Galvanized After Fabrication In Accordance With ASTM A123 Weld 3/8" Thick All Around. Shop Prime With Rust Inhibiting Primer (Field Repair Primer As Needed).
2. Paint Handrail Per MAG Specifications Section 530. All exposed concrete shall be painted Dunn Edwards Neutral Valley DE 6119 or equal.
3. Vertical Posts To Be Evenly Spaced.

NO WORKING DATE BEFORE YOU OR CALL
802-263-1100
BLUE STAKE

DETAIL D3 9-15-2008

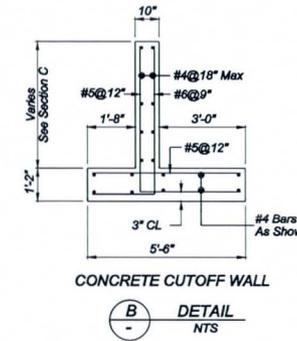
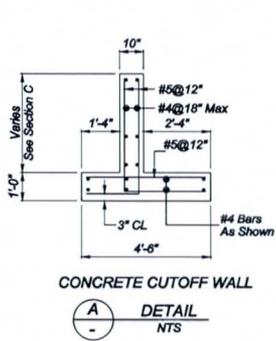
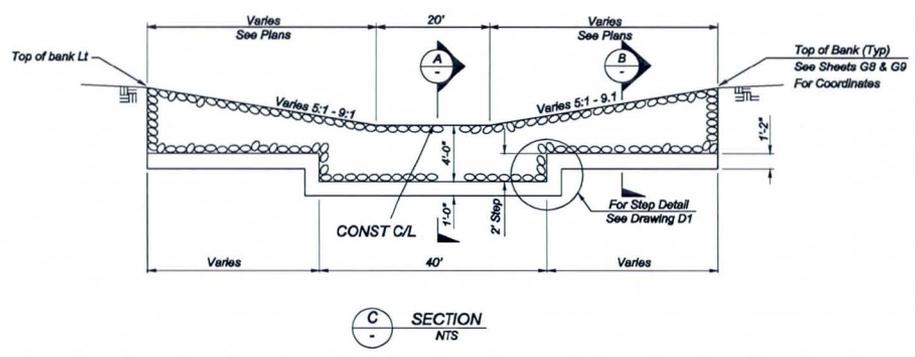
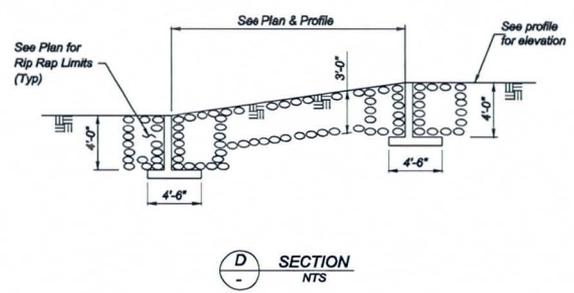
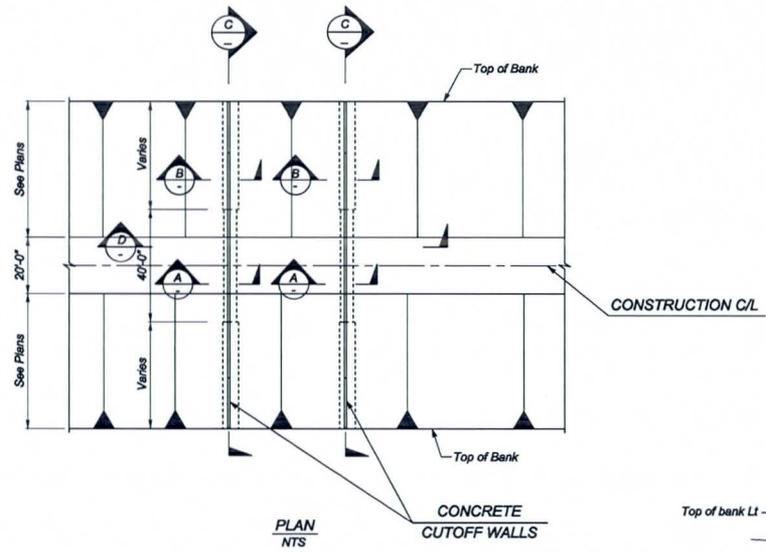
NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 C018

	BY	DATE
DESIGNED	KVH	11/07
DRAWN	FRC	11/07
CHECKED	JRR	11/07

DRAWING NO. D3 HANDRAIL DETAILS SHEET OF 16 62



NOTES

Riprap D_{50} = 18 INCHES

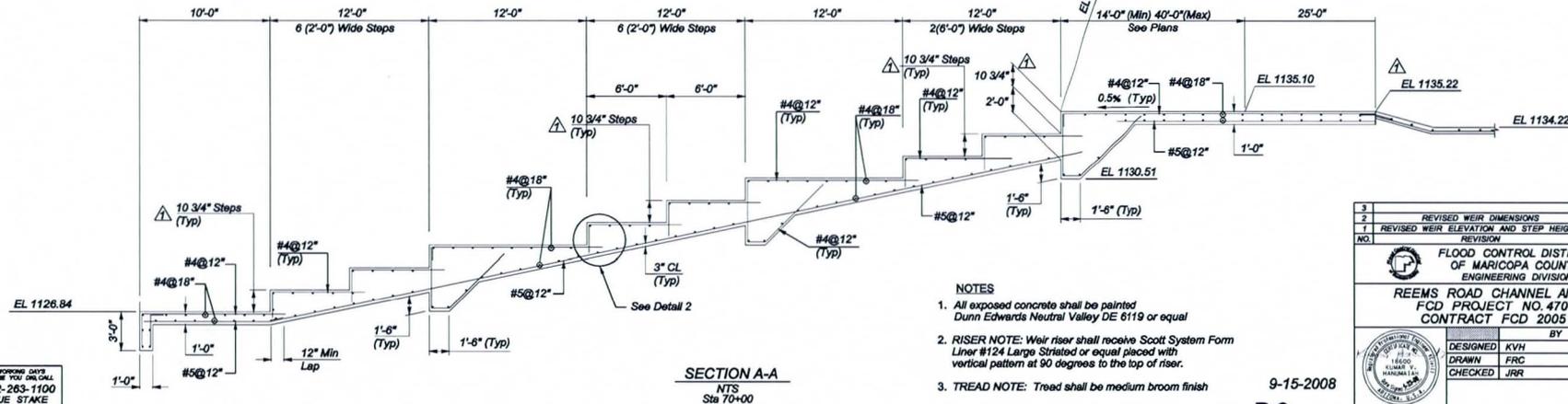
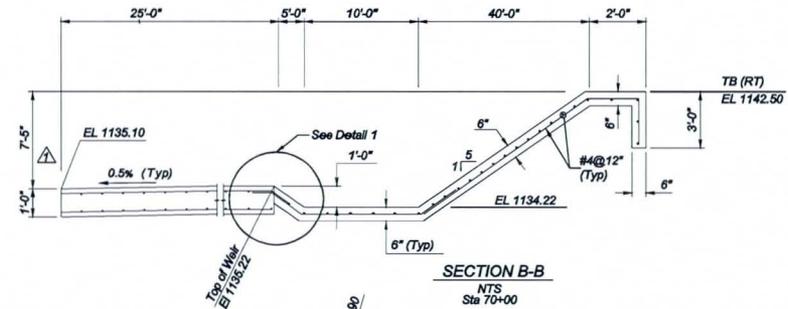
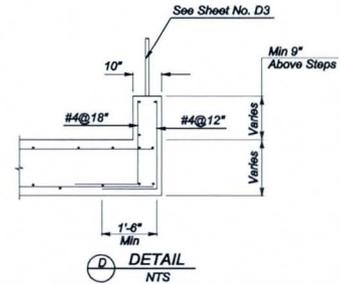
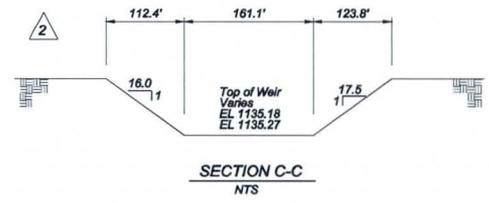
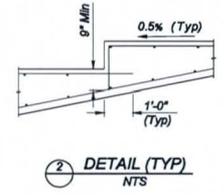
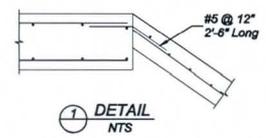
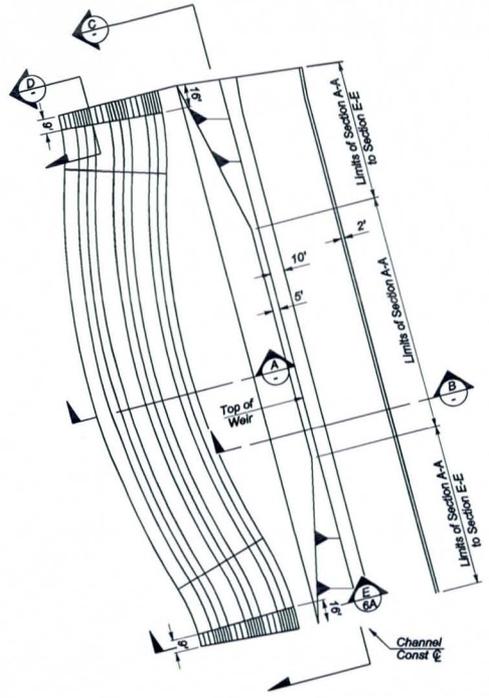
9-15-2008

DETAIL D5

CHANNEL GRADE CONTROL STRUCTURE

THIS WORKING DRAWING
IS TO BE USED ONLY
FOR THE PROJECT
602-263-1100
BLUE STAKE

3			
2			
1			
NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 CD18			
	DESIGNED	KVH	11/07
	DRAWN	FRC	11/07
	CHECKED	JRR	11/07
DRAWING NO. D5	GRADE CONTROL STRUCTURE		SHEET OF 18 59



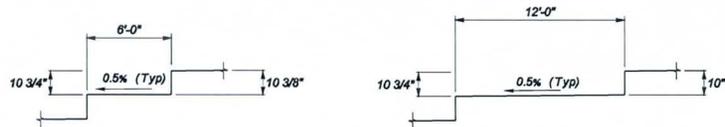
- NOTES**
- All exposed concrete shall be painted Dunn Edwards Neutral Valley DE 6119 or equal
 - RISER NOTE:** Weir riser shall receive Scott System Form Liner #124 Large Striated or equal placed with vertical pattern at 90 degrees to the top of riser.
 - TREAD NOTE:** Tread shall be medium broom finish

9-15-2008

DETAIL **D6**

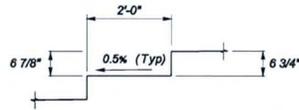
TWO WEEKS ADVANCE BEFORE YOU ORDER BLUE STAKE
802-263-1100

3	REVISED WEIR DIMENSIONS	WAG	8-21-08
2	REVISED WEIR ELEVATION AND STEP HEIGHT	WAG	8-21-08
1	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018			
		BY	DATE
DESIGNED	KVH		08/08
DRAWN	FRC		08/08
CHECKED	JRR		08/08
DRAWING NO.	D6	DESIGN INFORMATION SKETCH	SHEET OF 19 59

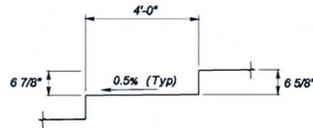


(A-A) 6' WIDE STEP DETAIL
D-6 NTS

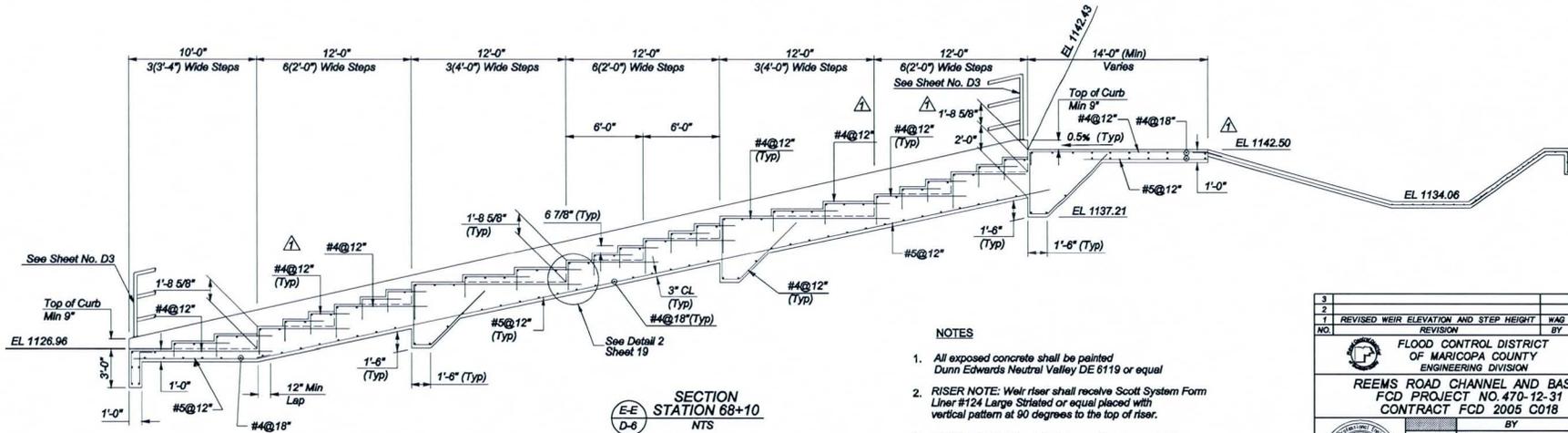
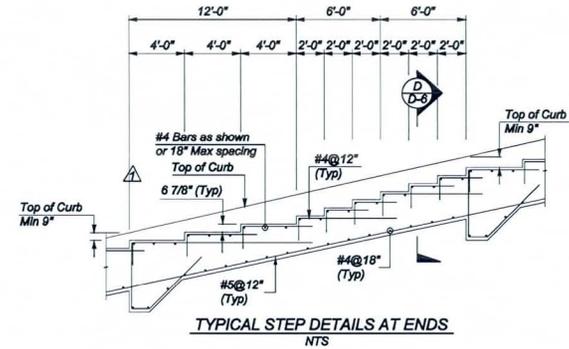
(A-A) 12' WIDE STEP DETAIL
D-6 NTS



(E-E) 2' WIDE STEP DETAIL
- NTS



(E-E) 4' WIDE STEP DETAIL
- NTS



(E-E) SECTION STATION 68+10
D-6 NTS

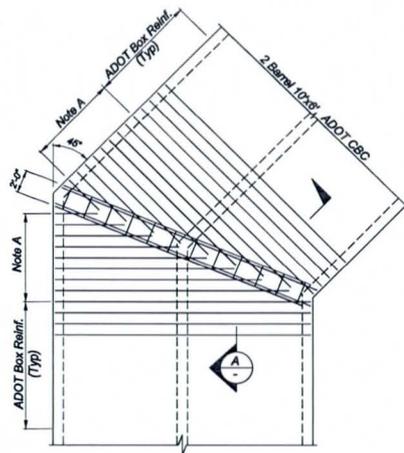
NOTES

- All exposed concrete shall be painted Dunn Edwards Neutral Valley DE 8119 or equal
- RISER NOTE: Weir riser shall receive Scott System Form Liner #124 Large Slatied or equal placed with vertical pattern at 90 degrees to the top of riser.
- TREAD NOTE: Tread shall be medium broom finish

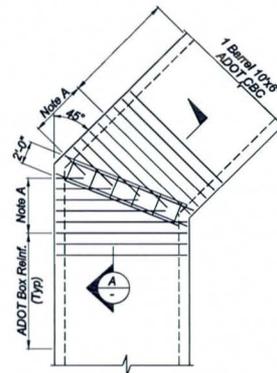
9-15-2008

DETAIL D6A

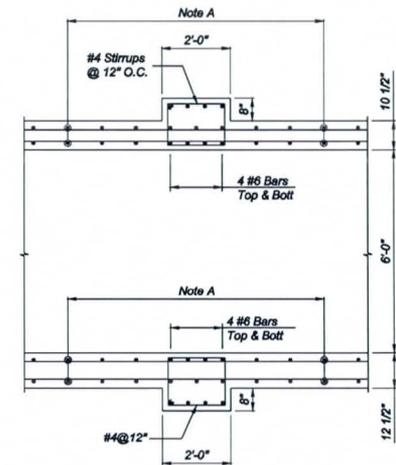
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2			
1	REVISED WEIR ELEVATION AND STEP HEIGHT	WAG	8-21-08
NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018			
		BY	DATE
		DESIGNED	KVH 08/08
		DRAWN	FRC 08/08
		CHECKED	JRR 08/08
DRAWING NO. D6A		DESIGN INFORMATION SKETCH	SHEET OF 10A 58



PLAN VIEW
OF BOX CULVERT AT BENDS
2 BARREL (TYPICAL)
NTS



PLAN VIEW
OF BOX CULVERT AT BENDS
AUXILIARY 1 BARREL (TYPICAL)
NTS



(A) SECTION
NTS

NOTE "A"

Standard ADOT CBC Reinforcing
Cut bars as required and dowel
into proposed beam

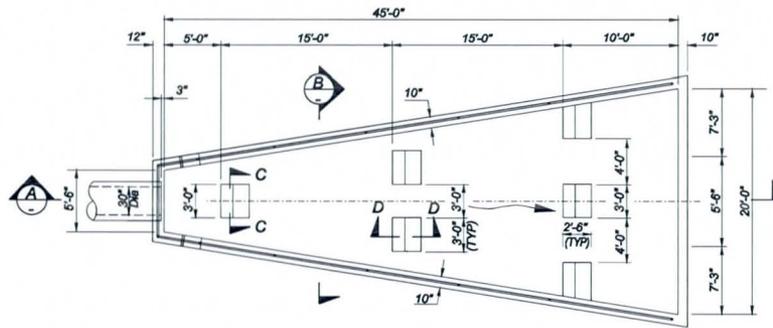
See Drawing No. B1.1, B1.2, C1, & C2
for Concrete Box Culvert

THIS DRAWING DATE
BEFORE YOU DRILL CALL
602-263-1100
BLUE STAKE

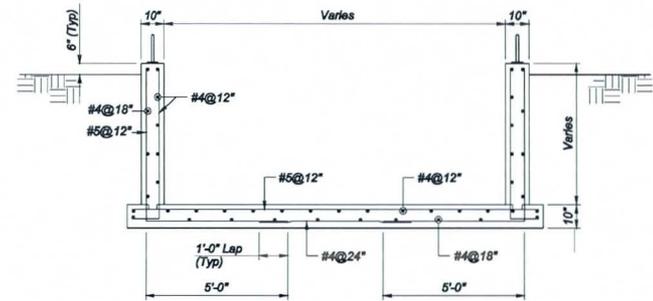
9-15-2008

DETAIL **D7**

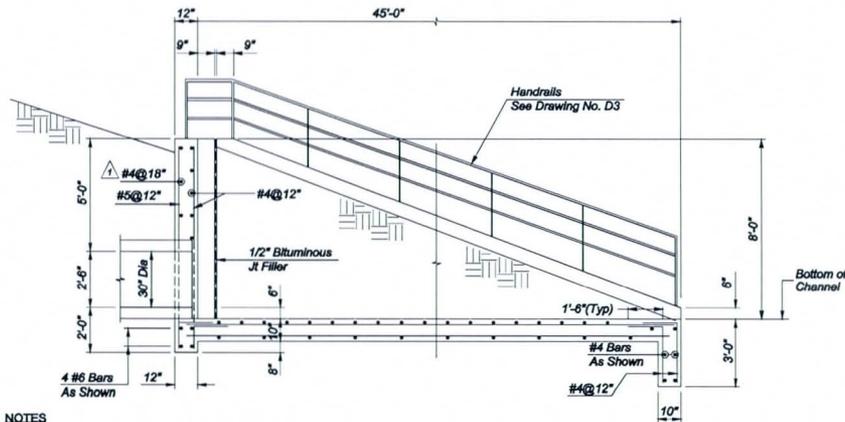
3			
2			
1			
NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018			
	DESIGNED	WAG	11/07
	DRAWN	FRC	11/07
	CHECKED	JRR	11/07
	BY		DATE
DRAWING NO.	STRUCTURAL DETAILS		SHEET OF
D7			20 58



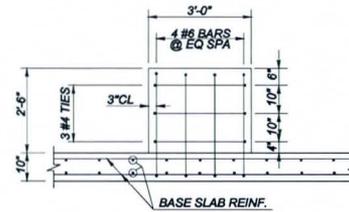
PLAN AT CHANNEL OUTLET
NTS



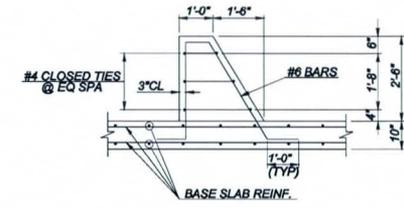
B SECTION
NTS



A SECTION
NTS



C SECTION
NTS



D SECTION
NTS

NOTES

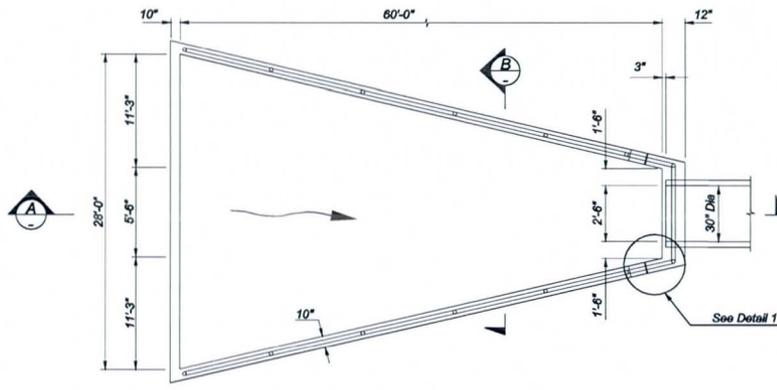
- Exposed concrete surfaces shall receive Scott's System Form Liner #124 Large Striated or equal placed at a 60° angle and painted Dunn Edwards Neutral Valley DE 6119 or equal.

THE ABOVE DATA
APPLIES TO ALL
602-263-1100
BLUE STAKE

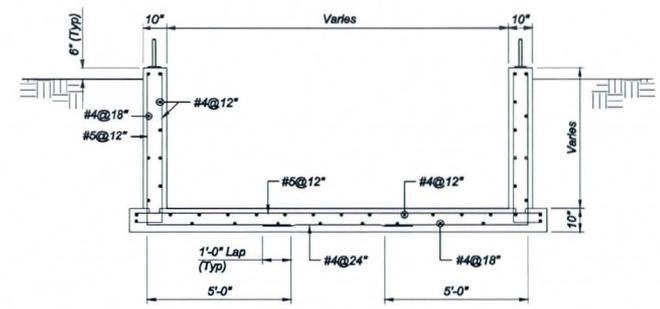
3			
2	Added baffle block to channel outlet	KVH	9-10-08
1	Revised pipe to 30" in section & revised reinforcing	KVH	8-18-08
NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018			
DESIGNED	WAG	DATE	09/07
DRAWN	FRC	DATE	09/07
CHECKED	JRR	DATE	09/07
DRAWING NO. D8R		OUTLET STRUCTURE DETAILS	SHEET OF 21 58

9-15-2008

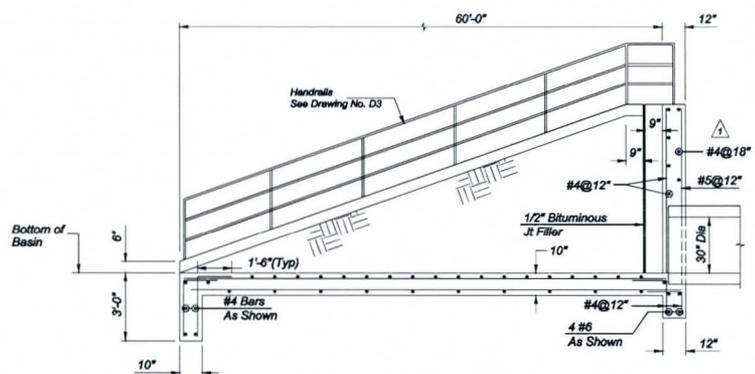
DETAIL D8R



PLAN AT BASIN INLET
NTS

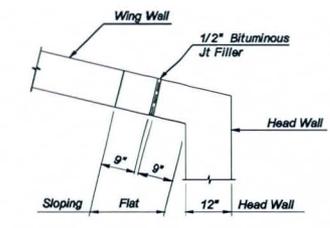


B - SECTION
NTS



A - SECTION
NTS

NOTES
1. Exposed concrete surfaces shall receive Scott System Form Liner #124 Large Striated or equal placed at a 90° angle and painted Dunn Edwards Neutral Valley DE 6119 or equal.



1 TYPICAL EXPANSION JOINT DETAIL
NTS

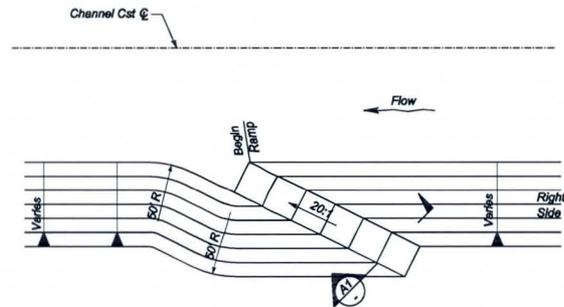
FOR FURTHER DATA
BEFORE YOU OR CALL
602-263-1100
BLUE STAKE

9-15-2008

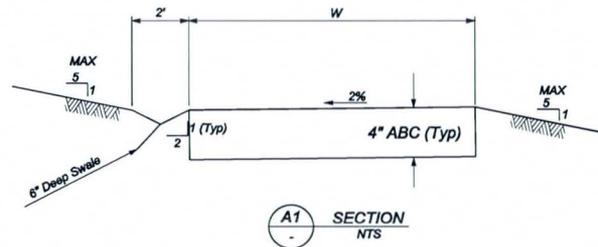
DETAIL D9

3			
2			
1	Revised steel reinforcing	KVH	8-21-08
NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018			
	DESIGNED	WAG	09/07
	DRAWN	FRC	09/07
	CHECKED	JRR	09/07
	BY		DATE
DRAWING NO.	INLET STRUCTURE DETAILS		SHEET OF
D9			22 59

ACCESS RAMP LOCATIONS			
NO.	BEGIN STATION	W (ft)	LENGTH (ft)
1	14+26.6 RT	14	171.54
2	17+67.3 LT	14	160.00
3	20+24.45 LT	14	222.54
4	24+52.08 LT	14	184.00
5	31+14.63 RT	14	195.00
6	44+03.25 LT	14	181.40
7	45+15.18 RT	14	170.00
8	55+24.92 LT	14 <td 287.64	
9	61+33.52 RT	14	161.07
10	73+13.00 LT	14	195.00
11	84+59.00 RT	14	201.30



PLAN VIEW
MAINTENANCE ROAD ACCESS RAMP
NTS



A1 SECTION
NTS

NO WORKING DATE
BEFORE YOU CALL
602-263-1100
BLUE STAKE

9-15-2008
DETAIL D10

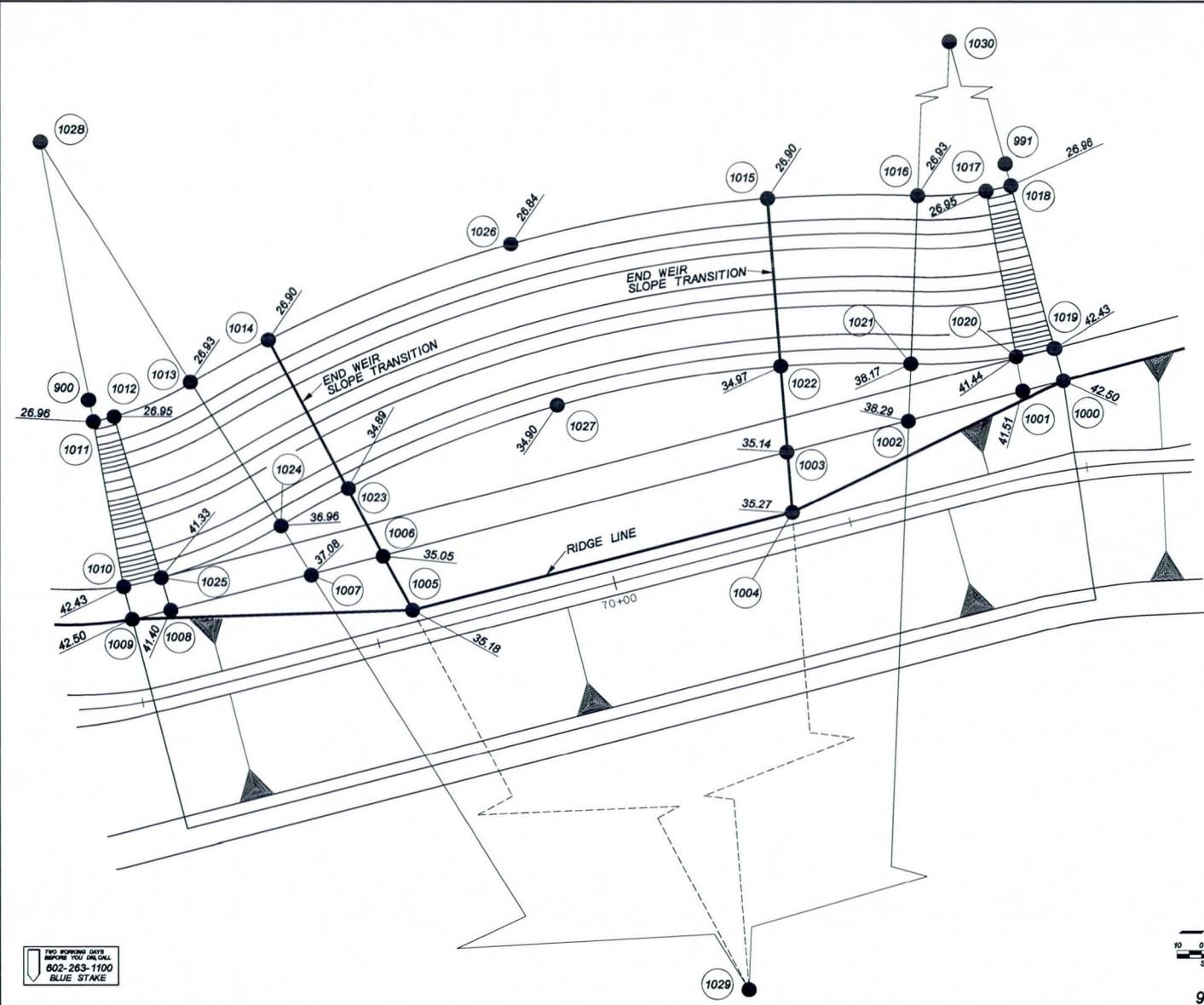
NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 C018

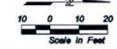
	BY	DATE
DESIGNED	WAG	11/07
DRAWN	FRC	11/07
CHECKED	JRR	11/07

DRAWING NO. D10 MAINTENANCE RAMP SHEET OF 23 58



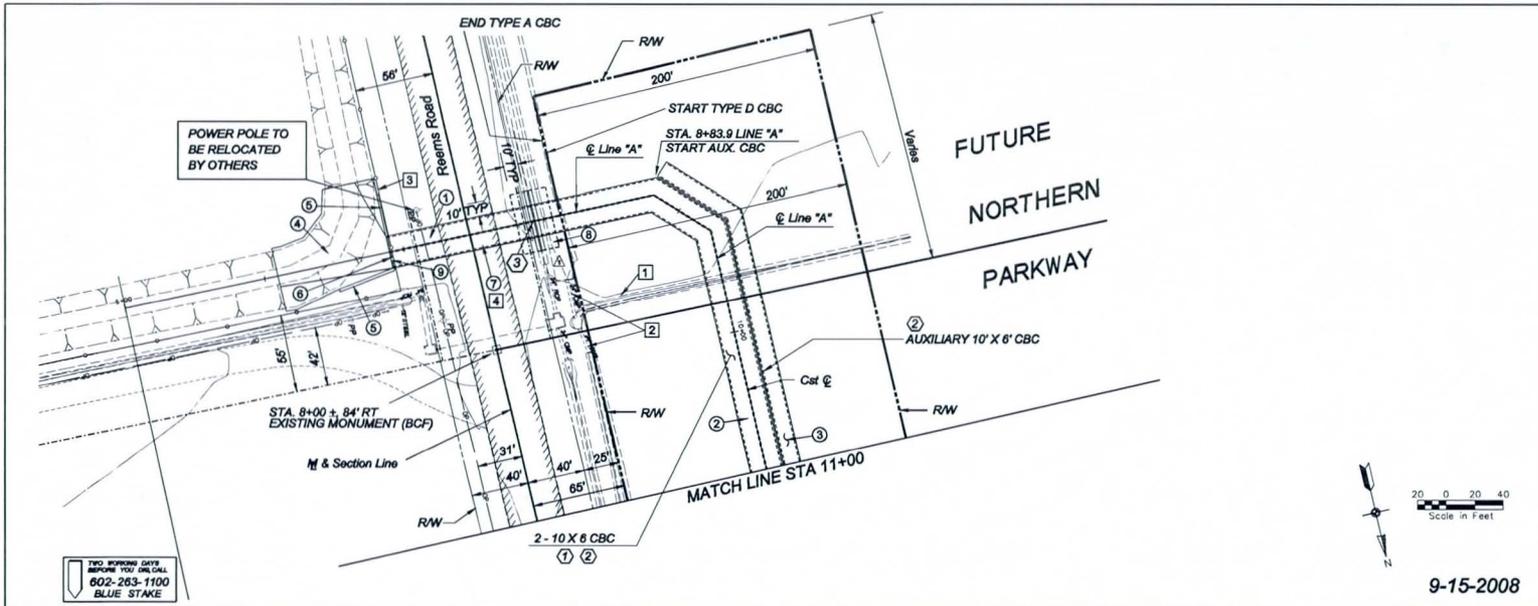
WEIR CONTROL POINTS		
PT#	EASTING	NORTHING
900	SEE SHEET 37	
901	SEE SHEET 37	
1000	554406.5261	937316.5994
1001	554410.8699	937300.0396
1002	554423.4175	937253.1560
1003	554436.2783	937203.1376
1004	554461.5368	937205.4122
1005	554502.4072	937049.5828
1006	554479.9590	937037.5649
1007	554487.8752	937007.9472
1008	554502.5843	936950.3993
1009	554506.4127	936934.4374
1010	554492.8362	936930.8761
1011	554423.9860	936918.2413
1012	554421.8740	936926.8279
1013	554407.3881	936958.3542
1014	554389.6650	936990.2710
1015	554330.5618	937195.3065
1016	554329.4241	937257.0805
1017	554327.5048	937285.1537
1018	554325.2749	937295.2863
1019	554392.9842	937313.0472
1020	554396.4148	937297.4585
1021	554399.3677	937254.2691
1022	554400.3543	937200.6915
1023	554451.6031	937023.1882
1024	554467.2526	936995.4725
1025	554489.0671	936946.4516
1026	554349.6385	937089.7693
1027	554416.7986	937108.8317
1028	554307.6161	936896.8862
1029	554856.5966	937235.8901
1030	554199.5290	937262.3018

TWO WORKING DAYS BEFORE YOU DIG CALL 602-263-1100 BLUE STAKE



9-15-2008

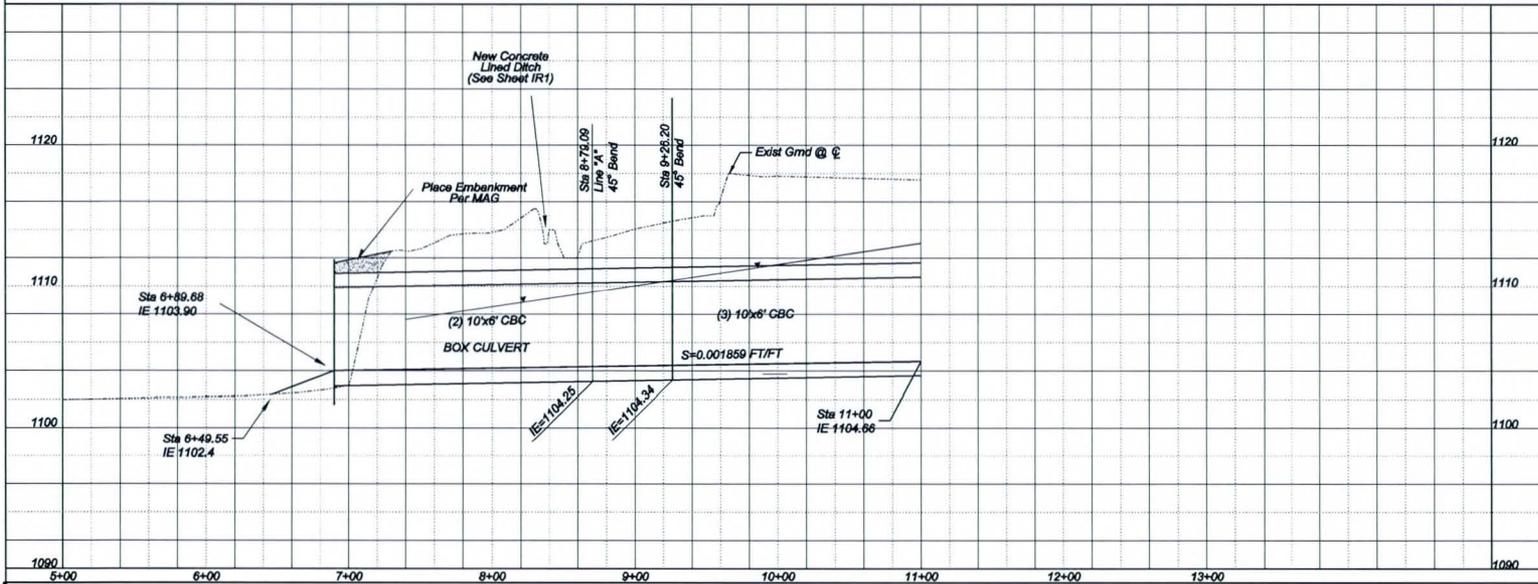
3			
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NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018			
		BY	DATE
		DESIGNED WAG	10/08
		DRAWN GLM	10/08
		CHECKED WAG	10/08
DRAWING NO. D10A		WEIR LAYOUT DETAIL	SHEET OF 23A 59



1	REMOVE CONCRETE LINED DITCH	220 LF
2	REMOVE 24" PIPE & HEADWALLS (NP)	48 LF
3	REMOVE FENCE (NP)	75 LF
4	REMOVE PAVEMENT (NP)	195 SY

1	CONSTRUCT CONCRETE BOX CULVERT TYPE A, SEE DRAWING B1.1, B1.2 & D7	121 LF
2	CONSTRUCT CONCRETE BOX CULVERT TYPE D (30' FILL LOADING) SEE DRAWING B1.1, B1.2 & D7	289 LF
3	CONSTRUCT AUXILIARY CONCRETE BOX CULVERT TYPE B (30' FILL LOADING) SEE DRAWING B1.1, B1.2 & D7	241 LF
4	CONSTRUCT CONCRETE CHANNEL LINING	500 SY
5	CONSTRUCT SOUTH CONCRETE RETAINING WALLS, SEE DRAWING B1.1, B1.2 & D7	2 EA
6	CONSTRUCT ACCESS BARRIER SEE DRAWING B1.2	2 EA
7	PAVEMENT REPLACEMENT MAG 200 TYPE "B" T TOP	195 SY
8	20 MIL PVC SHEET VINYL WATERPROOFING	1,075 SF
9	CONSTRUCT HANDRAIL PER DETAIL ON DRAWING D3	92 LF

9-15-2008



- 1 SEE DRAWING G6 FOR CBC & COORDINATES
- 2 SEE DRAWING NO. B1.1, B1.2 & D7 FOR CONCRETE BOX CULVERT DETAIL (NOTE: ONE BARREL AUXILIARY IS FOR FUTURE STREET DRAINAGE)
- 3 SEE DRAWING G10 & DRAWING NO. IR1 FOR CONCRETE LINED DITCH REPLACEMENT

9-15-2008

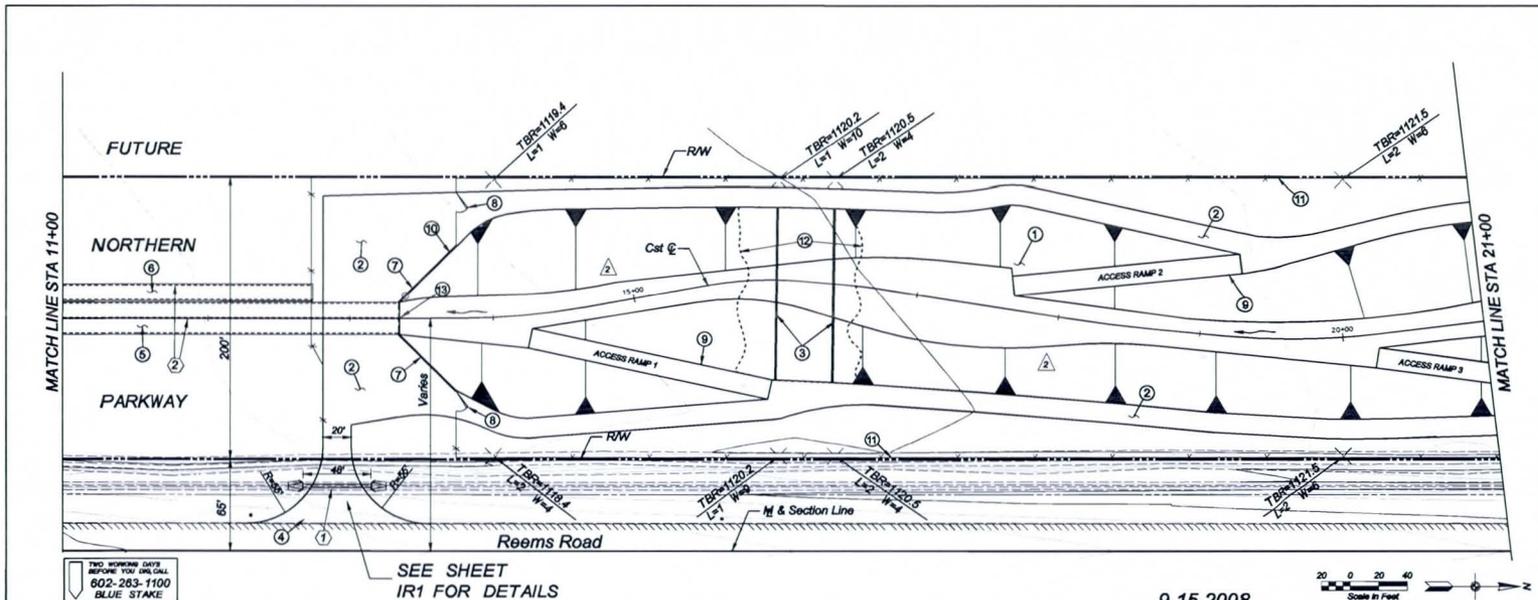
NO.	SEE NOTE	REVISION	WAG	2/12/2008
1			BY	DATE

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 CO18

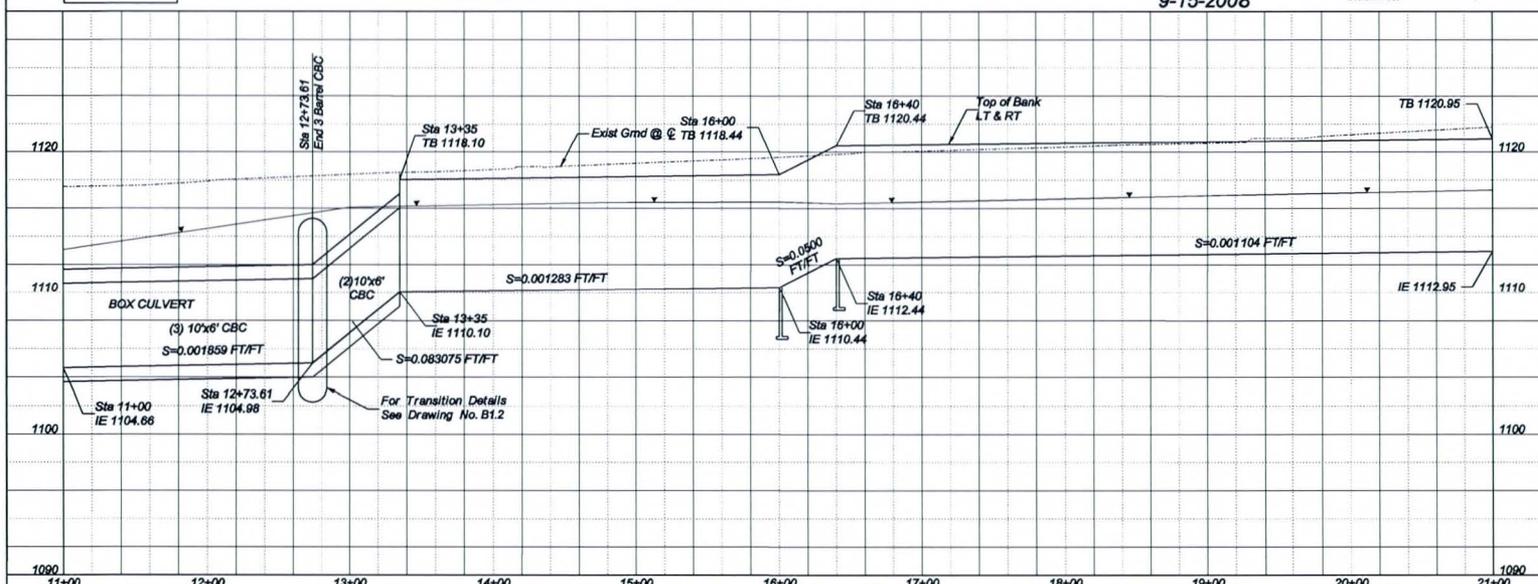
DESIGNED	JRR	BY	DATE
DRAWN	FRC		11/07
CHECKED	WAG		11/07

DRAWING NO.	PLAN AND PROFILE SHEET	SHEET OF
C1R	STA 5+00 TO 11+00	24 59



- ① CONSTRUCT EARTHEN CHANNEL CY
- ② CONSTRUCT 4" ABC MAINTENANCE ROAD 4,343 SY
- ③ CONSTRUCT CONCRETE GRADE CONTROL STRUCTURE. SEE DETAIL D5 2 EA
- ④ PAVEMENT CONNECTION MAG 200 TYPE "B" NOT-TOP 248 SY
- ⑤ CONSTRUCT CONCRETE BOX CULVERT TYPE D (30' FILL) SEE DRAWING B1.1, B1.2, AND D7 235 LF
- ⑥ CONSTRUCT AUX. CONC BOX CULVERT TYPE B (30' FILL) SEE DRAWING B1.1, B1.2, AND D7 174 LF
- ⑦ CONSTRUCT CONCRETE RETAINING WALLS SEE DRAWING B1.1, B1.2, D1 AND D2 2 EA
- ⑧ CONSTRUCT GATE PER DETAIL ON SHEET D4 2 EA
- ⑨ CONSTRUCT ACCESS RAMP PER DETAIL ON SHEET D10 NPI
- ⑩ CONSTRUCT HANDRAIL PER DETAIL ON SHEET D3 134 LF
- ⑪ CONSTRUCT FENCE PER DETAIL ON SHEET D4 1,700 LF
- ⑫ INSTALL PLAIN RIP RAP 1,934 CY
- ⑬ CONSTRUCT ACCESS BARRIER SEE DRAWING B1.2 2 EA

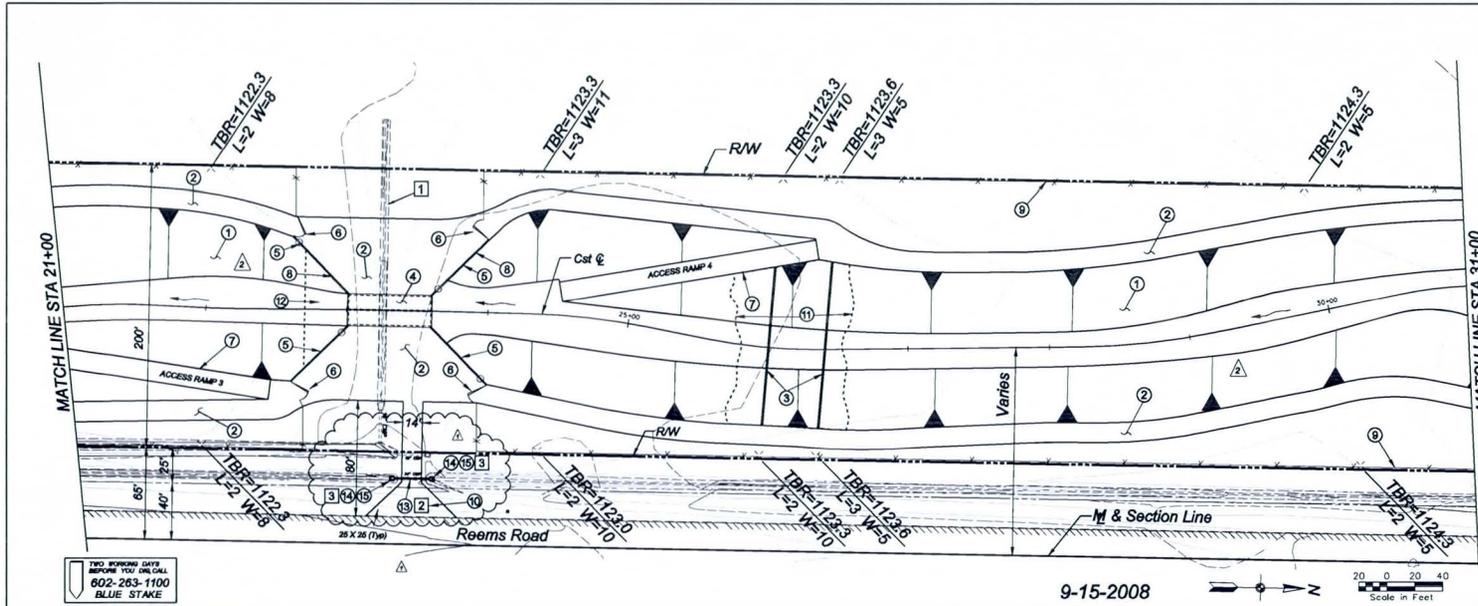
9-15-2008



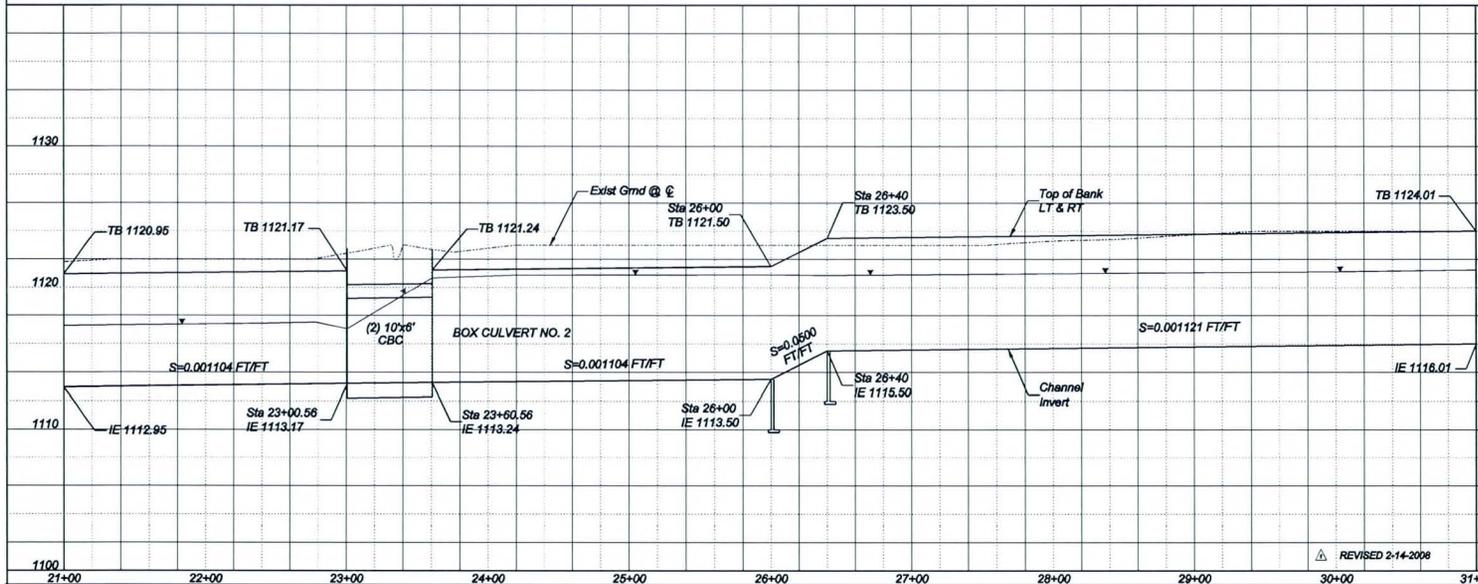
- ① SEE DRAWING IR1 FOR PIPE & DITCH CONSTRUCTION
- ② SEE DRAWING NO. B1.1, B1.2 & D7 FOR CONCRETE BOX CULVERT DETAIL (NOTE: ONE BARREL IS FOR FUTURE STREET DRAINAGE)

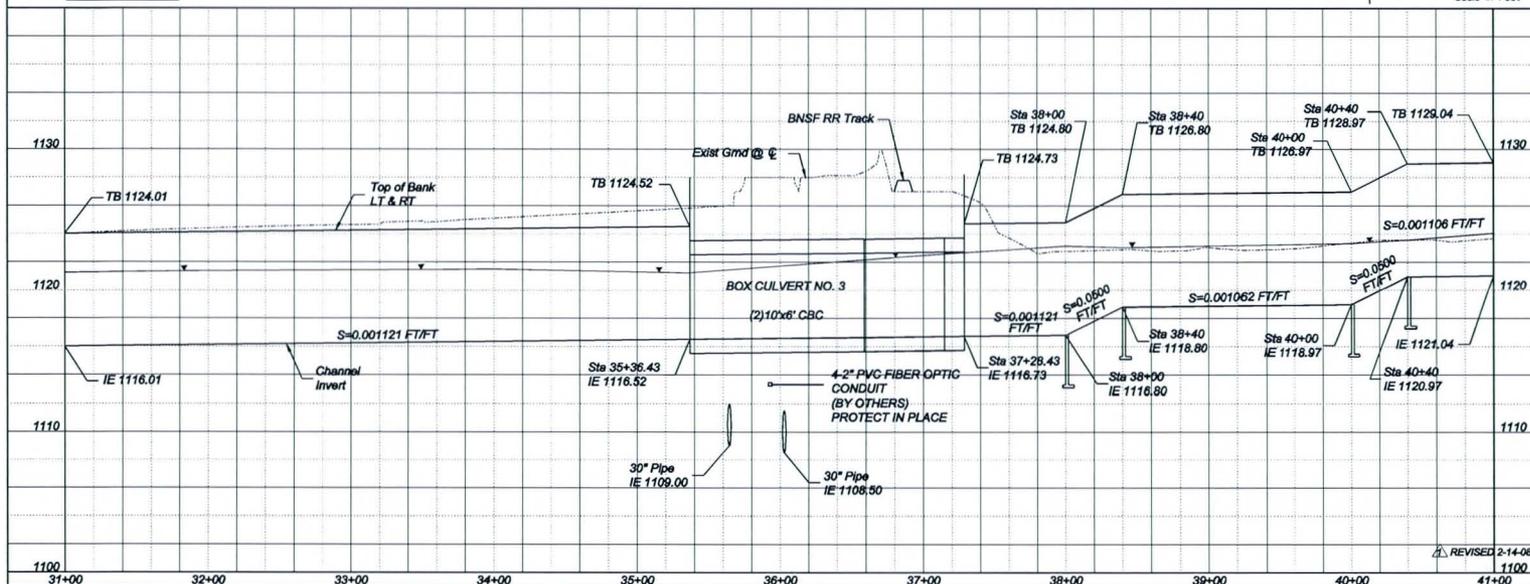
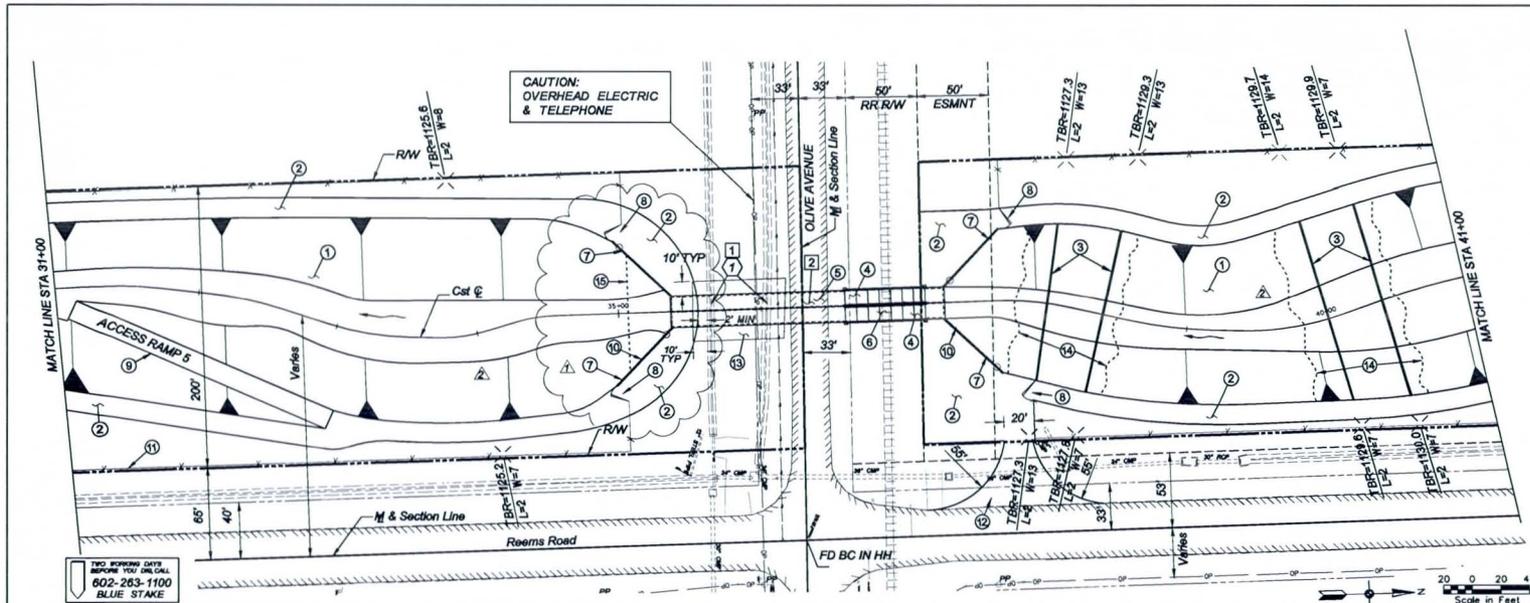
9-15-2008

3	REVISED TOP OF SLOPE	WAG	6-8-08
2			
1			
NO.	REVISION	BY	DATE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 CO18			
		BY	DATE
DESIGNED		JRR	11/07
DRAWN		FRC	11/07
CHECKED		WAG	11/07
DRAWING NO.	PLAN AND PROFILE SHEET	SHEET OF	
C2705	STA 11+00 TO STA 21+00	25 59	



1	CONSTRUCT EARTHEN CHANNEL	CY
2	CONSTRUCT 4" ABC MAINTENANCE ROAD	4,807 SY
3	CONSTRUCT CONCRETE GRADE CONTROL STRUCTURE. SEE DETAIL D5	2 EA
4	CONSTRUCT CONCRETE BOX CULVERT TYPE A SEE DRAWING B2	60 LF
5	CONSTRUCT CONCRETE RETAINING WALLS SEE DRAWING D1, D2 AND B2	4 EA
6	CONSTRUCT GATE PER DETAIL ON SHEET D4	4 EA
7	CONSTRUCT ACCESS RAMP PER DETAIL ON SHEET D10	NPI
8	CONSTRUCT HANDRAIL PER DETAIL ON SHEET D3	288 LF
9	CONSTRUCT FENCE PER DETAIL ON SHEET D4	1,837 LF
10	PAVEMENT REPLACEMENT MAG 200 TYPE "B" NOT T-TOP	143 SY
11	INSTALL PLAIN RIP RAP	1,640 CY
12	INSTALL PLAIN RIP RAP APRON 30 FT IN LENGTH & 3 FT DEEP	1,640 CY
13	INSTALL 24" MAIN LINE PIPE	24 LF
14	INSTALL CONCRETE HEADWALL PER MWD STD DRAWING 723 & 724	2 EA
15	CONSTRUCT CONCRETE LINED DITCH PER MWD STD DRAWING 103	10 LF





- 1 REMOVE CLD - SEE DRAWINGS IR2 & IR3
- 2 REMOVE PAVEMENT (NPI) 135 SY

- 1 CONSTRUCT EARTHEN CHANNEL CY
- 2 CONSTRUCT 4" ABC MAINTENANCE ROAD 3,721 SY
- 3 CONSTRUCT CONCRETE GRADE CONTROL STRUCTURE. SEE DETAIL D5 4 EA
- 4 CONSTRUCT CONCRETE BOX CULVERT TYPE A, SEE DRAWING B3.1 & B3.2 160 LF
- 5 PAVEMENT REPLACEMENT MAG 200 TYPE "B" T-TOP 135 SY
- 6 CONSTRUCT CONCRETE BOX CULVERT TYPE C, SEE DRAWING B3.1 & B3.2 (PRECAST) 112 LF
- 7 CONSTRUCT CONCRETE RETAINING WALLS AT OLIVE AVENUE 4 EA
- 8 CONSTRUCT GATE PER DETAIL ON SHEET D4 4 EA
- 9 CONSTRUCT ACCESS RAMP PER DETAIL ON SHEET D10 NPI
- 10 CONSTRUCT HANDRAIL PER DETAIL ON SHEET D3 268 LF
- 11 CONSTRUCT FENCE PER DETAIL ON SHEET D4 1,580 LF
- 12 PAVEMENT CONNECTION MAG 200 TYPE "B" (NO T-TOP) 250 SY
- 13 20 MIL PVC SHEET VINYL WATERPROOFING 2,782 SF
- 14 INSTALL PLAIN RIP RAP 3,855 CY
- 15 INSTALL PLAIN RIP RAP APRON 30 FT IN LENGTH & 3FT DEEP 3,855 CY

SEE DRAWINGS NO. IR2 & IR3 FOR PIPE AND CONSTRUCTION DETAIL
SEE DRAWING NO. B3.1 & B3.2 FOR CONCRETE BOX CULVERT DETAIL

BNSF REFERENCE INFORMATION:
REEMS RD. MP 6.91, DOT# 025716A

9-15-2008

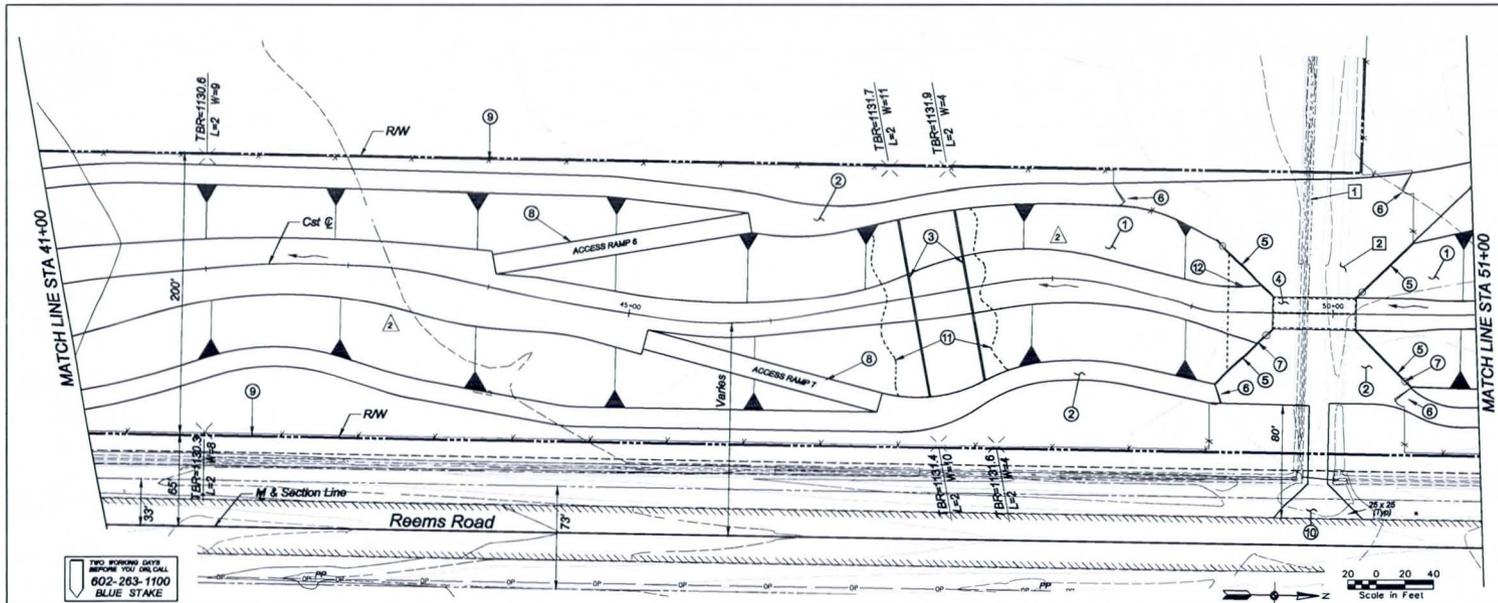
3	REVISED TOP OF SLOPE	WAG	5-8-08
2	REVISED O&M ROADS	WAG	2-14-08
1	REVISION	BY	DATE

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 CO18

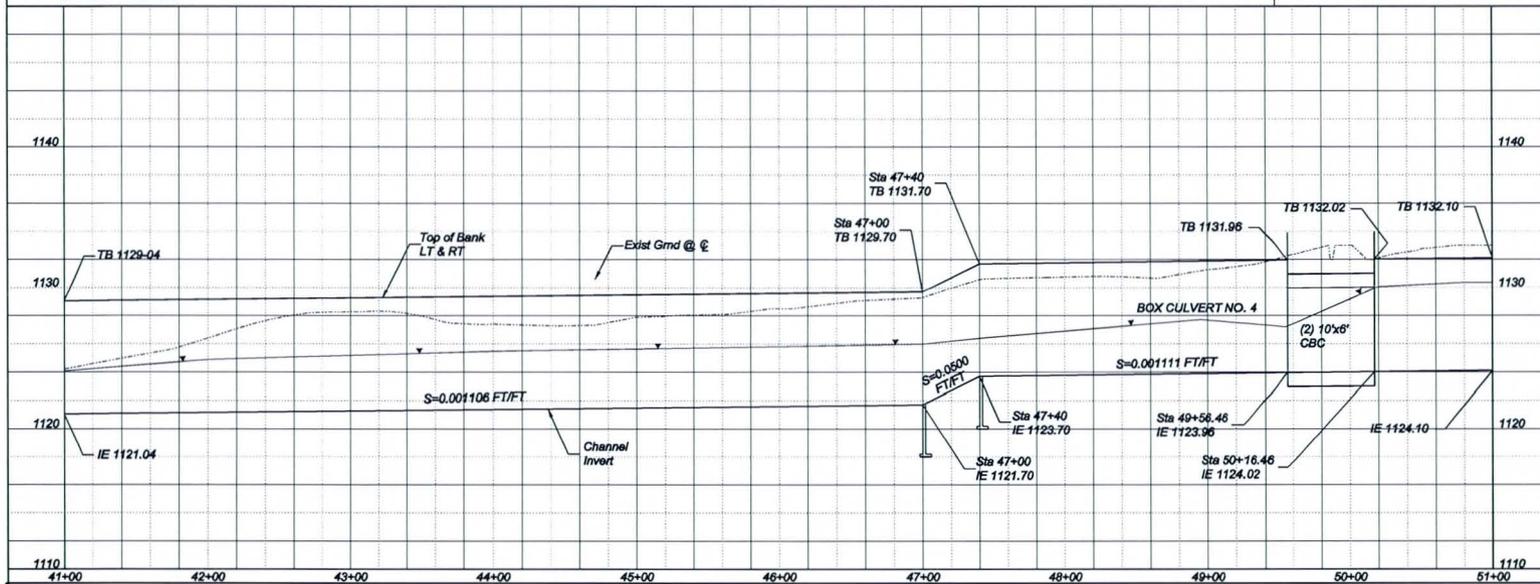
DESIGNED	JRR	BY	DATE
DRAWN	FRC		11/07
CHECKED	WAG		11/07

DRAWING NO. PLAN AND PROFILE SHEET
CARTOS STA 31+00 TO STA 41+00 SHEET OF 27 58



TWO WEEKS DATE BEFORE YOU OR CALL 602-263-1100 BLUE STAKE

- | | | |
|----|--|----------|
| 1 | REMOVE CONCRETE LINED DITCH | 210 LF |
| 2 | CONSTRUCT EARTHEN CHANNEL | CY |
| 3 | CONSTRUCT 4" ABC MAINTENANCE ROAD | 5,509 SY |
| 4 | CONSTRUCT CONCRETE GRADE CONTROL STRUCTURE. SEE DETAIL D5 | 2 EA |
| 5 | CONSTRUCT CONCRETE BOX CULVERT TYPE A, SEE DRAWING B2 | 60 LF |
| 6 | CONSTRUCT CONCRETE RETAINING WALLS SEE DRAWING D1, D2 AND B2 | 4 EA |
| 7 | CONSTRUCT GATE PER DETAIL ON SHEET D4 | 4 EA |
| 8 | CONSTRUCT HANDRAIL PER DETAIL ON SHEET D3 | 288 LF |
| 9 | CONSTRUCT ACCESS RAMP PER DETAIL ON SHEET D10 | NPI |
| 10 | CONSTRUCT FENCE PER DETAIL ON SHEET D4 | 1,695 LF |
| 11 | PAVEMENT CONNECTION MAG 200 TYPE "B" NOT T-TOP | 143 SY |
| 12 | INSTALL PLAIN RIP RAP | 1,724 CY |
| 13 | INSTALL PLAIN RIP RAP APRON 30 FT IN LENGTH & 3 FT DEEP | 1,724 CY |



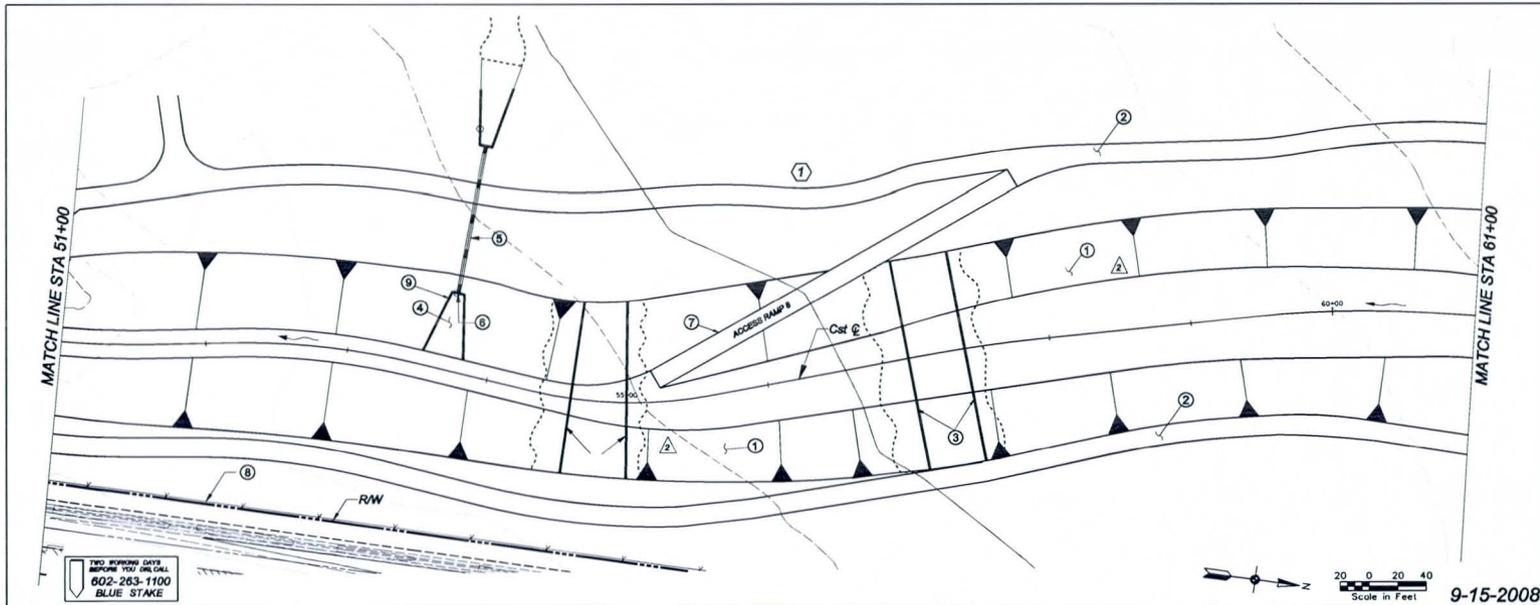
9-15-2008

3	REVISED TOP OF SLOPE	WAG	5-8-08
2			
1	REVISION	BY	DATE

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION
REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 CO18

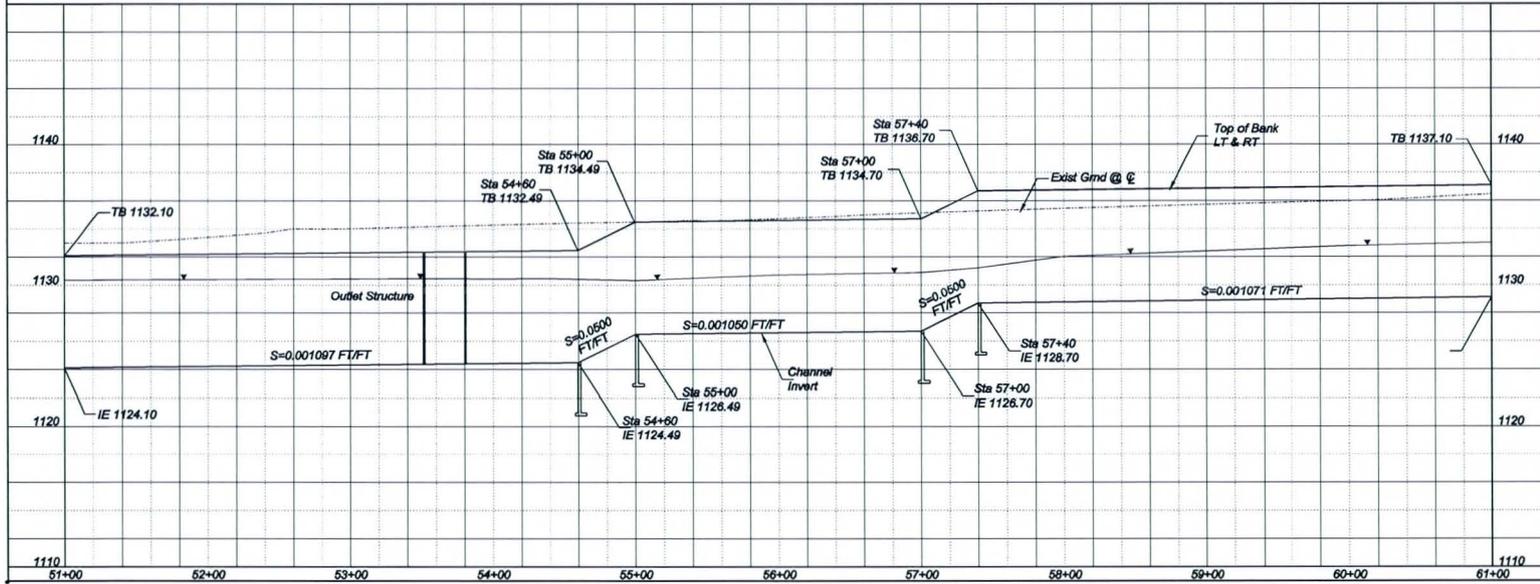
	BY	DATE
DESIGNED	JRR	11/07
DRAWN	FRC	11/07
CHECKED	WAG	11/07

DRAWING NO. C870S	PLAN AND PROFILE SHEET STA 41+00 TO STA 51+00	SHEET OF 28 58
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1	CONSTRUCT EARTHEN CHANNEL	CY
2	CONSTRUCT 4" ABC MAINTENANCE ROAD	3,602 SY
3	CONSTRUCT CONCRETE GRADE CONTROL STRUCTURE SEE DETAIL D5	4 EA
4	CONSTRUCT CONCRETE OUTLET STRUCTURE SEE DRAWING NO. D8	1 EA
5	INSTALL 30 INCH PIPE SEE DRAWING NO. SD1	107 LF
6	INSTALL 30 INCH FLAPGATE - WATERMAN MODEL F-10 OR APPROVED EQUAL	1 EA
7	CONSTRUCT ACCESS RAMP PER DETAIL ON SHEET D10	NPI
8	CONSTRUCT FENCE PER DETAIL ON SHEET D4	982 LF
9	CONSTRUCT HANDRAIL PER DETAIL ON SHEET D3	100 LF
10	INSTALL PLAIN RIP RAP	3,827 CY

- ① SEE DRAWING NO. GB1 FOR BASIN GRADING PLAN
 ② SEE DRAWING NO. D8 FOR OUTLET STRUCTURE DETAIL
 ③ SEE DRAWING NO. D9 FOR INLET STRUCTURE DETAIL
 ④ SEE DRAWING SD-1 FOR STORM DRAIN PROFILE



- ① SEE DRAWING NO. GB1 FOR BASIN GRADING PLAN
 ② SEE DRAWING NO. D8 FOR OUTLET STRUCTURE DETAIL
 ③ SEE DRAWING NO. D9 FOR INLET STRUCTURE DETAIL
 ④ SEE DRAWING SD-1 FOR STORM DRAIN PROFILE

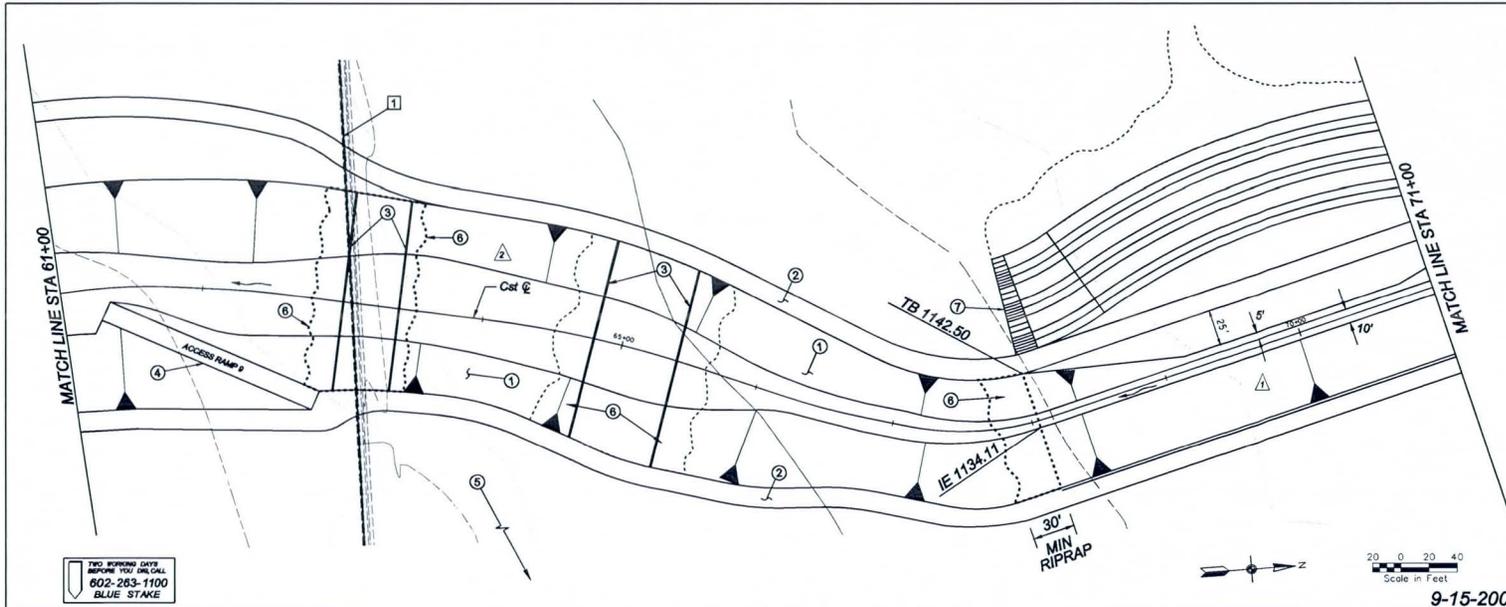
9-15-2008

3	REVISED TOP OF SLOPE	WAG	5-8-08
2			
1			
NO.	REVISION	BY	DATE


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION
REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 C018

DESIGNED	JRR	08/07
DRAWN	FRC	08/07
CHECKED	WAG	08/07

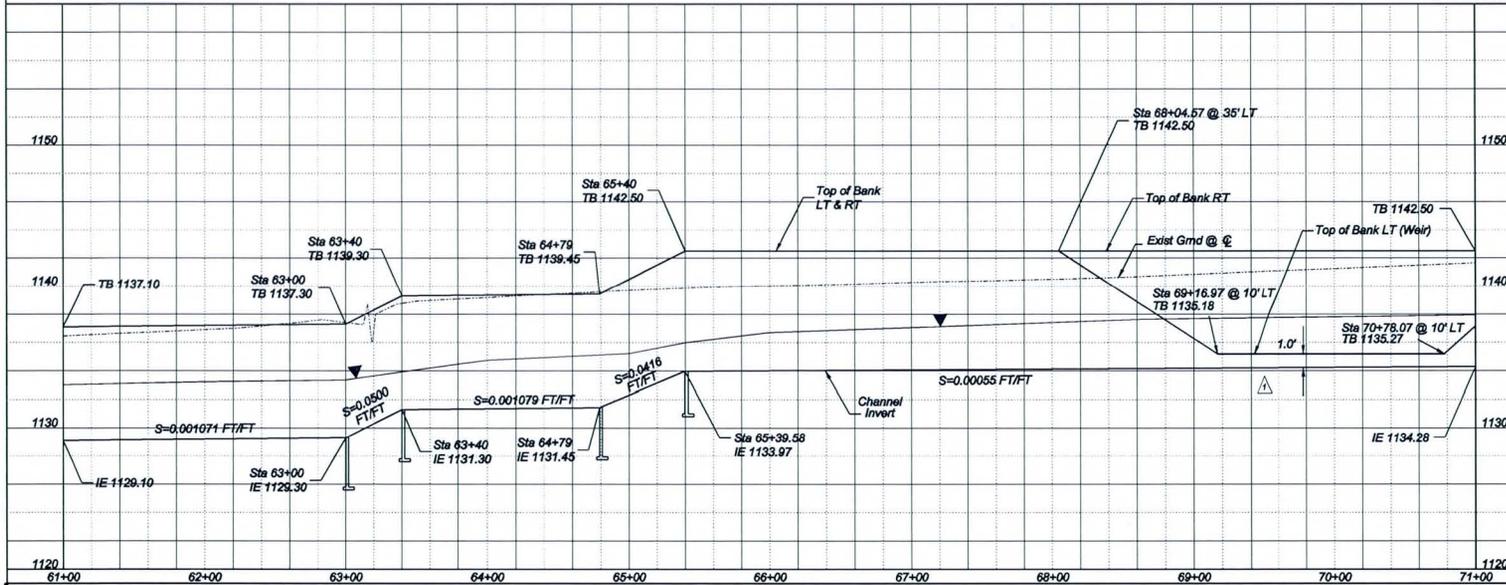
DRAWING NO.	PLAN AND PROFILE SHEET	SHEET OF
CETOS	STA 51+00 TO STA 61+00	29 58



TWO BYTWO DATE BEFORE YOU DRILL 602-263-1100 BLUE STAKE

9-15-2008

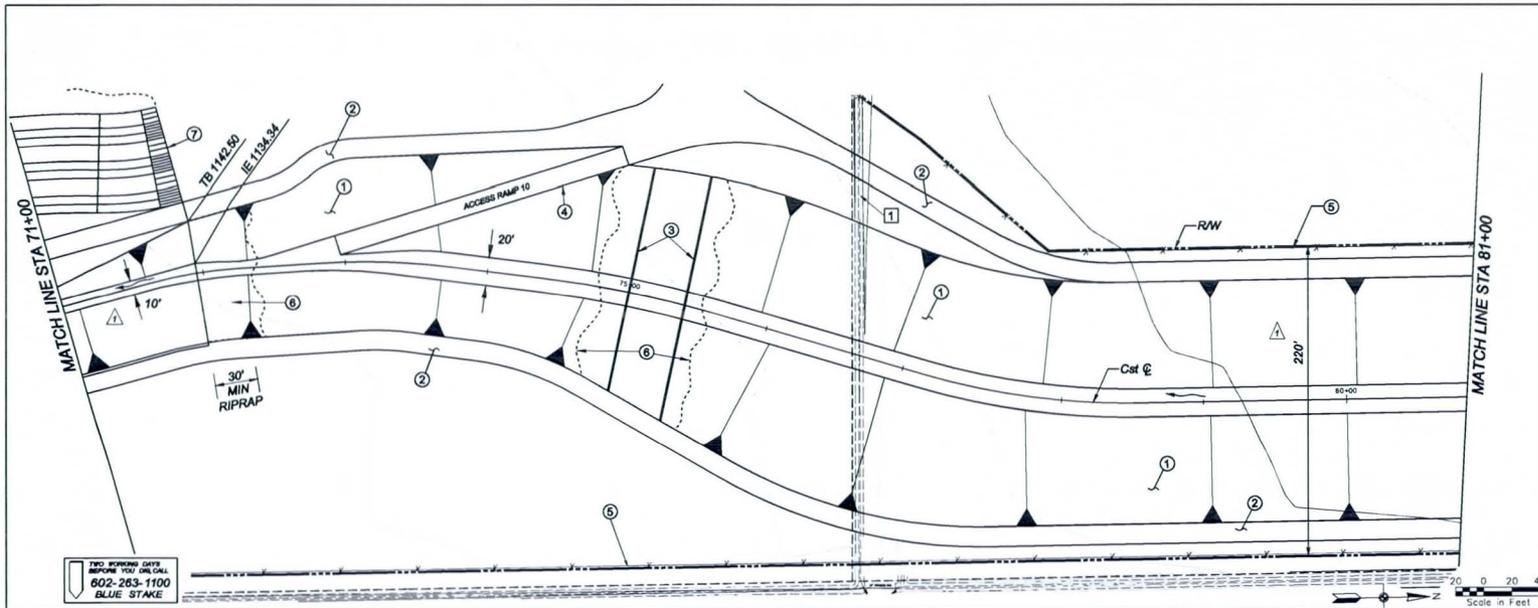
- 1 SEE DRAWING GB1 FOR DITCH REMOVALS
- ① CONSTRUCT EARTHEN CHANNEL CY 2,996 SY
 - ② CONSTRUCT 4" ABC MAINTENANCE ROAD 4 EA
 - ③ CONSTRUCT CONCRETE GRADE CONTROL STRUCTURE. SEE DETAIL D5 NPI
 - ④ CONSTRUCT ACCESS RAMP PER DETAIL ON SHEET D4 1,004 LF
 - ⑤ CONSTRUCT FENCE PER DETAIL ON SHEET D4 4,699 CY
 - ⑥ INSTALL PLAIN RIP RAP 70 LF
 - ⑦ CONSTRUCT HANDRAIL PER DETAIL ON SHEET D3



SEE DRAWING GB1 FOR BASIN GRADING PLAN

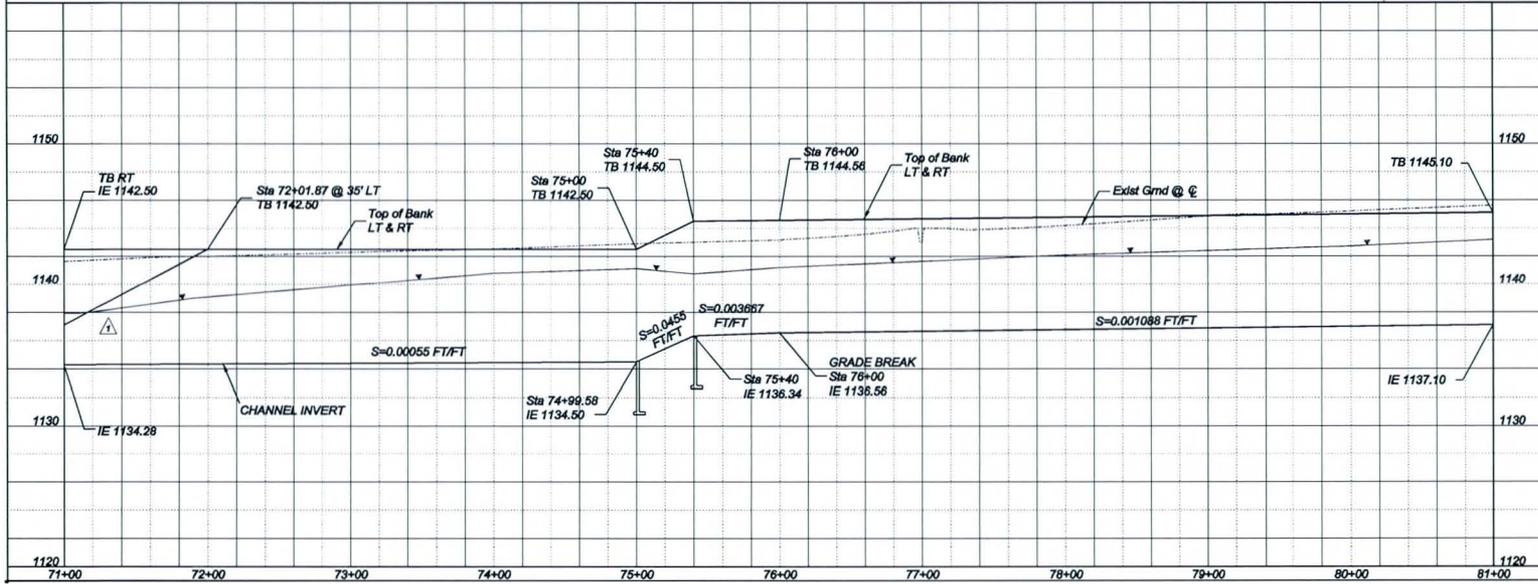
9-15-2008

3			
2	REVISED WEIR & CHANNEL	WAG	8-18-2008
1	REVISION	BY	DATE
NO.			
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 CO18			
	DESIGNED	JRR	11/07
	DRAWN	FRC	11/07
	CHECKED	WAG	11/07
		BY	DATE
DRAWING NO.	PLAN AND PROFILE SHEET		SHEET OF
CTR8-18-08	STA 61+00 TO STA 71+00		30 59



720. REMOVE DATE BEFORE YOU USE. CALL 602-263-1100 BLUE STAKE

1 REMOVE CONCRETE LINED DITCH	380 LF
2 CONSTRUCT 4" ABC MAINT. RD	3,700 SY
3 CONSTRUCT CONCRETE GRADE CONTROL STRUCTURE. SEE DETAIL D5	2 EA
4 CONSTRUCT ACCESS RAMP PER DETAIL ON SHEET D10	NPI
5 CONSTRUCT FENCE PER DETAIL ON SHEET D4	1,261 LF
6 INSTALL PLAIN RIP RAP	3,043 CY
7 CONSTRUCT HANDRAIL PER DETAIL ON SHEET D3	70 LF



SEE DRAWING NO. G81 FOR BASIN GRADING PLAN

9-15-2008

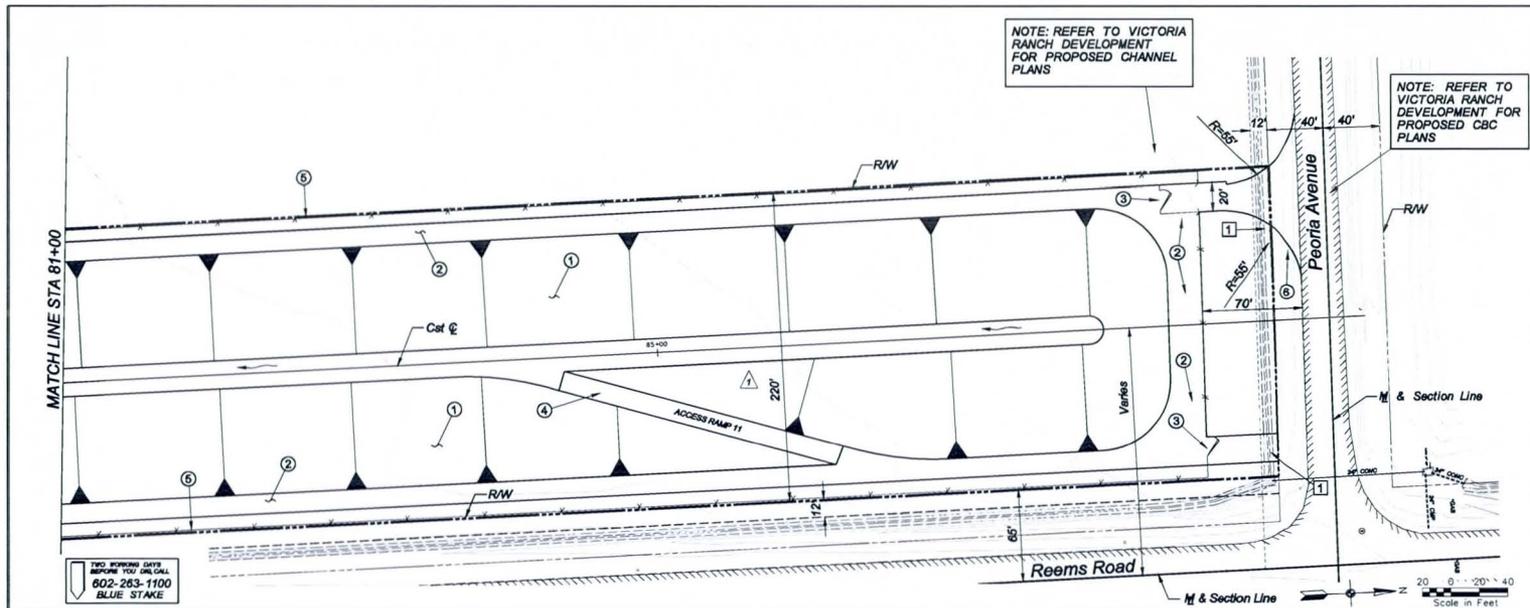
NO.	REVISION	WAG	8-18-2008
1	REVISED WEIR & CHANNEL		
2			
3			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

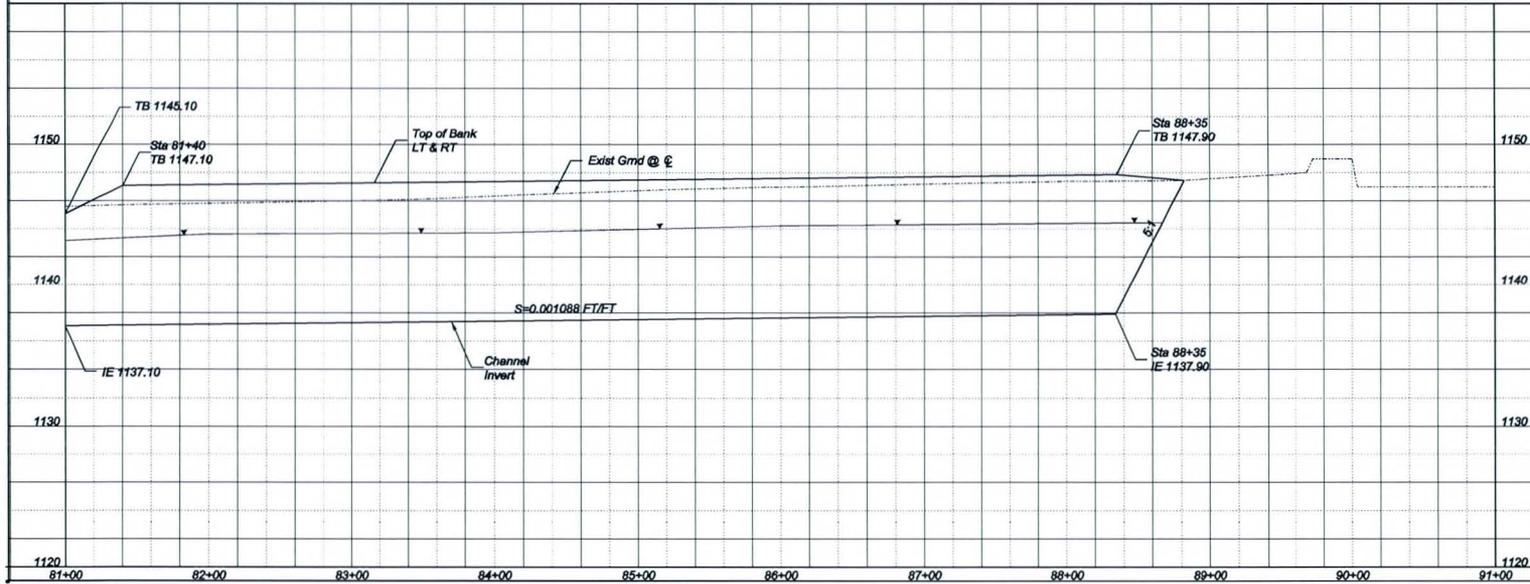
REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 CO18

DESIGNED	JRR	DATE	11/07
DRAWN	FRC	DATE	11/07
CHECKED	WAG	DATE	11/07

DRAWING NO. C898-18-08 PLAN AND PROFILE SHEET STA 71+00 TO STA 81+00 SHEET OF 31 59



- 1 REMOVE CONCRETE LINED DITCH (NPI) 270 LF
- 2 CONSTRUCT 4" ABC MAINTENANCE ROAD 3,846 SY
- 3 CONSTRUCT GATE PER DETAIL ON SHEET D4 2 EA
- 4 CONSTRUCT ACCESS RAMP PER DETAIL ON SHEET D10 NPI
- 5 CONSTRUCT FENCE PER DETAIL ON SHEET D4 1,896 LF
- 6 PAVEMENT CONNECTION MAG 200 TYPE "B" (NOT T-TOP) 160 SY



9-15-2008

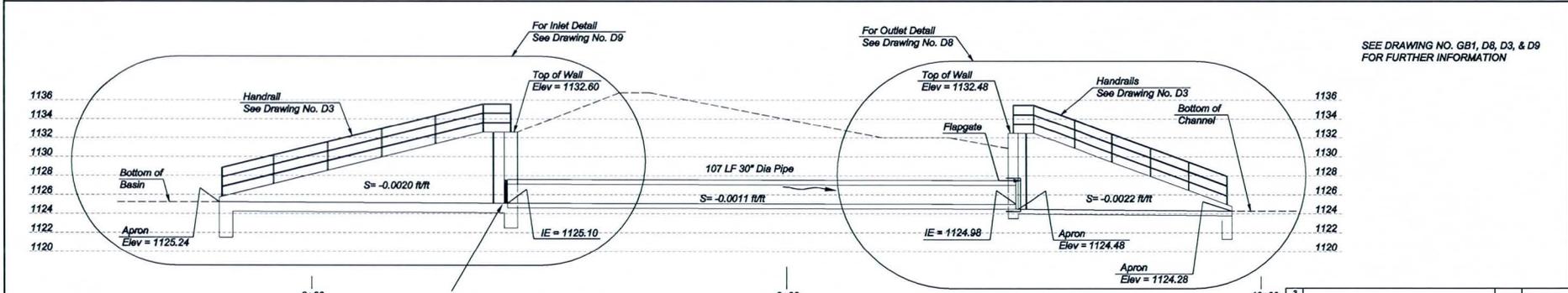
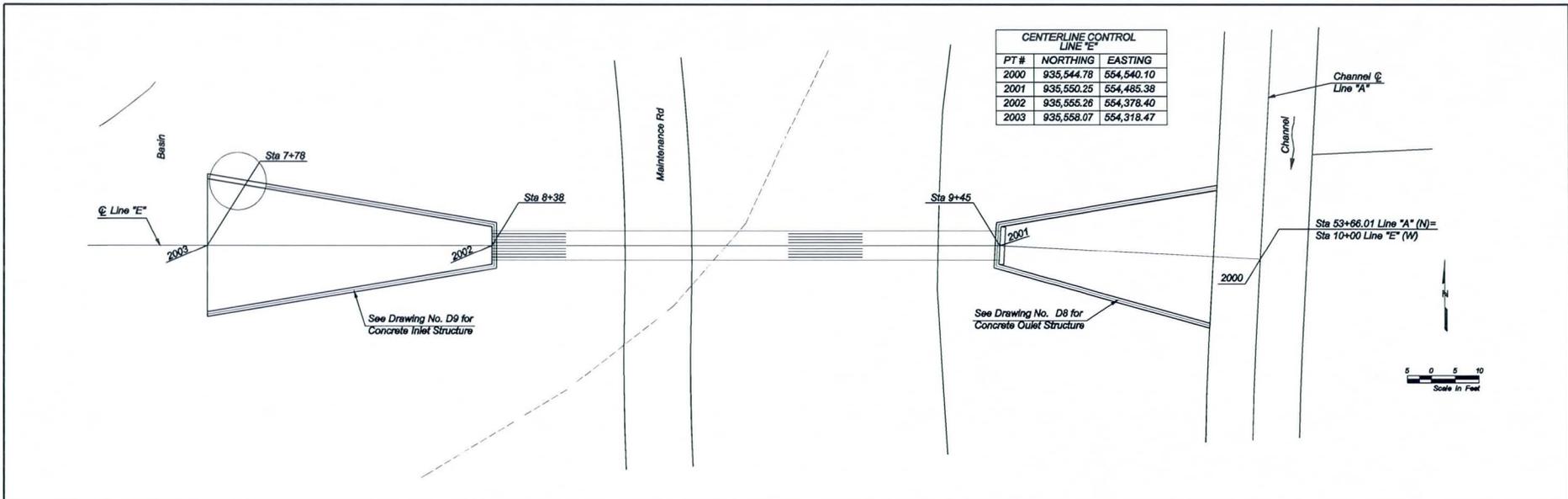
NO.	REVISION	BY	DATE
1	REVISED ROW AND ALIGNMENT FOR CHANNEL	WAG	5/1/2008

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 CO18

DESIGNED	JRR	DATE	11/07
DRAWN	FRC	DATE	11/07
CHECKED	WAG	DATE	11/07

DRAWING NO. CWR PLAN AND PROFILE SHEET STA 81+00 TO STA 91+00 SHEET OF 32 59



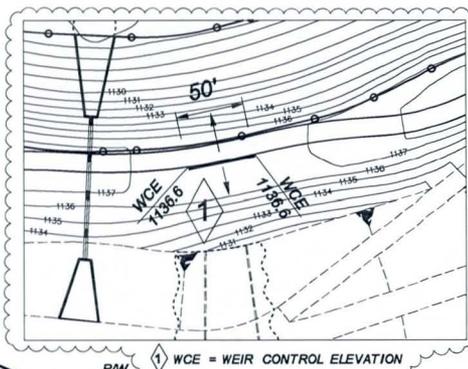
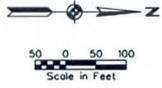
SEE DRAWING NO. GB1, D8, D3, & D9
FOR FURTHER INFORMATION

E SECTION

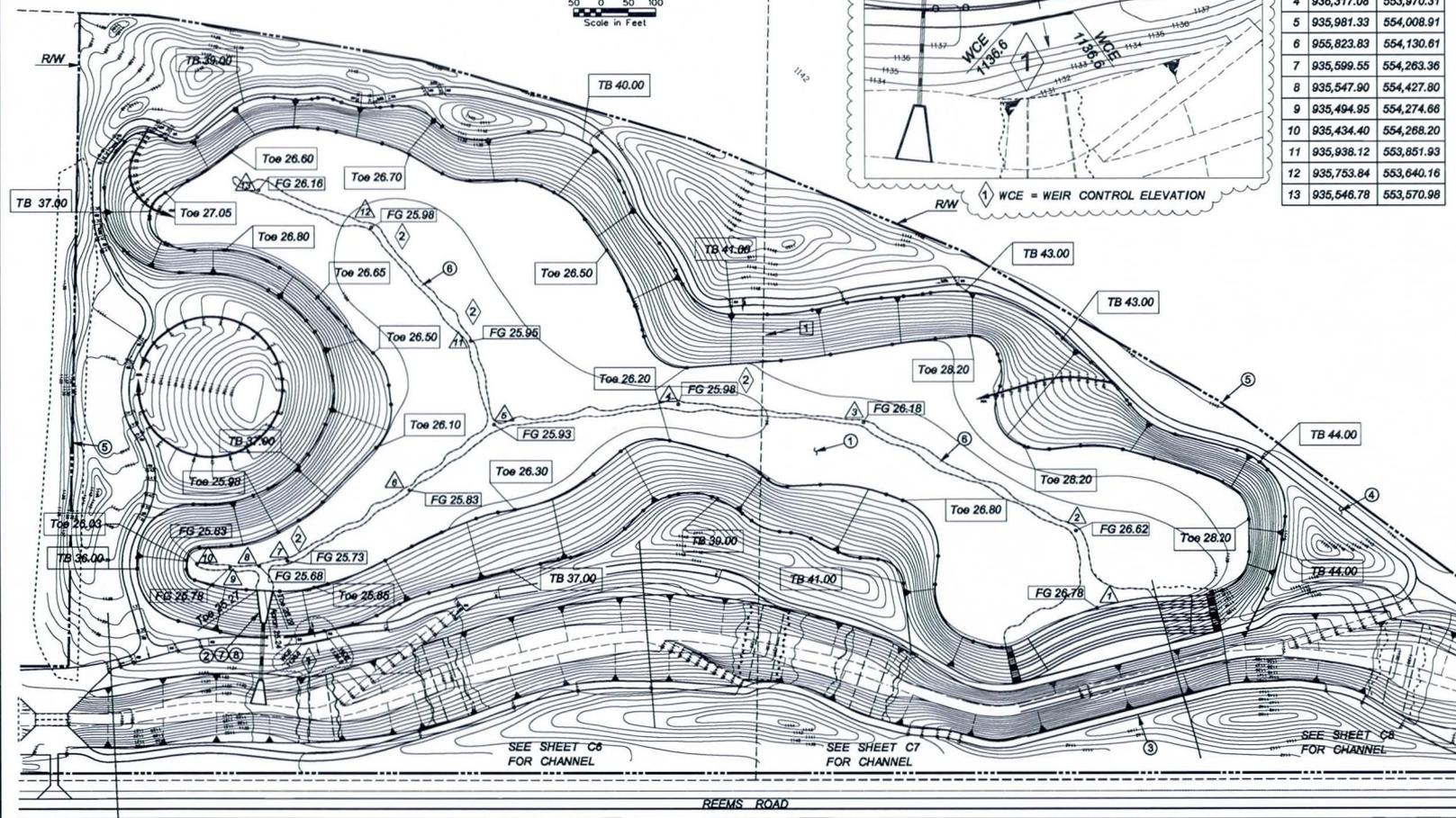
3			
2			
1			
NO.	REVISION	BY	DATE
REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018			
	DESIGNED	WAG	11/07
	DRAWN	FRC	11/07
	CHECKED	JRR	11/07
	BY	DATE	
	DESIGNED	WAG	11/07
	DRAWN	FRC	11/07
	CHECKED	JRR	11/07
DRAWING NO.	PLAN AND DETAIL VIEW		SHEET OF
SD1			33 OF 39

9-15-2008

100 REMOVAL DAYS
BEFORE YOU DRILL
802-263-1100
BLUE STAKE



PT NO.	NORTHING	EASTING
1	937,085.26	554,350.96
2	937,047.43	554,206.76
3	936,657.19	554,005.03
4	936,317.08	553,870.31
5	935,981.33	554,008.91
6	955,823.83	554,130.61
7	935,599.55	554,263.36
8	935,547.90	554,427.80
9	935,494.95	554,274.66
10	935,434.40	554,268.20
11	935,938.12	553,851.93
12	935,753.84	553,640.16
13	935,546.78	553,570.98



REMOVE		
1	REMOVE CONCRETE LINED DITCH	1,140 LF

CONSTRUCTION		
1	EXCAVATE BASIN	437,800 CY
2	CONSTRUCT INLET STRUCTURE SEE SHEET NO. D9, SD1	1 EA
3	CONSTRUCT WEIR STRUCTURE SEE SHEET NO. D6	1 EA
4	CONSTRUCT 4" ABC MAINTENANCE ROAD	6,182 SY
5	INSTALL WIRE FENCE	4,153 LF
6	INSTALL RIPRAP	4,762 CY
7	CONSTRUCT HANDRAIL	140 LF
8	CONSTRUCT ACCESS BARRIER PER DETAIL DRAWING B1.2 MODIFIED, SD1	1 EA

SEE SHEET LP3-LP8 FOR LANDSCAPE MOUND INFORMATION

3	UPDATED LFC ELEV. & DEL 1125' CONTOUR	WAG	2/17/2009
2	ADDED BASIN EMERGENCY SPILLWAY	WAG	6/5/2008
1	REVISION	BY	DATE

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 C018

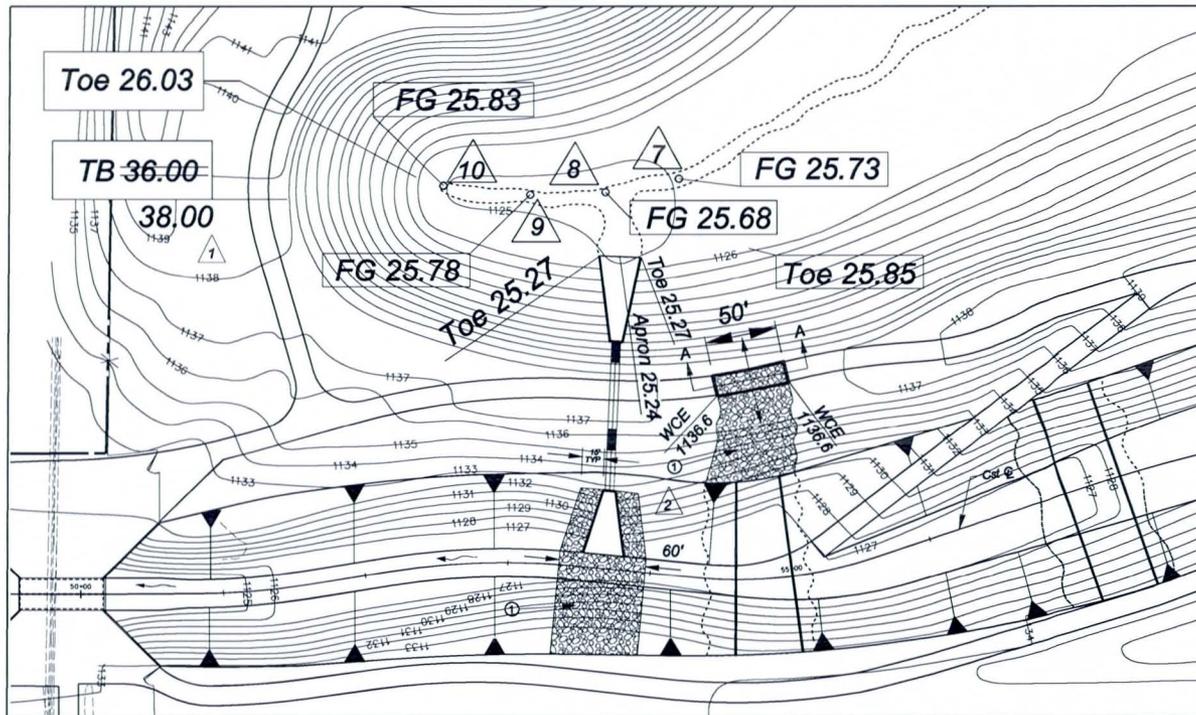
DESIGNED	WAG	BY	DATE
DRAWN	FRC		11/07
CHECKED	JRR		11/07

DRAWING NO. GB1R BASIN GRADING PLAN SHEET OF 34 59

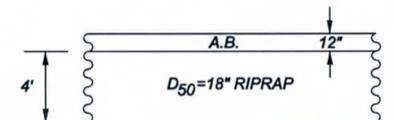
TWO WORKING DAYS BEFORE YOU DIG CALL 602-263-1100 BLUE STAKE

WCE = WEIR CONTROL ELEVATION

9-15-2008



① INSTALL PLAIN RIPRAP
 $D_{50}=18"$ - 4' THICK 1385 CY
 (WITH 12" ABC CAP ON
 MAINTENANCE ACCESS ROAD)



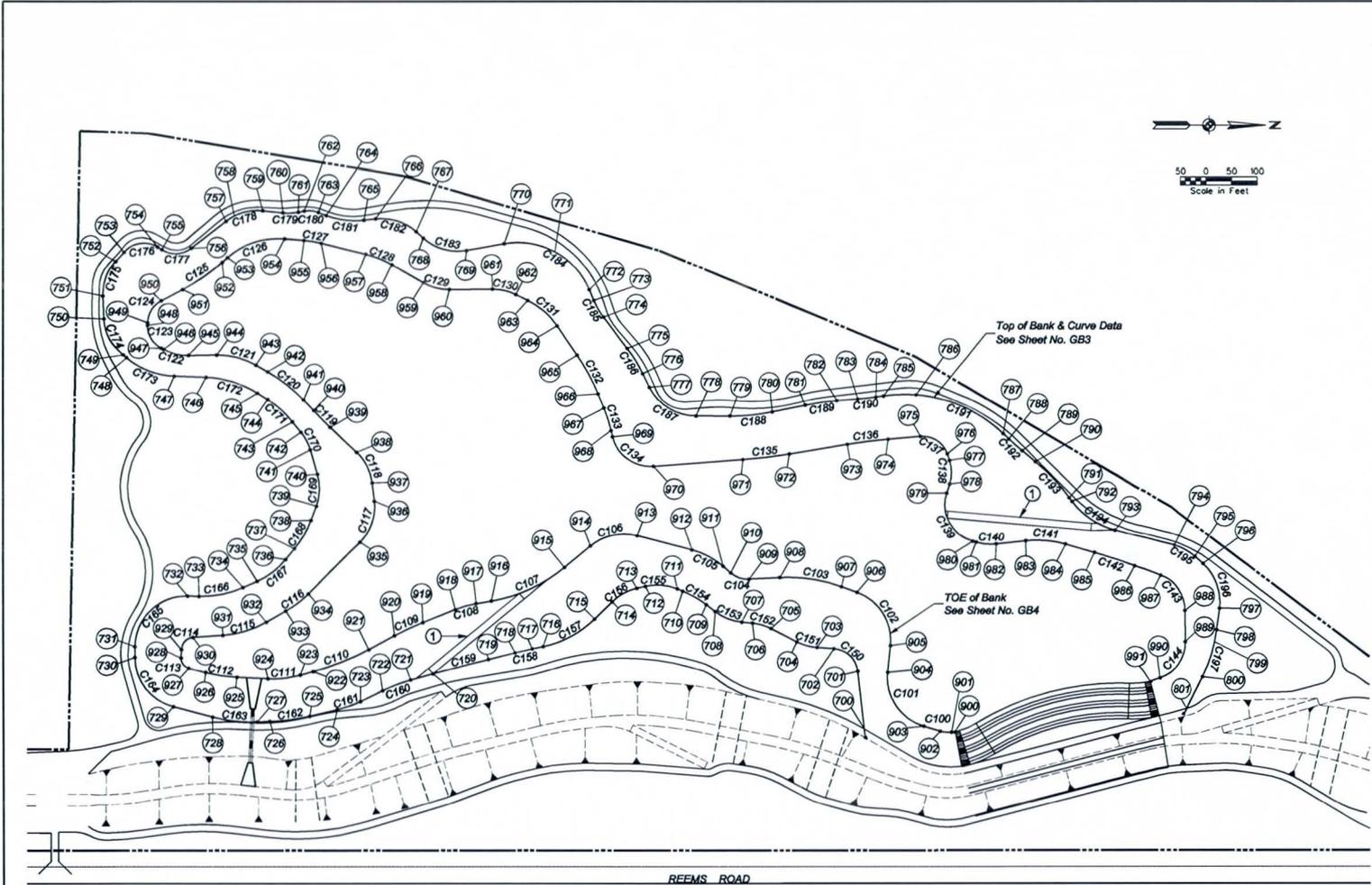
SEC A-A
 (ALONG 50' SECTION OF
 MAINTENANCE ACCESS ROAD ONLY)

TWO WORKING DAYS
 BEFORE YOU DRILL
 602-263-1100
 BLUE STAKE



3	ADDED RIPRAP	WAG	4-08-2008
2	REVISED TB ELEV TO 1138.0	WAG	4-18-2008
1	REVISION	BY	DATE
NO.	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION		
REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018			
	DESIGNED	WAG	4/17/2008
	DRAWN	JGW	4/17/2008
	CHECKED	JRR	4/17/2008
DRAWING NO. GBA			SHEET OF 34A 59

9-15-2008



THE REVISION DATA
BEFORE YOU DRAG CALL
602-263-1100
BLUE STAKE

REMOVE

CONSTRUCTION
 ① CONSTRUCT ACCESS RAMP
 SEE DETAIL D10, SHEET _ NIC

SEE SHEET LP3 - LP8 FOR LANDSCAPE MOUND INFORMATION
 SEE DETAIL D8 FOR WEIR DETAIL

3			
2			
1			
NO.	REVISION	BY	DATE

FLOOD CONTROL DISTRICT
 OF MARICOPA COUNTY
 ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
 FCD PROJECT NO. 470-12-31
 CONTRACT FCD 2005 C018

	BY	DATE
DESIGNED	WAG	10/07
DRAWN	FRC	10/07
CHECKED	JRR	10/07

DRAWING NO. GB2 BASIN ELEVATIONS SHEET OF 35 69

9-15-2008

BASIN GEOMETRY DATA				
PT #	DESC	ELEVATION	NORTHING	EASTING
700	POE	1141.39	936,741.79	554,418.47
701	PC	1141.00	936,729.67	554,305.13
702	PT	1140.64	936,683.44	554,260.57
703	PC	1140.47	936,650.31	554,258.26
704	PT	1140.47	936,611.15	554,247.23
705	PC	1139.97	936,560.80	554,221.06
706	PT	1139.78	936,524.49	554,210.27
707	PC	1139.67	936,503.54	554,208.21
708	PT	1139.38	936,451.95	554,187.62
709	PC	1139.27	936,434.68	554,174.19
710	PT	1139.00	936,389.01	554,147.52
711	PC	1138.95	936,378.59	554,143.17
712	PT	1138.65	936,316.95	554,138.14
713	PC	1138.57	936,300.47	554,142.05
714	PT	1138.30	936,252.83	554,168.64
715	PC	1138.07	936,219.20	554,202.27
716	PT	1137.62	936,119.28	554,256.50
717	PC	1137.42	936,097.86	554,261.04
718	PT	1137.26	936,064.63	554,268.68
719	PC	1137.00	936,012.31	554,281.66
720	PT	1136.85	936,903.92	554,310.16
721	PC	1136.80	936,860.44	554,322.25
722	PT	1136.72	936,806.05	554,343.25
723	PC	1136.66	936,763.33	554,364.72
724	PT	1136.60	936,719.68	554,380.63
725	PC	1136.52	936,666.18	554,393.32
726	PT	1136.42	936,588.59	554,403.86
727	PC	1136.39	936,563.85	554,404.77
728	PT	1136.28	936,476.45	554,395.10
729	PC	1136.17	936,399.76	554,374.92
730	PT	1136.00	936,325.20	554,277.73
731	PC	1136.05	936,325.30	554,256.57
732	PT	1136.46	936,427.80	554,157.09
733	PC	1136.52	936,450.29	554,157.65
734	PT	1136.74	936,536.65	554,140.42
735	PC	1136.82	936,564.23	554,128.14
736	PT	1137.00	936,620.05	554,085.18
737	PC	1137.00	936,637.08	554,064.03
738	PT	1137.00	936,668.83	554,008.13
739	PC	1137.00	936,679.32	553,979.83
740	PT	1137.00	936,681.66	553,917.41
741	PC	1137.00	936,667.86	553,869.48
742	PT	1137.00	936,649.97	553,834.81
743	PC	1137.00	936,633.56	553,814.23
744	PT	1137.00	936,584.86	553,770.35
745	PC	1137.00	936,564.84	553,757.56
746	PT	1137.00	936,483.98	553,726.19
747	PC	1137.00	936,401.89	553,724.06
748	PT	1137.00	936,308.75	553,667.47
749	PC	1137.00	936,302.63	553,662.16
750	PT	1137.00	936,268.26	553,611.21

BASIN GEOMETRY DATA				
PT #	DESC	ELEVATION	NORTHING	EASTING
751	PC	1137.23	936,266.17	553,565.81
752	PT	1137.61	936,288.83	553,497.69
753	PC	1137.73	936,303.70	553,479.62
754	PT	1138.10	936,369.23	553,469.24
755	PC	1138.15	936,377.29	553,474.39
756	PT	1138.46	936,434.96	553,471.67
757	PC	1138.90	936,503.27	553,418.37
758	TB	1139.00	936,519.48	553,408.06
759	PT	1139.09	936,575.49	553,397.78
760	PC	1139.15	936,614.93	553,402.03
761	PT	1139.20	936,644.57	553,400.80
762	PC	1139.21	936,655.96	553,398.60
763	PT	1139.26	936,683.57	553,401.10
764	PC	1139.28	936,698.97	553,407.10
765	PT	1139.39	936,770.72	553,416.32
766	PC	1139.43	936,792.92	553,413.74
767	PT	1139.56	936,871.68	553,438.01
768	PC	1139.59	936,885.51	553,451.57
769	PT	1139.73	936,970.50	553,475.92
770	PC	1139.87	936,044.09	553,482.62
771	TB	1140.00	936,142.96	553,478.75
772	PT	1140.23	936,209.63	553,553.53
773	PC	1140.29	936,218.41	553,575.03
774	PT	1140.37	936,236.84	553,607.74
775	PC	1140.55	936,282.76	553,669.58
776	PT	1140.68	936,312.57	553,719.06
777	PC	1140.74	936,325.40	553,745.90
778	PT	1141.00	936,415.27	553,802.79
779	PC	1141.31	936,481.45	553,803.02
780	PT	1141.69	936,563.81	553,794.75
781	PC	1141.99	936,627.93	553,781.50
782	PT	1142.29	936,690.03	553,772.69
783	PC	1142.47	936,730.70	553,769.50
784	PT	1142.64	936,766.12	553,765.45
785	PC	1142.71	936,780.61	553,763.27
786	TB	1143.00	936,843.62	553,761.08
787	PT	N/A	937,012.94	553,837.70
788	PC	1143.00	937,023.72	553,848.15
789	PT	1143.08	937,049.65	553,871.57
790	PC	1143.16	937,075.03	553,892.94
791	PT	1143.37	937,140.84	553,963.57
792	PC	1143.38	937,146.25	553,971.00
793	PT	1143.62	937,229.52	554,027.84
794	PC	1143.89	937,342.86	554,057.52
795	PT	1144.00	937,384.31	554,079.84
796	PC	1144.00	937,399.70	554,093.64
797	PT	1144.00	937,432.02	554,181.34
798	PC	1144.00	937,426.33	554,223.79
799	TB	1144.00	937,422.12	554,247.77
800	PT	1143.75	937,398.07	554,316.59
801	POE	N/A	937,367.38	554,378.86

BASIN GEOMETRY CURVE DATA				
CV #	RADIUS	DELTA ANGLE	LENGTH	TANGENT
C150	50.00	79°54'08"	69.730	41.88
C151	100.00	23°28'18"	40.97	20.77
C152	100.00	21°50'01"	38.11	19.29
C153	100.00	32°14'39"	56.28	28.91
C154	200.00	15°11'40"	53.04	26.68
C155	100.00	36°01'24"	62.87	32.51
C156	100.00	31°39'26"	55.25	28.35
C157	200.00	33°01'26"	115.28	69.29
C158	1,000.00	1°57'14"	34.10	17.05
C159	4,000.00	1°36'20"	112.08	56.05
C160	300.00	11°09'12"	58.40	29.29
C161	200.00	13°20'24"	48.57	23.39
C162	400.00	11°14'-05"	78.43	39.34
C163	300.00	16°51'15"	88.25	44.44
C164	100.00	75°32'13"	131.84	77.48
C165	100.00	91°09'25"	159.10	102.04
C166	200.00	25°26'05"	88.78	45.14
C167	150.00	27°09'31"	71.10	36.23
C168	200.00	18°29'51"	64.57	32.57
C169	100.00	36°24'01"	63.53	32.88
C170	100.00	22°29'36"	39.26	19.89
C171	200.00	18°51'50"	65.85	33.22
C172	200.00	30°37'19"	106.89	54.76
C173	150.00	38°58'15"	102.03	53.07
C174	100.00	46°25'59"	81.04	42.89
C175	100.00	42°04'09"	73.42	38.48
C176	50.00	83°07'48"	72.54	44.34
C177	50.00	70°31'54"	61.55	35.36
C178	100.00	44°06'42"	76.99	40.52
C179	100.00	17°03'28"	29.77	15.00
C180	50.00	32°10'58"	28.08	14.42
C181	150.00	27°54'15"	73.05	37.27
C182	100.00	48°51'24"	85.27	45.42
C183	100.00	52°28'06"	91.57	49.28
C184	150.00	78°01'57"	204.29	121.54
C185	150.00	14°22'49"	37.65	28.92
C186	300.00	11°02'59"	57.86	29.02
C187	100.00	64°15'15"	112.14	62.80
C188	400.00	11°52'40"	82.92	41.61
C189	500.00	7°11'33"	62.77	31.42
C190	500.00	4°05'09"	35.66	17.84
C191	275.00	52°39'49"	252.77	136.10
C192	500.00	4°00'13"	34.94	17.48
C193	400.00	13°51'43"	96.77	48.62
C194	150.00	39°11'50"	102.83	53.53
C195	100.00	27°13'50"	47.53	24.22
C196	100.00	55°43'25"	97.26	52.86
C197	300.00	18°36'31"	97.43	49.15

FOR LOCATION KEY MAP SEE SHEET GB2

THE INFORMATION SHOWN BEFORE YOU OR CALL 602-263-1100 BLUE STAKE

9-15-2008

3			
2			
1			
NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018			
	DESIGNED	WAG	09/07
	DRAWN	FRC	09/07
	CHECKED	JRR	09/07
DRAWING NO.	TOP OF BANK ELEVATION & CURVE DATA		SHEET OF
GB3			36 OF 69

BASIN GEOMETRY DATA				
PT #	DESC	ELEVATION	NORTHING	EASTING
900	POB	1126.80	936,918.25	554,423.99
901	PC	1126.97	936,911.09	554,425.01
902	PT	1127.20	936,889.17	554,423.26
903	PC	1127.90	936,857.51	554,413.42
904	PT	1127.10	936,787.76	554,307.34
905	PC	1127.01	936,793.39	554,254.48
906	PT	1126.80	936,728.67	554,150.11
907	PC	1126.76	936,698.61	554,138.98
908	PT	1126.59	936,578.05	554,120.77
909	PC	1126.51	936,517.99	554,124.06
910	PT	1126.46	936,482.23	554,111.68
911	PC	1126.44	936,467.77	554,098.96
912	PT	1126.35	936,407.19	554,066.63
913	PC	1126.20	936,301.27	554,038.52
914	PT	1126.23	936,211.27	554,058.64
915	PC	1126.25	936,161.01	554,100.89
916	PT	1126.30	936,018.34	554,167.00
917	PC	1126.26	936,988.57	554,172.08
918	PT	1126.22	935,947.89	554,183.54
919	PC	1126.14	935,884.38	554,208.95
920	PT	1126.08	935,829.23	554,236.01
921	PC	1126.01	935,779.72	554,262.22
922	PT	1125.88	935,672.92	554,305.74
923	PC	1125.85	935,648.15	554,312.63
924	PT	1125.32	935,585.17	554,319.74
925	PC	1125.30	935,524.09	554,316.87
926	PT	1125.60	935,462.85	554,307.60
927	PC	1125.81	935,429.90	554,299.06
928	PT	1126.00	935,414.93	554,279.00
929	PC	1126.03	935,415.52	554,262.21
930	PT	1126.00	935,438.78	554,238.15
931	PC	1125.99	935,496.82	554,234.13
932	PT	1125.98	935,582.23	554,208.26
933	PC	1125.98	935,620.03	554,186.66
934	PT	1126.01	935,684.00	554,152.63
935	PC	1126.10	935,762.66	554,051.45
936	PT	1126.12	935,790.40	553,970.24
937	PC	1126.25	935,786.28	553,934.26
938	PT	1126.50	935,756.88	553,874.20
939	PC	1126.82	935,706.49	553,824.87
940	PT	1126.70	935,674.31	553,791.89
941	PC	1126.65	935,654.88	553,771.02
942	PT	1126.77	935,584.76	553,715.35
943	PC	1126.78	935,561.79	553,702.16
944	PT	1126.80	935,484.71	553,682.25
945	PC	1126.86	935,429.63	553,683.13

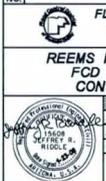
BASIN GEOMETRY DATA				
PT #	DESC	ELEVATION	NORTHING	EASTING
946	PT	1126.93	935,380.82	553,671.29
947	PC	1126.92	935,376.17	553,688.80
948	PT	1126.99	935,349.79	553,623.98
949	PC	1126.99	935,349.86	553,618.94
950	PT	1127.05	935,376.41	553,575.53
951	PC	1126.90	935,417.88	553,553.51
952	PT	1126.60	935,495.66	553,499.53
953	PC	1126.60	935,506.21	553,490.17
954	PT	1126.64	935,617.97	553,452.91
955	PC	1126.65	935,655.54	553,455.99
956	PT	1126.66	935,689.08	553,461.64
957	PC	1126.68	935,774.00	553,483.51
958	PT	1126.70	935,824.50	553,504.21
959	PC	1126.67	935,885.77	553,539.77
960	PT	1126.64	935,936.68	553,553.28
961	PC	1126.60	936,021.29	553,552.68
962	PT	1126.58	936,066.72	553,563.23
963	PC	1126.57	936,089.74	553,574.74
964	PT	1126.53	936,148.87	553,624.82
965	PC	1126.50	936,185.92	553,682.50
966	PT	1126.41	936,226.34	553,758.86
967	PC	1126.38	936,237.59	553,787.14
968	PT	1126.33	936,251.35	553,831.43
969	PC	1126.31	936,254.17	553,843.79
970	PT	1126.20	936,332.93	553,901.93
971	PC	1126.86	936,506.26	553,888.87
972	PT	1127.21	936,597.10	553,877.83
973	PC	1127.65	936,710.02	553,858.82
974	PT	1127.96	936,789.29	553,848.72
975	PC	1128.20	936,852.20	553,843.24
976	PT	1128.20	936,904.03	553,877.43
977	PC	1128.20	936,908.29	553,890.39
978	PT	1128.20	936,908.44	553,936.81
979	PC	1128.20	936,902.68	553,954.68
980	PT	1128.20	936,953.10	554,049.68
981	PC	1128.20	936,959.98	554,051.69
982	PT	1128.20	936,998.71	554,055.09
983	PC	1128.20	937,056.21	554,048.87
984	PT	1128.20	937,133.43	554,055.61
985	PC	1128.20	937,189.95	554,071.99
986	PT	1128.20	937,267.83	554,098.08
987	PC	1128.20	937,316.40	554,116.60
988	PT	1128.20	937,364.68	554,186.19
989	PC	1128.18	937,365.08	554,247.18
990	PT	1127.00	937,314.74	554,318.50
991	PC	1126.80	937,295.29	554,325.27

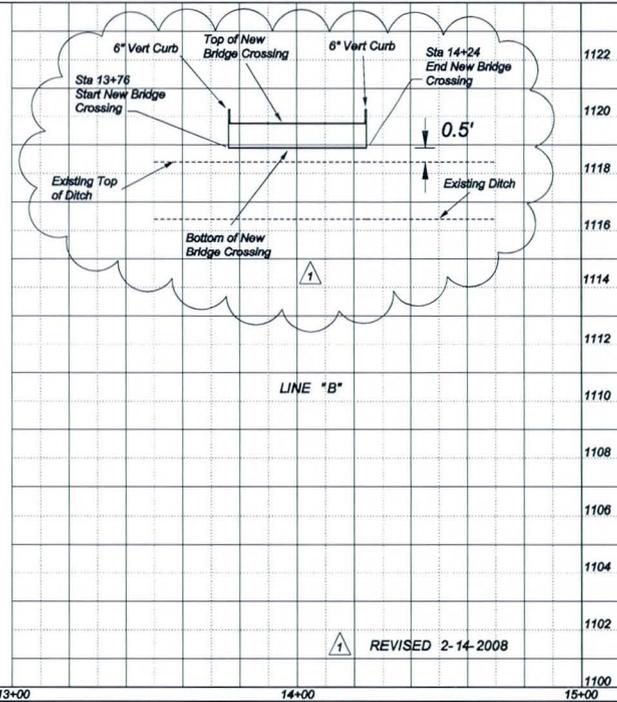
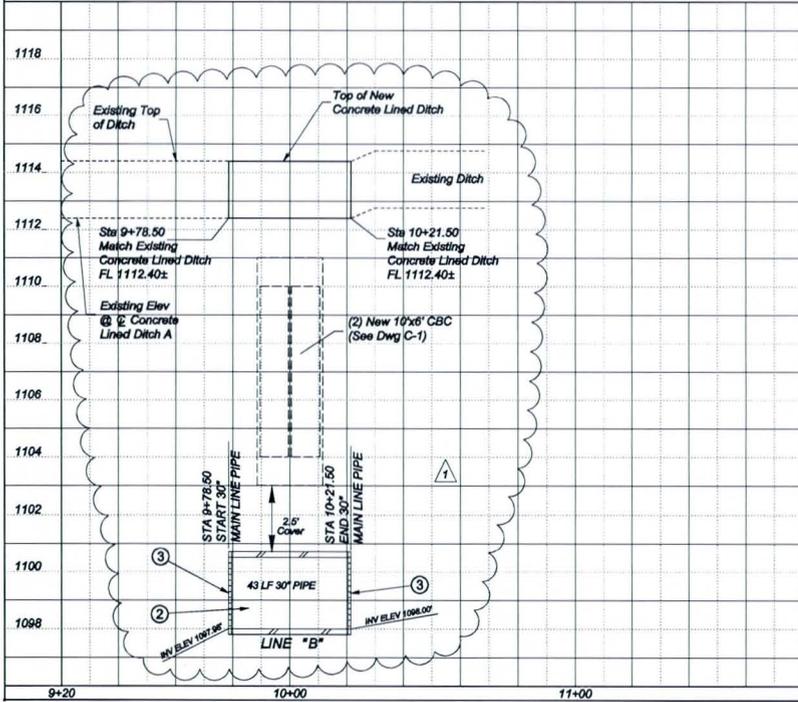
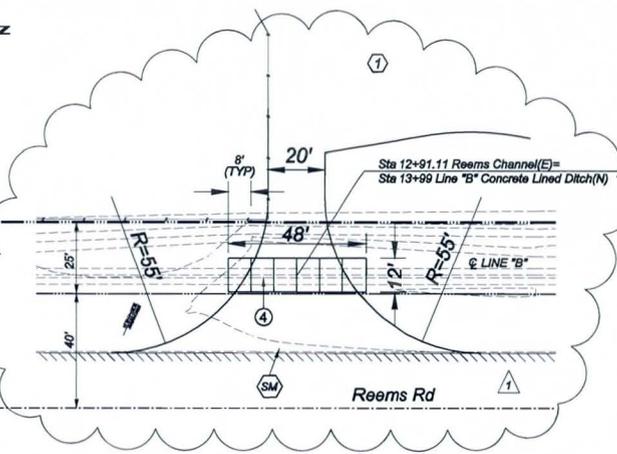
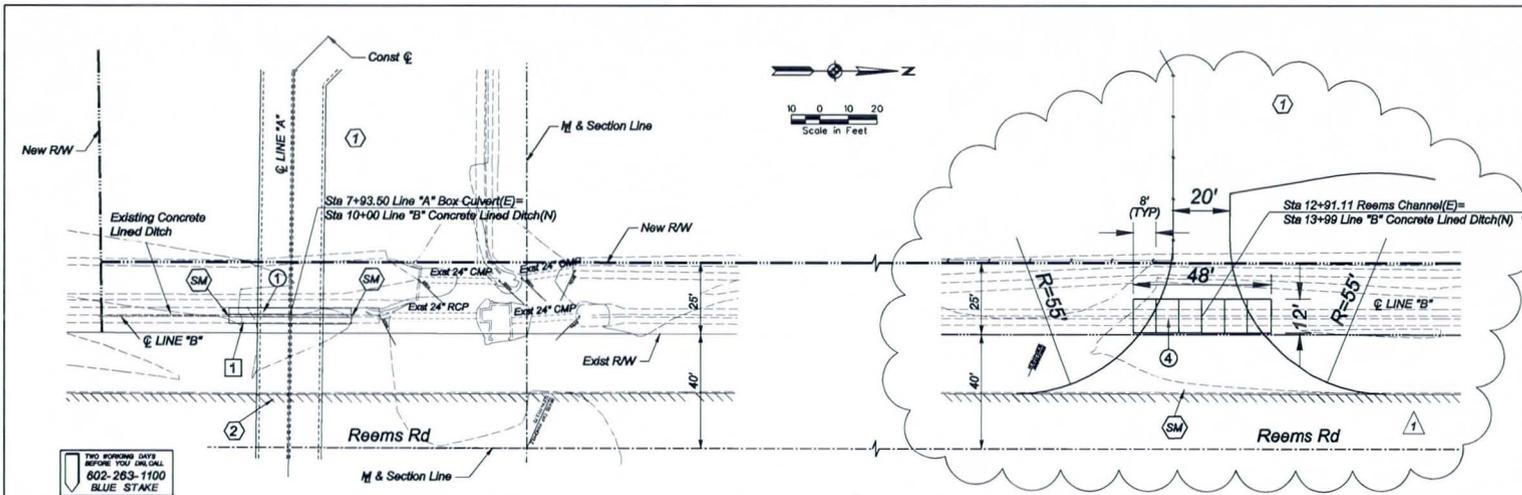
BASIN GEOMETRY CURVE DATA				
CV#	RADIUS	DELTA ANGLE	LENGTH	TANGENT
C100	50.00	25°24'44"	22.18	11.27
C101	100.00	78°48'55"	137.56	82.16
C102	100.00	75°45'59"	132.24	77.80
C103	300.00	23°27'02"	122.79	62.27
C104	50.00	44°27'39"	38.80	20.44
C105	150.00	26°28'01"	69.29	35.27
C106	100.00	54°54'52"	95.84	51.96
C107	300.00	30°23'14"	159.11	81.47
C108	200.00	12°07'58"	42.35	21.26
C109	500.00	6°59'33"	61.02	30.55
C110	500.00	13°14'39"	115.58	58.05
C111	200.00	18°14'01"	63.65	32.09
C112	300.00	11°51'02"	62.05	31.14
C113	20.00	77°28'30"	27.04	16.04
C114	25.00	84°01'48"	36.67	22.52
C115	200.00	25°47'04"	90.01	45.78
C116	200.00	15°58'49"	55.78	28.07
C117	100.00	50°49'16"	88.70	47.51
C118	100.00	39°03'48"	68.18	35.47
C119	1,000.00	2°38'28"	46.08	23.05
C120	300.00	17°09'50"	89.87	45.27
C121	150.00	30°46'35"	80.67	41.28
C122	100.00	29°05'17"	50.77	25.94
C123	50.00	62°40'35"	54.70	30.45
C124	50.00	61°10'40"	53.39	29.56
C125	400.00	13°35'35"	94.90	47.67
C126	150.00	46°14'46"	121.07	64.05
C127	200.00	9°45'29"	34.06	17.07
C128	200.00	15°41'06"	54.75	27.55
C129	100.00	30°32'18"	53.30	27.30
C130	100.00	26°58'27"	47.08	23.98
C131	150.00	29°20'24"	76.81	39.27
C132	400.00	12°24'00"	86.57	43.45
C133	300.00	8°51'59"	46.42	23.26
C134	75.00	81°28'48"	106.66	64.60
C135	1,000.00	5°14'42"	91.54	45.80
C136	1,000.00	4°34'47"	79.93	39.99
C137	50.00	76°45'56"	66.99	39.60
C138	75.00	38°03'32"	47.20	24.41
C139	75.00	91°36'41"	119.92	77.14
C140	100.00	22°25'18"	39.13	19.82
C141	200.00	22°20'51"	78.01	39.51
C142	1,000.00	4°42'26"	82.15	41.10
C143	75.00	68°45'09"	90.00	51.31
C144	75.00	71°11'02"	93.18	53.68

FOR LOCATION KEY MAP SEE SHEET G82

TWO WORKING DAYS BEFORE THE DATE 602-263-1100 BLUE STAKE

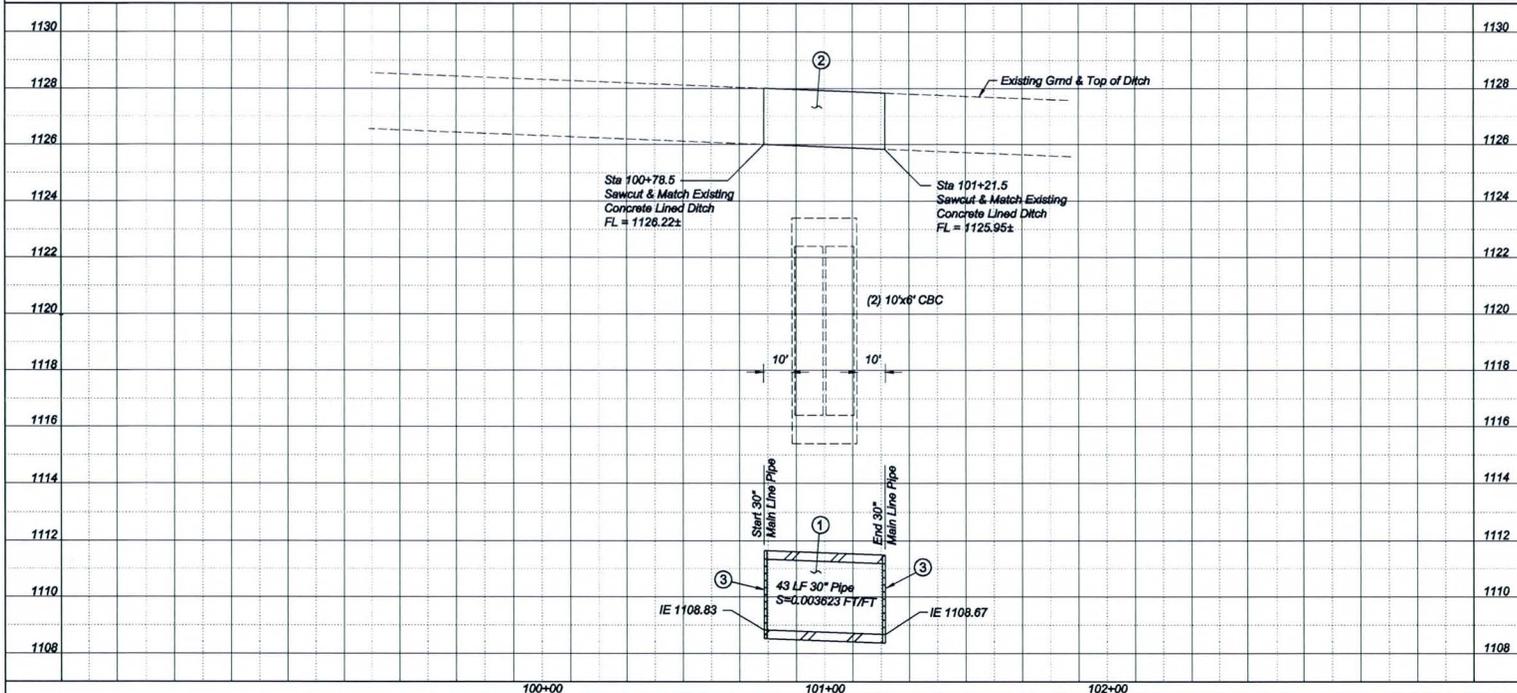
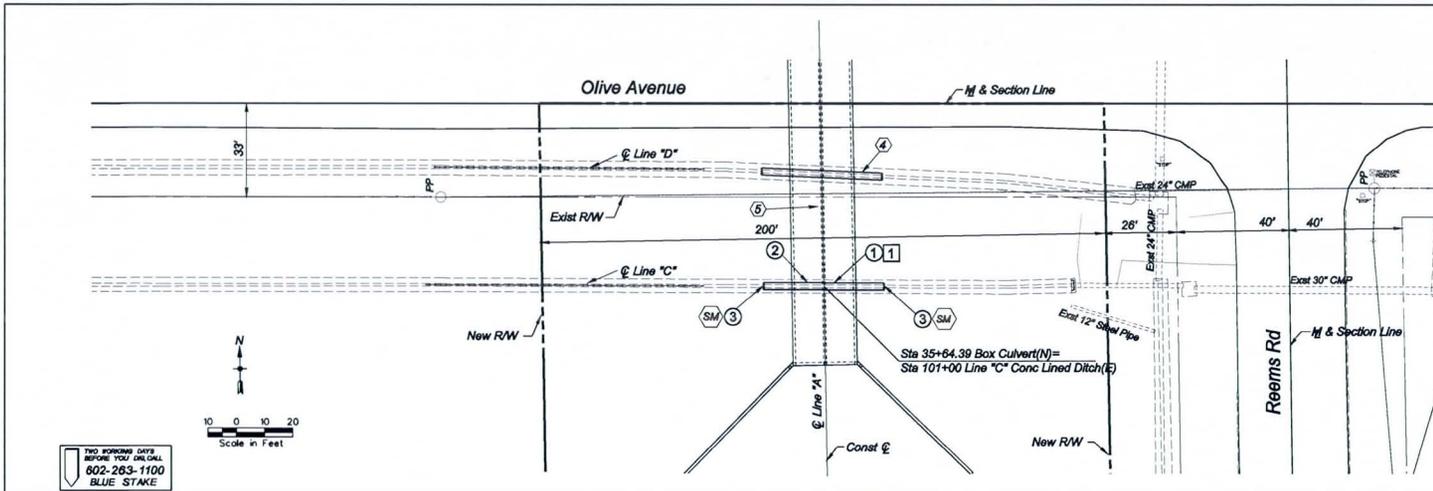
9-15-2008

3			
2			
1	UPDATED ELEVATIONS	WAG	8/9/2008
NO.	REVISION	BY	DATE
			
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 478-12-31 CONTRACT FCD 2005 C018			
	DESIGNED	WAG	09/07
	DRAWN	FRC	09/07
	CHECKED	JRR	09/07
	BY		DATE
DRAWING NO.	GB4R	TOE & CURVE DATA	SHEET OF 37 69



<input type="checkbox"/> REMOVE									
1 REMOVE CONCRETE LINED DITCH SEE DRAWING C1	43 LF								
<input type="checkbox"/> CONSTRUCT									
1 CONSTRUCT CONCRETE LINED DITCH PER MWD STD DRAWING 103	43 LF								
2 INSTALL 30" MAIN LINE PIPE	43 LF								
3 CONSTRUCT PIPE PLUG FOR 30" PIPE PER MWD STD DRAWING 541	2 EA								
4 INSTALL BRIDGE CROSSING PER ATTACHED FCD PRECAST BRIDGE CROSSINGS DETAIL SHEET	1 EA								
1 SEE DRAWING NO. C1 & C2 FOR PROJECT CONSTRUCTION									
2 SEE DRAWING NO. B1.1 & B1.2 FOR CONCRETE BOX CULVERT CONSTRUCTION									
9-15-2008									
<table border="1"> <tr> <th>NO.</th> <th>REVISION</th> <th>WAG</th> <th>DATE</th> </tr> <tr> <td>1</td> <td>ADDED 30" PIPE & FCD BRIDGE CROSSING</td> <td>WAG</td> <td>2/14/2008</td> </tr> </table>		NO.	REVISION	WAG	DATE	1	ADDED 30" PIPE & FCD BRIDGE CROSSING	WAG	2/14/2008
NO.	REVISION	WAG	DATE						
1	ADDED 30" PIPE & FCD BRIDGE CROSSING	WAG	2/14/2008						
REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT 2005 CO18									
<table border="1"> <tr> <th>BY</th> <th>DATE</th> </tr> <tr> <td>DESIGNED JRR</td> <td>09/07</td> </tr> <tr> <td>DRAWN FRC</td> <td>09/07</td> </tr> <tr> <td>CHECKED WAG</td> <td>09/07</td> </tr> </table>		BY	DATE	DESIGNED JRR	09/07	DRAWN FRC	09/07	CHECKED WAG	09/07
BY	DATE								
DESIGNED JRR	09/07								
DRAWN FRC	09/07								
CHECKED WAG	09/07								
DRAWING NO. IR1R	PLAN AND PROFILE SHEET CONCRETE LINED DITCH								
SHEET OF 38 59									

REVIS 2-14-2008



□ REMOVE □	
1 REMOVE CONCRETE LINED DITCH	43 LF

○ CONSTRUCT ○	
1 INSTALL 30" MAIN LINE PIPE	43 LF
2 CONSTRUCT CONCRETE LINED DITCH AND MATCH TO EXISTING DITCH	43 LF
3 CONSTRUCT PIPE PLUG FOR 30" PIPE PER MAG DETAIL 427	2 EA

- 4 SEE SHEET IR3 FOR LINE "D" IRRIGATION CONSTRUCTION
- 5 SEE SHEET B3.1 & B3.2 FOR CONCRETE BOX CULVERT CONSTRUCTION

9-15-2008

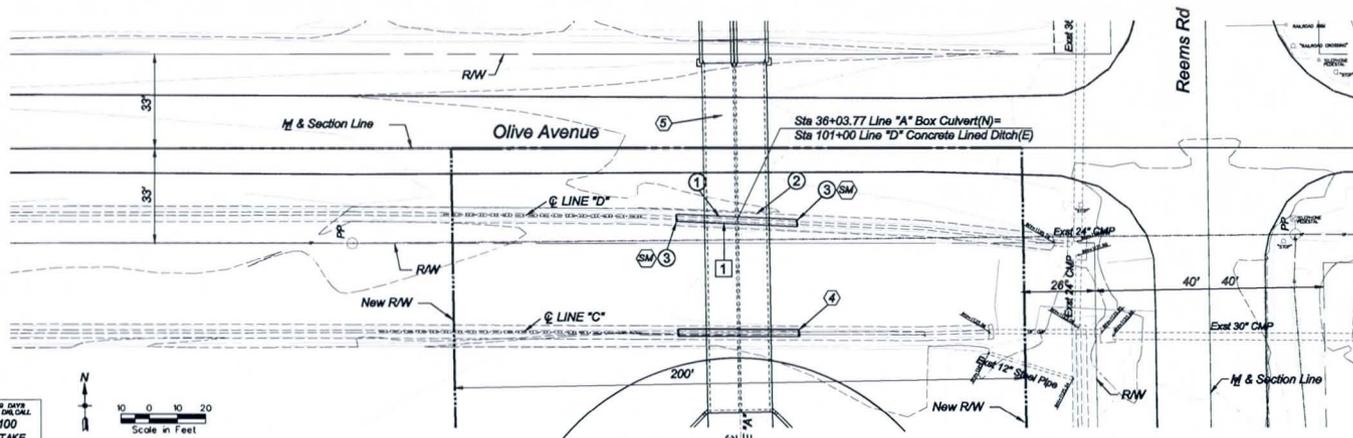
3			
2			
1			
NO.	REVISION	BY	DATE

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION

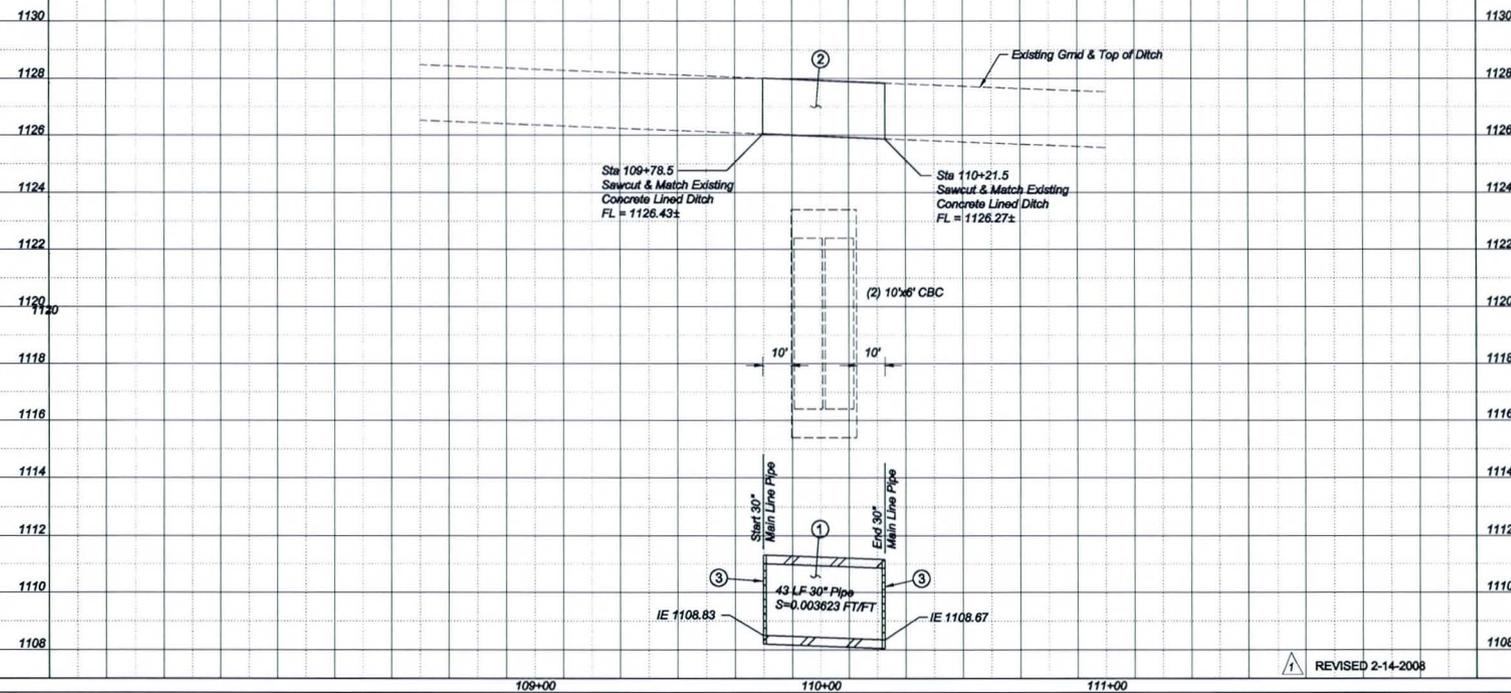
REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT 2005 C018

	BY	DATE
DESIGNED	JRR	11/07
DRAWN	FRC	11/07
CHECKED	WAG	11/07

DRAWING NO. IR2	PLAN AND PROFILE SHEET CONCRETE LINED DITCH	SHEET OF 39 59
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TWO HORIZONTAL LINES BEFORE YOU DIG CALL. 263-1100 BLUE STAKE
 N
 Scale in Feet



□ REMOVE □	
1 REMOVE CONCRETE LINED DITCH	43 LF

○ CONSTRUCT ○	
1 INSTALL 30" MAIN LINE PIPE	43 LF
2 CONSTRUCT CONCRETE LINED DITCH AND MATCH TO EXISTING DITCH PER MWD STD DRAWING 103	43 LF
3 CONSTRUCT PIPE PLUG FOR 30" PIPE PER MAG DETAIL 427	2 EA

- 4 SEE SHEET IR2 FOR LINE "C" IRRIGATION CONSTRUCTION
- 5 SEE SHEET B3.1 & B3.2 FOR CONCRETE BOX CULVERT CONSTRUCTION

9-15-2008

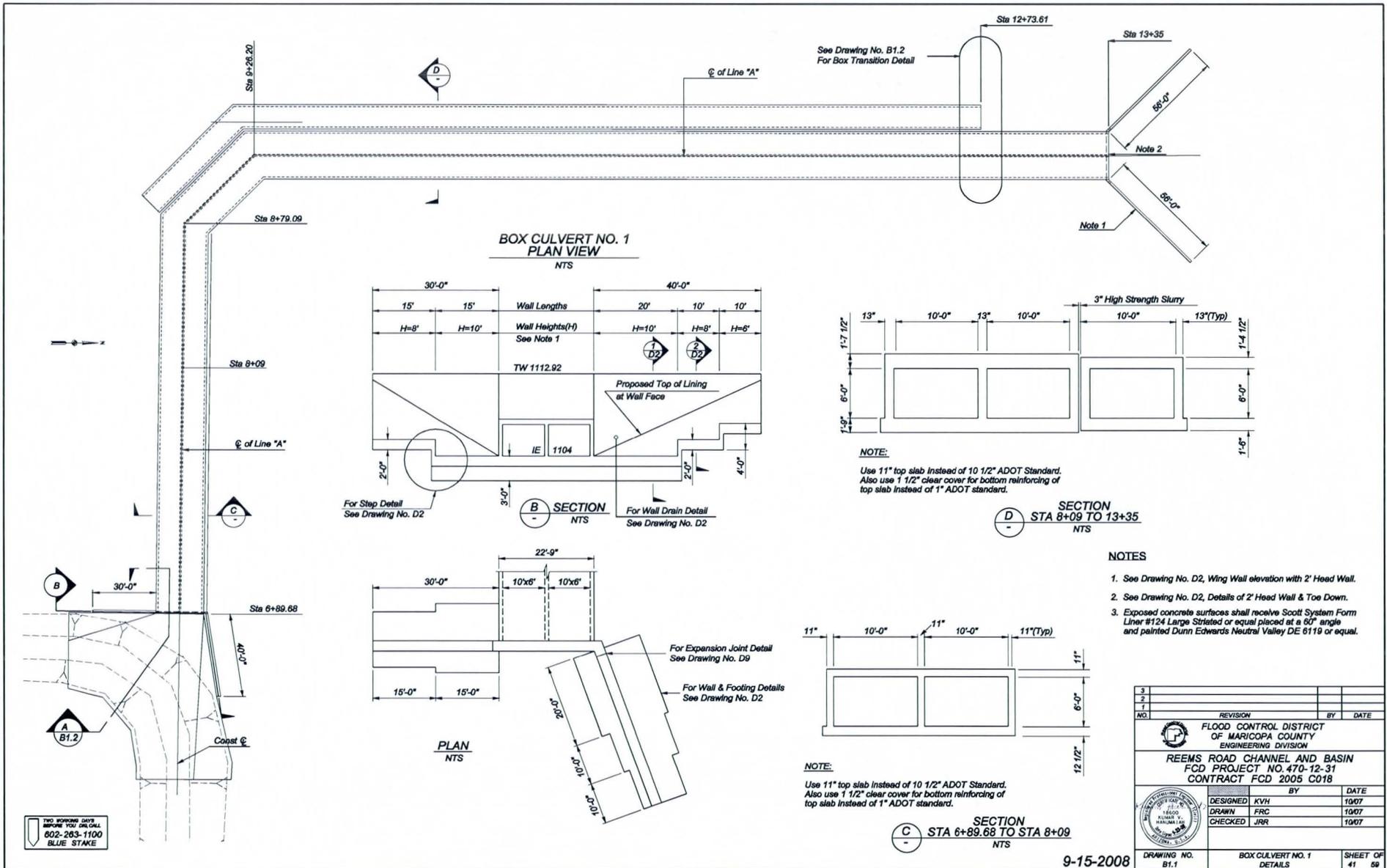
3			
2			
1	ADDED CONSTRUCTION & REMOVAL NOTES	WAG	2/14/2008
NO.	REVISION	BY	DATE

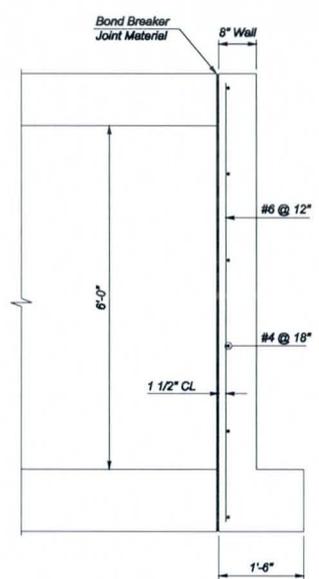
FLOOD CONTROL DISTRICT
 OF MARICOPA COUNTY
 ENGINEERING DIVISION
REEMS ROAD CHANNEL AND BASIN
 FCD PROJECT NO. 478-12-31
 CONTRACT 2005 C018

	DESIGNED	JRR	BY	DATE
	DRAWN	FRG		11/07
	CHECKED	WAG		11/07

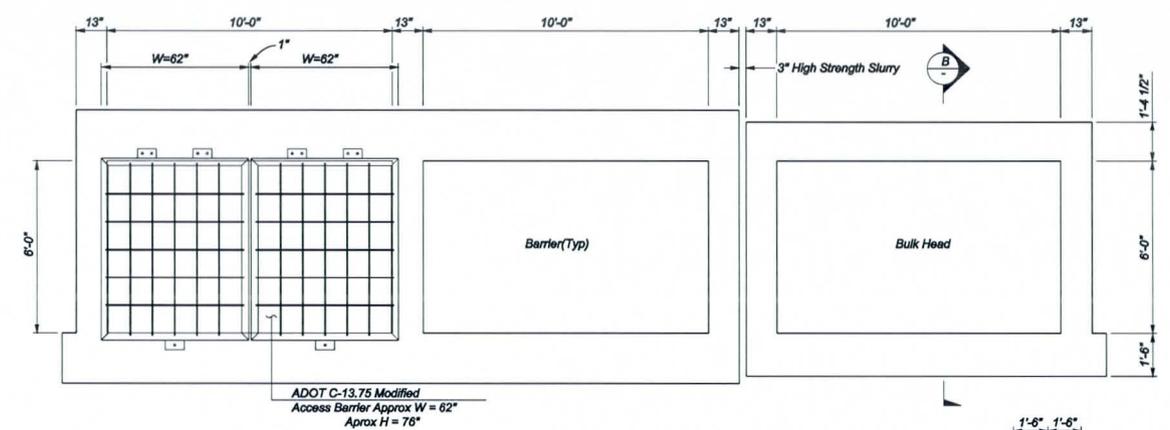
REVISD 2-14-2008

DRAWING NO.	PLAN AND PROFILE SHEET	SHEET OF
IR3R	CONCRETE LINED DITCH	40 59



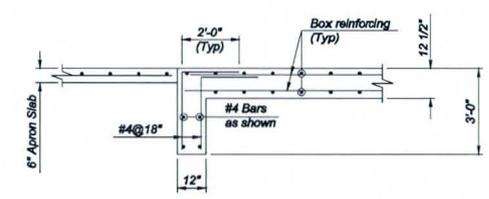


B WALL SECTION AT BULK HEAD
NTS

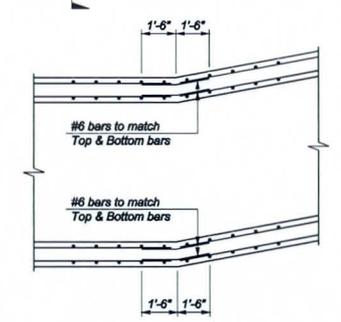


NOTE: Add 1/2" more to top of slab of ADOT Standard.
Also use 1 1/2" clear cover for bottom reinforcing of top slab instead of 1" ADOT standard.

D SECTION
NTS

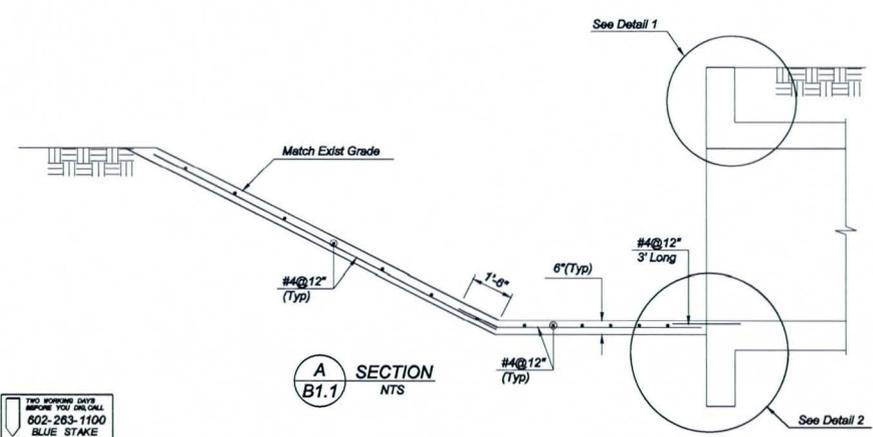


2 DETAIL
NTS

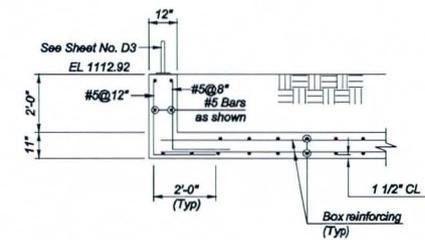


3 BOX TRANSITION DETAIL
@ STA 12+73.61
NTS

NOTE:
For Section 1 & 2 & other Details
See Drawing No. B1.1



A SECTION
B1.1 NTS

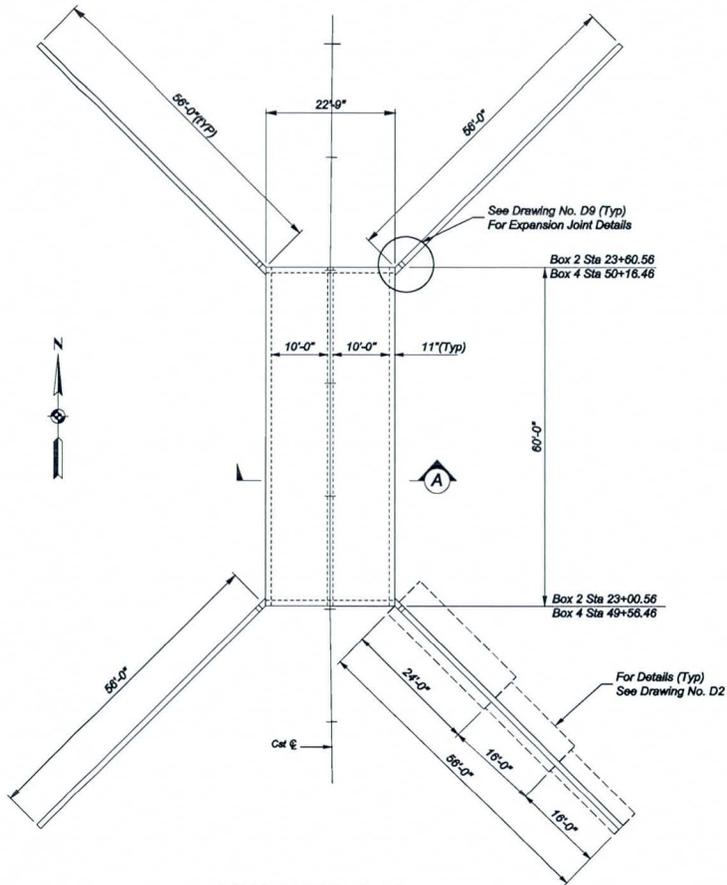


1 DETAIL
NTS

TWO WORKING DAYS
BEFORE TOP DRILL CALL
602-263-1100
BLUE STAKE

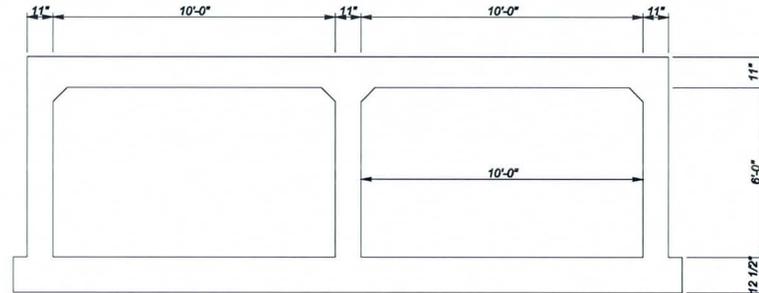
9-15-2008

NO.	REVISION	BY	DATE
3			
2			
1			
NO.	DESIGNED	KVH	10/07
	DRAWN	FRC	10/07
	CHECKED	JRR	10/07
	BY		
	DATE		
	10/07		
	10/07		
	10/07		
DRAWING NO.	BOX CULVERT NO. 1	SHEET OF	
B1.2	DETAILS	42	59



**BOX CULVERT NO. 2 & 4
PLAN VIEW**
NTS

TWO WORKING DAYS
BEFORE YOU DIG, CALL
263-1100
BLUE STAKE

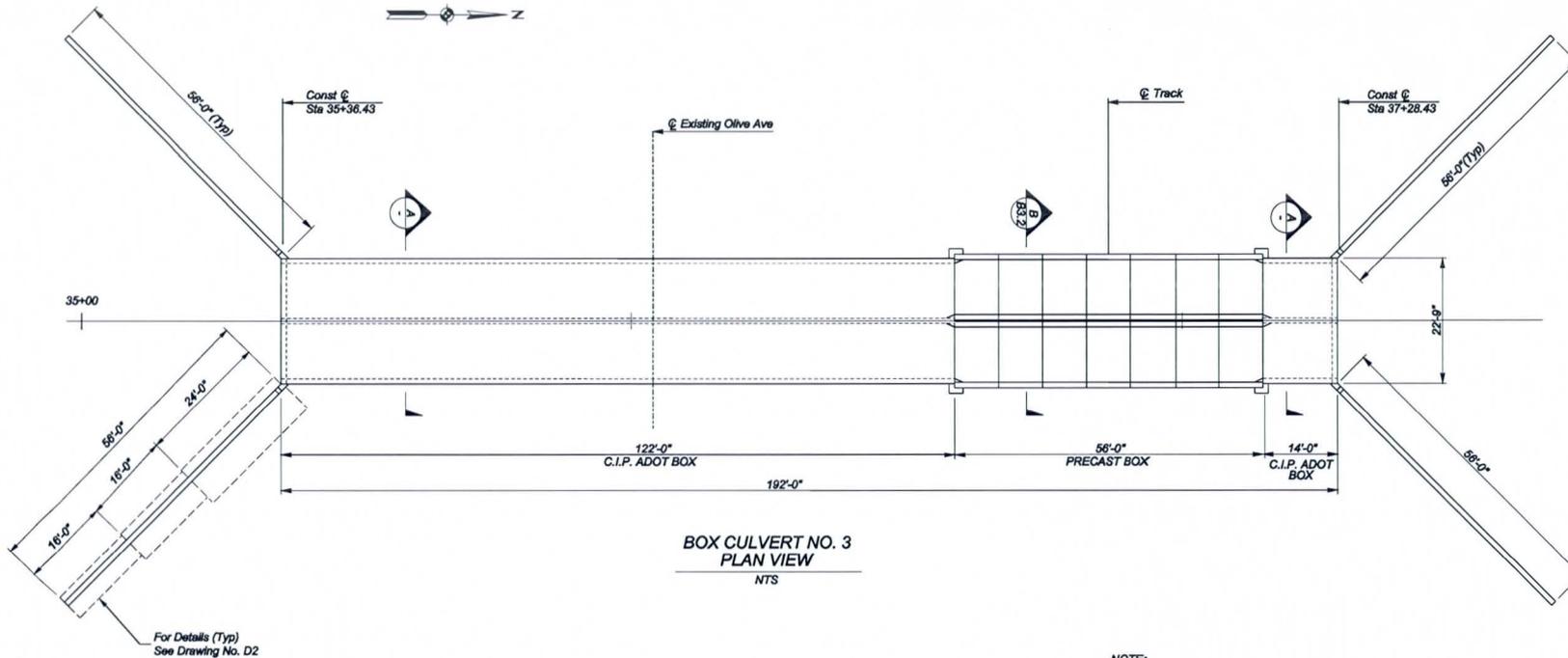


NOTE:

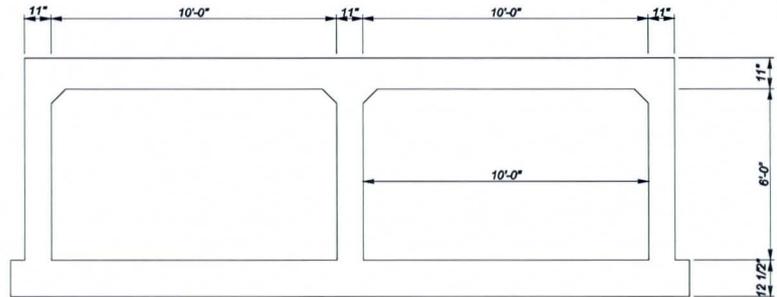
1. Use 13" top slab instead of 12 1/2" ADOT standard. Also, use 1 1/2" clear cover for bottom main reinforcing of top slab instead of 1" ADOT standard.
2. For Head Wall, Toe Down & Footing Step Details. See Drawing No. D1

3			
2			
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NO.	REVISION	BY	DATE
<p>FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION</p> <p>REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018</p>			
	DESIGNED	KVH	10/07
	DRAWN	FRC	10/07
	CHECKED	JRR	10/07
	BY		DATE
DRAWING NO. 52		BOX CULVERT NO. 2 & 4 DETAILS	SHEET OF 43 59

9-15-2008



**BOX CULVERT NO. 3
PLAN VIEW**
NTS



A
SECTION
NTS

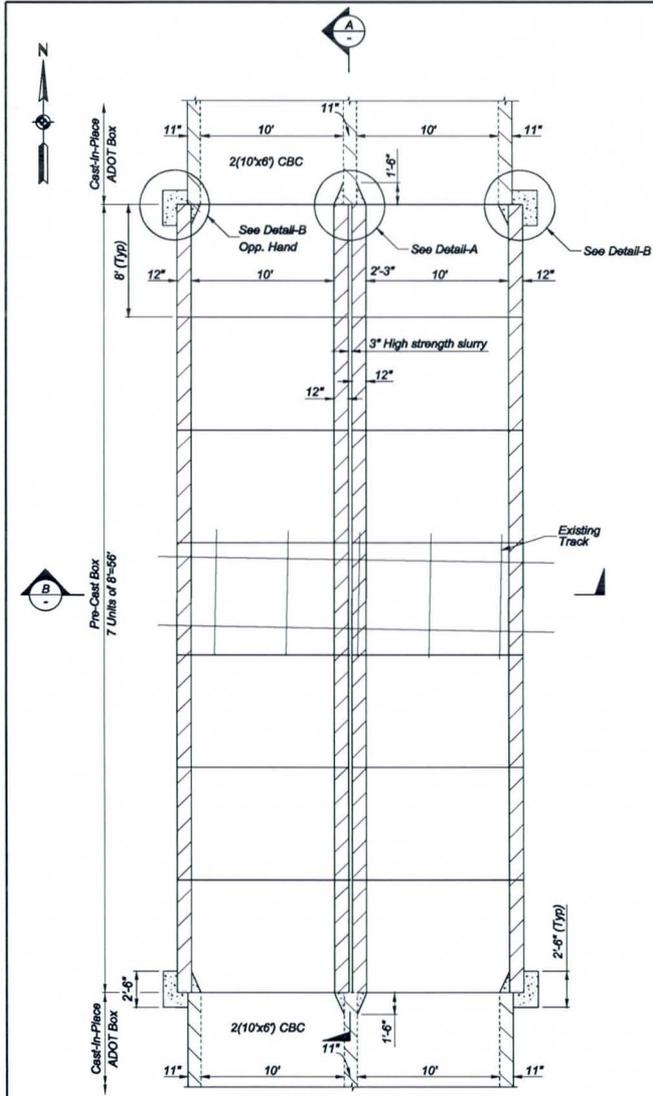
NOTE:

1. For Pre-Cast Box Details. See Drawing No. B3.2
2. For Wing Wall Expansion Joint Details. See Detail 1, Drawing No. D9
3. For C.I.P. ADOT Box, use 11" top slab instead of 10 1/2" ADOT Standard. Also use 1 1/2" clear cover for bottom reinforcing of top slab instead of 1" ADOT Standard.
4. For Head Wall, Toe Down & Footing Step Details. See Drawing No. D1.
5. Contractor shall not be allowed to begin any work on BNSF property until the channel crossing of BNSF tracks has final approval of the structure design. BNSF Structures and Field Engineering offices must concur that the design is approved.

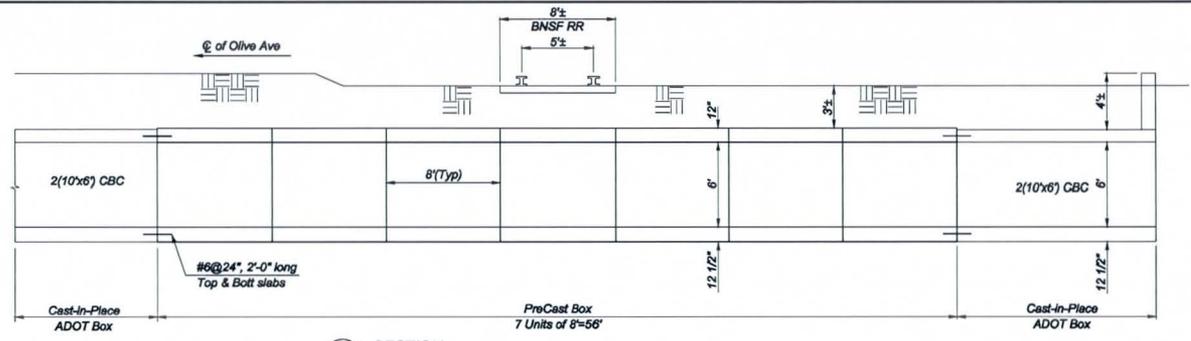
TWO WORKING DAYS BEFORE YOU DIG CALL 802-283-1100 BLUE STAKE

9-15-2008

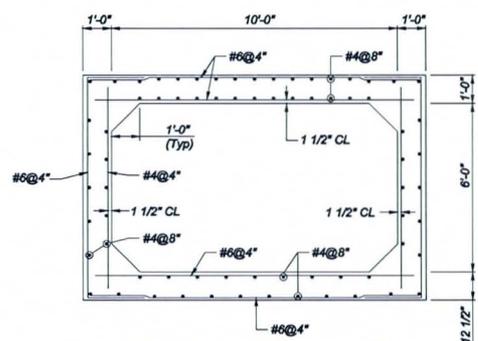
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NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2008 C018			
			DATE
	DESIGNED	KVH	10/07
	DRAWN	FRC	10/07
	CHECKED	JRR	10/07
DRAWING NO. B3.1		PLAN AND DETAIL VIEW	
		SHEET OF 44 59	



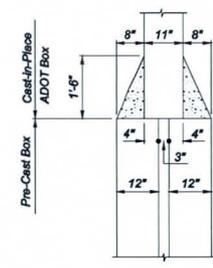
PLAN SHOWING
TRANSITION @ RR TRACK
NTS



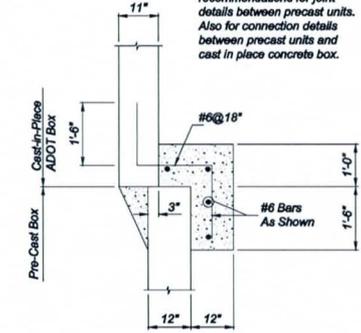
SECTION
A
NTS



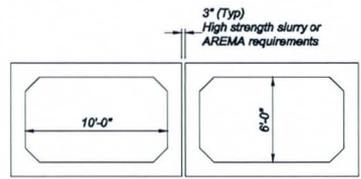
TYPICAL PRE-CAST BOX SECTION
NTS



DETAIL (TYPICAL)
A
NTS



DETAIL (TYPICAL)
B
NTS



SECTION
B
NTS

GENERAL NOTES
PRE-CAST BOXES
Concrete - $f_c = 5,000$ psi
Grade 60 Reinf - $f_s = 24,000$ psi
All reinforcing shall have 2" clear cover unless noted otherwise.
Design loading:
Cooper E-80 loading

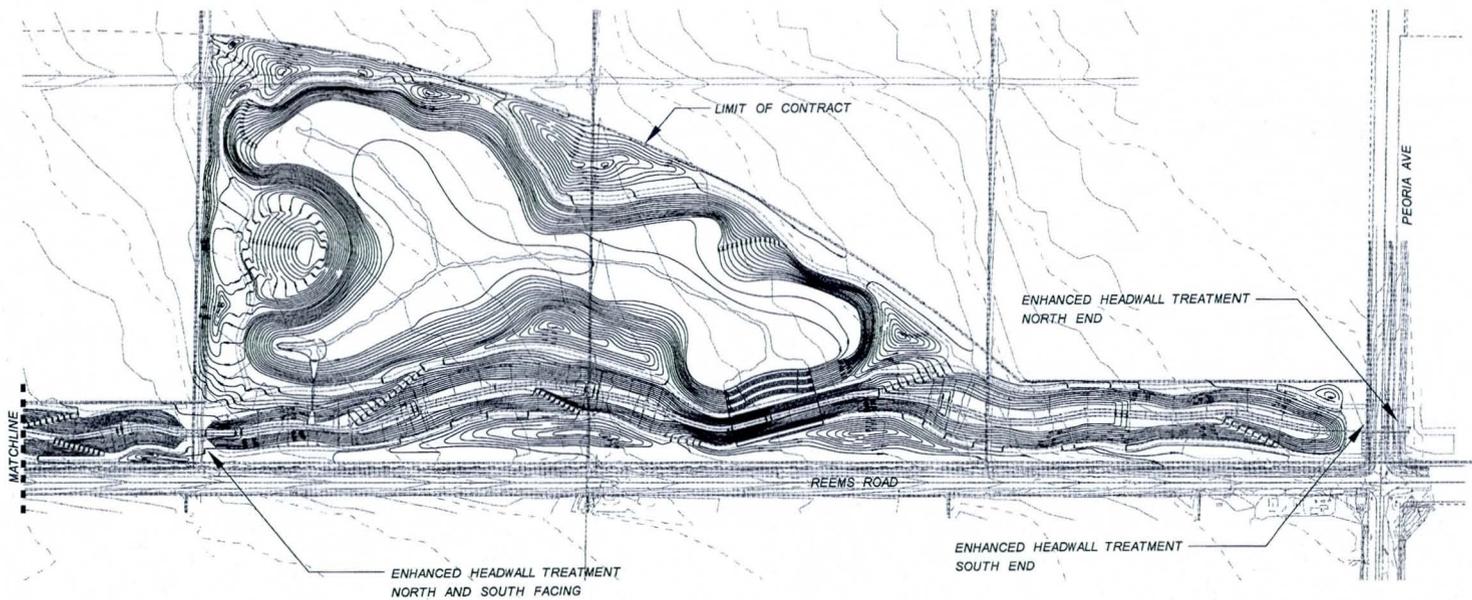
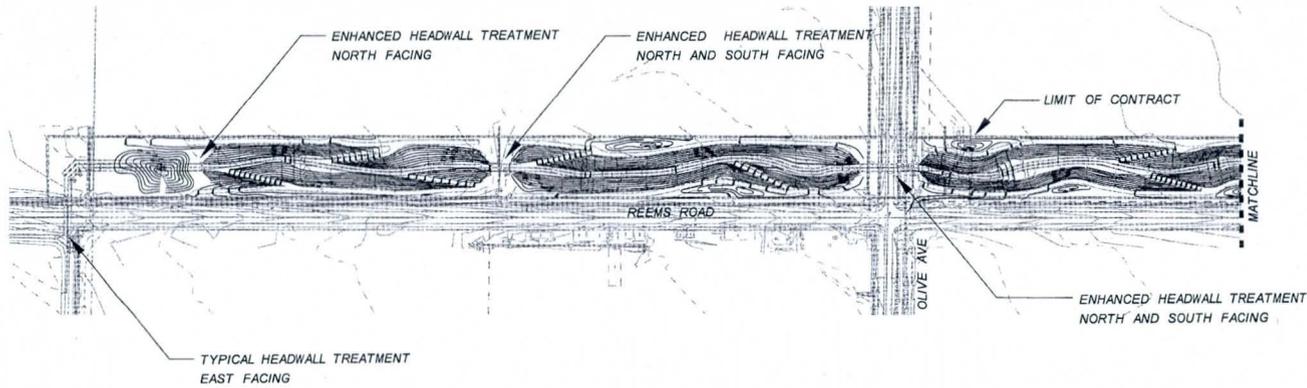
FOR BOX CULVERT NO. 3 DETAIL
SEE DRAWING NO. B3.1 & C4.

NOTE:
Tracks will be removed and replaced by BNSFRR. Contractor shall coordinate with BNSFRR for this work.
Follow AREMA requirements and precast fabricators recommendations for joint details between precast units. Also for connection details between precast units and cast in place concrete box.

THE INFORMATION CONTAINED HEREIN IS FOR YOUR INFORMATION ONLY. CALL 602-263-1100 FOR BLUE STAKE.

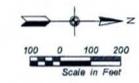
3			
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NO.	REVISION	BY	DATE
	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31 CONTRACT FCD 2005 C018		
	DESIGNED	KVH	11/07
	DRAWN	FRC	11/07
	CHECKED	JRR	11/07
	BY		DATE
DRAWING NO.	BOX CULVERT NO. 3		SHEET OF
B3.2	DETAILS @ RR TRACK		45 59

9-15-2008



REMOVE

CONSTRUCT



120 WORKING DAYS
BEFORE YOU DIG CALL
602-263-1100
BLUE STAKE

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NO.	REVISION	BY	DATE



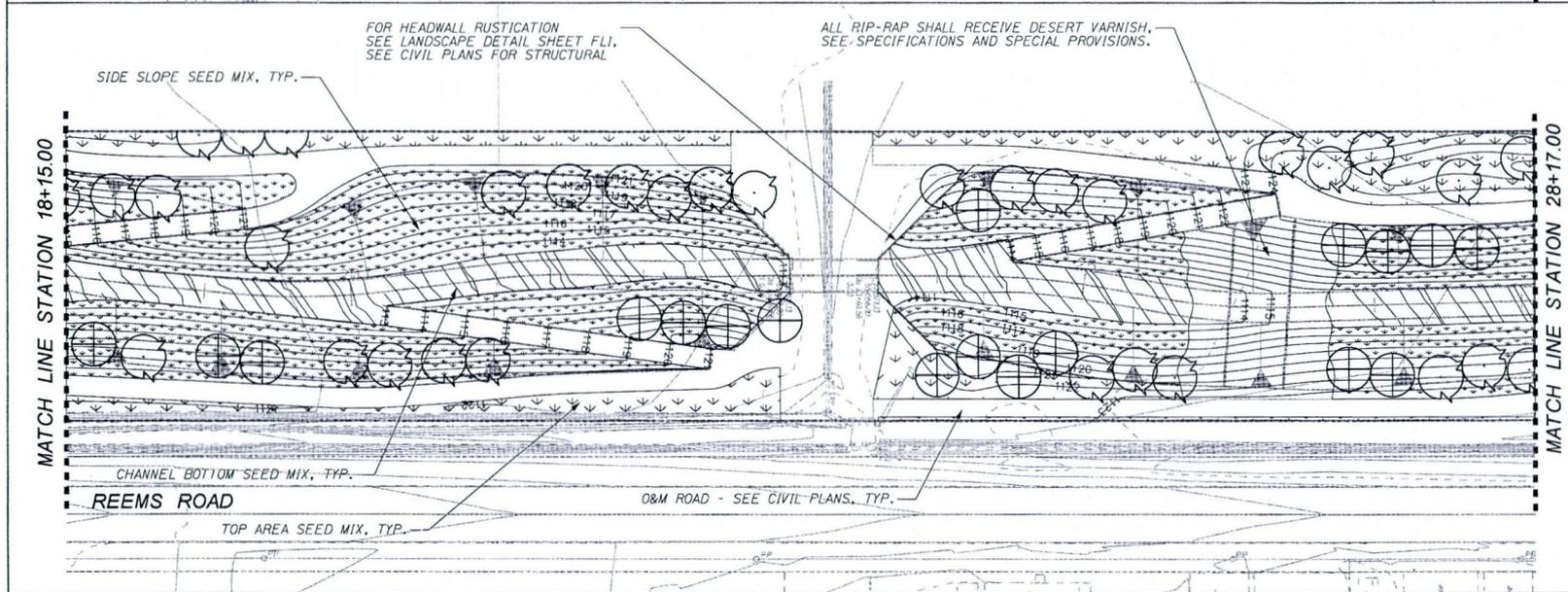
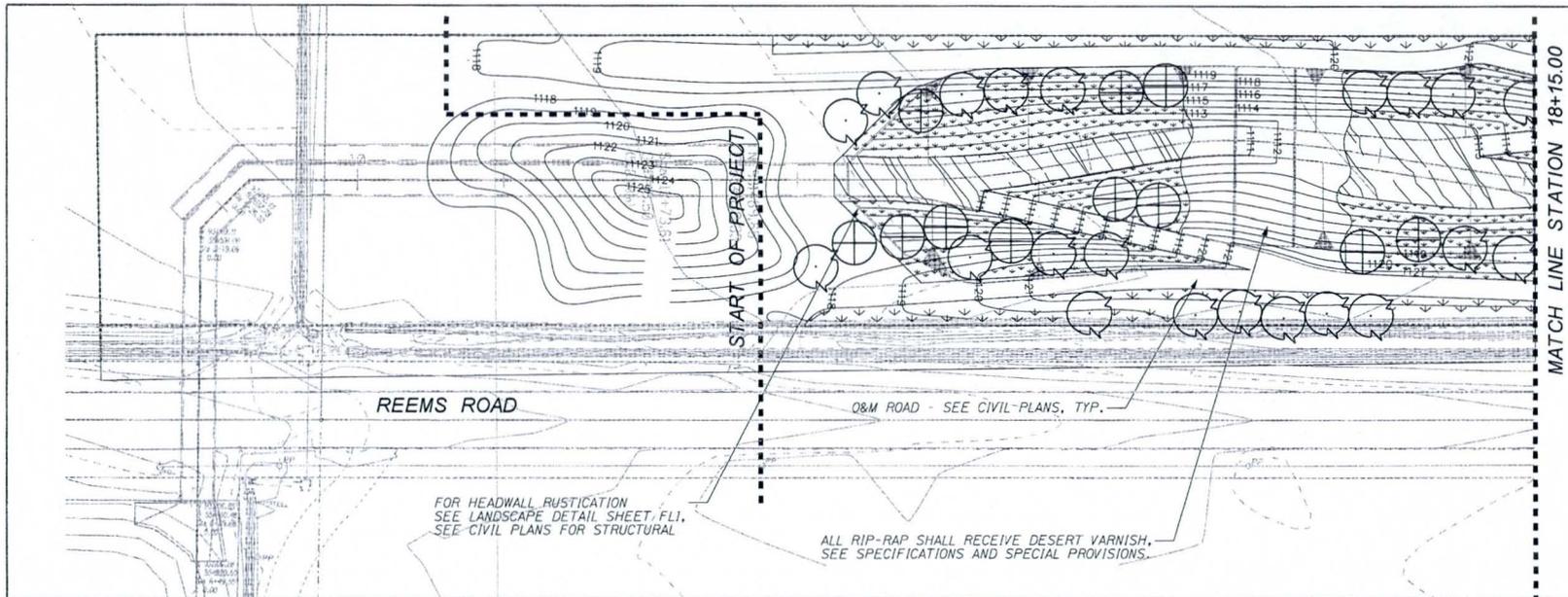
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION
REEMS ROAD CHANNEL AND BASIN

FCD PROJECT NO. 470-12-31



	BY	DATE
DESIGNED	SH	12/07
DRAWN	BSM	12/07
CHECKED	SH	12/07

DRAWING NO. LPD	LANDSCAPE AND SEEDING SITE PLAN	SHEET OF 47 59
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REMOVE

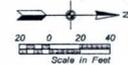
CONSTRUCT

SYM.	ABV.	QTY.	
Trees:			
	CF	53	Blue Palo Verde (Cercidium floridum)
	CM	-	Foothills Palo Verde (Cercidium microphyllum)
	OT	29	Ironwood (Olneya tesota)
	PV	-	Velvet Mesquite (Prosopis juliflora)

• ALL TREE SIZES TO BE TALL POTS.

SYM.	QTY.	
Seed Mixes:		
	5,144 SQ. YDS.	Seed Mix A Top Area
	12,479 SQ. YDS.	Seed Mix B Side Slope
	4,017 SQ. YDS.	Seed Mix C Channel Bottom
	0 SQ. YDS.	Seed Mix D Basin Bottom

Refer to plan sheet FL2 for seed mix chart



TWO WORKING DAYS
BEFORE YOU RIG CALL
602-263-1100
BLUE STAKE

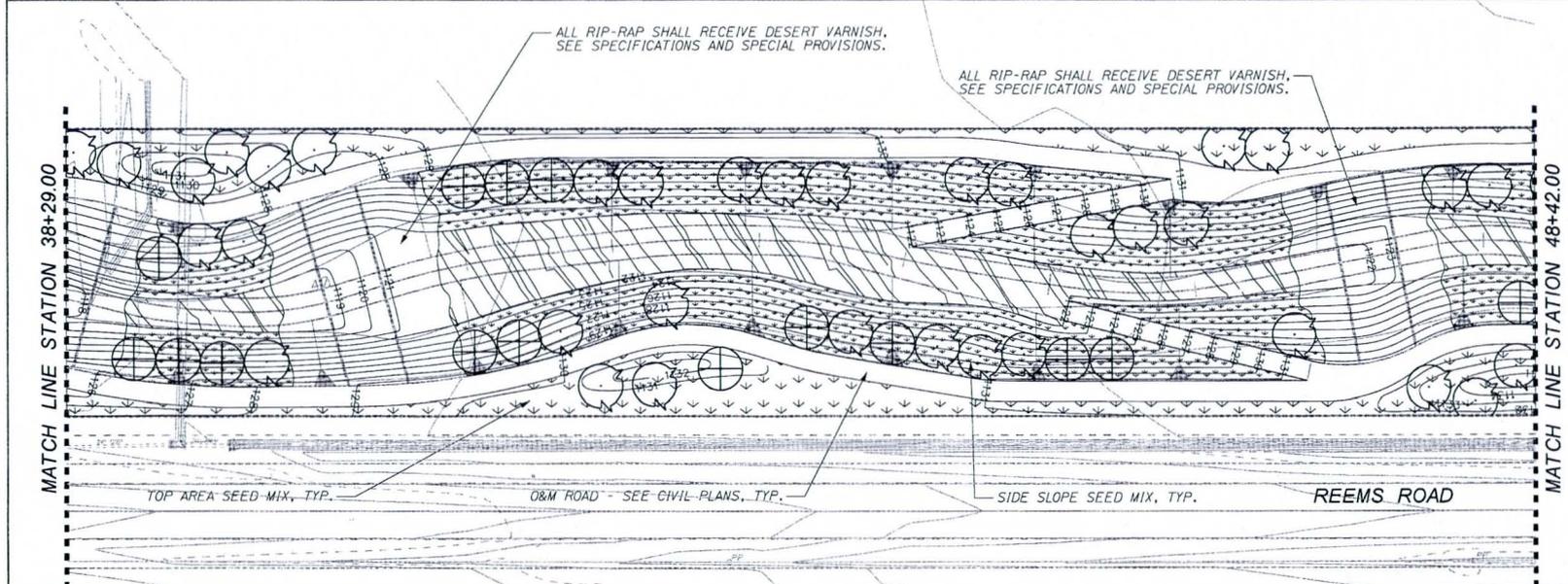
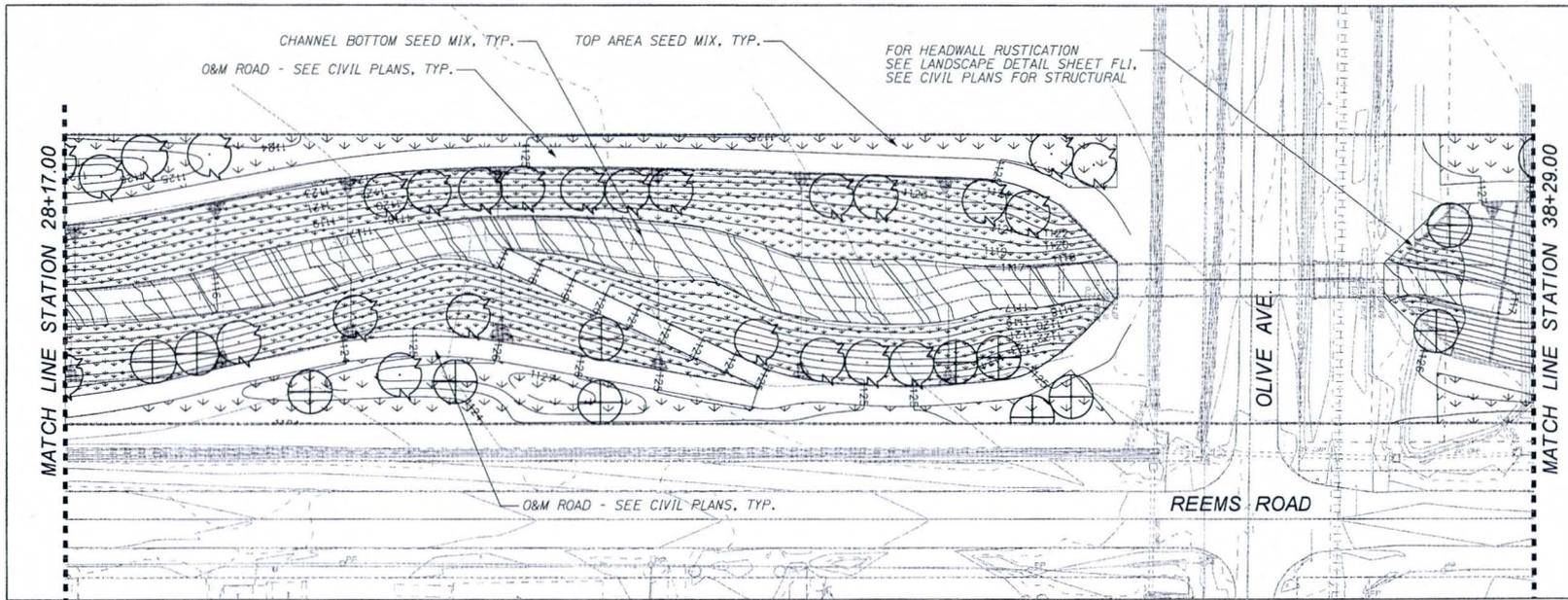
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NO.	REVISION	BY	DATE

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION
REEMS ROAD CHANNEL AND BASIN

FCD PROJECT NO. 470-12-31

	BY	DATE
DESIGNED	SH	12/07
DRAWN	BSM	12/07
CHECKED	SH	12/07

DRAWING NO. LP1	LANDSCAPE AND SEEDING	SHEET OF 48 59
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REMOVE

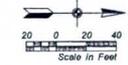
CONSTRUCT

SYM.	ABV.	QTY.	
Trees:			
	CF	59	Blue Palo Verde (Cercidium floridum)
	CM	-	Foothills Palo Verde (Cercidium microphyllum)
	OT	27	Ironwood (Olneya tesota)
	PJ	-	Velvet Mesquite (Prosopis velutina)

• ALL TREE SIZES TO BE TALL POTS.

SYM.	QTY.	
Seed Mixes:		
	8,304 SQ. YDS.	Seed Mix A Top Area
	14,426 SQ. YDS.	Seed Mix B Side Slope
	5,886 SQ. YDS.	Seed Mix C Channel Bottom
	0 SQ. YDS.	Seed Mix D Basin Bottom

Refer to plan sheet FL2 for seed mix chart



240 WORKING DAYS
BEFORE YOU USE CALL
602-263-1100
BLUE STAKE

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NO	REVISION	BY	DATE

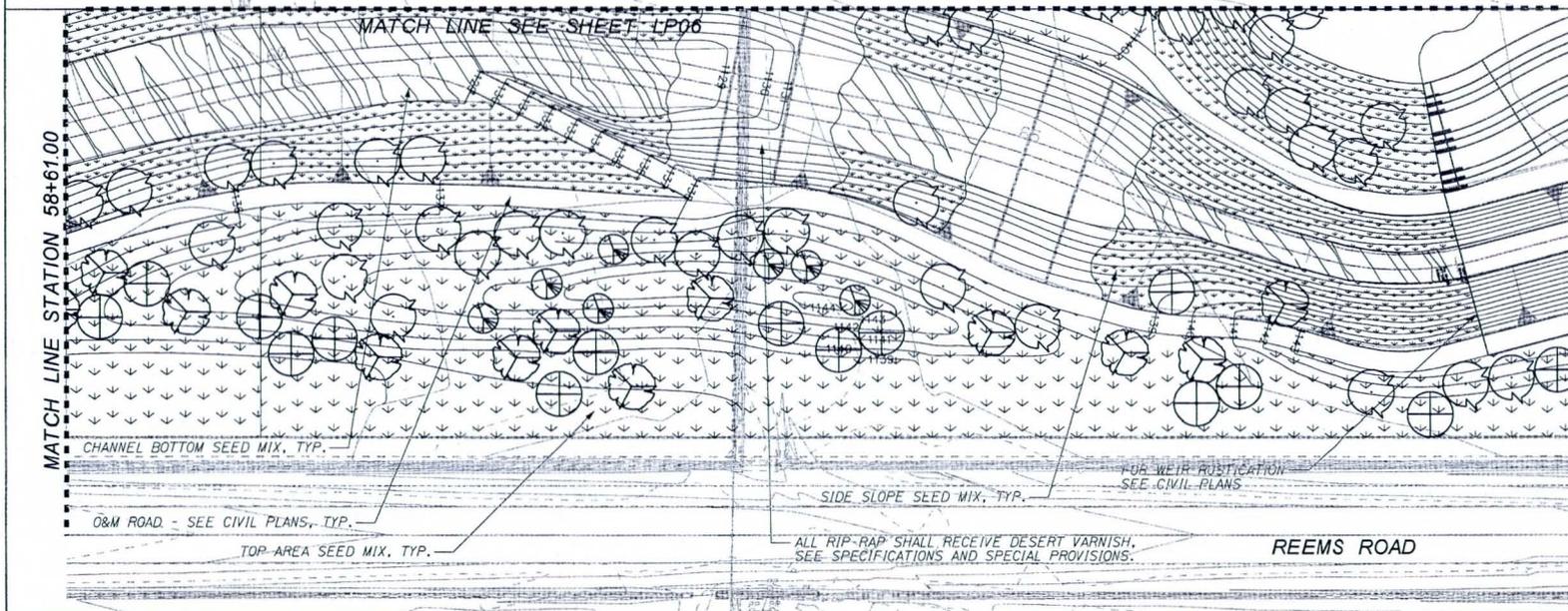
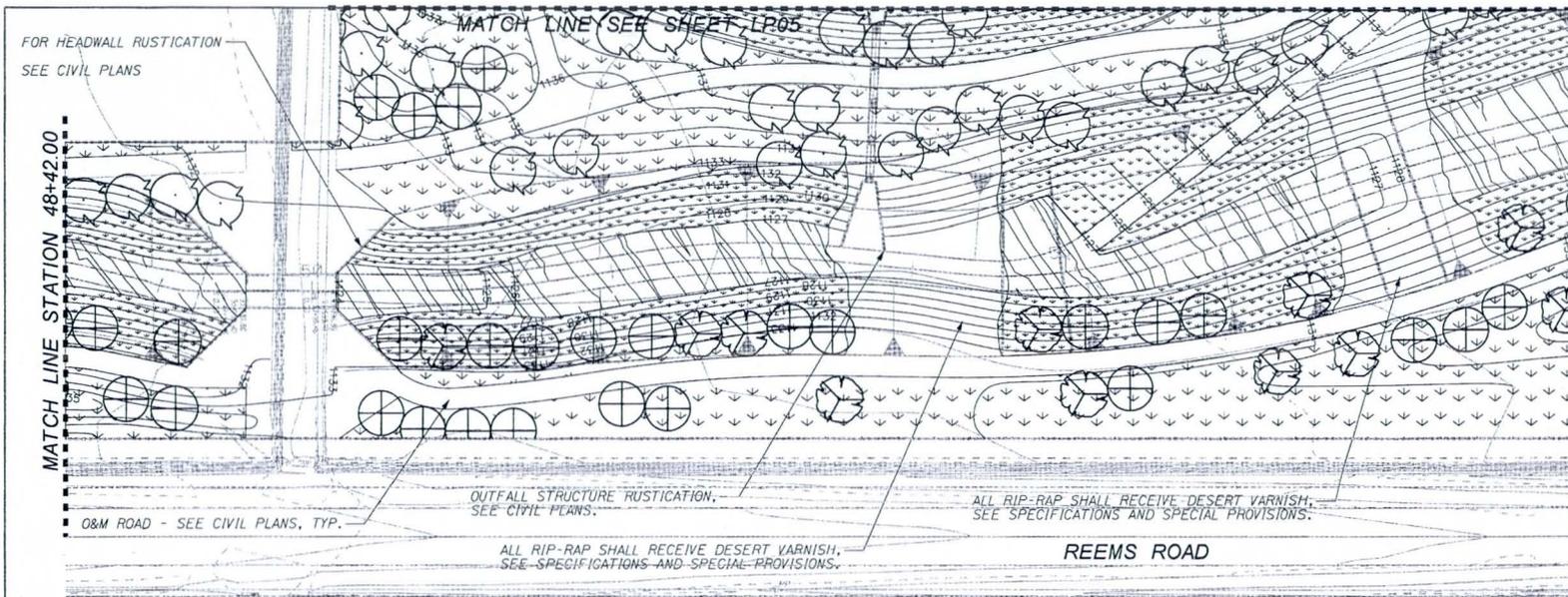
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN

FCD PROJECT NO. 470-12-31

	BY	DATE
DESIGNED	SH	12/07
DRAWN	BSM	12/07
CHECKED	SH	12/07

DRAWING NO. LP2 LANDSCAPE AND SEEDING SHEET OF 49 59



REMOVE

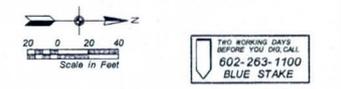
CONSTRUCT

SYM.	ABV.	QTY.	
Trees:			
	CF	64	Blue Palo Verde (Cercidium floridum)
	CM	7	Foothills Palo Verde (Cercidium microphyllum)
	OT	43	Ironwood (Olneya tesota)
	PJ	23	Velvet Mesquite (Prosopis velutina)

■ ALL TREE SIZES TO BE TALL POT

SYM.	QTY.	
Seed Mixes:		
	24,338 SQ. YDS.	Seed Mix A Top Area
	14,561 SQ. YDS.	Seed Mix B Side Slope
	7,425 SQ. YDS.	Seed Mix C Channel Bottom
	500 SQ. YDS.	Seed Mix D Basin Bottom

Refer to plan sheet FL2 for seed mix chart



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2			
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REVISION BY DATE

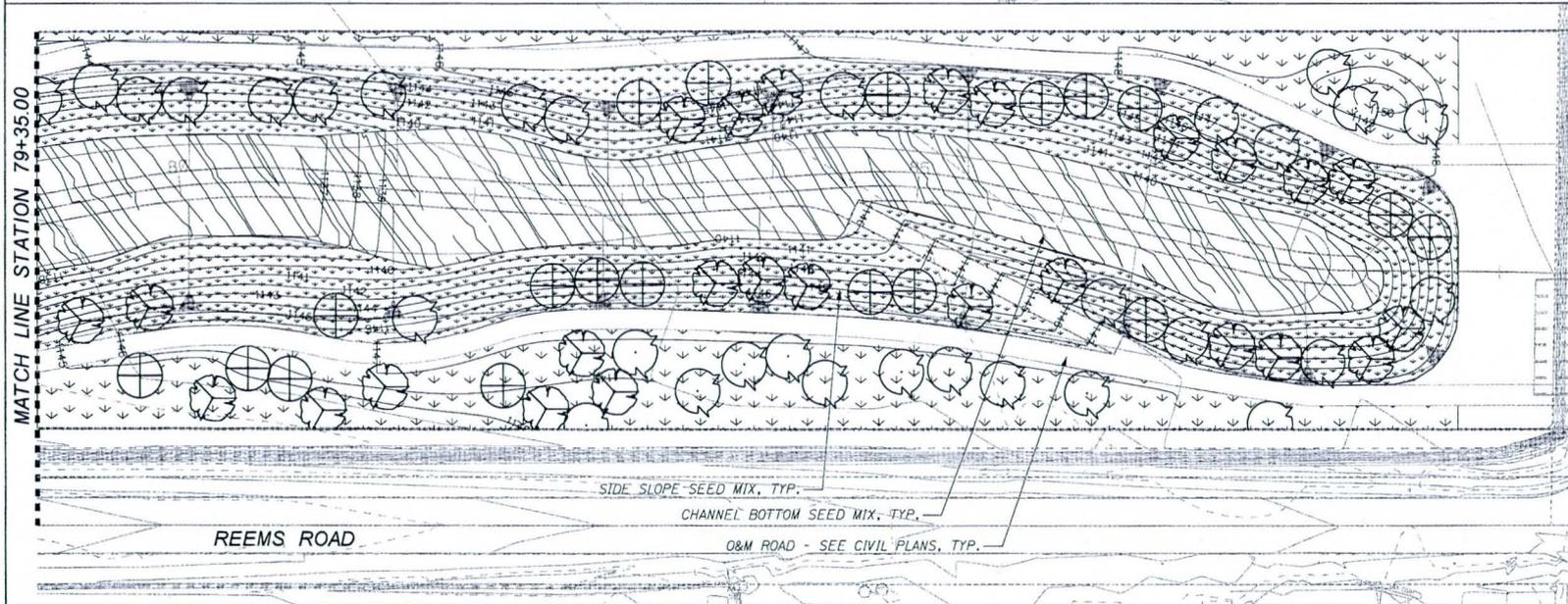
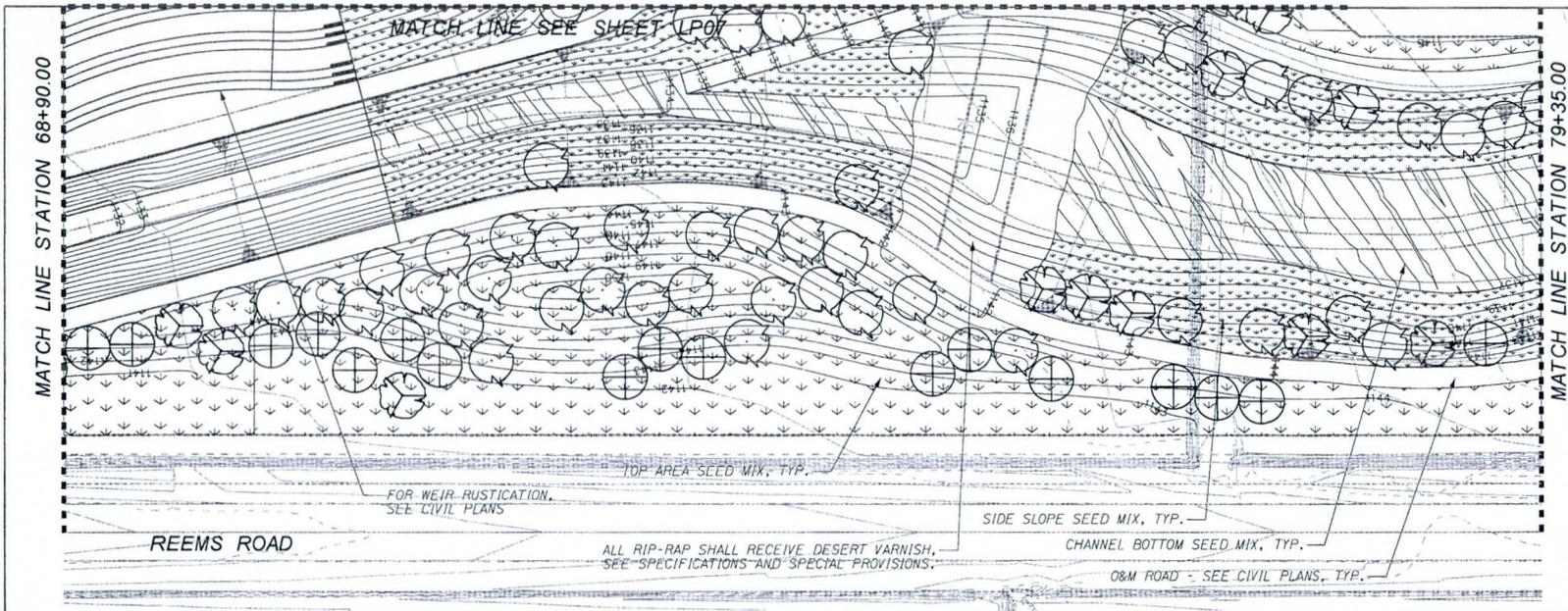
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN

FCD PROJECT NO. 470-12-31

	BY	DATE
DESIGNED	SH	12/07
DRAWN	BSM	12/07
CHECKED	SH	12/07

DRAWING NO. LPS LANDSCAPE AND SEEDING SHEET OF 50 59



REMOVE

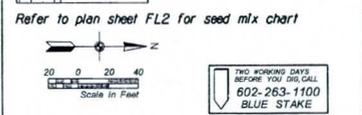
CONSTRUCT

SYM.	ABV.	QTY.	
Trees:			
	CF	75	Blue Palo Verde (Cercidium floridum)
	CM	-	Foothills Palo Verde (Cercidium microphyllum)
	OT	36	Ironwood (Olneya tesota)
	PJ	37	Velvet Mesquite (Prosopis velutina)

• ALL TREE SIZES TO BE TALL POT

SYM.	QTY.	
Seed Mixes:		
	17,322 SQ. YDS.	Seed Mix A Top Area
	19,170 SQ. YDS.	Seed Mix B Side Slope
	10,899 SQ. YDS.	Seed Mix C Channel Bottom
	0 SQ. YDS.	Seed Mix D Basin Bottom

Refer to plan sheet FL2 for seed mix chart



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NO.	REVISION	BY	DATE

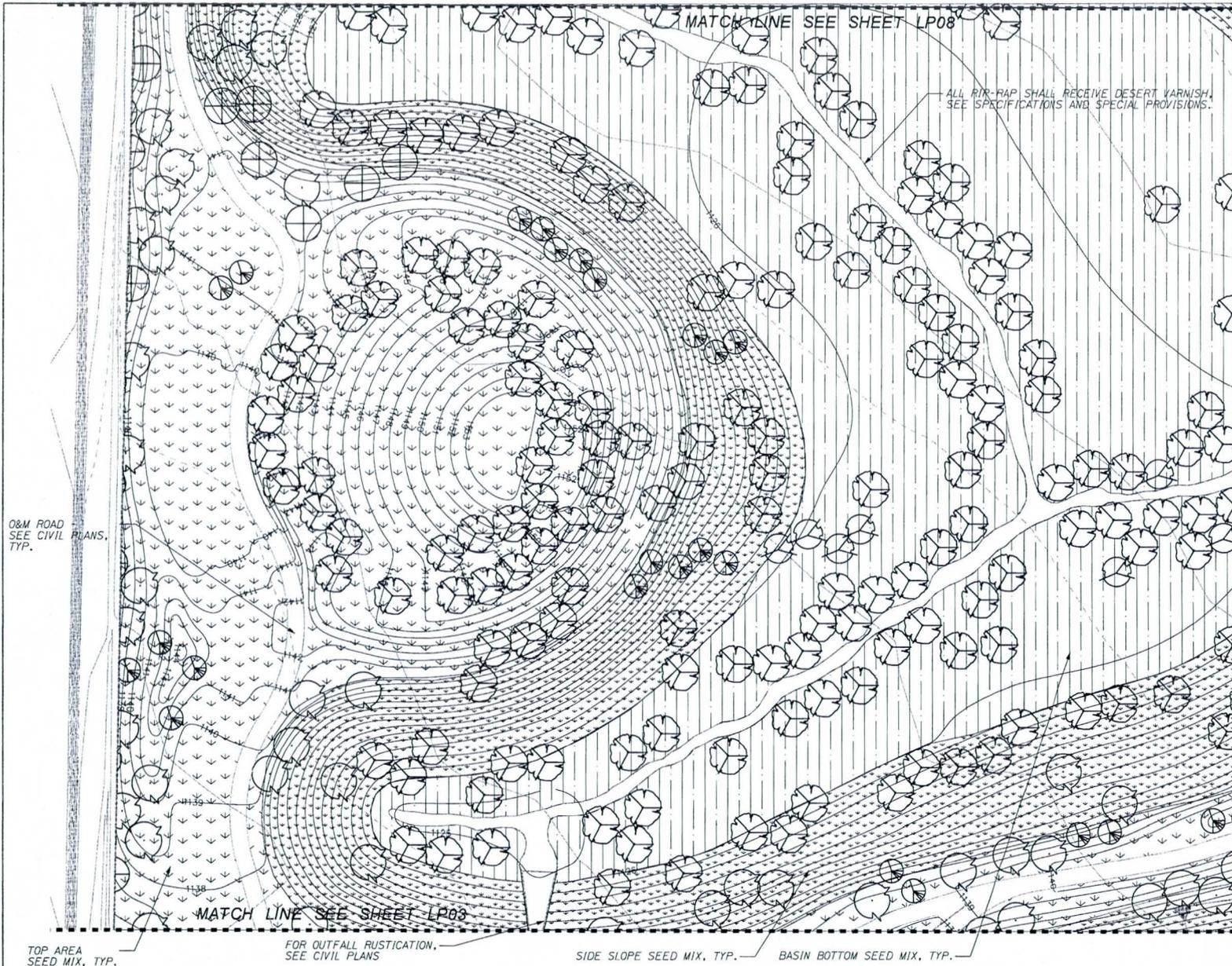
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN

FCD PROJECT NO. 470-12-31

DESIGNED	SH	DATE	12/07
DRAWN	BSM	DATE	12/07
CHECKED	SH	DATE	12/07

DRAWING NO. LP4 LANDSCAPE AND SEEDING SHEET OF 51 59



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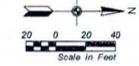
CONSTRUCT

SYM.	ABV.	QTY.	
Trees:			
	CF	39	Blue Palo Verde (Cercidium floridum)
	CM	24	Foothills Palo Verde (Cercidium microphyllum)
	OT	14	Ironwood (Olneya tesota)
	PJ	173	Velvet Mesquite (Prosopis velutina)
	CL	7	Desert Willow (Chilopsis linearis)

• ALL TREE SIZES TO BE TALL POT

SYM.	QTY.	
Seed Mixes:		
	28,091 SQ. YDS.	Seed Mix A Top Area
	17,283 SQ. YDS.	Seed Mix B Side Slope
	0 SQ. YDS.	Seed Mix C Channel Bottom
	34,167 SQ. YDS.	Seed Mix D Basin Bottom

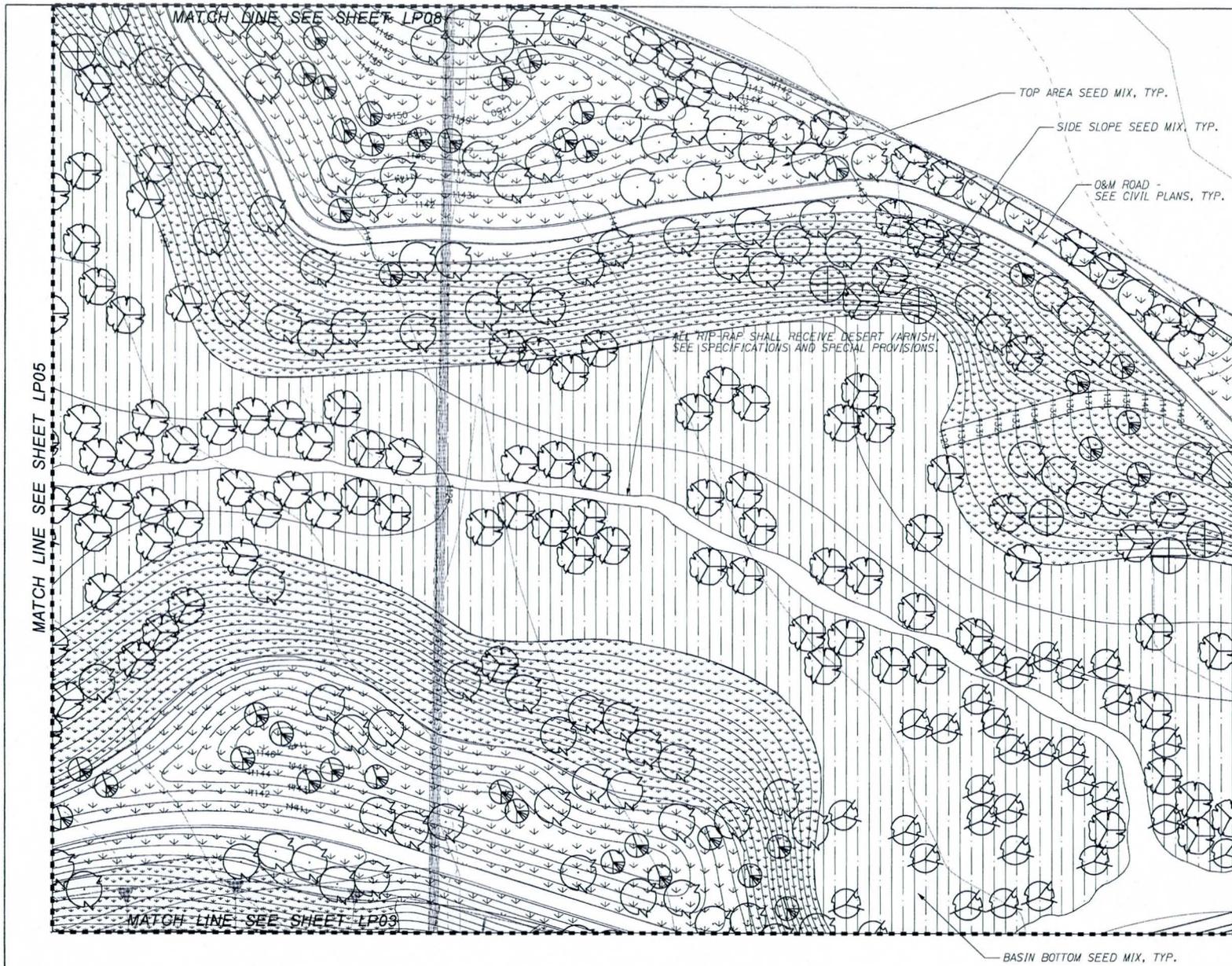
Refer to plan sheet FL2 for seed mix chart



2 TO WORKING DAYS
BEFORE YOU CALL
602-263-1100
BLUE STAKE

3			
2			
1			
NO.	REVISION	BY	DATE
	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31		
	DESIGNED	SH	12/07
	DRAWN	BSM	12/07
	CHECKED	SH	12/07
DRAWING NO.	LANDSCAPE AND SEEDING		SHEET OF
LP5			52 59

TOP AREA SEED MIX, TYP. FOR OUTFALL RUSTICATION, SEE CIVIL PLANS SIDE SLOPE SEED MIX, TYP. BASIN BOTTOM SEED MIX, TYP.



REMOVE

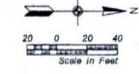
CONSTRUCT

SYM.	ABV.	QTY.	
Trees:			
	CF	103	Blue Palo Verde (<i>Cercidium floridum</i>)
	CM	41	Foothills Palo Verde (<i>Cercidium microphyllum</i>)
	OT	6	Ironwood (<i>Olneya tesota</i>)
	PJ	101	Velvet Mesquite (<i>Prosopis velutina</i>)
	CL	32	Desert Willow (<i>Chilopsis linearis</i>)

* ALL TREE SIZES TO BE TALL POT

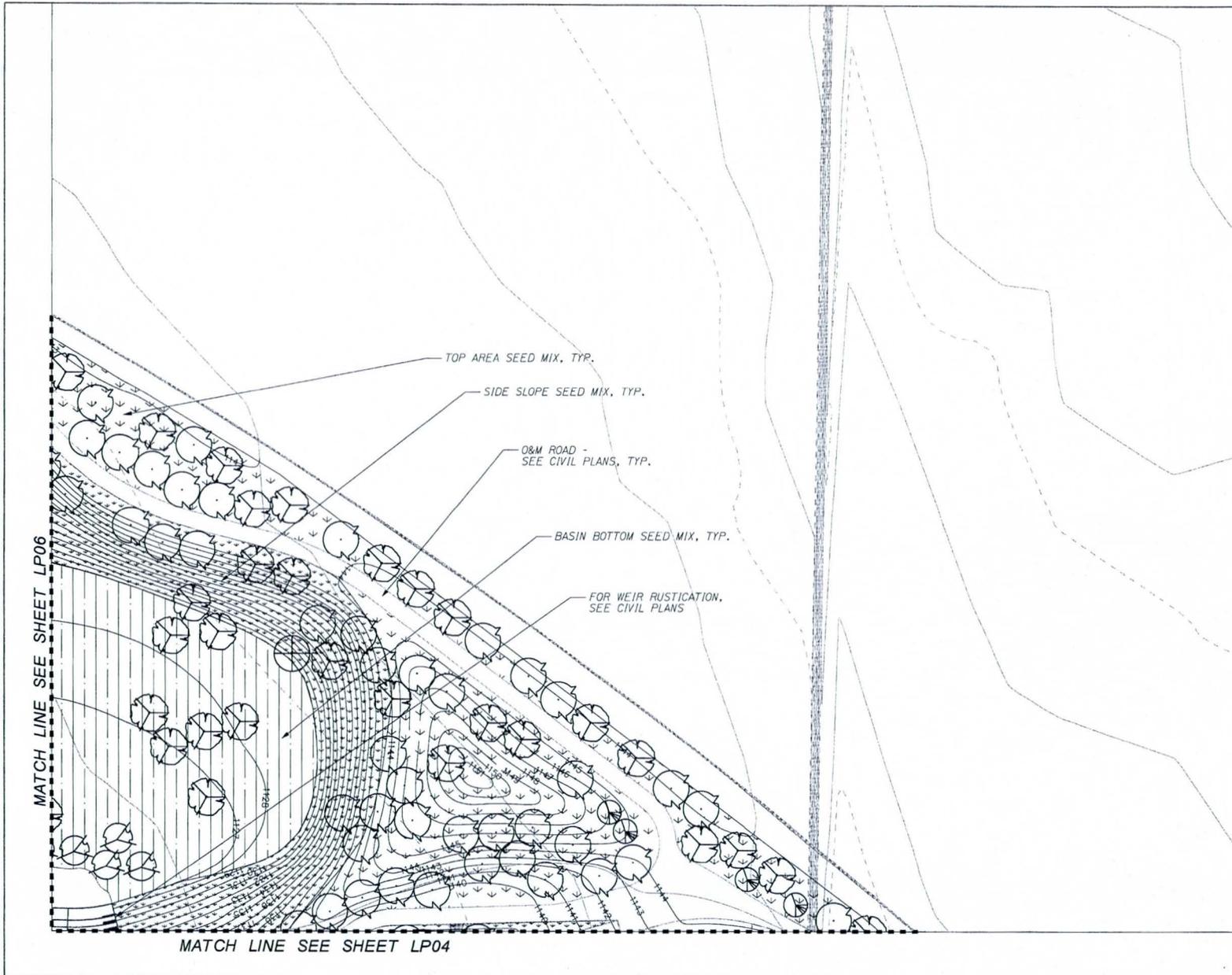
SYM.	QTY.	
Seed Mixes:		
	19,040 SQ. YDS.	Seed Mix A Top Area
	23,978 SQ. YDS.	Seed Mix B Side Slope
	0 SQ. YDS.	Seed Mix C Channel Bottom
	30,509 SQ. YDS.	Seed Mix D Basin Bottom

Refer to plan sheet FL2 for seed mix chart



TWO WORKING DAYS
BEFORE YOU SET CALL
602-263-1100
BLUE STAKE

3			
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1			
NO.	REVISION	BY	DATE
	 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION REEMS ROAD CHANNEL AND BASIN FCD PROJECT NO. 470-12-31		
		BY	DATE
	DESIGNED	SH	12/07
	DRAWN	BSM	12/07
	CHECKED	SH	12/07
DRAWING NO. LP6	LANDSCAPE AND SEEDING		SHEET OF 53 59



REMOVE

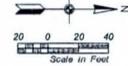
CONSTRUCT

SYM.	ABV.	QTY.	
Trees:			
	CF	44	Blue Palo Verde (Cercidium floridum)
	CM	4	Foothills Palo Verde (Cercidium microphyllum)
	OT	1	Ironwood (NIC) (Olneya tesota)
	PJ	28	Velvet Mesquite (Prosopis velutina)
	CL	4	Desert Willow (Chilopsis linearis)

* ALL TREE SIZES TO BE TALL POT

SYM.	QTY.	
Seed Mixes:		
	8,093 SQ. YDS.	Seed Mix A Top Area
	4,385 SQ. YDS.	Seed Mix B Side Slope
	0 SQ. YDS.	Seed Mix C Channel Bottom
	5,421 SQ. YDS.	Seed Mix D Basin Bottom

Refer to plan sheet FL2 for seed mix chart



TWO WORKING DAYS
BEFORE YOU CALL
802-263-1100
BLUE STAKE

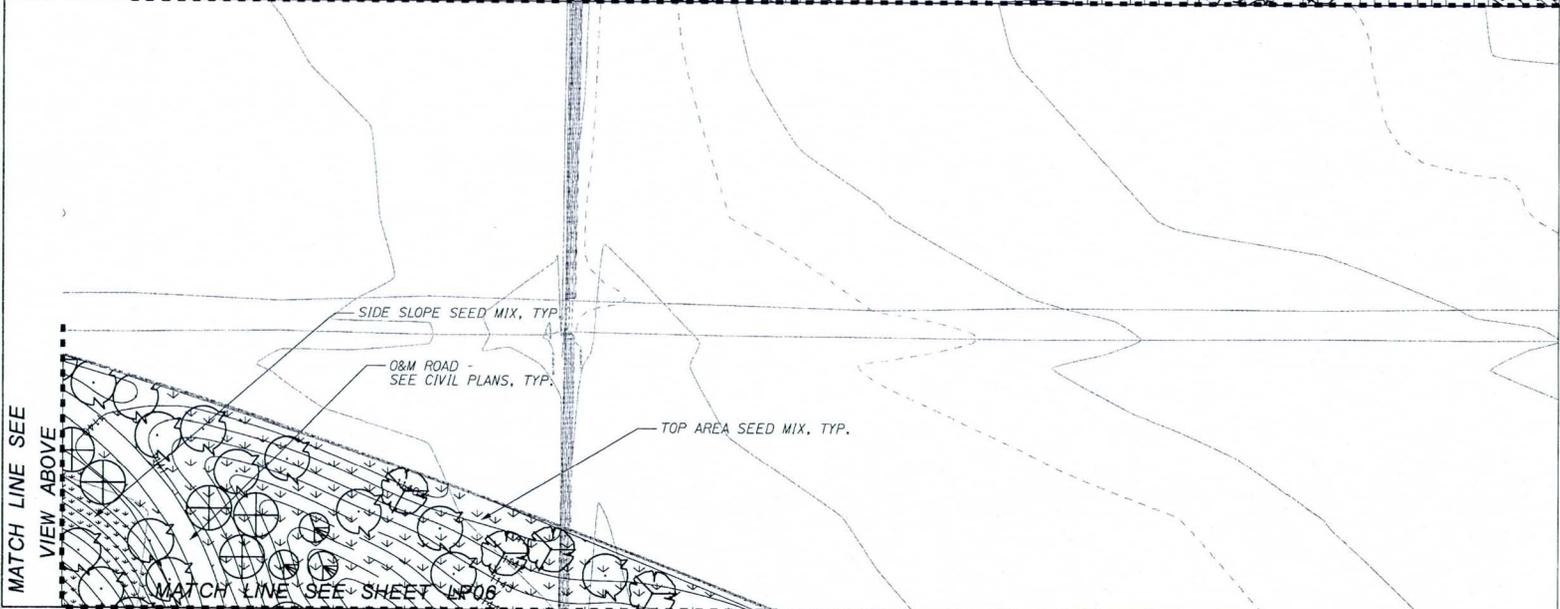
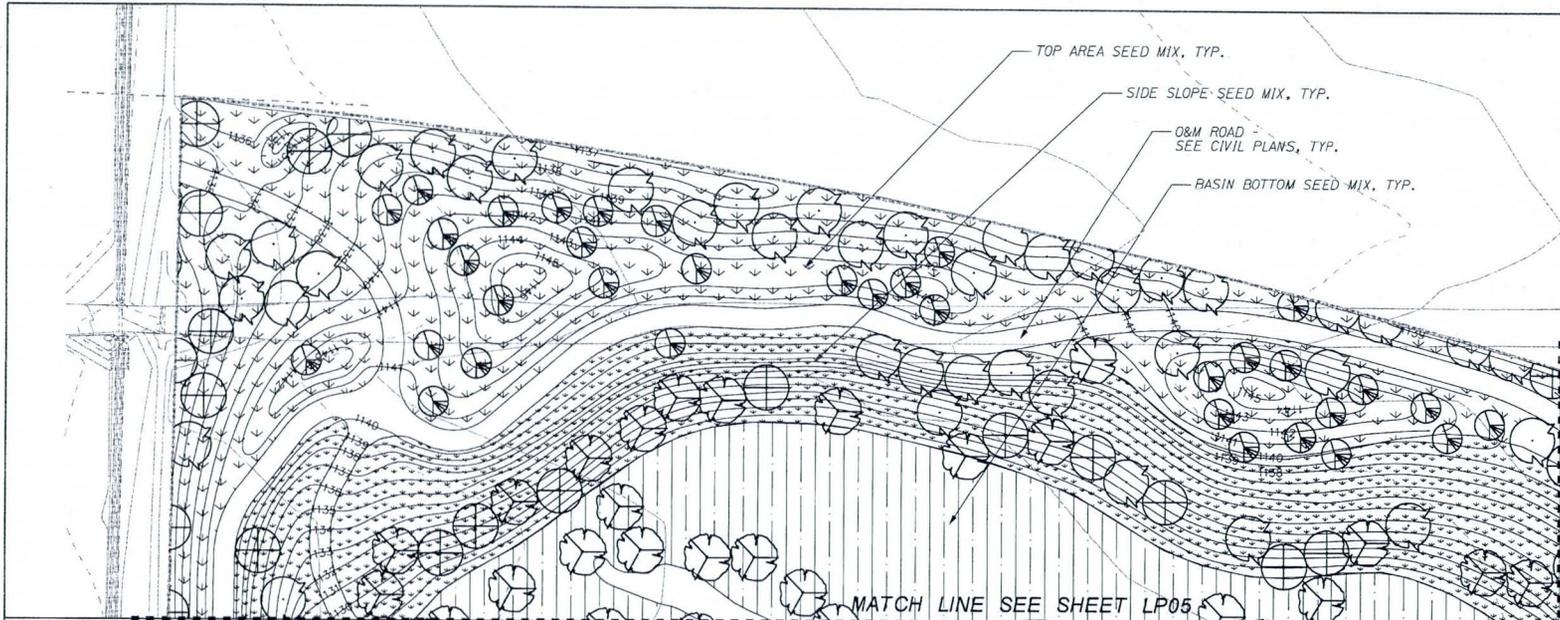
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NO.	REVISION	BY	DATE

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION
REEMS ROAD CHANNEL AND BASIN

-FCD PROJECT NO. 470-12-31

	BY	DATE
	DESIGNED SH	12/07
	DRAWN BSM	12/07
	CHECKED SH	12/07

DRAWING NO. LP7	LANDSCAPE AND SEEDING	SHEET OF 54 59
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REMOVE

CONSTRUCT

SYM.	ABV.	QTY.	
Trees:			
	CF	55	Blue Palo Verde (<i>Cercidium floridum</i>)
	CM	38	Foothills Palo Verde (<i>Cercidium microphyllum</i>)
	OT	26	Ironwood (<i>Olneya tesota</i>)
	PJ	27	Velvet Mesquite (<i>Prosopis velutina</i>)

* ALL TREE SIZES TO BE TALL POT

SYM.	QTY.	
Seed Mixes:		
	17,058 SQ. YDS.	Seed Mix A Top Area
	9,067 SQ. YDS.	Seed Mix B Side Slope
	0 SQ. YDS.	Seed Mix C Channel Bottom
	5,796 SQ. YDS.	Seed Mix D Basin Bottom

Refer to plan sheet FL2 for seed mix chart



PRO. WORKING DAYS BEFORE YOU DIG CALL 602-263-1100 BLUE STAKE

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2			
1			
NO.	REVISION	BY	DATE

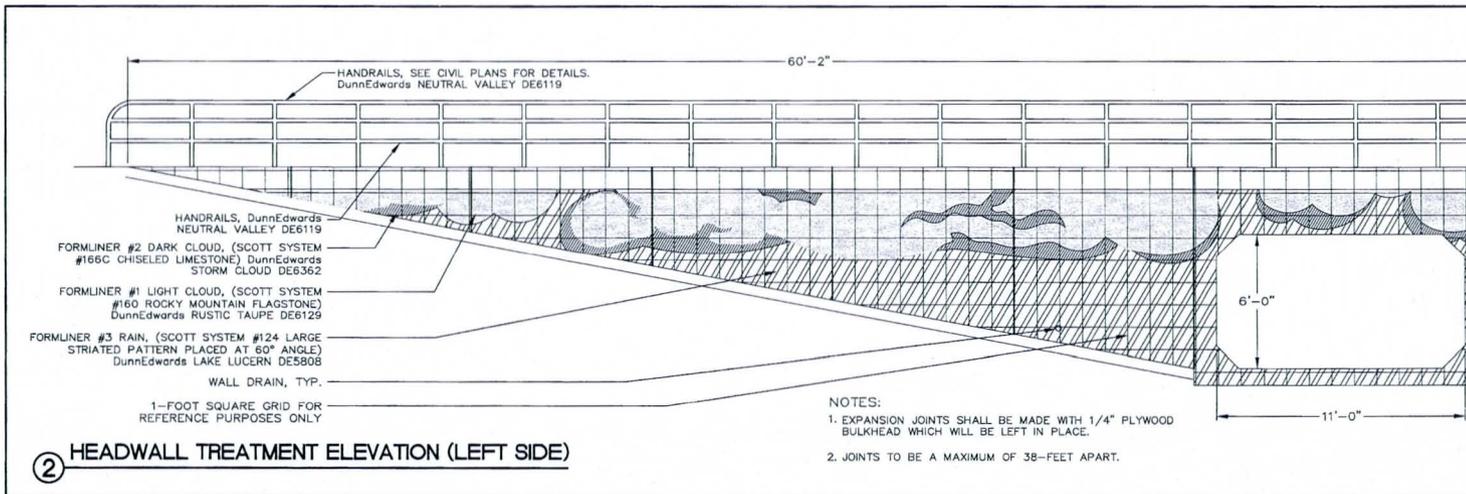
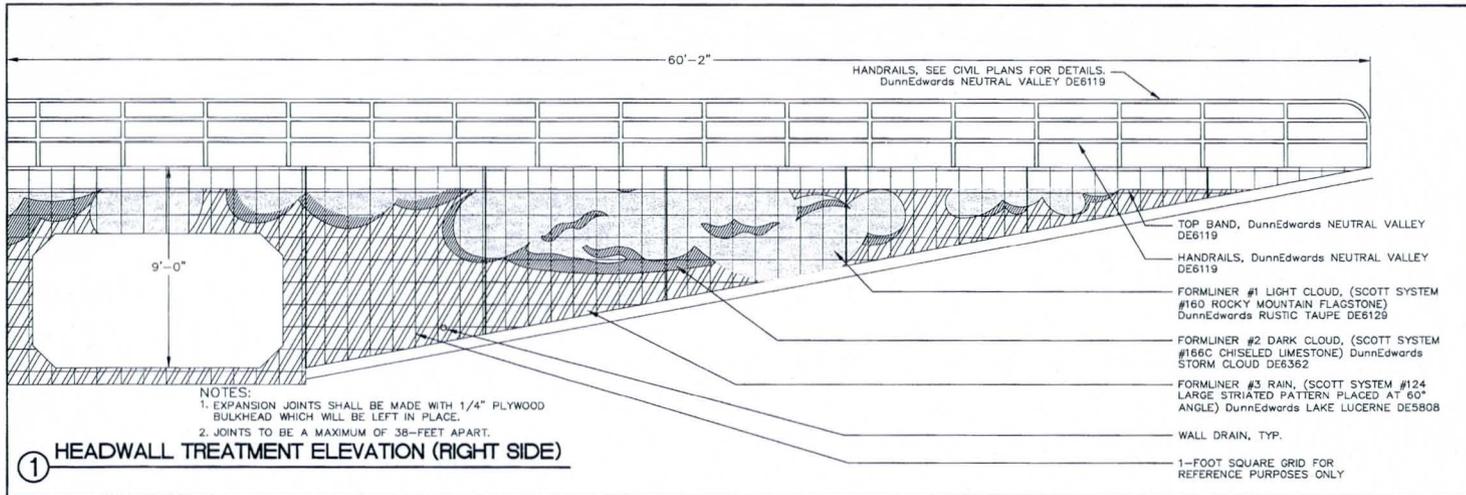
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN

FCD PROJECT NO. 470-12-31

	BY	DATE
DESIGNED	SH	12/07
DRAWN	BSM	12/07
CHECKED	SH	12/07

DRAWING NO. LP8 LANDSCAPE AND SEEDING SHEET OF 55 59



REMOVE

CONSTRUCT

NO WORKING DATE BEFORE YOU CALL
602-263-1100
BLUE STAKE

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1			
NO.	REVISION	BY	DATE



FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION
REEMS ROAD CHANNEL AND BASIN

FCD PROJECT NO. 470-12-31

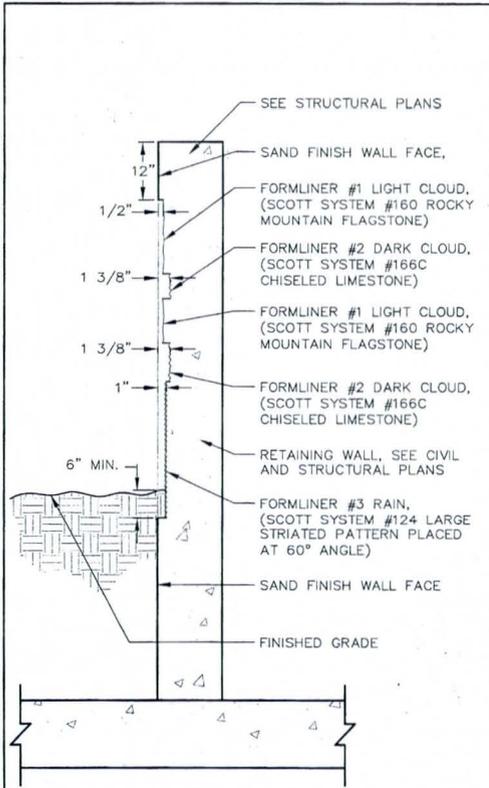


	BY	DATE
DESIGNED	SH	12/07
DRAWN	BSM	12/07
CHECKED	SH	12/07

DRAWING NO.
FL1

LANDSCAPE AND SEEDING
FORM LINER DETAILS

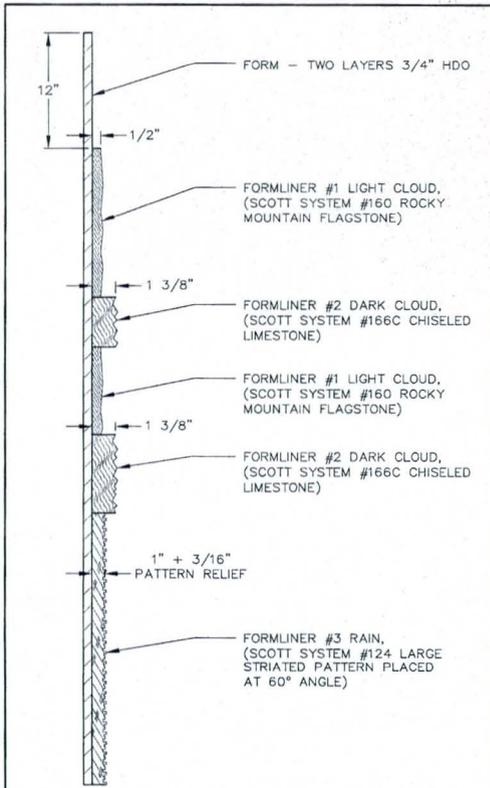
SHEET OF
58 59



- NOTES:
1. EXPANSION JOINTS SHALL BE MADE WITH 1/4" PLYWOOD BULKHEAD WHICH WILL BE LEFT IN PLACE.
 2. JOINTS TO BE A MAXIMUM OF 38- FEET APART.

TYPICAL HEADWALL FORM DEPTH SECTION

1



- NOTES:
1. EXPANSION JOINTS SHALL BE MADE WITH 1/4" PLYWOOD BULKHEAD WHICH WILL BE LEFT IN PLACE.
 2. JOINTS TO BE A MAXIMUM OF 38- FEET APART.

TYPICAL FORMLINER ATTACHMENT SECTION

2

**Reems Road and Basin Project
Hydroseed Mixes
December 20, 2007**

Scientific Name	Common Name	Mix A	Mix B	Mix C	Mix D
		(Top Area)	(Side Slope)	(Channel Bottom)	(Basin Bottom)
		PLS/ Acre	PLS/ Acre	PLS/ Acre	PLS/ Acre
Forbes/Wildflowers					
<i>Dasylirion multifidum</i>	Desert Marigold	1	1	0.5	0.5
<i>Eurotia macdonnana</i>	Mexican Gold Poppy	2	2	1	1
<i>Lesquerella gordonii</i>	Gordon Bladder Pod	1	1	0.5	0.5
<i>Orthocarpus purpurascens</i>	Owl Clover	1	1	0.5	0.5
<i>Phacelia conchata</i>	Desert Phacelia	1	1	1	1
<i>Sphaeralcea ambigua</i>	Globe Malow	1	1	1	1
Grasses					
<i>Arundo donax</i>	Purple Three-awn	2	2		
<i>Digitaria californica</i>	Arizona Cotton-top			0.5	0.5
<i>Sporobolus airoides</i>	Alkali Sacaton			1	1
<i>Sporobolus cryptandrus</i>	Sand Dropseed			1	1
Shrubs/Small Tree					
<i>Acacia constricta</i>	Whitethorn	1.5			2
<i>Acacia greggii</i>	Catclaw Acacia	2			4
<i>Ambrosia deltoidea</i>	Triangle-leaf Burrage	3	3		3
<i>Atriplex canescens</i>	Four-wing Saltbush	2			2
<i>Atriplex polycarpa</i>	Quabush	1			1
<i>Celtis pallida</i>	Desert Hackberry				2
<i>Eriola hermosa</i>	Bristlebrush		1		
<i>Larrea tridentata</i>	Cococote Bush	4.5			
<i>Palafoxia occipet</i>	Paper Daisy	1	1		1
Trees					
<i>Cercocarpus floridum</i>	Blue Palo Verde	3			3
<i>Chilopsis linearis</i>	Desert Willow	1			1
<i>Olneya tesota</i>	Ironwood	1			2
<i>Prosopis juliflora</i>	Velvet Mesquite	1			2
Total PLS/Acre		30	13	2	30

REMOVE

CONSTRUCT

TWO WORKING DAYS BEFORE YOU DRILL
602-263-1100
BLUE STAKE

3			
2			
1			
NO.	REVISION	BY	DATE

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

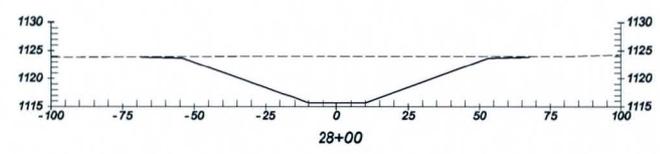
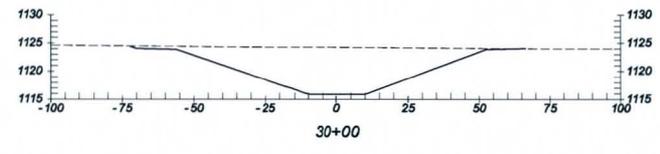
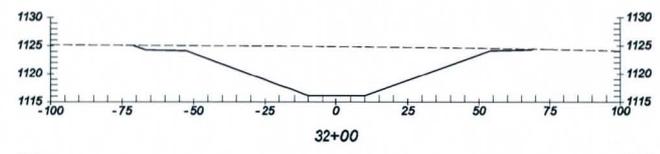
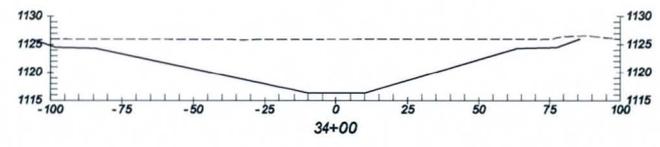
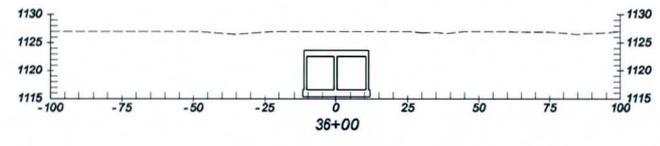
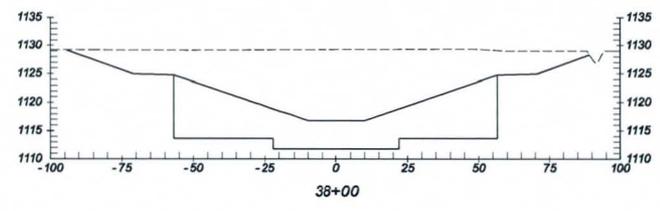
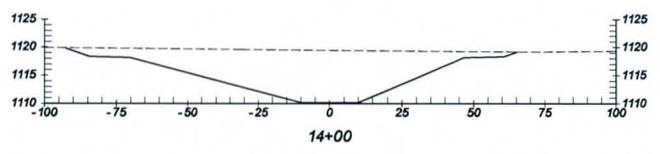
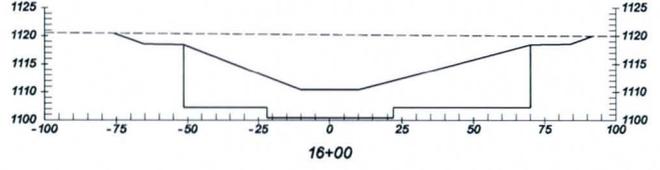
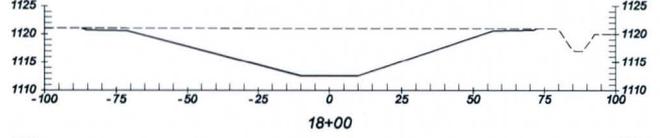
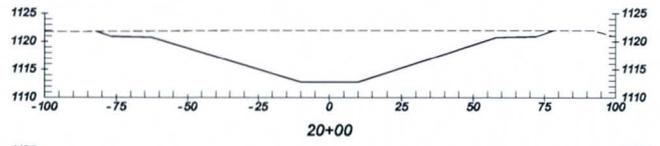
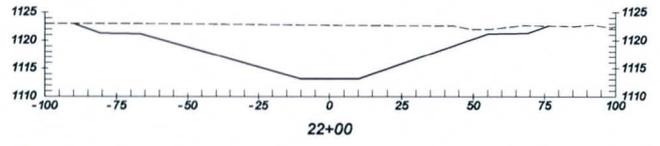
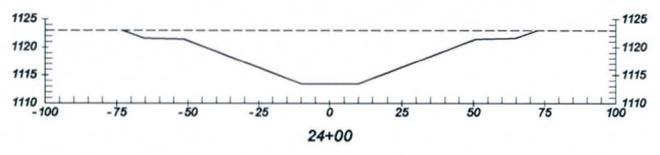
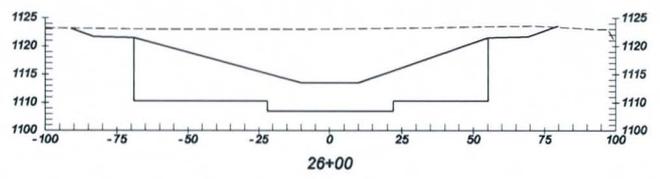
REEMS ROAD CHANNEL AND BASIN

FCD PROJECT NO. 470-12-31

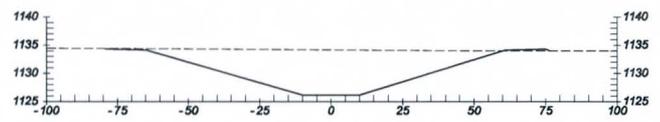
	BY	DATE
DESIGNED	SH	12/07
DRAWN	BSM	12/07
CHECKED	SH	12/07

DRAWING NO. FL2 LANDSCAPE AND SEEDING FORM LINER DETAILS & SEED MIX SHEET OF 57 58

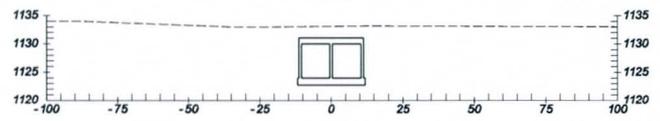
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DATE	08/08	CROSS SECTIONS
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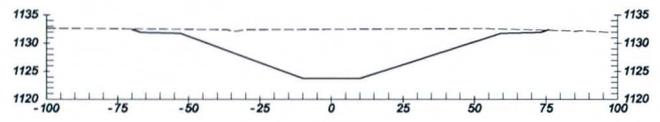
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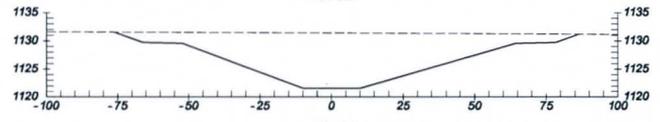
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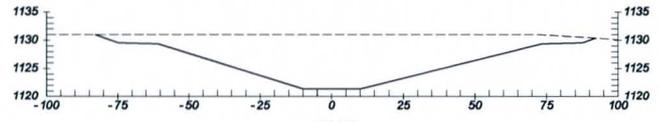
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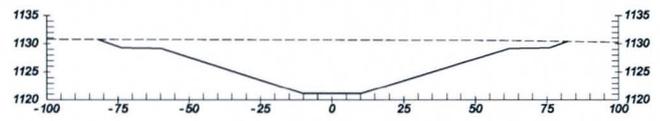
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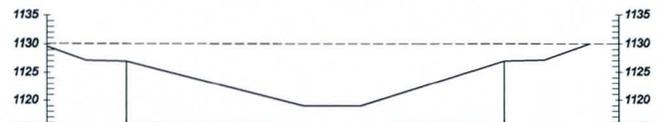
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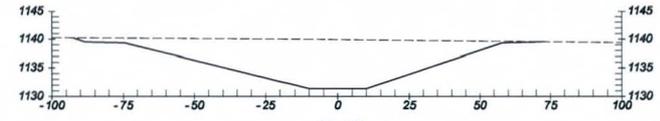
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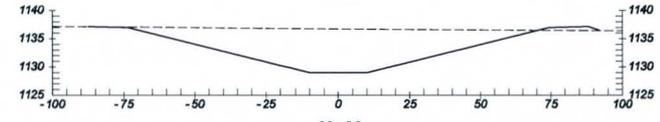
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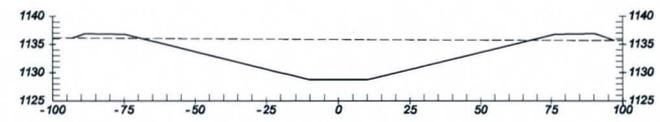
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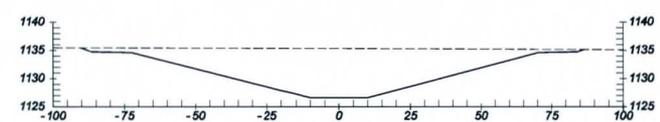
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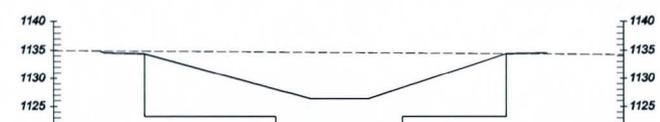
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58+00

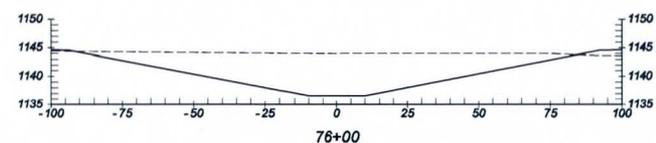
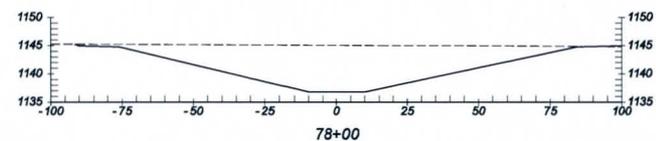
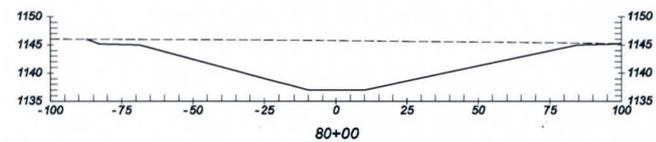
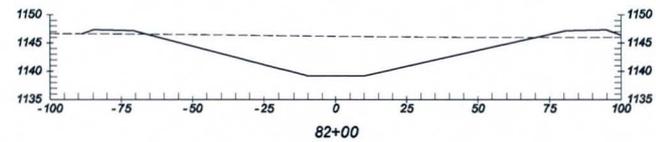
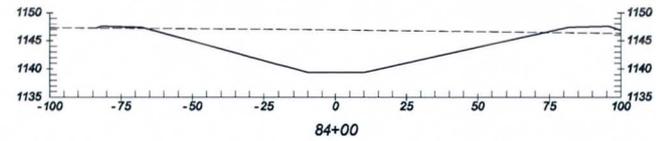
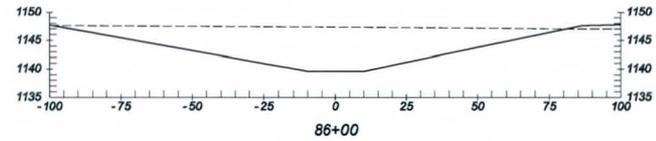
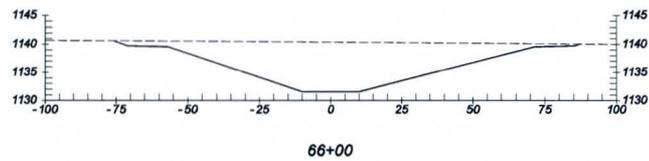
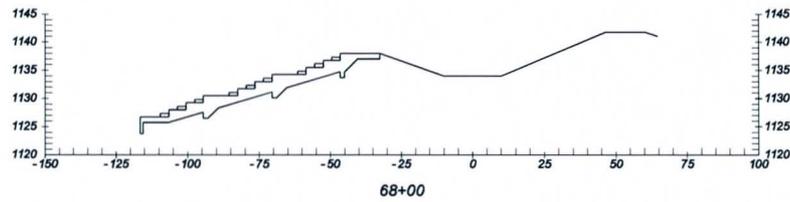
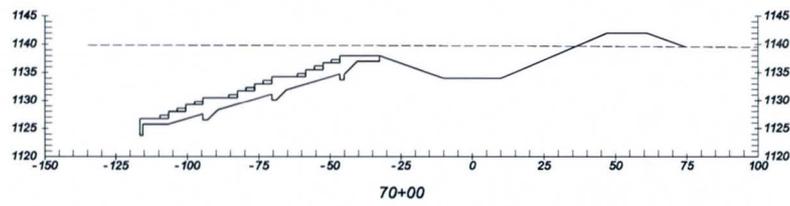
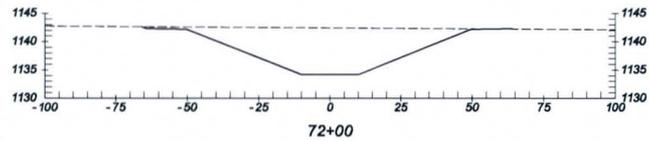
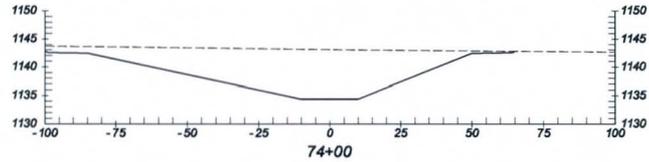


56+00



54+00

REEMS ROAD CHANNEL AND BASIN		DRAWING NO.
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DATE	09/06	CROSS SECTIONS
		SHEET OF
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9-15-2008