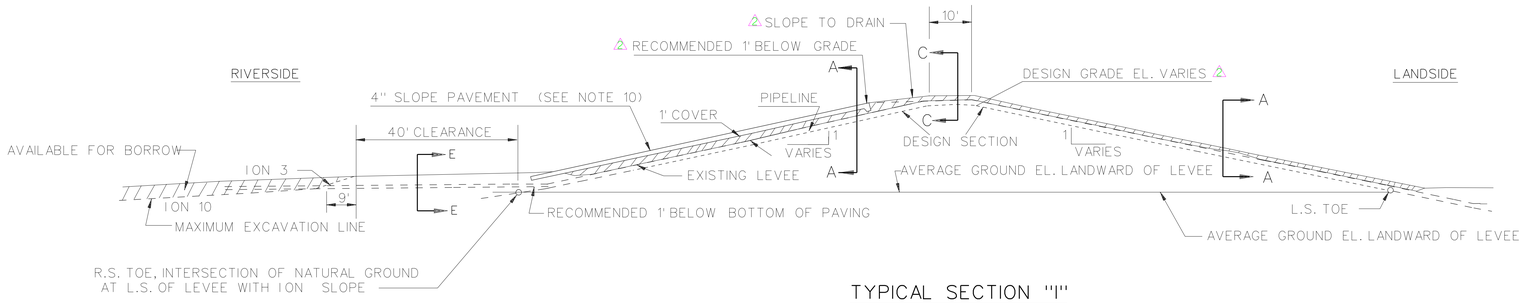
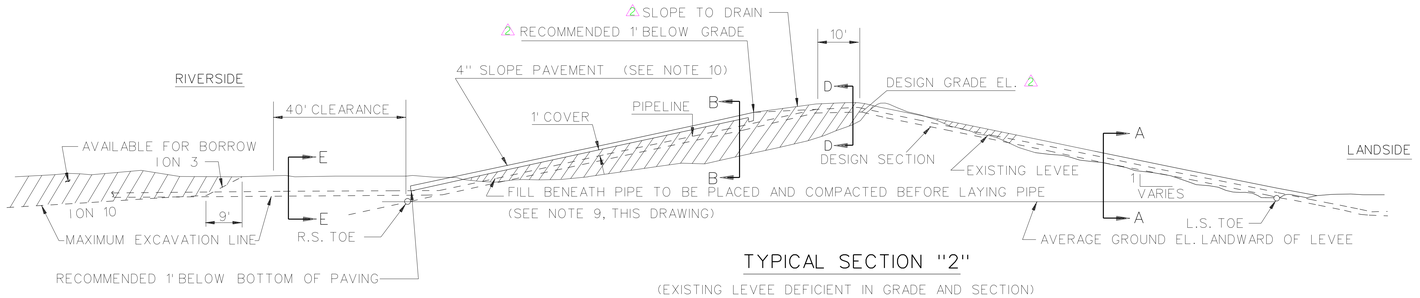


TYPICAL SECTION "1"

(M.R.C. CODE SECTION CONTAINED WITHIN EXISTING LEVEE)

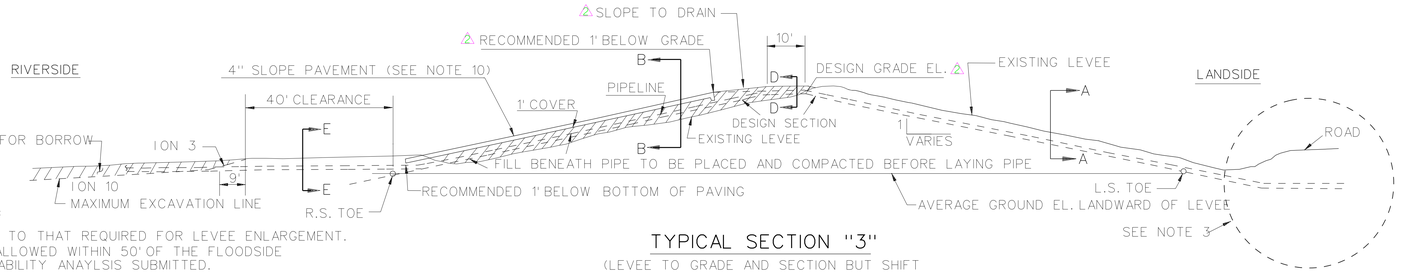
NOT TO SCALE



TYPICAL SECTION "2"

(EXISTING LEVEE DEFICIENT IN GRADE AND SECTION)

NOT TO SCALE



NOTES REGARDING BORROW:

BORROW SHALL BE LIMITED TO THAT REQUIRED FOR LEVEE ENLARGEMENT. NO BORROW EXCAVATION ALLOWED WITHIN 50' OF THE FLOODSIDE LEVEE TOE WITHOUT A STABILITY ANAYLSIS SUBMITTED.

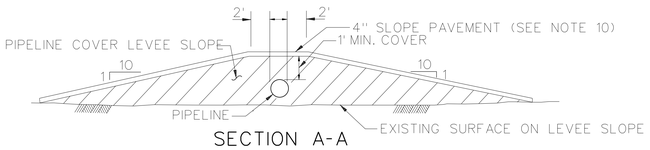
WITHOUT A STABILITY ANALYSIS, BORROW EXCAVATION MUST NOT BE CLOSER THAN 200' FROM THE FLOODSIDE LEVEE TOE.

BORROW PIT DRAINAGE DITCHES SHALL BE EXCAVATED TO THE RIVER TO INSURE COMPLETE DRAINAGE OF PITS.

TYPICAL SECTION "3"

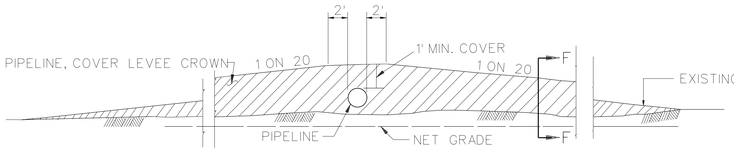
(LEVEE TO GRADE AND SECTION BUT SHIFT REQUIRED FOR PIPE CLEARANCE UNDER ROAD)

NOT TO SCALE



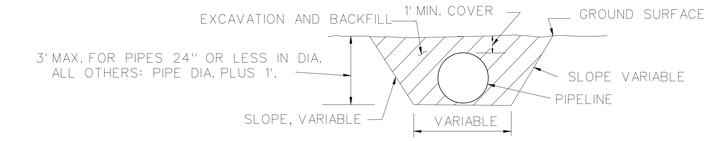
SECTION A-A

NOT TO SCALE



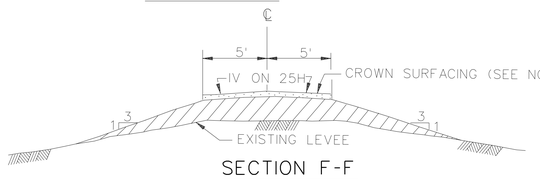
SECTION C-C

NOT TO SCALE



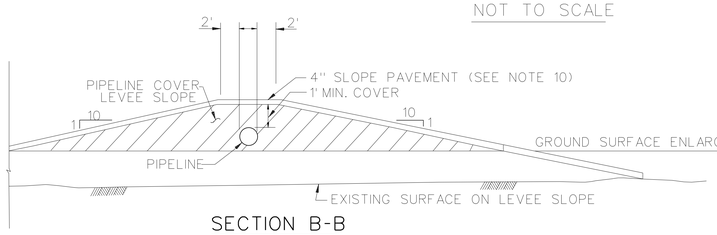
SECTION E-E

NOT TO SCALE



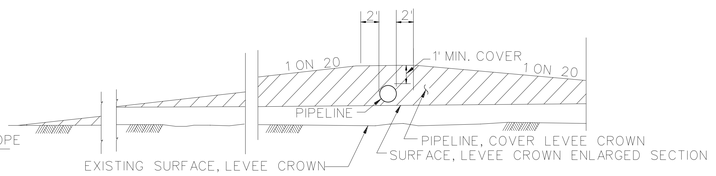
SECTION F-F

NOT TO SCALE



SECTION B-B

NOT TO SCALE

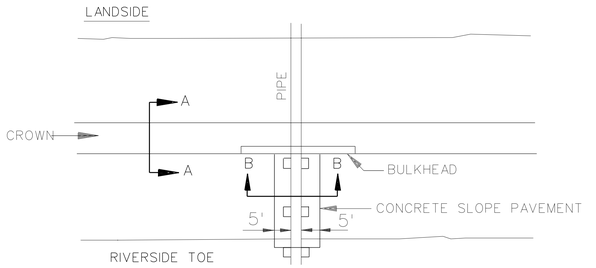


SECTION D-D

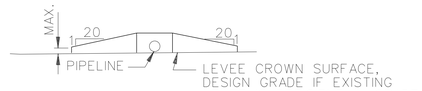
NOT TO SCALE

NOTES:

1. TYPICAL SECTION "1", WHEN EXISTING LEVEE IS ≥ M.R.C. DESIGN SECTION, THE PIPELINE SHALL BE LAID ON EXISTING LEVEE SURFACE AND COVERED OVER AS SHOWN IN SECTIONS A-A AND C-C. NO EXCAVATION TO DESIGN SECTION WILL BE ALLOWED. ALLOWABLE EXCAVATION ON RIVERSIDE AS SHOWN IN SECTION E-E.
2. TYPICAL SECTION "2", PIPELINE MAY BE PLACED ON ENLARGED DESIGN SECTION, SHOWN AS DASHED LINE. EXCESS EXISTING LEVEE EMBANKMENT MATERIAL ON THE LANDSIDE SLOPE CAN BE DEGRADED AND USED AS LEVEE FILL ON THE RIVERSIDE SLOPE. EXCAVATION LANDWARD OF LANDSIDE TOE SHALL NOT EXTEND BELOW LANDSIDE SLOPE EXTENDED. ALLOWABLE EXCAVATION ON RIVERSIDE AS SHOWN IN SECTION E-E.
3. TYPICAL SECTION "3", SAME AS NOTE "2". IF PASSING THE PIPELINE UNDER AN ADJACENT ROAD WILL REQUIRE A SUBSTANTIAL SHIFT IN THE LEVEE, THE PIPELINE MAY BE ALLOWED TO VIOLATE THE DESIGN SLOPE EXTENDED. WAIVERS WILL BE EVALUATED ON A CASE BY CASE BASIS.
4. SMOOTH TRANSITIONS SHALL BE CONSTRUCTED BETWEEN THE LEVEE ENLARGEMENT AND EXISTING LEVEE.
5. ALL FRESH FILLS SHALL BE SODDED OR FERTILIZED AND SEEDED AND SHALL BE MAINTAINTED UNTIL A HEALTHY GROWTH IS OBTAINED.
6. THE CROWN RAMP OVER THE PIPELINE CROSSING SHALL BE SURFACED WITH NINE (9) INCHES OF CRUSHED STONE (LOOSE MEASUREMENT) FOR FULL WIDTH (10' MIN.) AND LENGTH OF RAMP.
7. FILL MATERIAL USED IN CONSTRUCTION OF LEVEE ENLARGEMENTS, RAMP, PIPE COVER, AND BACKFILL OF EXCAVATION SHALL BE A COMPACTED IMPERVIOUS EARTH FILL (CLAY). SEE NOTE 9 BELOW.
8. PIPELINE MARKERS SHALL BE PLACED AND MAINTAINED AT EACH TOE OF LEVEE IN LINE WITH THE CROSSING AND INDICATING OWNER, SIZE, NUMBER OF LINES, PRODUCT AND ADDRESS FOR CONTACTING OWNER.
9. SEE DWGS. 2, 3, OR 4 FOR DESCRIPTION OF COMPACTED FILL.
10. THE INSTALLATION OF 4" THICK UNREINFORCED CONCRETE SLOPE PAVEMENT ON THE LEVEE FLOODSIDE SLOPE IS REQUIRED IN ALL AREAS OF EXISTING SLOPE PAVEMENT OR IN AREAS SUSCEPTIBLE TO WAVE EROSION. SEE SLOPE PAVEMENT DETAILS SHEET 4 OF 7.
11. ALL COVER OVER PIPELINES MUST BE DESIGNED FOR H520-44 LOADING FOR THE LIFE OF THE LINE.



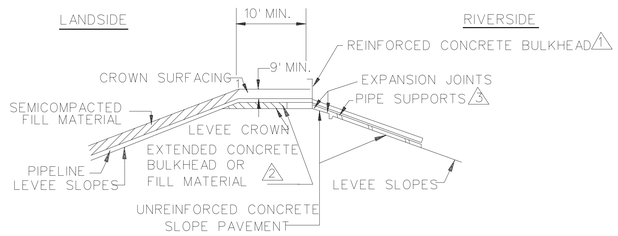
PLAN VIEW



CONCRETE BULKHEAD

SECTION B-B

NOT TO SCALE



SECTION A-A

NOT TO SCALE

NOTES:

1. DESIGN DETAILS ARE THE RESPONSIBILITY OF THE APPLICANT.
2. BOTTOM OF CONCRETE BULKHEAD MAY EXTEND COMPLETELY ACROSS CROWN.
3. PIPE SUPPORTS MUST BE INDEPENDENT OF CONCRETE SLOPE PAVEMENT. EXISTING PAVEMENT CAN BE CUT TO ACCOMMODATE SUPPORTS.
4. CONCRETE SLOPE PAVEMENT MUST EXTEND 5' BEYOND OUTERMOST EDGES OF THE STRUCTURE OR SUPPORTS AND 3' INTO BATTURE.

US Army Corps of Engineers
New Orleans District

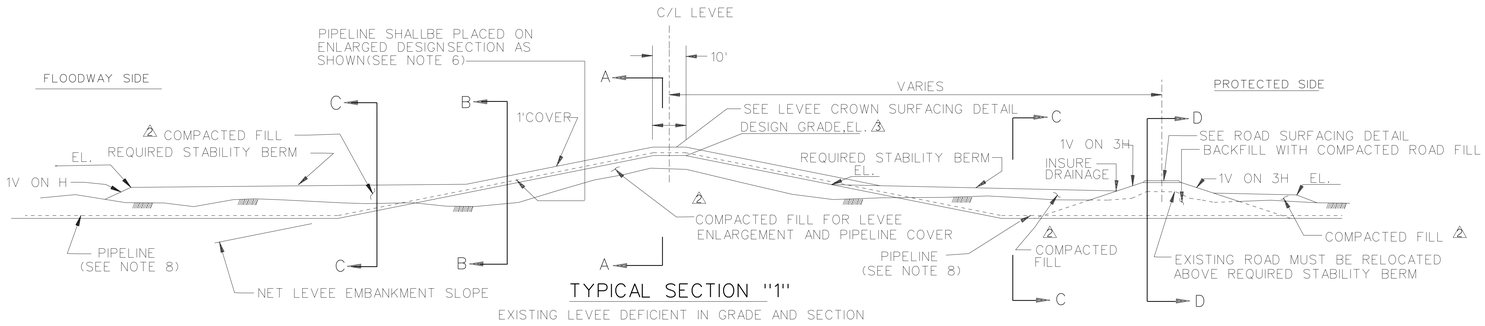
MARK	DESCRIPTION	DATE	APPR
2	REVISED DESIGN GRADE AND SLOPE PAVING LOCATION ON SECTIONS 1, 2 & 3, AND REVISED PAVING NOTE.	8/12/08	B.J.L.
1	MADE REVISION TO NOTE NO. 9.	12/31/03	B.J.L.

U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY:	
CHECKED BY:	
DRAWN BY: PINTO	
DATE: NOV 2003	
PLOT SCALE: 200:1	
PLOT DATE: NOV 2003	
DESIGN FILE NAME: 29027P01.dgn	
SUBMITTED BY: WALTER O. BAUMY ..... DESIGN ENGINEER	
SOLICITATION NO. DACW29-X	

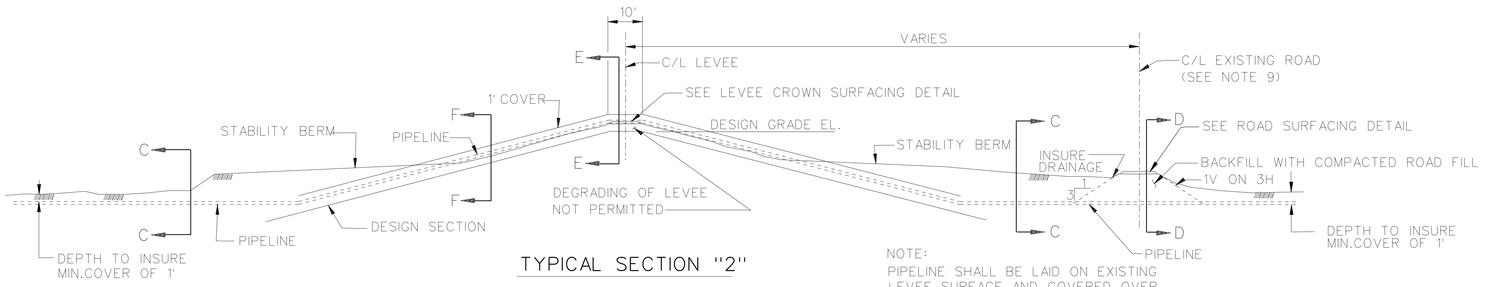
PIPELINE CROSSINGS OVER LEVEES AND FLOODWALLS
SURFACE CROSSINGS
TYPICAL FOR RIVER LEVEES
MISS. RIVER, ATCH. RIVER, AND RED RIVER LEVEES

FILE NUMBER
H-8-29027
DWG. 1 OF 7



TYPICAL SECTION "1"

EXISTING LEVEE DEFICIENT IN GRADE AND SECTION



TYPICAL SECTION "2"

EXISTING LEVEE SUFFICIENT IN GRADE AND SECTION

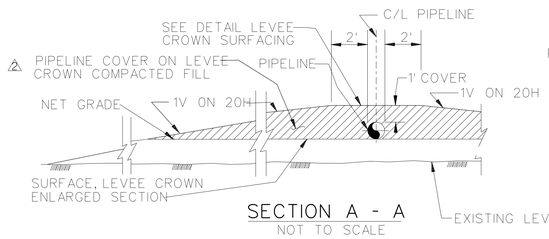
NOTE:
PIPELINE SHALL BE LAID ON EXISTING LEVEE SURFACE AND COVERED OVER AS SHOWN IN SECTIONS E-E AND F-F NO EXCAVATION TO DESIGN SECTION WILL BE ALLOWED.ALLOWABLE EXCAVATION BEYOND EXISTING LEVEE TOE IS SHOWN IN SECTION C-C.

NOTES:

1. SMOOTH TRANSITION SHALL BE CONTRUCTED BETWEEN THE LEVEE ENLARGEMENT AND EXISTING LEVEE.
2. ALL FRESH FILL SHALL BE SODDED OR FERTILIZED AND SEEDED AND SHALL BE MAINTAINED UNTIL A HEALTHY GROWTH IS OBTAINED.
3. THE CROWN RAMP OVER THE PIPELINE CROSSING SHALL BE SURFACED WITH CRUSHED STONE NINE (9) INCHES IN THICKNESS FOR A FULL WIDTH (10' MIN.) AND LENGTH OF RAMP.
4. FILL MATERIAL USED IN CONTRUCTION OF LEVEE ENLARGEMENT RAMPS, PIPE COVER, AND BACKFILL OF EXCAVATION SHALL BE IMPERVIOUS EARTH FILL.
5. PIPELINE MARKERS SHALL BE PLACED AND MAINTAINED AT EACH TOE OF LEVEE IN LINE WITH PIPE CROSSING AND INDICATING OWNER, SIZE, AND NUMBER OF LINES, PRODUCT AND ADDRESS FOR CONTACTING OWNER.
6. NEW STABILITY BERMS OR ENLARGEMENT OF EXISTING BERMS MAY BE REQUIRED BEFORE THE LEVEE CAN BE ENLARGED TO DESIGN SECTION AND PLACEMENT OF THE PIPELINE AND COVER THEREON. EACH CROSSING MUST BE EVALUATED FROM A LEVEE STABILITY STANDPOINT PRIOR TO APPROVAL.
7. ⚠2 ⚠1 EMBANKMENT REQUIREMENTS:

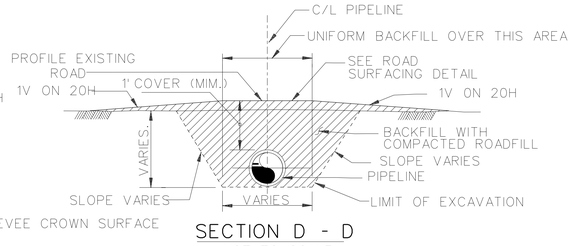
   A) COMPACTED FILL (LEVEE).
   THE FIRST AND EACH SUCESSIVE LAYER OF COMPACTED FILL MATERIAL SHALL BE COMPACTED TO AT LEAST 90 PERCENT OF MAXIMUM DRY DENSITYAS DETERMINED BY ASTM D 698 (STANDARD PROCTOR COMPACTION TEST) AT A MOISTURE CONTENT WITHIN THE LIMITS OF PLUS 5 TO MINUS 3 PERCENT OF OPTIMUM MOISTURE CONTENT DETERMINED FROM THE STANDARD PROCTOR COMPACTION TEST ASTM D 698.

   B) THE FILL USED FOR LEVEE ENLARGEMENT OR BACKFILL MUST HAVE AN ORGANIC CONTENT NO GREATER THAN 9% AS DETERMINED BY ASTM D2974, METHOD C. THE P.I. OF THE FILL MUST BE 10 OR MORE BY ATTERBERG LIMITS BY ASTM D4318, AND THE MATERIAL IS CLASSIFIED AS EITHER A CH OR CL BY ASTM D2487, WITH LESS THAN 35% SAND RETAINED ON THE NO. 200 SIEVE BY ASTM D1140.
8. PIPELINE MAY BE PLACED ON TOP OF THE REQUIRED STABILITY BERM AND COVERED AS SHOWN IN SECTION B-B OR F-F.
9. IN SOME LOCATIONS THE ROAD IS LOCATED ON THE CROWN OF LEVEE.



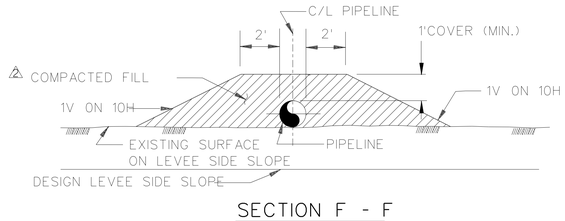
SECTION A - A

NOT TO SCALE



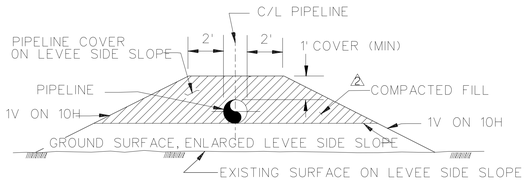
SECTION D - D

NOT TO SCALE



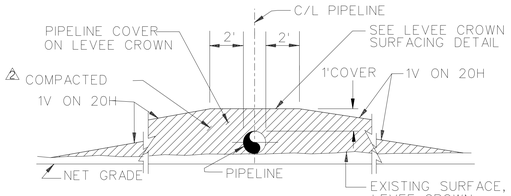
SECTION F - F

NOT TO SCALE



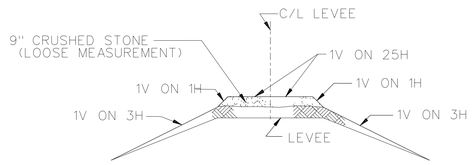
SECTION B - B

NOT TO SCALE



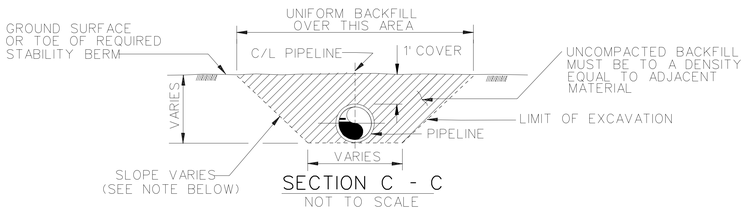
SECTION E - E

NOT TO SCALE



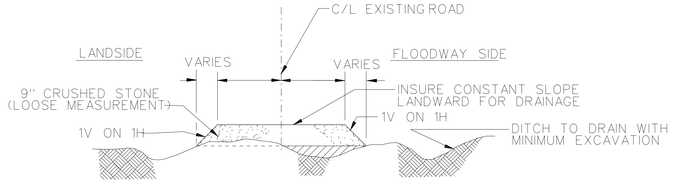
SECTION C - C

NOT TO SCALE



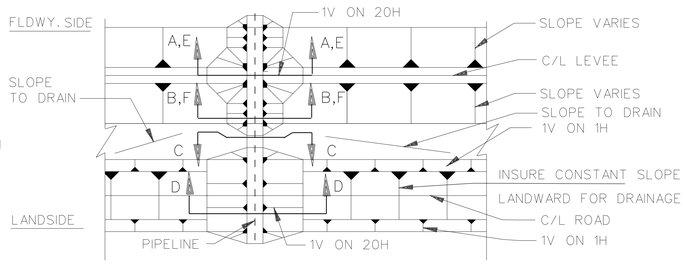
SECTION C - C

NOT TO SCALE



ROAD SURFACING DETAIL

NOT TO SCALE



TYPICAL PLAN

NOT TO SCALE

NOTE:
MAXIMUM DEPH ALLOWED IS THAT REQUIRED TO PROVIDE 1' OF COVER OVER PIPELINE OR ALLOWED BY STABILITY ANALYSIS.

US Army Corps of Engineers
New Orleans District

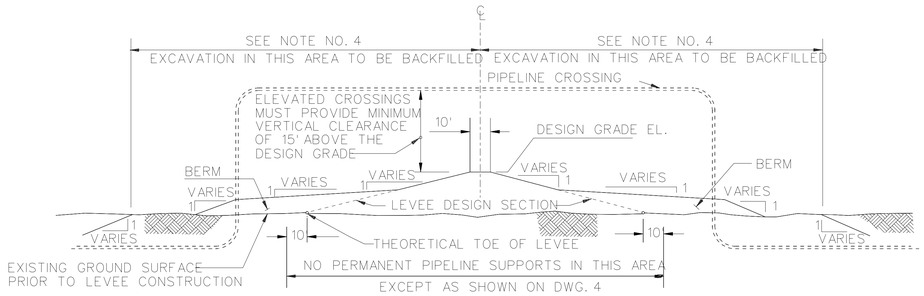
MARK	DESCRIPTION	DATE	APPR
2	REVISED TYPICAL SECTION 1, LOCATION OF DESIGN GRADE.	8/12/08	B.J.L.
1	REVISED NOTE 7 AND CALLOUTS REFERENCING "SEMICOMPACTED FILL" TO "COMPACTED FILL".	12/13/01	B.J.L.
	REVISED NOTE 7.	10/7/06	T.W.M.

U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY:	PLOT SCALE:	DESIGN FILE NAME: 29027P02.dgn	SOLICITATION NO. DACW29-X
CHECKED BY:	200:1	SUBMITTED BY: WALTER O. BAUMY, DESIGN ENGINEER	
DRAWN BY: PINTO	PLOT DATE: NOV 2003		
DATE: NOV 2003			

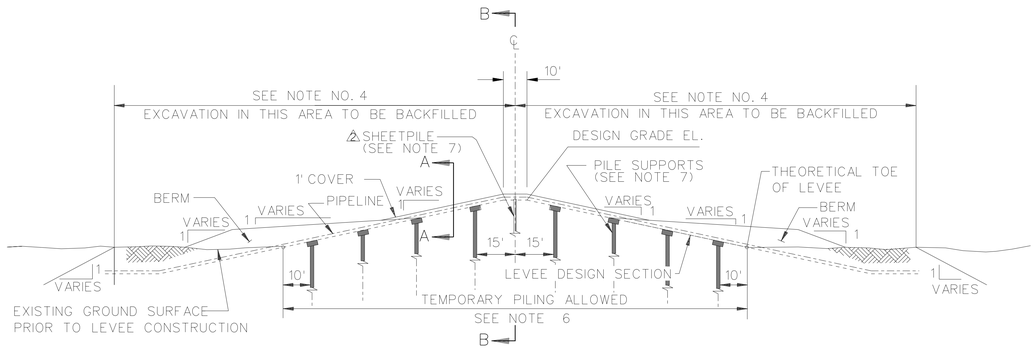
PIPELINE CROSSINGS OVER LEVEES AND FLOODWALLS
SURFACE CROSSINGS
TYPICAL FOR RIVER LEVEES
MISS. RIVER, ATCH. RIVER, AND RED RIVER LEVEES

FILE NUMBER
H-8-29027
DWG. 2 OF 7



ELEVATED CROSSING

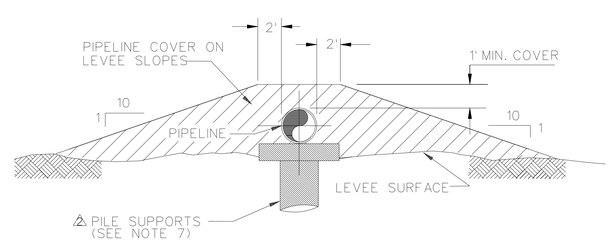
NOT TO SCALE



ALL PIPELINES MUST BE PLACED ABOVE LEVEE DESIGN SECTION. NO EXCAVATION WILL BE ALLOWED BELOW DASHED LINE INCLUDING EXTENSION BELOW EXISTING GROUND SURFACE IF LEVEE EMBANKMENT EXISTS AT THE TIME OF PIPELINE CROSSING CONSTRUCTION.

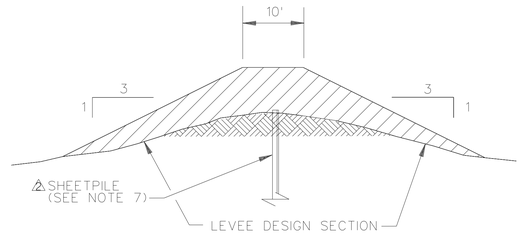
SURFACE CROSSING

NOT TO SCALE



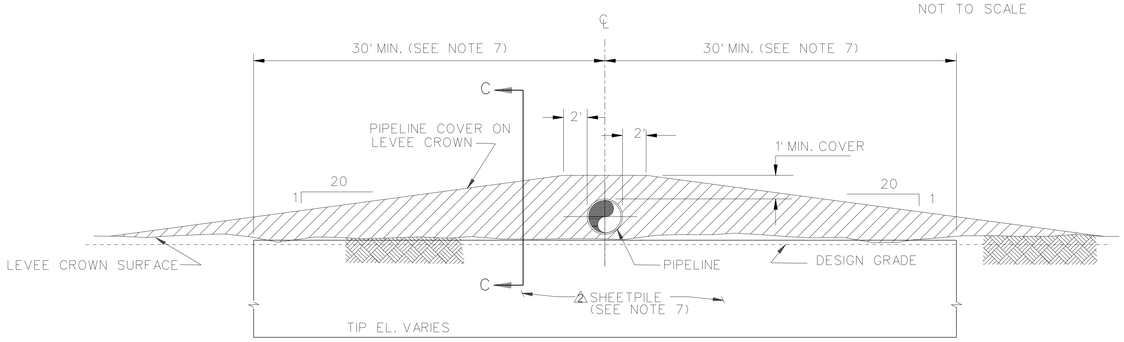
SECTION A - A

NOT TO SCALE



SECTION C - C

NOT TO SCALE



SECTION B - B

NOT TO SCALE

NOTES:

1. FILL MATERIAL USED IN CONSTRUCTION OF LEVEE ENLARGEMENT RAMPS, PIPE COVER, AND BACKFILL EXCAVATION SHALL BE IMPERVIOUS EARTH FILL.

2. ALL FRESH FILL SHALL BE SODDED OR FERTILIZED AND SEEDED AND SHALL BE MAINTAINED UNTIL A HEALTHY GROWTH IS OBTAINED.

3. AT LOCATIONS WHERE THE ELEVATION OF ORIGINAL NATURAL GROUND IS NOT EASILY DETERMINED BECAUSE OF PREVIOUS HYDRAULIC SPOIL PLACED IN THE AREA, THE ELEVATION OF +1 FT.N.G.V.D. WILL BE USED TO DETERMINE THE THEORETICAL TOE OF THE LEVEE.

4. THE DISTANCE AND SLOPE WILL BE DETERMINED BASED ON A 1.5 FACTOR OF SAFETY FOR THE LEVEE.

5. PIPELINE MARKERS SHALL BE PLACED AND MAINTAINED AT EACH TOE OF LEVEE IN LINE WITH PIPE CROSSING AND INDICATING OWNER, SIZE AND NUMBER OF LINES, PRODUCT, AND ADDRESS FOR CONTACTING OWNER.

6. AFTER COMPLETION OF THE LEVEE ALL PILINGS AND SUPPORTS WITHIN THE AREA DESIGNATED "TEMPORARY PILING ALLOWED" MUST BE REMOVED BY EITHER DRIVING DOWN OR BREAKING OFF TO A MINIMUM DEPTH OF 8 FT. BELOW THE THEORETICAL LEVEE DESIGN SECTION AND BERM SURFACE. THE HOLE CREATED BY THE REMOVAL OF THE PILE MUST BE BACKFILLED WITH A CEMENT GROUT TO WITHIN 3 FT. OF THE EMBANKMENT SURFACE, THEN WITH IMPERVIOUS SOIL TO THE EXISTING LEVEE SURFACE.

⚠2 7. SUPPORTS ARE ALLOWED INTO THE LEVEE CROSS SECTION PROVIDED THAT A SHEETPILE WALL IS CONSTRUCTED WITH THE LEVEE SECTION. THE VERTICAL SUPPORTS SHALL NOT BE LOCATED WITHIN 15 FEET OF THE LEVEE CENTERLINE OR WITHIN 10 FEET OF THE THEORETICAL TOE OF LEVEE. THE SHEETPILE MUST NOT ONLY PROVIDE SEEPAGE REDUCTION BUT ALSO BE STABLE IN THE EVENT UP 6 FEET OF SCOUR OR EROSION COULD TAKE PLACE. SHEETPILE MUST NOT BE USED TO SUPPORT THE PIPELINE AND MUST EXTEND AT A MINUMUM OF 30 FEET ON EITHER SIDE OF THE PIPELINE CROSSING. THE APPLICANT IS REQUIRED TO DETERMINE THE CORRECT DISTANCE AND TIP ELEVATIONS OF THE SHEETPILE.

⚠ EMBANKMENT REQUIREMENTS

A) COMPACTED FILL (LEVEE).
THE FIRST AND EACH SUCESSIVE LAYER OF COMPACTED FILL MATERIAL SHALL BE COMPACTED TO AT LEAST 90 PERCENT OF MAXIMUM DRY DENSITYAS DETERMINED BY ASTM D 698 (STANDARD PROCTOR COMPACTION TEST) AT A MOISTURE CONTENT WITHIN THE LIMITS OF PLUS 5 TO MINUS 3 PERCENT OF OPTIMUM MOISTURE CONTENT DETERMINED FROM THE STANDARD PROCTOR COMPACTION TEST ASTM D 698.

B) THE FILL USED FOR LEVEE ENLARGEMENT OR BACKFILL MUST HAVE AN ORGANIC CONTENT NO GREATER THAN 9% AS DETERMINED BY ASTM D2974, METHOD C. THE P.I. OF THE FILL MUST BE 10 OR MORE BY ATTERBERG LIMITS BY ASTM D4318, AND THE MATERIAL IS CLASSIFIED AS EITHER A CH OR CL BY ASTM D2487, WITH LESS THAN 35% SAND RETAINED ON THE NO. 200 SIEVE BY ASTM D1140.

US Army Corps of Engineers
New Orleans District

MARK	DESCRIPTION	DATE	APPR.
⚠2	ADDED SHEETPILE AND EXAMPLE OF PILE SUPPORTS TO THE SURFACE CROSSING DETAILS, AND ADDED NOTE 7.	8/8/08	B.L.L.
⚠1	REVISED ALL REFERENCES TO "SEMICOMPACTED FILL" OR "UNCOMPACTED FILL" TO "COMPACTED FILL".	12/13/06	B.L.L.

U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

DESIGNED BY:		PLOT SCALE:	DESIGN FILE NAME: 29027P03.dgn
CHECKED BY:		PLOT DATE:	SUBMITTED BY: WALTER O. BALAMY, DESIGN ENGINEER
DRAWN BY:		NOV 2003	SOLICITATION NO. DACW29-X
DATE:	NOV 2003	200:1	

PIPELINE CROSSINGS OVER LEVEES AND FLOODWALLS
SURFACE CROSSINGS
TYPICAL FOR HURRICANE LEVEES
WITH LIFT CONSTRUCTION
HURRICANE PORTECTION LEVEES

FILE NUMBER
H-8-29027

DWG. 3 OF 7