



SAN ANTONIO INTERNATIONAL AIRPORT

PLANS FOR CONSTRUCTION

OF

**RUNWAY 3/21 EXTENSION  
 JURISDICTIONAL WATERS MITIGATION AND  
 TREE PLANTING PLANS**

AT

**OLMOS BASIN GOLF COURSE**

PREPARED BY



555 EAST RAMSEY | SAN ANTONIO, TEXAS 78216 | PHONE: 210.375.9000  
 FAX: 210.375.9010

TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470

INDEX OF SHEETS	
Sheet Number	Sheet Title
C1.0	COVER SHEET
C1.1	GENERAL NOTES & ESTIMATE OF QUANTITY
G1.0	OVERALL GRADING PLAN
G2.0	GRADING CROSS SECTIONS
G2.1	GRADING CROSS SECTIONS
P1.0	STREAM PLAN AND PROFILE (STA. 0+00 TO STA. 5+00)
P1.1	STREAM PLAN AND PROFILE (STA. 5+00 TO STA. 10+00)
P1.2	STREAM PLAN AND PROFILE (STA. 10+00 TO STA. 16+00)
M1.0	OVERALL LANDSCAPE MITIGATION PLAN
M2.0	LANDSCAPE AND IRRIGATION PLAN
M3.0	LANDSCAPE AND IRRIGATION PLAN
D1.0	CHANNEL STRUCTURE DETAILS
D1.1	CHANNEL STRUCTURE DETAILS
B1.0	BRIDGE LAYOUT AND PROFILES
U1.0	OVERALL UTILITY & STAGING AREA PLAN
I1.0	OVERALL TREE PLANTING AND IRRIGATION PLAN
I2.0	DETAILED TREE PLANTING AND IRRIGATION PLAN
I3.0	DETAILED TREE PLANTING AND IRRIGATION PLAN
I4.0	DETAILED TREE PLANTING AND IRRIGATION PLAN
I5.0	DETAILED TREE PLANTING AND IRRIGATION PLAN
I6.0	TREE PLANTING AND IRRIGATION DETAILS
S1.0	STORMWATER POLLUTION PREVENTION PLAN
S2.0	SWPPP TYPICAL DETAILS



**FOR CONSTRUCTION**





- LEGEND**
- CREEK CENTERLINE
  - CONSERVATION EASEMENT
  - GOLF HOLE NUMBERS
  - CROSS SECTIONS - SEE SHEETS G2.0 & G2.1
  - PROPOSED BRIDGES
  - BENCHMARK

NOTE: THE CONTRACTOR SHALL VERIFY EXISTING ELEVATIONS AND NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION.

**BENCHMARK POINT LIST**

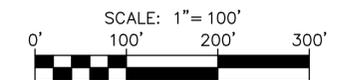
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12	13727217.98	2131360.85	711.69	"SIRCTV"
13	13726747.73	2131242.14	709.32	"SIRCTV"

SIRCTV - SET IR WITH RED CAP (CONTROL)

**TOPOGRAPHIC SURVEY INFORMATION**

FIELD TOPOGRAPHIC INFORMATION: SURVEY POINTS  
 SOURCE: PAPE-DAWSON ENGINEERS, GPS-RTK METHOD  
 DATE: AUGUST 2011  
 ACCURACY: 0.15' VERTICAL AND 0.10' HORIZONTAL

AERIAL TOPOGRAPHIC INFORMATION: BEXAR COUNTY 2010 AERIAL PHOTOGRAMMETRY  
 SOURCE: SAN ANTONIO RIVER AUTHORITY  
 DATE: THIS DATA IS DERIVED FROM 2010 AERIAL DATA AND WAS PRODUCED USING ESTABLISHED TECHNIQUES, METHODOLOGIES AND EQUIPMENT. DATA WAS COMPLETED AS OF NOVEMBER 2011  
 ACCURACY: HORIZONTAL (COMPILED TO MEET 11' AT 95% RMSE)  
 VERTICAL (COMPILED TO MEET 0.6' AT 95% RMSE WITH CONTOURS, BREAKLINES, AND POINTS)

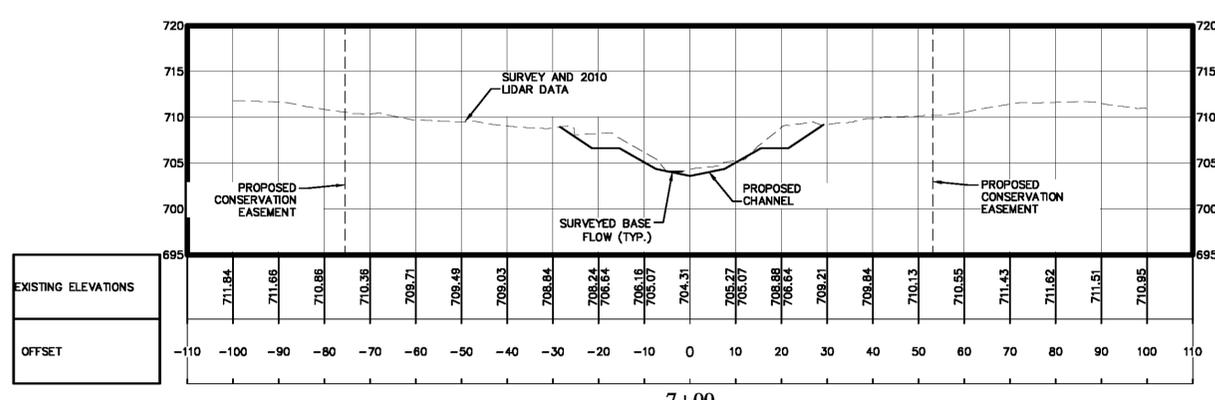
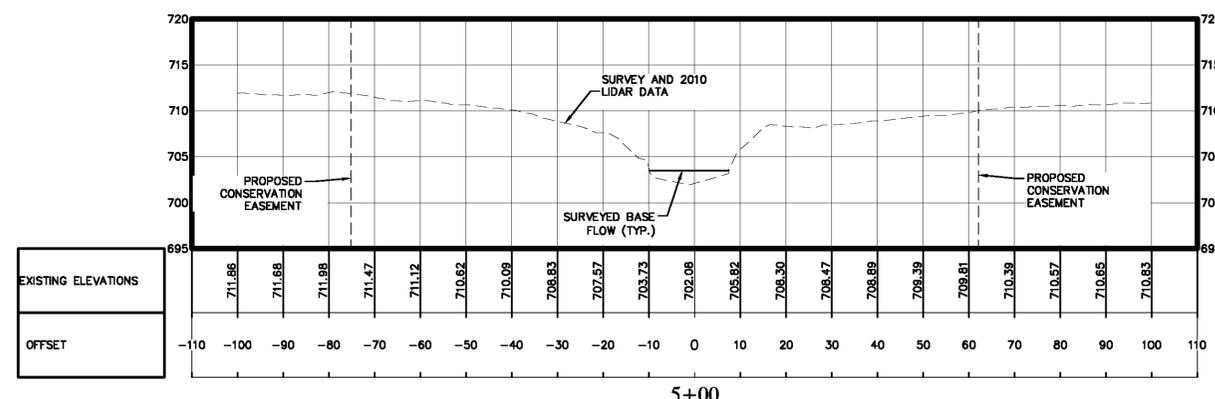
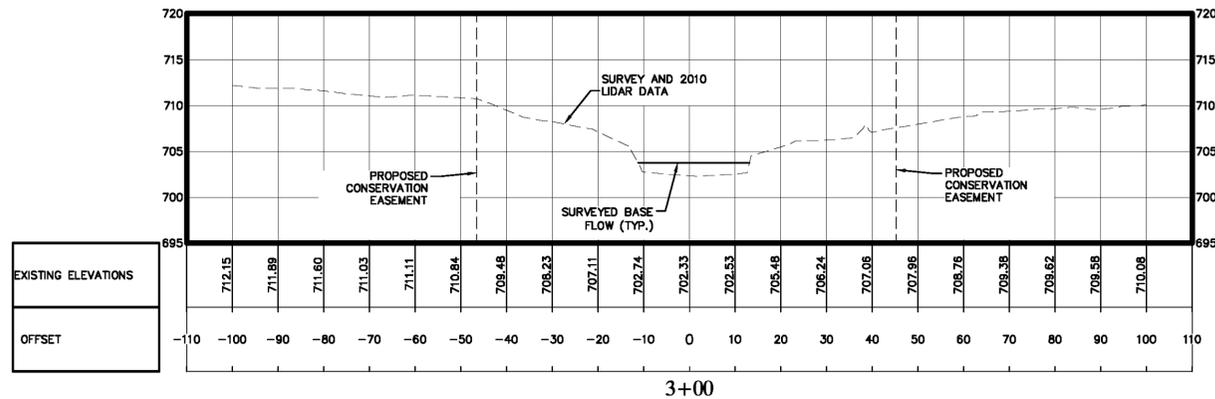
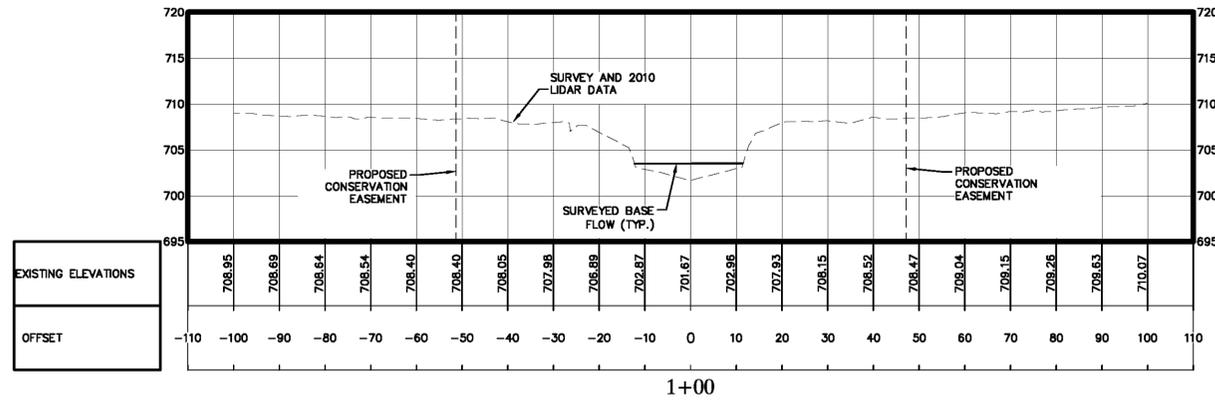
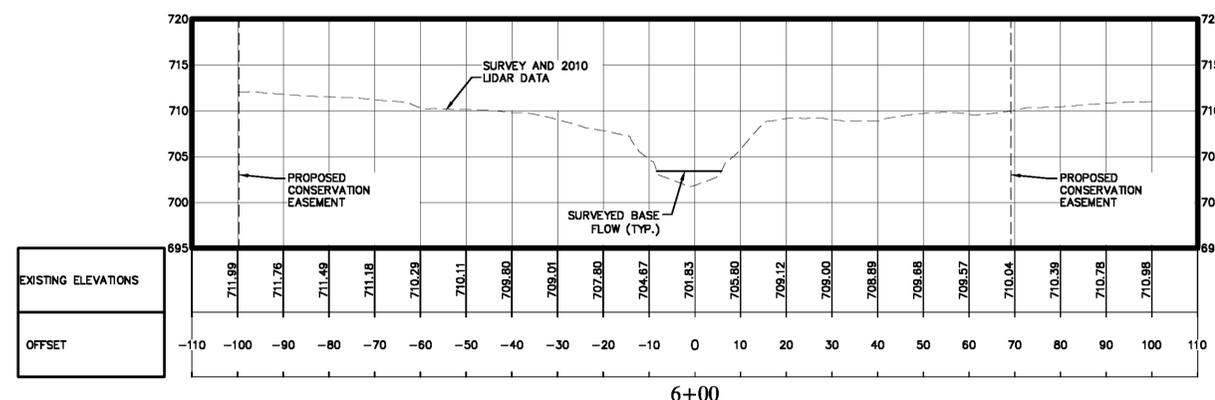
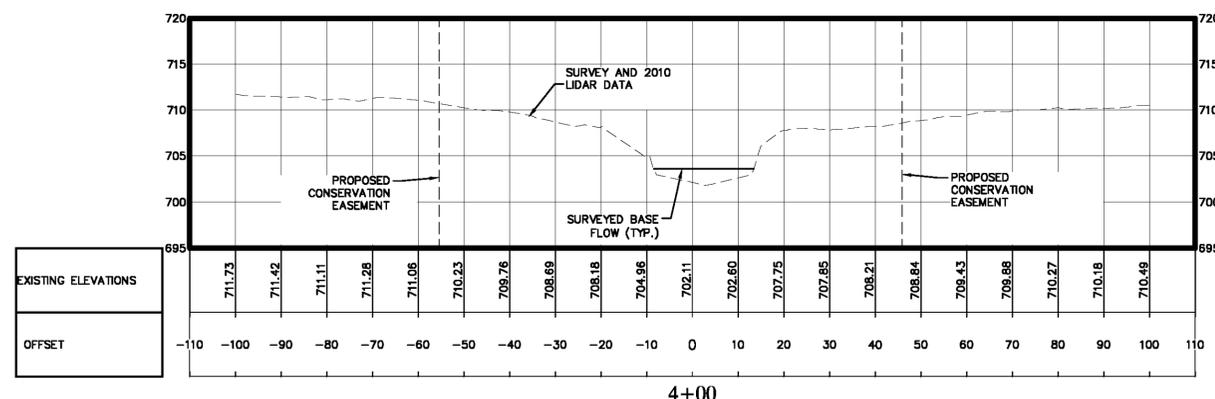
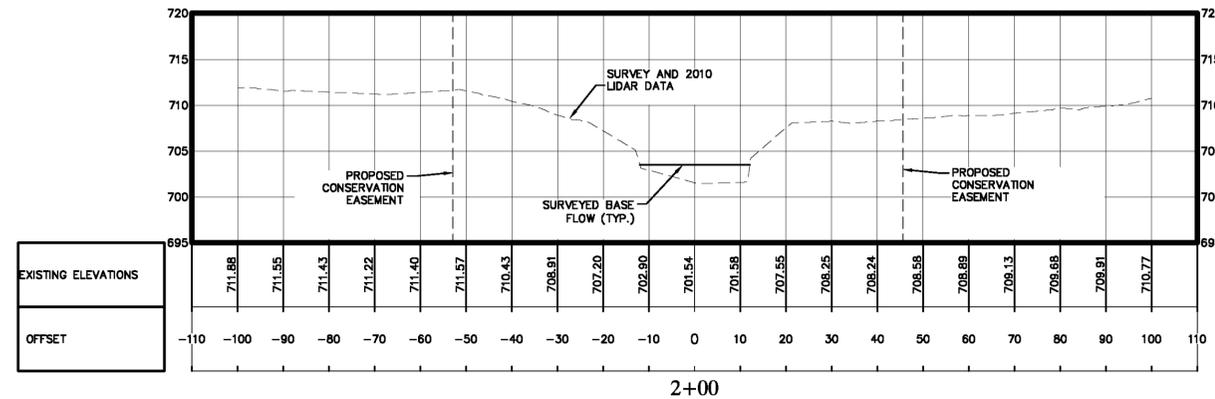
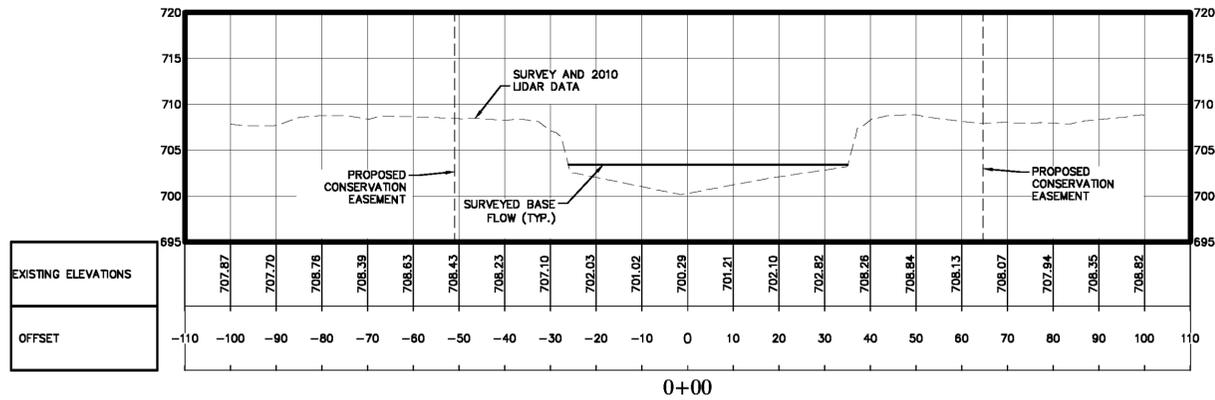


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No.	Revision	By	App.	Date

<p><b>FOR CONSTRUCTION</b></p>	<p><b>SAN ANTONIO AIRPORT SYSTEM</b></p>	<p><b>PAPE-DAWSON ENGINEERS</b>  <small>555 EAST RAMSEY   SAN ANTONIO, TEXAS 78216   PHONE: 210.375.9000        HOUSTON, TEXAS 77057   FAX: 210.375.9010        TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470</small></p>	<p><b>AECOM</b>  <small>TEXAS REGISTERED ENGINEERING FIRM P.C.</small>        5757 Woodway Drive        Suite 101 West        Houston, Texas 77057        Tel: 713.267.3200        Fax: 713.267.3278</p>	<p><i>Brice Moczygemba</i> 7/25/13</p>	<p>Designed By: RE        Drawn By: FG        Checked By: CVH        Date: FEB. 2013        Scale: AS SHOWN</p>	<p><b>SAN ANTONIO INTERNATIONAL AIRPORT</b>        RUNWAY 3/21 EXTENSION - JURISDICTIONAL WATERS MITIGATION AND TREE PLANTING PLANS</p> <p><b>OVERALL GRADING PLAN</b></p>	<p>Project No. 33-00160 C.I.P. No. 0000 A.I.P. No. 0000 Sheet <b>G1.0</b></p>
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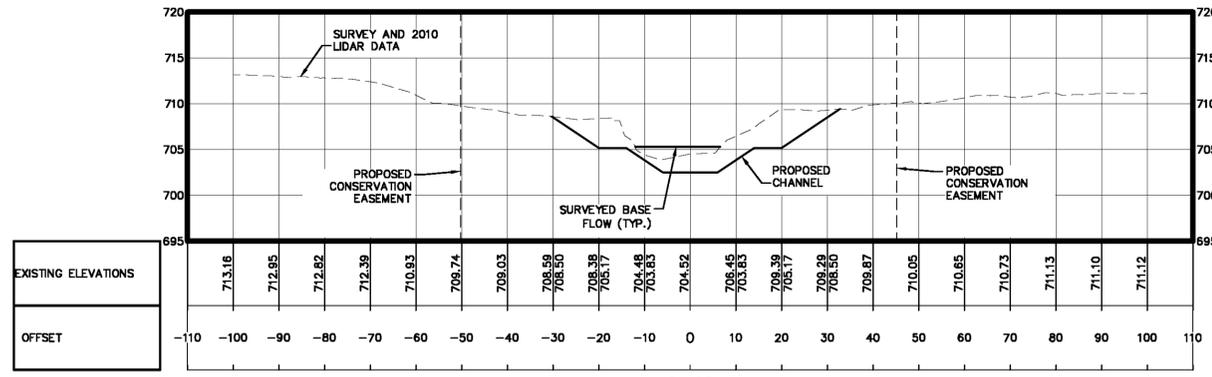
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**SAN ANTONIO INTERNATIONAL AIRPORT**  
RUNWAY 3/21 EXTENSION - JURISDICTIONAL WATERS MITIGATION  
AND TREE PLANTING PLANS

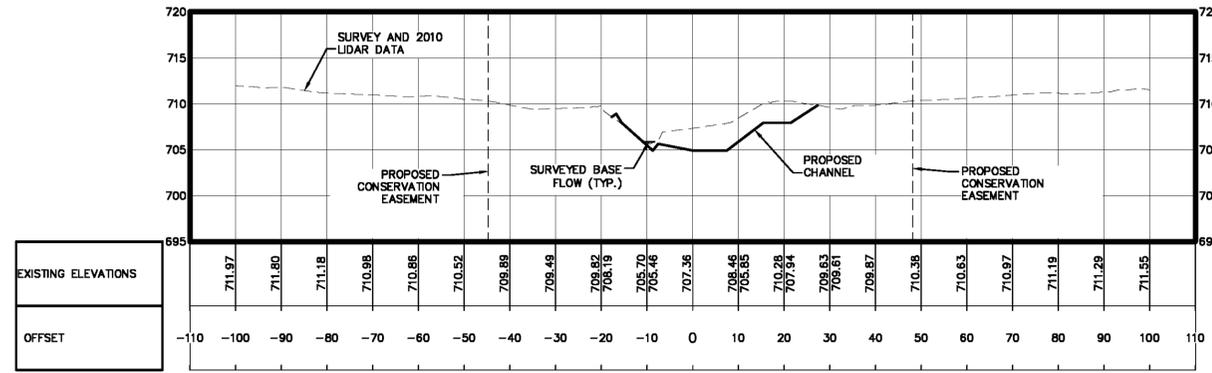
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Checked By: CVH				
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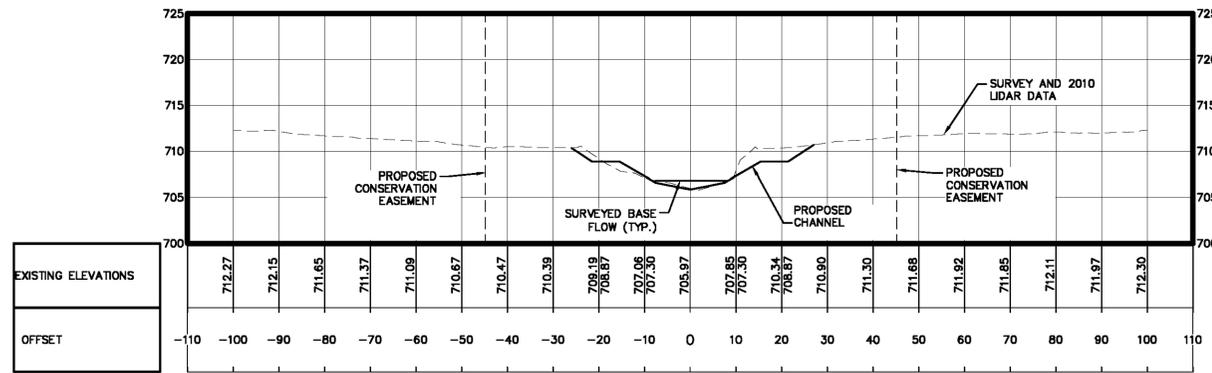
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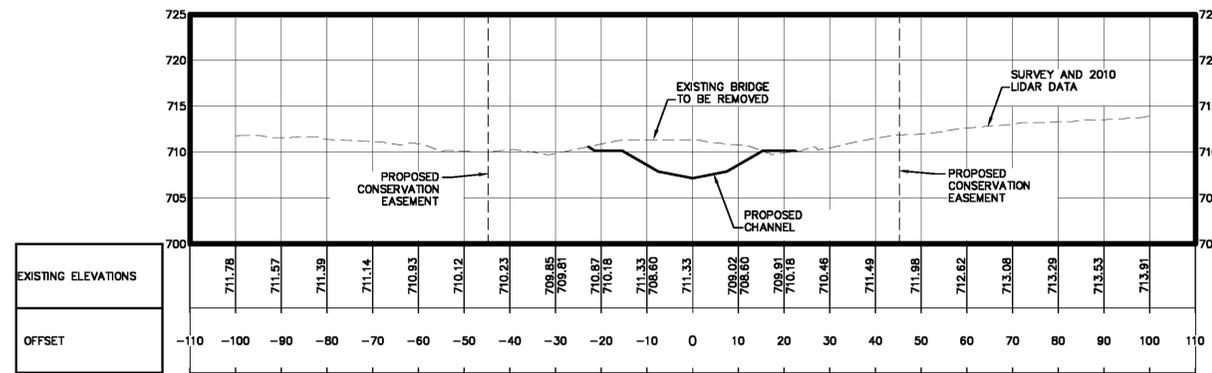
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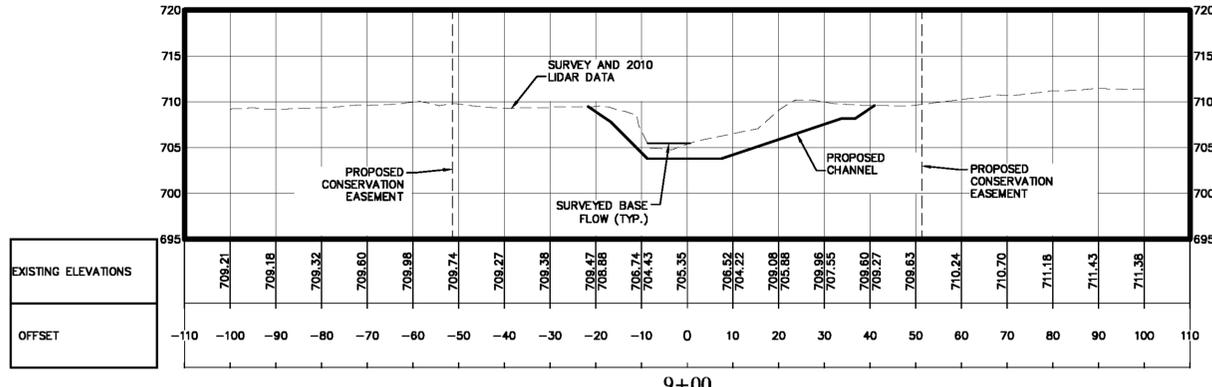
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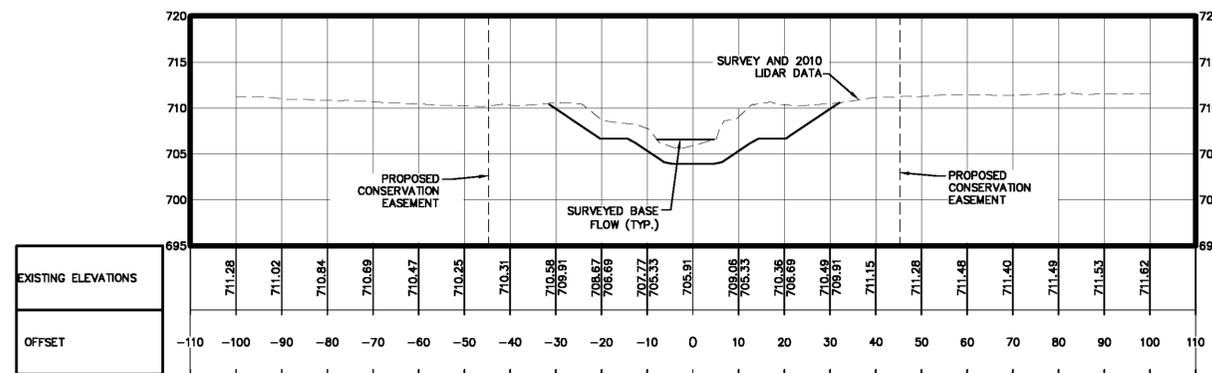
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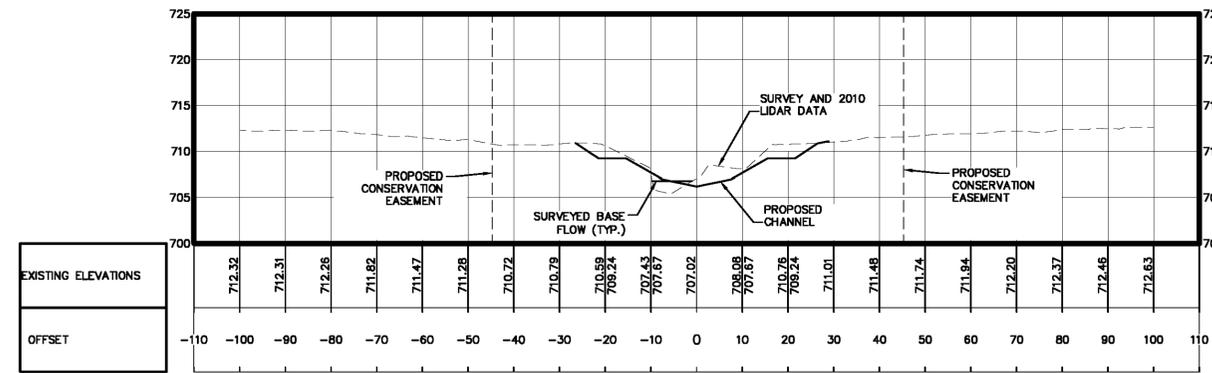
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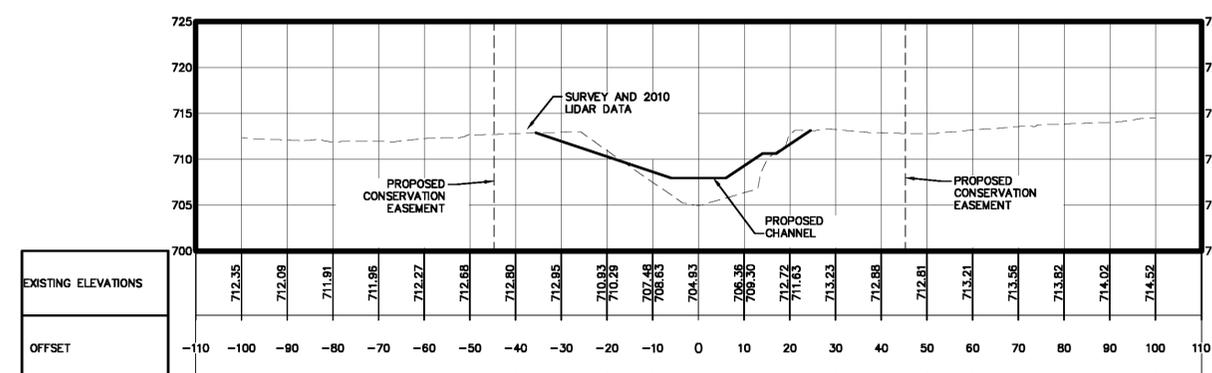
9+00



11+00



13+00



14+50

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**AECOM**

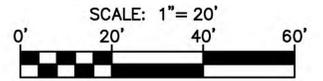
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LICENSED PROFESSIONAL ENGINEER  
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RUNWAY 3/21 EXTENSION - JURISDICTIONAL WATERS MITIGATION  
AND TREE PLANTING PLANS

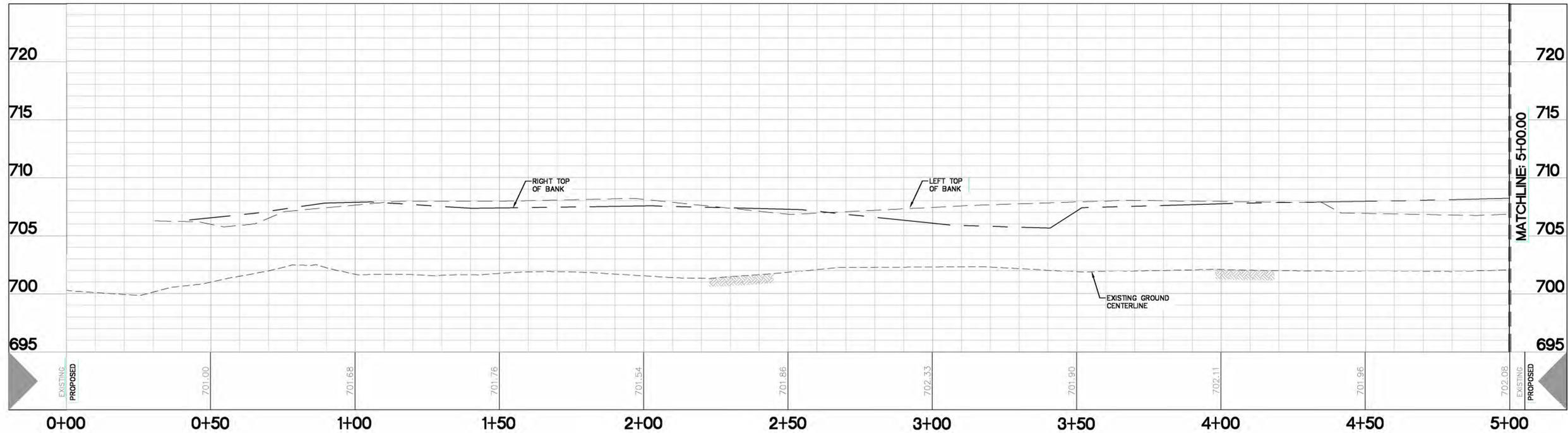
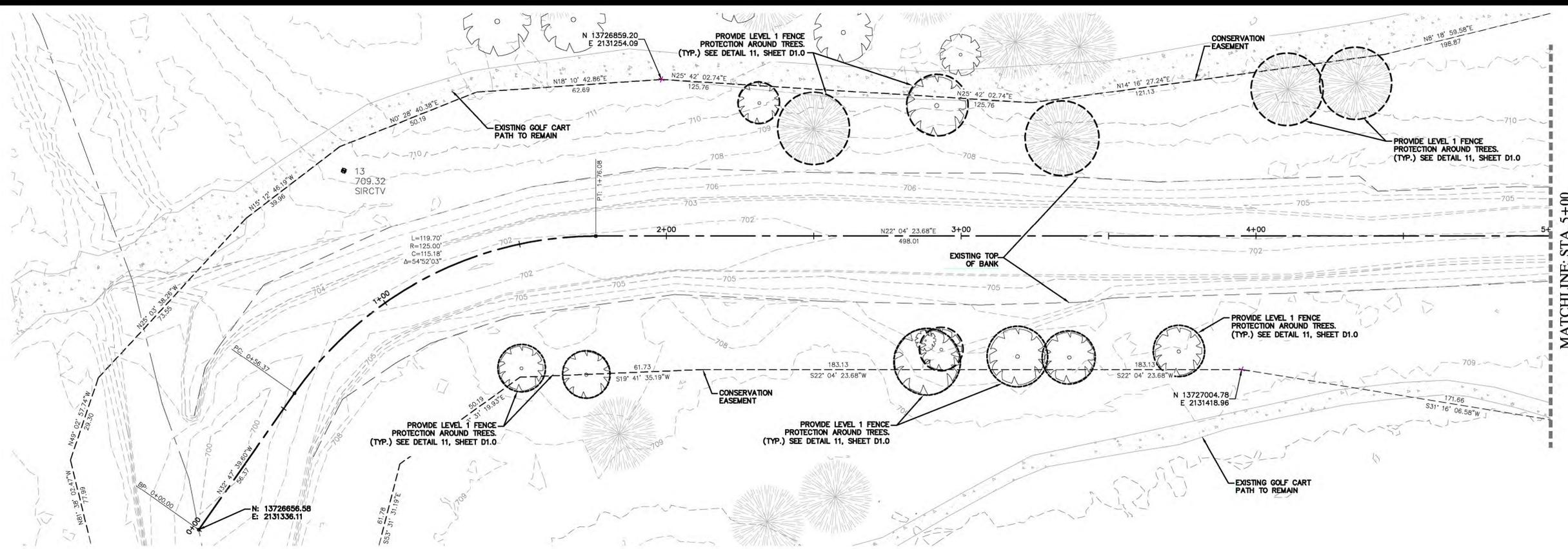
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Checked By: CVH				
Date: AUGUST 2012				
Scale: AS SHOWN				



**LEGEND**

-  CREEK CENTERLINE
-  CONSERVATION EASEMENT
-  IRRIGATION TRUNK LINE
-  EXISTING CONTOURS
-  PROPOSED CONTOURS
-  DEMOLISHED BRIDGES/CART PATH
-  EXISTING CART PATH TO REMAIN
-  PROPOSED BRIDGES
-  PROPOSED LOG VANES
-  PROPOSED RIFFLE
-  PROPOSED TOE WOOD
-  APPROXIMATE LOCATION OF EXISTING TREES
-  LOCATION OF SURVEYED TREES



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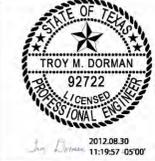
**FOR  
CONSTRUCTION**



**SAN ANTONIO  
AIRPORT SYSTEM**

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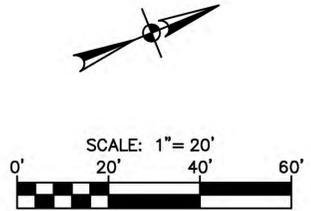
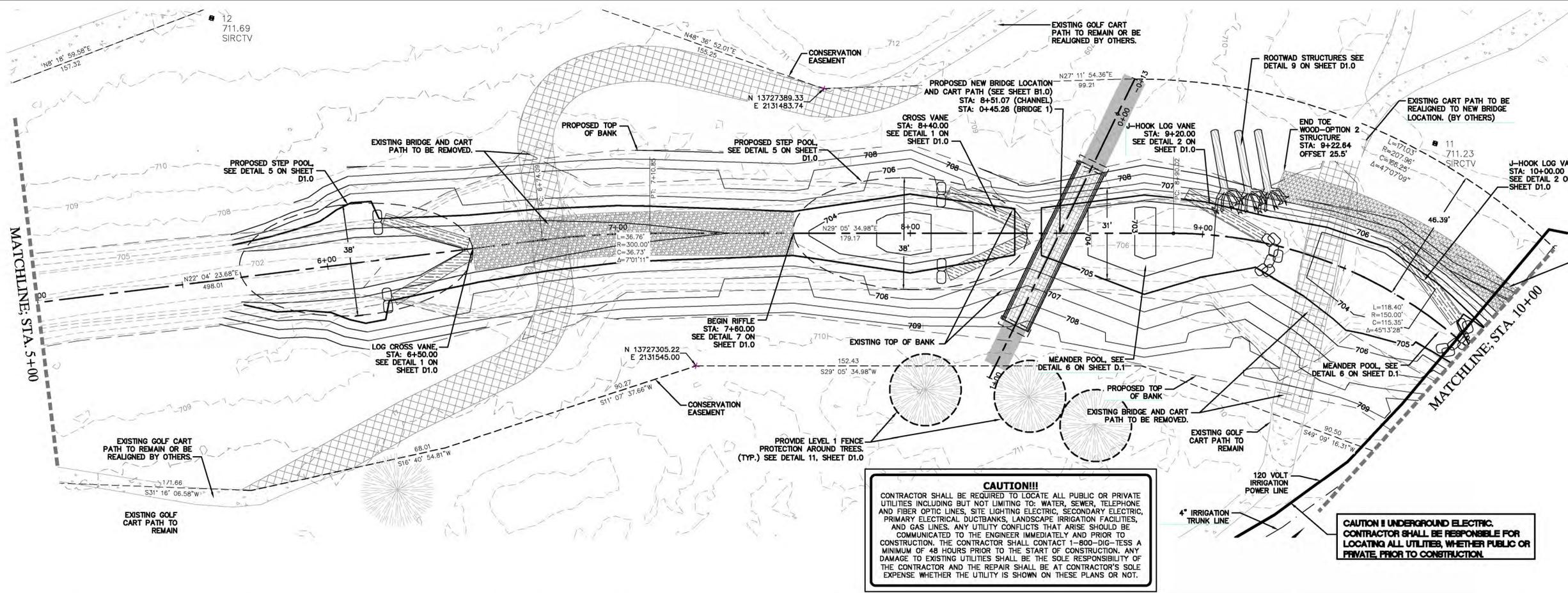


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Checked By: CVH  
Date: AUGUST 2012  
Scale: AS SHOWN

**SAN ANTONIO INTERNATIONAL AIRPORT  
RUNWAY 3/21 EXTENSION - JURISDICTIONAL WATERS MITIGATION  
AND TREE PLANTING PLANS**

**STREAM PLAN AND PROFILE  
STA. 0+00 TO STA. 5+00**

Project No. 33-00160 C.I.P. No. 0000 A.I.P. No. 0000 Sheet **P1.0**



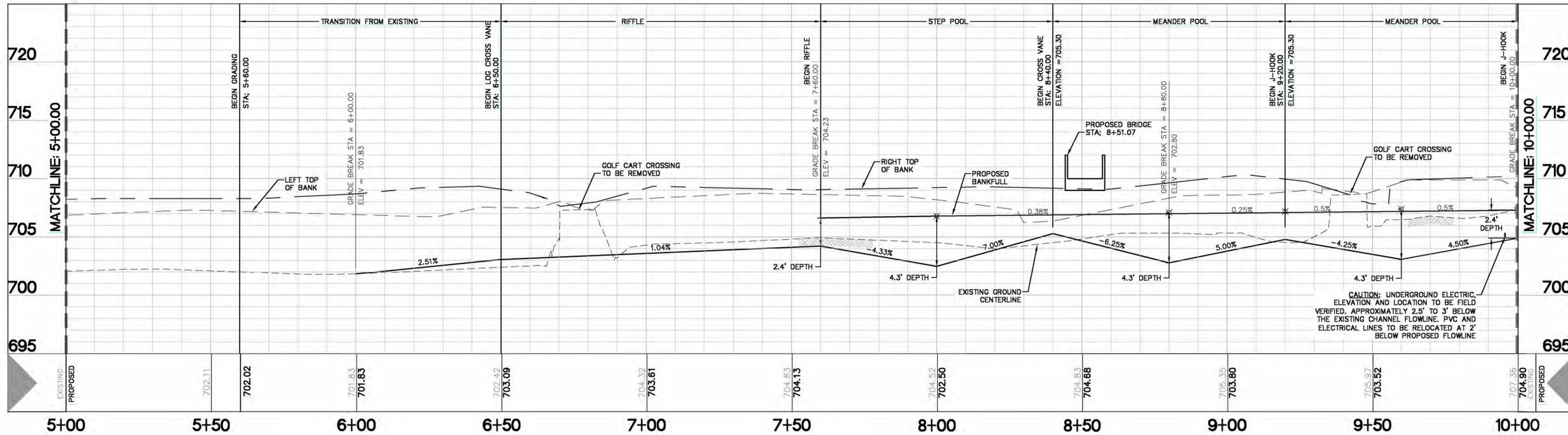
ESTIMATED TOE WOOD MATERIAL QUANTITIES	
MATERIAL	QUANTITY
SOIL LIFTS	205 CY
LOGS	50 EA
EROSION CONTROL BLANKET	480 SY
CUTTINGS (6" TO 12" LAYER)	168 SY
POTTED SWITCHGRASS	110 SY

(SEE DETAIL 8, SHEET D1.0)

LEGEND	
	CREEK CENTERLINE
	CONSERVATION EASEMENT
	IRRIGATION TRUNK LINE
	UNDERGROUND ELECTRIC
	EXISTING CONTOURS
	PROPOSED CONTOURS
	DEMOLISHED BRIDGES/CART PATH
	EXISTING CART PATH TO REMAIN
	PROPOSED BRIDGES
	PROPOSED LOG VANES
	PROPOSED RIFFLE
	PROPOSED TOE WOOD
	APPROXIMATE LOCATION OF EXISTING TREES

**CAUTION!!!**  
 CONTRACTOR SHALL BE REQUIRED TO LOCATE ALL PUBLIC OR PRIVATE UTILITIES INCLUDING BUT NOT LIMITING TO: WATER, SEWER, TELEPHONE AND FIBER OPTIC LINES, SITE LIGHTING ELECTRIC, SECONDARY ELECTRIC, PRIMARY ELECTRICAL DUCTBANKS, LANDSCAPE IRRIGATION FACILITIES, AND GAS LINES. ANY UTILITY CONFLICTS THAT ARISE SHOULD BE COMMUNICATED TO THE ENGINEER IMMEDIATELY AND PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL CONTACT 1-800-DIG-TESS A MINIMUM OF 48 HOURS PRIOR TO THE START OF CONSTRUCTION. ANY DAMAGE TO EXISTING UTILITIES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND THE REPAIR SHALL BE AT CONTRACTOR'S SOLE EXPENSE WHETHER THE UTILITY IS SHOWN ON THESE PLANS OR NOT.

**CAUTION I UNDERGROUND ELECTRIC.**  
 CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL UTILITIES, WHETHER PUBLIC OR PRIVATE, PRIOR TO CONSTRUCTION.



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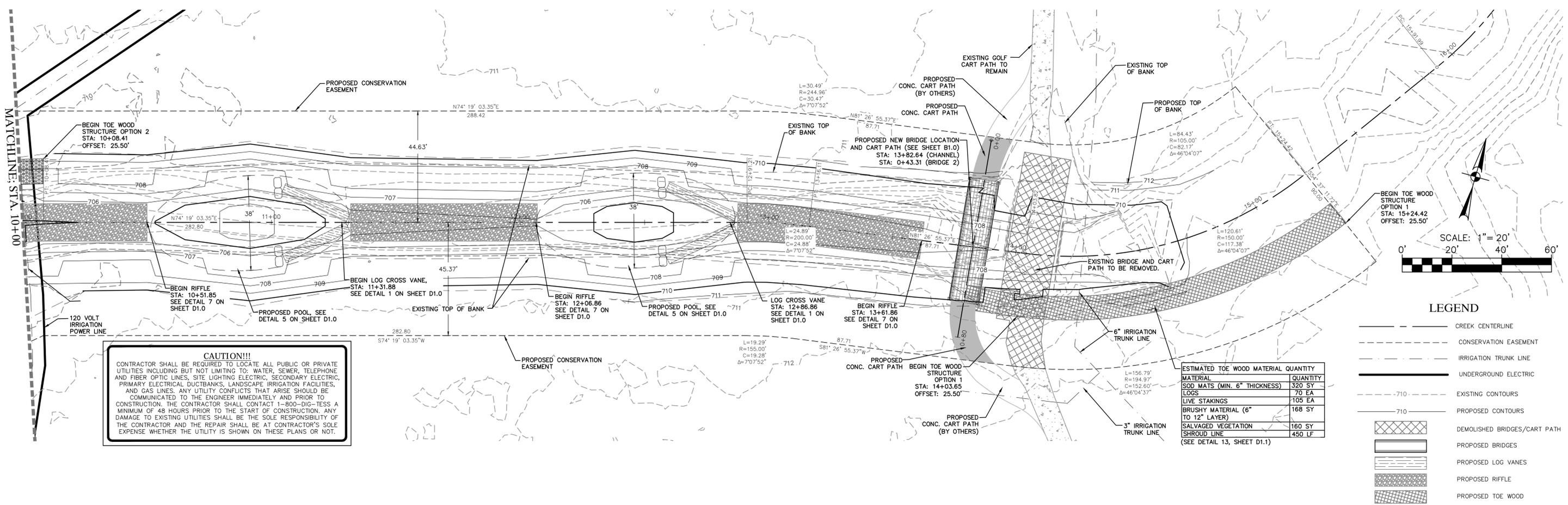
**AECOM**

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**SAN ANTONIO INTERNATIONAL AIRPORT**  
 RUNWAY 3/21 EXTENSION - JURISDICTIONAL WATERS MITIGATION  
 AND TREE PLANTING PLANS

**STREAM PLAN AND PROFILE**  
 STA. 5+00 TO STA. 10+00

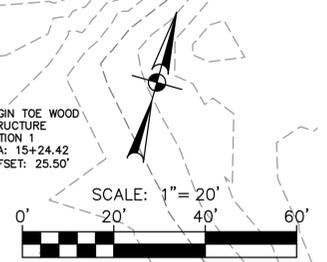
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Checked By: CVH								
Date: AUGUST 2012								



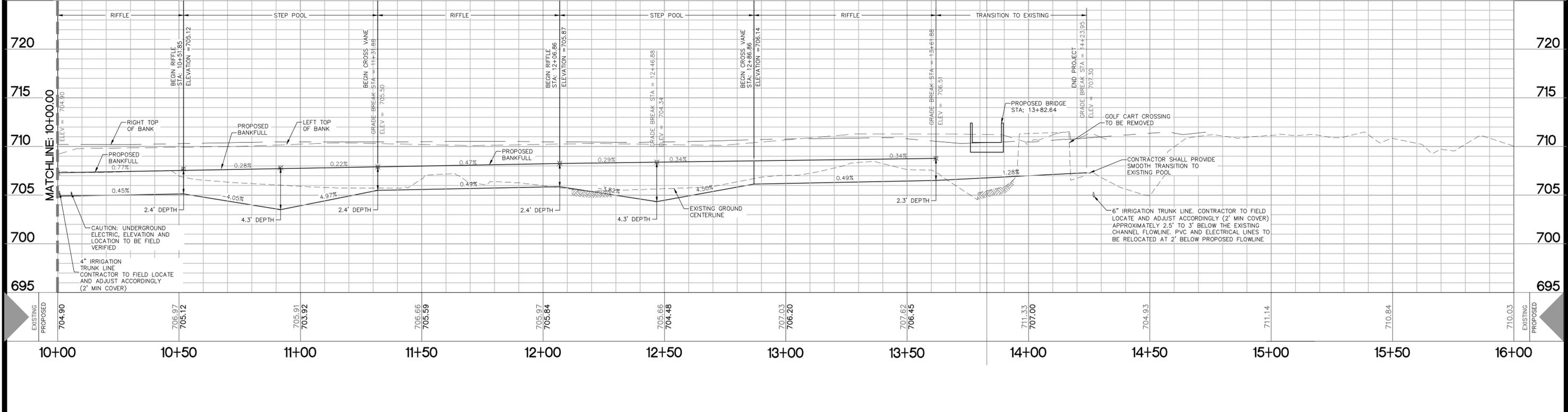
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ESTIMATED TOE WOOD MATERIAL QUANTITY	
MATERIAL	QUANTITY
SOD MATS (MIN. 6" THICKNESS)	320 SY
LOGS	70 EA
LIVE STAKINGS	105 EA
BRUSHY MATERIAL (6" TO 12" LAYER)	168 SY
SALVAGED VEGETATION SHROUD LINE	160 SY
	450 LF

(SEE DETAIL 13, SHEET D1.1)



- LEGEND**
- CREEK CENTERLINE
  - - - CONSERVATION EASEMENT
  - - - IRRIGATION TRUNK LINE
  - - - UNDERGROUND ELECTRIC
  - - - EXISTING CONTOURS
  - - - PROPOSED CONTOURS
  - 710
  - DEMOLISHED BRIDGES/CART PATH
  - PROPOSED BRIDGES
  - PROPOSED LOG VANES
  - PROPOSED RIFFLE
  - PROPOSED TOE WOOD



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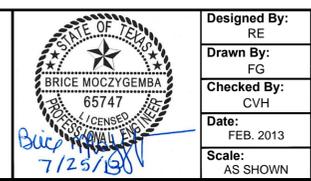
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 Drawn By: FG  
 Checked By: CVH  
 Date: FEB. 2013  
 Scale: AS SHOWN

**SAN ANTONIO INTERNATIONAL AIRPORT**  
 RUNWAY 3/21 EXTENSION - JURISDICTIONAL WATERS MITIGATION AND TREE PLANTING PLANS

**STREAM PLAN AND PROFILE**  
 STA. 10+00 TO STA. 16+00

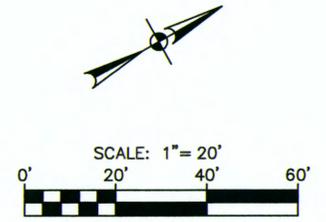
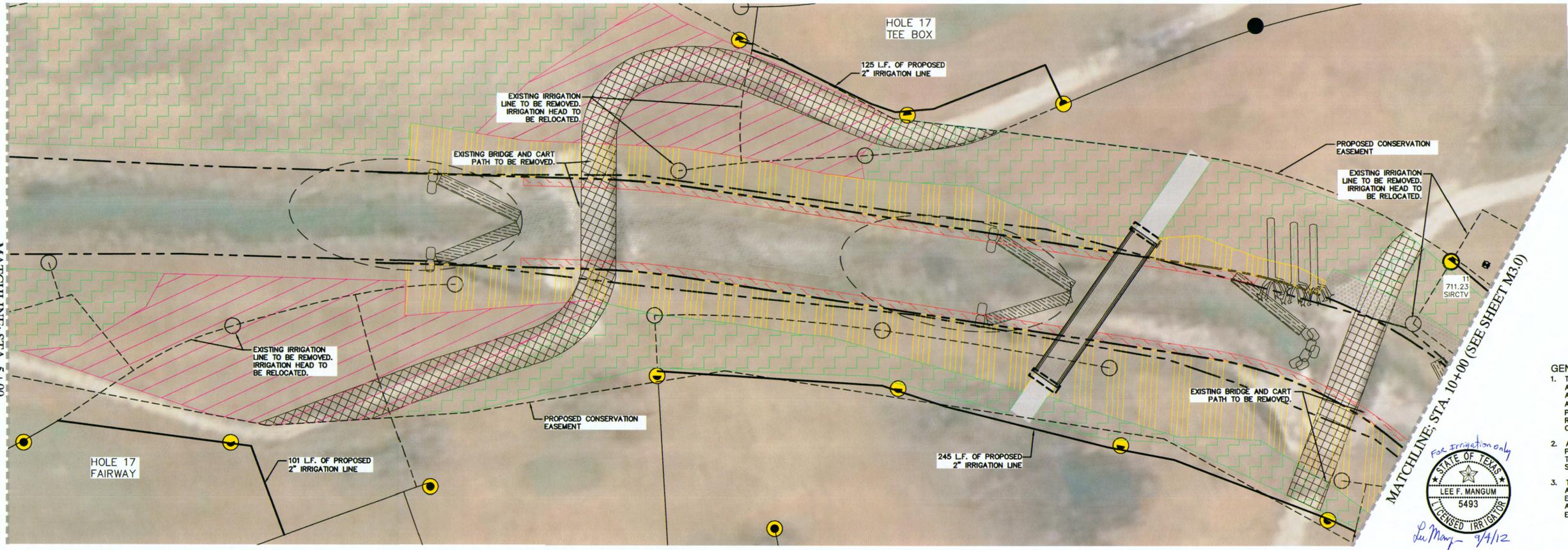
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### LEGEND

- EXISTING IRRIGATION LINE TO REMAIN
- - - EXISTING IRRIGATION LINE TO BE REMOVED
- PROPOSED 2" IRRIGATION LINE (UNLESS OTHERWISE NOTED)
- EXISTING PROPERTY LINE
- - - PROPOSED CONSERVATION EASEMENT
- - - LIMITS OF MITIGATION
- - - LIMITS OF JURISDICTIONAL WATERS
- ▨ EXISTING LOW WATER CROSSING OR CART PATH TO BE REMOVED
- ▨ EMERGENT PLANT ZONE (4,254 SQ. FT.) PLANTED ON APPROXIMATELY 2' ON CENTER
- ▨ BANK PLANTING ZONE (20,622 SQ. FT.) WETLAND FRINGE MIX, 20 LBS/ACRE, AND DRAINFIELD MIX SHALL BE APPLIED AT A RATE OF 30 LBS/ACRE.
- ▨ NATIVE SOD ZONE (14,208 SQ. FT.) OVERBANK FULL SUN MIX, 30 LBS/ACRE.
- ▨ TREES/SHRUB ZONE (52,567 SQ. FT.) SHADE FRIENDLY GRASS MIX, 10 LBS/ACRE, AND SHADE FRIENDLY WILDFLOWER MIX SHALL BE APPLIED AT A RATE OF 20 LBS/ACRE. 250 TREES AND SHRUBS WILL BE PLANTED IN THE TREE/SHRUB AREA AS DIRECTED BY ENGINEER AND GOLF COURSE PERSONNEL. THESE PLANTINGS WILL BE FROM THE TREE AND SHRUB LIST BELOW, WILL BE 5 GALLON OR LARGER, AND THE BREAKDOWN WILL BE APPROVED BY ENGINEER.
- ▨ LOG VANE STRUCTURE
- ▨ CROSS VANE STRUCTURE
- PROPOSED TREES
  - CYPRESS OAK
  - ELM
  - PECAN
  - LIVE OAK
- EXISTING IRRIGATION HEAD
- EXISTING IRRIGATION HEAD TO BE RELOCATED
- SOLENOID VALVE



- GENERAL NOTES:**
1. THE EXISTING IRRIGATION SPRINKLER LINES (NOT INCLUDING THE 4" AND 6" IRRIGATION MAIN LINES) ALONG THE STREAM MITIGATION AREA WILL BE PLUGGED AND CAPPED BY MUNICIPAL GOLF ASSOCIATION OF SAN ANTONIO (ALAMO CITY GOLF TRAIL PERSONNEL). THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND REPLACING THE IRRIGATION LINES IN THE VICINITY OF THE CONSERVATION EASEMENT.
  2. AT THE END OF GRADING OPERATIONS, ALAMO CITY GOLF TRAIL PERSONNEL AND ENGINEER SHALL BE NOTIFIED TO COORDINATE THE PLACEMENT OF PLANTS AND PLACEMENT OF RELOCATED SPRINKLERS.
  3. THE LOCATIONS OF PLANTS SHOWN ON THIS PLAN SHEET ARE APPROXIMATE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER. THE FINAL LOCATION OF PLANTS IS SUBJECT TO APPROVAL BY THE ALAMO CITY GOLF TRAIL PERSONNEL AND ENGINEER'S REPRESENTATIVE.



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No.	Revision	By	App.	Date

FOR  
CONSTRUCTION

SAN ANTONIO  
AIRPORT SYSTEM

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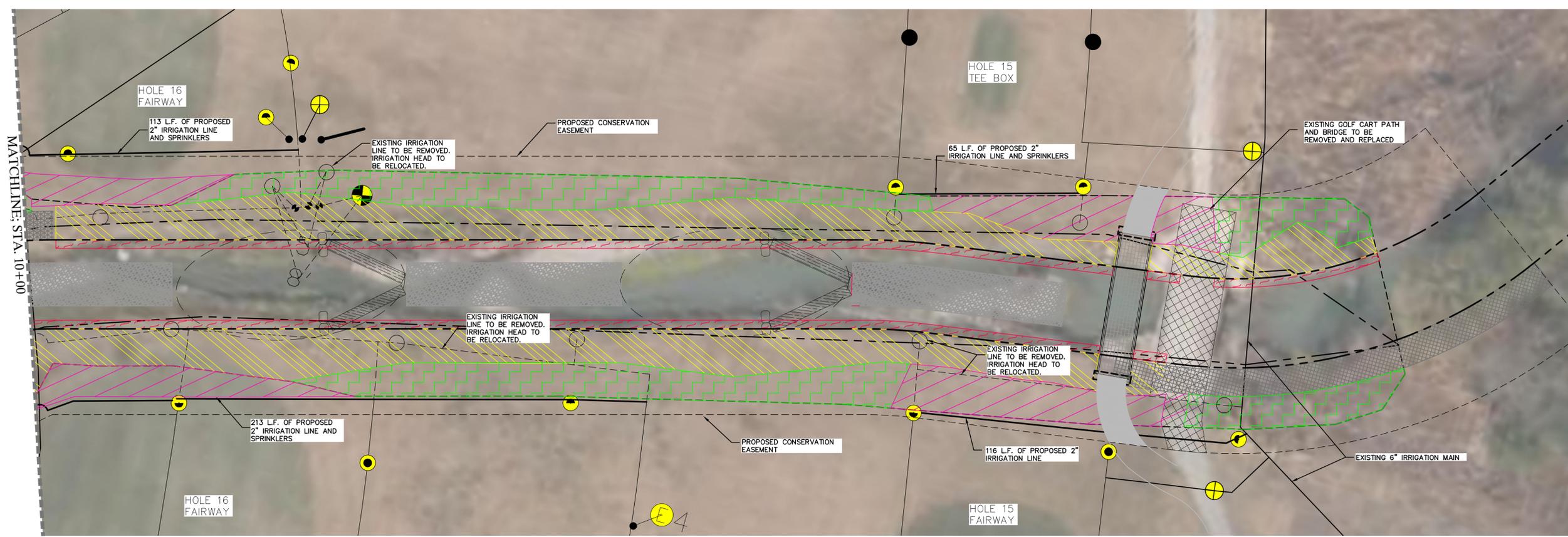
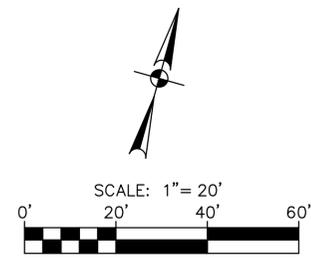
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Drawn By: FG  
Checked By: CVH  
Date: AUGUST 2012  
Scale: AS SHOWN

SAN ANTONIO INTERNATIONAL AIRPORT  
RUNWAY 3/21 EXTENSION - JURISDICTIONAL WATERS MITIGATION  
AND TREE PLANTING PLANS

LANDSCAPE AND IRRIGATION  
PLAN

M2.0

Project No. 33-00160 C.I.P. No. 0000 A.I.P. No. 0000 Sheet 0000



**LEGEND**

- EXISTING IRRIGATION LINE TO REMAIN
- EXISTING IRRIGATION LINE TO BE REMOVED
- PROPOSED 2" IRRIGATION LINE (UNLESS OTHERWISE NOTED)
- EXISTING PROPERTY LINE
- PROPOSED CONSERVATION EASEMENT
- LIMITS OF MITIGATION
- LIMITS OF JURISDICTIONAL WATERS
- EXISTING LOW WATER CROSSING OR CART PATH TO BE REMOVED
- EMERGENT PLANT ZONE (4,254 SQ. FT.) PLANTED ON APPROXIMATELY 2' ON CENTER
- BANK PLANTING ZONE (20,622 SQ. FT.) WETLAND FRINGE MIX, 20 LBS/ACRE, AND DRAINFIELD MIX SHALL BE APPLIED AT A RATE OF 30 LBS/ACRE.
- NATIVE SOD ZONE (14,208 SQ. FT.) OVBANK FULL SUN MIX, 30 LBS/ACRE.
- TREES\SHRUB ZONE (52,567 SQ. FT.) SHADE FRIENDLY GRASS MIX, 10 LBS/ACRE, AND SHADE FRIENDLY WILDFLOWER MIX SHALL BE APPLIED AT A RATE OF 20 LBS/ACRE. 250 TREES AND SHRUBS WILL BE PLANTED IN THE TREE\SHRUB AREA AS DIRECTED BY ENGINEER AND GOLF COURSE PERSONNEL. THESE PLANTINGS WILL BE FROM THE TREE AND SHRUB LIST BELOW, WILL BE 5 GALLON OR LARGER, AND THE BREAKDOWN WILL BE APPROVED BY ENGINEER.
- LOG VANE STRUCTURE
- CROSS VANE STRUCTURE
- PROPOSED TREES  
CYPRESSRED OAK, ELM, PECAN, LIVE OAK
- EXISTING IRRIGATION HEAD
- SOLENOID VALVE
- EXISTING IRRIGATION HEAD TO BE RELOCATED

**GENERAL NOTES:**

1. THE EXISTING IRRIGATION SPRINKLER LINES (NOT INCLUDING THE 4" AND 6" IRRIGATION MAIN LINES) ALONG THE STREAM MITIGATION AREA WILL BE PLUGGED AND CAPPED BY MUNICIPAL GOLF ASSOCIATION OF SAN ANTONIO (ALAMO CITY GOLF TRAIL PERSONNEL). THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND REPLACING THE IRRIGATION LINES IN THE VICINITY OF THE CONSERVATION EASEMENT.
2. AT THE END OF GRADING OPERATIONS, ALAMO CITY GOLF TRAIL PERSONNEL AND ENGINEER SHALL BE NOTIFIED TO COORDINATE THE PLACEMENT OF PLANTS AND PLACEMENT OF RELOCATED SPRINKLERS.
3. THE LOCATIONS OF PLANTS SHOWN ON THIS PLAN SHEET ARE APPROXIMATE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER. THE FINAL LOCATION OF PLANTS IS SUBJECT TO APPROVAL BY THE ALAMO CITY GOLF TRAIL PERSONNEL AND ENGINEER'S REPRESENTATIVE.

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FOR  
CONSTRUCTION

SAN ANTONIO  
AIRPORT SYSTEM

PAPE-DAWSON  
ENGINEERS

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5757 Woodway Drive  
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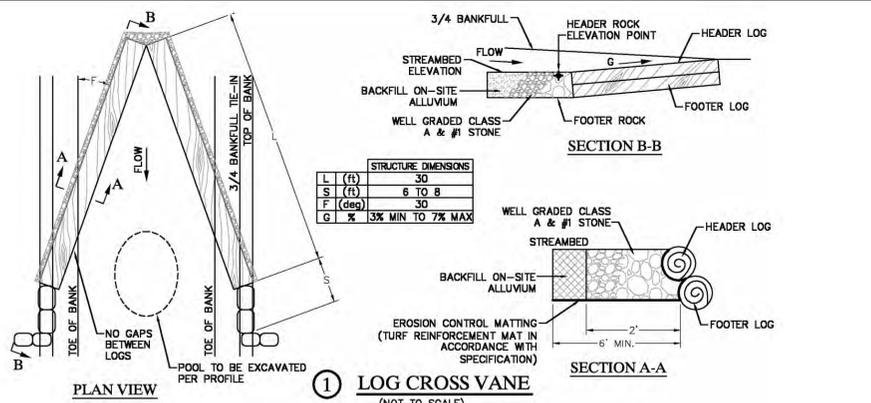
Lee F. Mangum  
7/24/13

Designed By:	RE
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Checked By:	CVH
Date:	FEB. 2013
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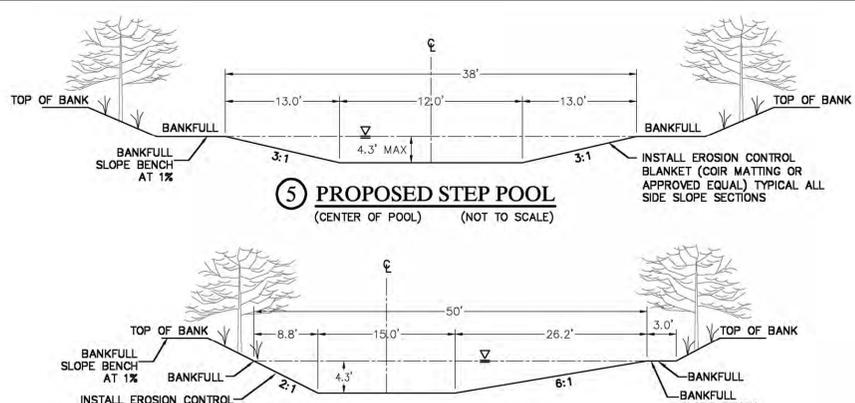
SAN ANTONIO INTERNATIONAL AIRPORT  
RUNWAY 3/21 EXTENSION - JURISDICTIONAL WATERS MITIGATION  
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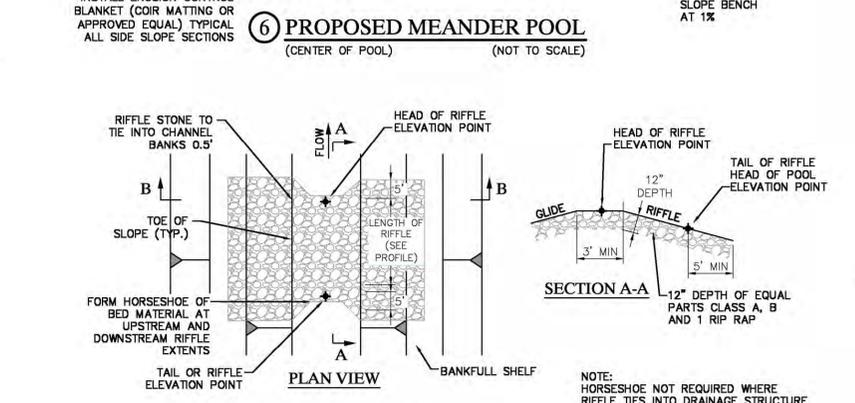
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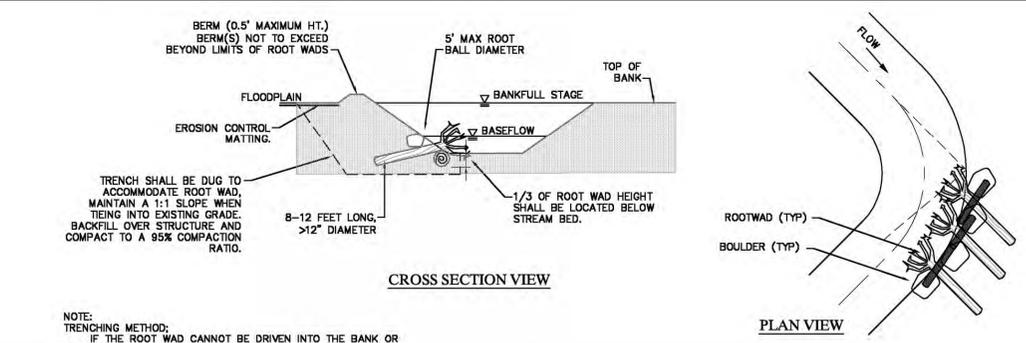
1 LOG CROSS VANE (NOT TO SCALE)



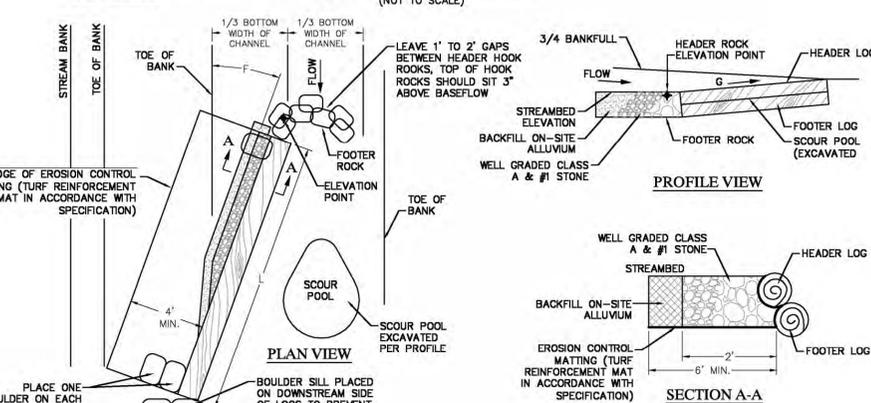
5 PROPOSED STEP POOL (CENTER OF POOL) (NOT TO SCALE)



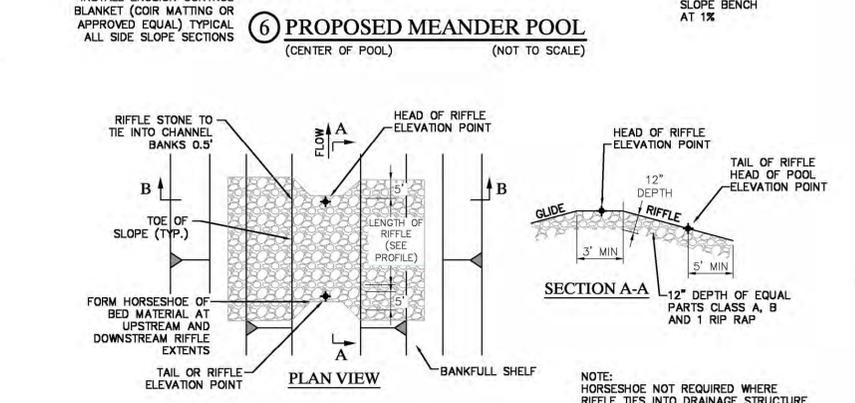
6 PROPOSED MEANDER POOL (CENTER OF POOL) (NOT TO SCALE)



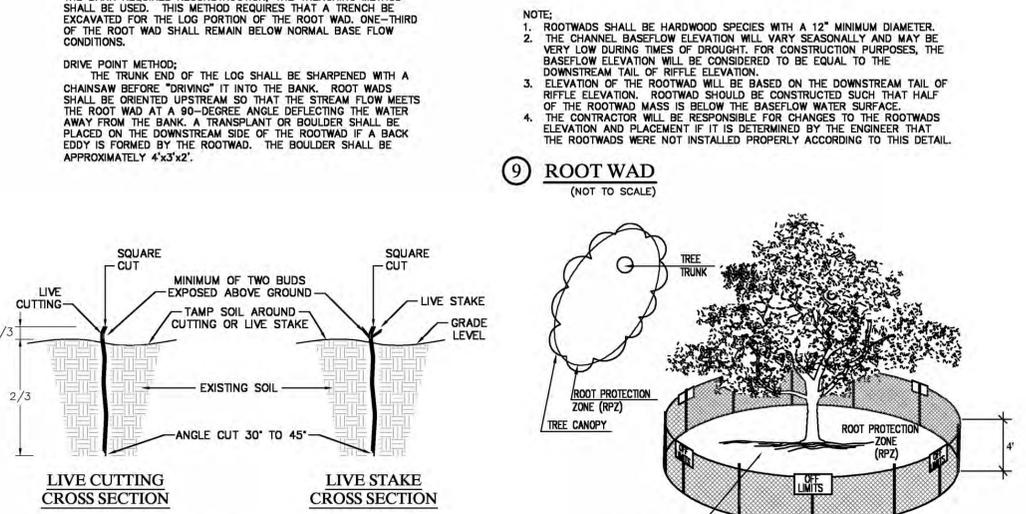
9 ROOT WAD (NOT TO SCALE)



2 J-HOOK LOG VANE (NOT TO SCALE)



7 CONSTRUCTED RIFFLE DETAIL (NOT TO SCALE)



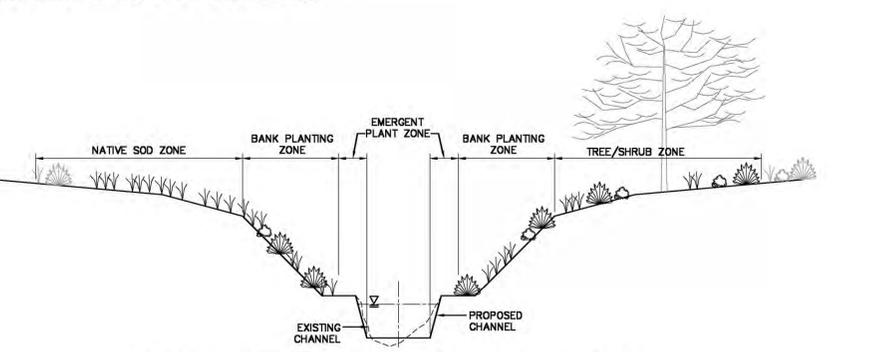
10 LIVE STAKING DETAIL (NOT TO SCALE)

**NOTES FOR ALL VANE STRUCTURES**

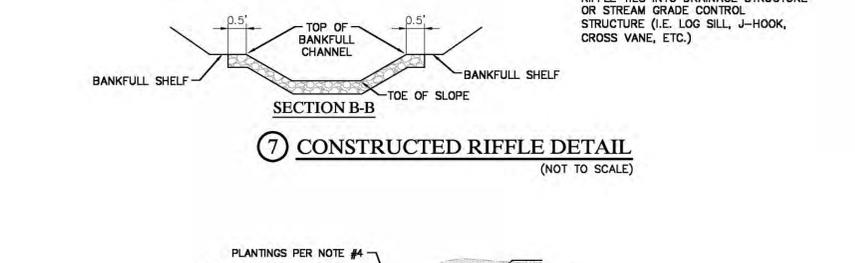
- BOULDERS MUST BE AT LEAST 2'x2'x2'
- LOGS SHOULD BE AT LEAST 12" IN DIAMETER WITH A MAXIMUM DIAMETER OF 24", RELATIVELY STRAIGHT, HARDWOOD AND RECENTLY HARVESTED.
- A SINGLE LOG WITH A MINIMUM DIAMETER OF 36" MAY BE USED IN PLACE OF TWO 12" TREES.
- INSTALL EROSION CONTROL MATTING (TRM) FOR DRAINAGE BEGINNING AT THE MIDDLE OF THE HEADER ROCKS AND EXTEND DOWNWARD TO THE DEPTH OF THE BOTTOM FOOTER ROCK, AND THEN UPSTREAM FOR A MINIMUM OF TEN FEET.
- USE EROSION CONTROL MATTING (TRM) TO SEAL GAPS BETWEEN LOGS. NAIL FILTER FABRIC ON TOP OF HEADER LOG USING 3" 10d GALVANIZED COMMON NAIL ON 1" SPACING ALONG LOG.
- DIG A TRENCH BELOW THE BED FOR FOOTER ROCKS AND PLACE FILL ON UPSTREAM SIDE OF VANE ARM, BETWEEN THE ARM AND STREAMBANK, START AT BANK AND PLACE FOOTER ROCKS FIRST AND THE HEADER ROCKS.
- CONTINUE WITH STRUCTURE, FOLLOWING ANGLE AND SLOPE SPECIFICATIONS.
- AN EXTRA BOULDER CAN BE PLACED IN SCOUR POOL FOR HABITAT IMPROVEMENT.
- USE WELL GRADED MIX OF CLASS "A" AND #1 STONE ON UPSTREAM SIDE OF STRUCTURE.
- AFTER ALL STONE HAS BEEN PLACED, FILL IN THE UPSTREAM SIDE OF THE STRUCTURE WITH ON-SITE ALLUVIUM TO THE ELEVATION OF THE TOP OF THE HEADER ROCK.

**NOTE:**

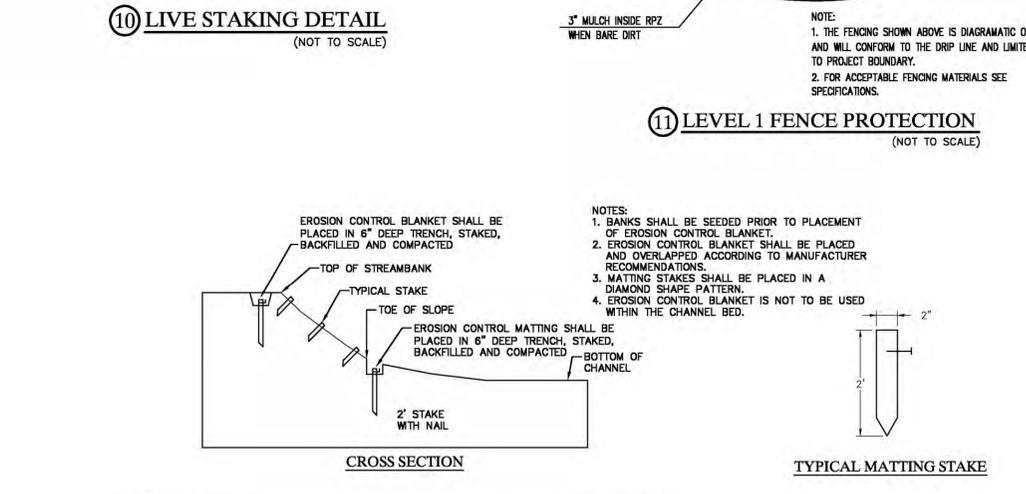
- ROOTWADS SHALL BE HARDWOOD SPECIES WITH A 12" MINIMUM DIAMETER.
- THE CHANNEL BASEFLOW ELEVATION WILL VARY SEASONALLY AND MAY BE VERY LOW DURING TIMES OF DROUGHT. FOR CONSTRUCTION PURPOSES, THE BASEFLOW ELEVATION WILL BE CONSIDERED TO BE EQUAL TO THE DOWNSTREAM TAIL OF RIFFLE ELEVATION.
- ELEVATION OF THE ROOTWAD WILL BE BASED ON THE DOWNSTREAM TAIL OF RIFFLE ELEVATION. ROOTWAD SHOULD BE CONSTRUCTED SUCH THAT HALF OF THE ROOTWAD MASS IS BELOW THE BASEFLOW WATER SURFACE.
- THE CONTRACTOR WILL BE RESPONSIBLE FOR CHANGES TO THE ROOTWADS ELEVATION AND PLACEMENT IF IT IS DETERMINED BY THE ENGINEER THAT THE ROOTWADS WERE NOT INSTALLED PROPERLY ACCORDING TO THIS DETAIL.



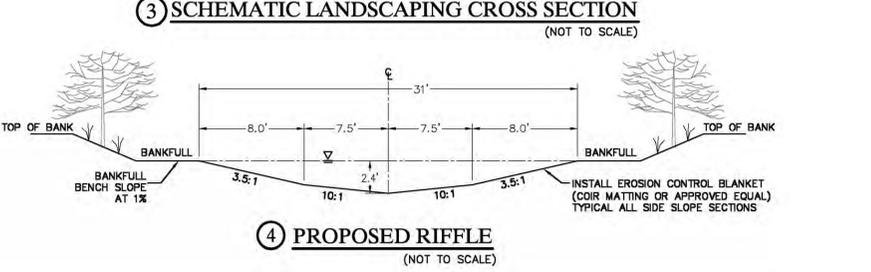
3 SCHEMATIC LANDSCAPING CROSS SECTION (NOT TO SCALE)



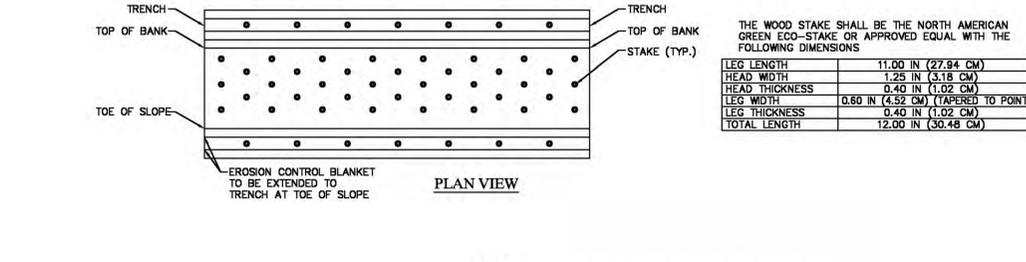
8 TOE WOOD OPTION 2-SOIL LIFTS WITH PLANTINGS (NOT TO SCALE)



11 LEVEL 1 FENCE PROTECTION (NOT TO SCALE)



4 PROPOSED RIFFLE (NOT TO SCALE)



12 EROSION CONTROL BLANKET (NOT TO SCALE)

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**FOR CONSTRUCTION**

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Scale: AS SHOWN

**SAN ANTONIO INTERNATIONAL AIRPORT**  
RUNWAY 3/21 EXTENSION - JURISDICTIONAL WATERS MITIGATION  
AND TREE PLANTING PLANS  
**CHANNEL STRUCTURE DETAILS**

Project No. 33-00160 C.I.P. No. 0000 A.I.P. No. 0000 Sheet D1.0