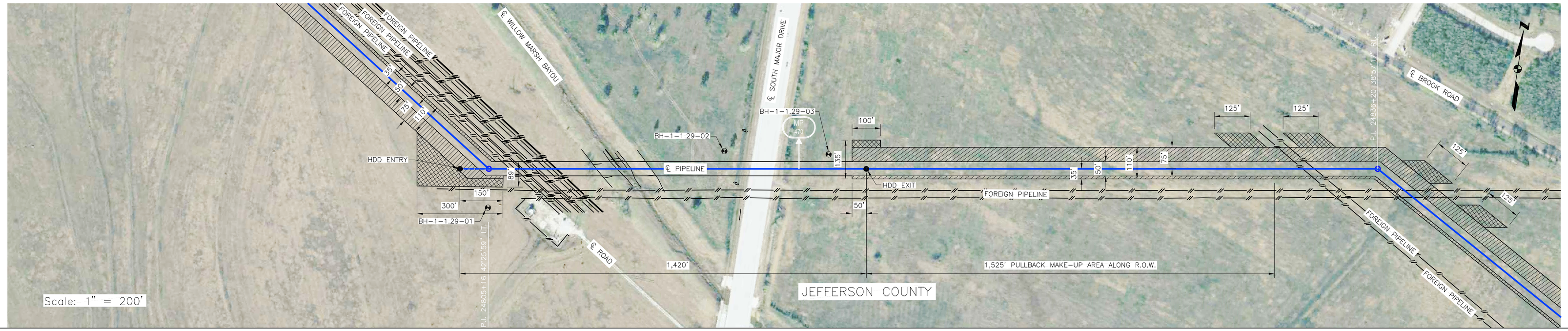
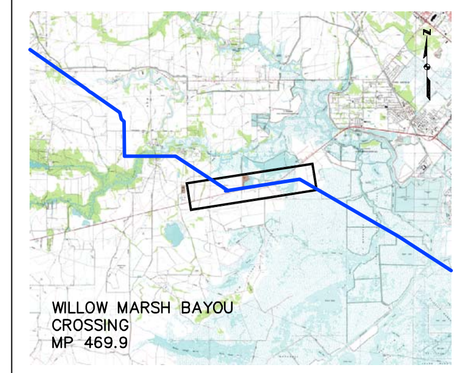
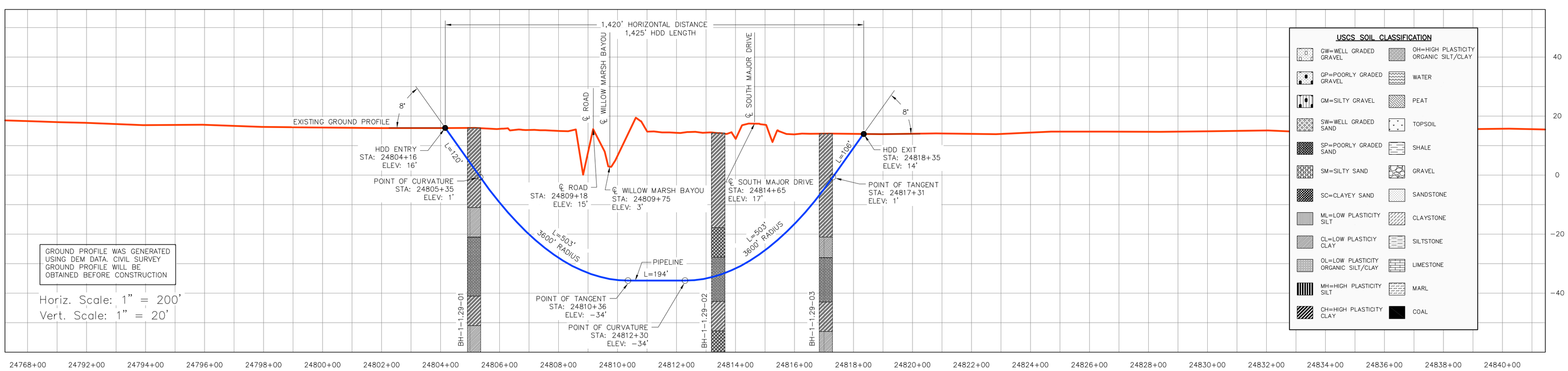






USCS SOIL CLASSIFICATION

- GW=WELL GRADED GRAVEL
- GP=POORLY GRADED GRAVEL
- GM=SILTY GRAVEL
- SW=WELL GRADED SAND
- SP=POORLY GRADED SAND
- SM=SILTY SAND
- SC=CLAYEY SAND
- ML=LOW PLASTICITY SILT
- CL=LOW PLASTICIY CLAY
- OL=LOW PLASTICITY ORGANIC SILT/CLAY
- MH=HIGH PLASTICITY SILT
- CH=HIGH PLASTICITY CLAY
- OH=HIGH PLASTICITY ORGANIC SILT/CLAY
- WATER
- PEAT
- TOPSOIL
- SHALE
- GRAVEL
- SANDSTONE
- CLAYSTONE
- SILTSTONE
- LIMESTONE
- MARL
- COAL

INSTALLATION NOTES

1) ACCESS: ALL EQUIPMENT MUST ACCESS THE SITE ALONG THE CONSTRUCTION RIGHT-OF-WAY FROM PUBLIC OR APPROVED PRIVATE ROADS.

2) VEHICLE AND EQUIPMENT ACCESS CROSSING MAY BE INSTALLED IF APPROVED BY THE ENVIRONMENTAL INSPECTOR.

3) WORK SPACE: WORK SPACE LIMITS ARE DEPICTED. CLEARING WILL BE RESTRICTED TO THE WORK SPACES INDICATED AT THE ENTRY AND EXIT POINTS AND PULLBACK MAKE-UP AREA ALONG THE RIGHT-OF-WAY. CLEARING BETWEEN THE ENTRY AND EXIT POINTS IS LIMITED TO THE MINIMUM AMOUNT NECESSARY TO STRING LOCATION WIRES AND INSTALL PUMPS AND PIPING TO OBTAIN WATER (WHERE APPROVED).

4) WATER SOURCE: DRILL WATER AND PRE-INSTALLATION HYDROSTATIC TEST WATER SHALL BE OBTAINED FROM AN APPROVED SOURCE. THE CONTRACTOR SHALL SCREEN THE INTAKE HOSE TO PREVENT THE ENTRAINMENT OF FISH OR DEBRIS AND IN ACCORDANCE WITH THE CONSTRUCTION MITIGATION AND RECLAMATION PLAN (CMRP) AND PROJECT REQUIREMENTS. THE HOSE SHALL BE KEPT OFF THE BOTTOM OF THE WATER BODY.

5) HYDROSTATIC TEST: PRE-INSTALLATION HYDROSTATIC TEST SHALL BE CONDUCTED IN ACCORDANCE WITH PERMIT REQUIREMENTS. THE CONTRACTOR SHALL DISCHARGE HYDROSTATIC TEST WATER IN ACCORDANCE WITH PROJECT PERMITS. DISCHARGES WILL BE BACK TO THE WATER SOURCE UNLESS OTHERWISE DIRECTED BY THE ENVIRONMENTAL INSPECTOR. DISCHARGES SHALL NOT CAUSE EROSION OR SEDIMENTATION. TO REDUCE THE VELOCITY OF THE DISCHARGE, THE CONTRACTOR SHALL UTILIZE AN ENERGY-DISSIPATING DEVICE AS DESCRIBED IN THE CMRP.

6) SPILL-PREVENTION: ALL PUMPS SHALL BE SET IN SECONDARY CONTAINMENT AND IN ACCORDANCE WITH THE SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN (SPCC). EQUIPMENT AND PUMPS OPERATING WITHIN 100 FEET OF ANY WATER BODY OR WETLAND SHALL BE OPERATED AND REFUELED IN ACCORDANCE WITH THE SPCC PLAN. EQUIPMENT REFUELING AND STORAGE OF HAZARDOUS MATERIALS, FUELS, ETC. SHALL BE CONDUCTED AT LEAST 100 FEET FROM WATER BODIES AND WETLANDS. EACH CONSTRUCTION CREW SHALL HAVE ON HAND SUFFICIENT TOOLS AND MATERIALS TO STOP LEAKS AND SUPPLIES OF ABSORBENT AND BARRIER MATERIALS TO ALLOW RAPID CONTAINMENT AND RECOVERY OF SPILLED MATERIALS.

7) EROSION AND SEDIMENT CONTROL: CONTRACTOR SHALL SUPPLY, INSTALL AND MAINTAIN SEDIMENT CONTROL STRUCTURES IN ACCORDANCE WITH CONTRACT DOCUMENTS. CONTRACTOR SHALL INSTALL ADDITIONAL EROSION CONTROL STRUCTURES AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

8) TOPSOIL SHALL BE STRIPPED AS REQUIRED BY PROJECT SPECIFICATIONS.

9) PRIOR TO PIPE PULLBACK, CONTRACTOR'S ACTUAL DRILL PROFILE SHALL BE SUBMITTED TO KEYSTONE FOR APPROVAL.

10) INSTALLATION: THE PIPE SECTION FOR THE DRILLED CROSSING SHALL BE MADE UP WITHIN THE RIGHT-OF-WAY AT THE DRILL EXIT POINT AS SHOWN. CONTRACTOR SHALL ASSESS THE NEED FOR AND SUPPLY APPROPRIATE BALLAST DURING PULLBACK.

11) MUD DISPOSAL: CONTRACTOR SHALL DISPOSE OF EXCESS DRILLING MUD AS DIRECTED BY THE COMPANY REPRESENTATIVE IN ACCORDANCE WITH PERMIT CONDITIONS. UNDER NO CIRCUMSTANCES SHALL DRILLING FLUID BE DISPOSED OF IN WATER BODIES OR WETLANDS. ANY DRILLING MUD WHICH INADVERTENTLY EXITS AT POINTS OTHER THAN THE ENTRY AND EXIT POINTS SHALL BE CONTAINED AND COLLECTED TO THE EXTENT PRACTICAL AND DISPOSED OF AS DIRECTED BY THE COMPANY REPRESENTATIVE IN ACCORDANCE WITH PERMIT CONDITIONS.

12) CLEANUP/STABILIZATION/RESTORATION: ALL DISTURBED AREAS SHALL BE RETURNED TO THE ORIGINAL CONTOURS. DISTURBED AREAS SHALL BE SEEDED AS SPECIFIED IN PROJECT DOCUMENTS.

13) NOMINAL WORKING SPACE DIMENSIONS ARE SHOWN. LARGER AREAS MAY BE REQUIRED IN IRREGULAR TERRAIN. UPDATED DIMENSIONS MAY BE PROVIDED AFTER LOCAL TOPOGRAPHICAL SURVEYS ARE PERFORMED.

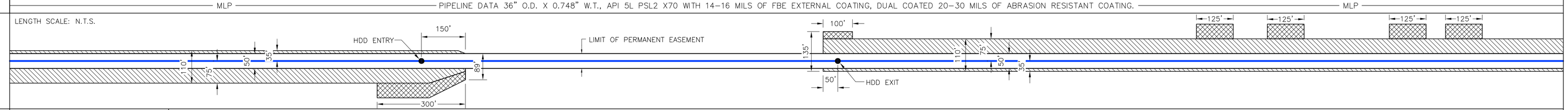
CROSSING INFORMATION (ESTIMATED STATIONING)

Station	Feature
24804+16	HDD ENTRY
24805+14	BH-1-1.29-01
24805+16	P.I. 42°25'59" LT.
24805+35	PT OF CURVATURE
24809+18	℄ ROAD
24809+75	℄ WILLOW MARSH BAYOU
24810+36	PT OF TANGENT
24812+30	PT OF CURVATURE
24813+42	BH-1-1.29-02
24814+65	℄ SOUTH MAJOR DRIVE
24817+07	BH-1-1.29-03
24817+31	PT OF TANGENT
24818+35	HDD EXIT
24836+20	P.I. 35°5'11" RT.

PIPELINE DATA: MLP — PIPELINE DATA 36" O.D. X 0.748" W.T., API 5L PSL2 X70 WITH 14-16 MILS OF FBE EXTERNAL COATING, DUAL COATED 20-30 MILS OF ABRASION RESISTANT COATING. — MLP

CONSTRUCTION WORKSPACE

LENGTH SCALE: N.T.S.



ENVIRONMENTAL MITIGATION/RECLAMATION

TOPSOIL SALVAGE METHOD	
STREAMS	
WETLANDS	
TIMING CONSRAINTS	
MILEPOST	
MONITORING	
RECLAMATION	
SPECIAL CONSIDERATIONS	

TO BE DETERMINED

LEGEND

- POINT OF INTERSECTION (P.I.)
- ENTRY OR EXIT POINT
- GEOTECHNICAL BOREHOLE
- POWERPOLE
- MLP — MAINLINE PIPE
- PIPELINE
- FOREIGN PIPELINE
- EDGE OF WATER
- PRIVATE ACCESS SHOO FLY ROAD
- COUNTY BOUNDARY
- WATER LEVEL
- USACOE CONSTRUCTION REFERENCE POINT
- WETLANDS
- PERMANENT EASEMENT
- TEMPORARY EASEMENT
- EXTRA WORKSPACE

REFERENCE DRAWINGS

DRAWING No	TITLE
11042 HDD XREF_15	11042 HDD XREF-15.dwg
TC_UD_BR_UEI	TC_UD_BR_UEI.dwg
NOTES-LEGEND	NOTES-LEGEND.dwg

REVISION / APPROVAL

REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
6	03.15.10	ISSUED FOR CONTRACT PRE-AWARD	11042	UEI	UEI	DW	JW	JH	UEI
5	09.08.09	ISSUED FOR RFP PACKAGE	11042	UEI	UEI	BM	JW	JH	UEI
4	07.27.09	ISSUED FOR BID REVIEW	11042	UEI	UEI	BM	JW	JH	UEI
3	06.22.09	ISSUED FOR BID REVIEW	11042	UEI	UEI	BM	JW	JH	UEI
2	05.13.09	ISSUED FOR J.D. HAIR REVIEW	11042	UEI	UEI	BM	JW	JH	UEI
1	03.19.09	ISSUED FOR TROW REVIEW	11042	UEI	UEI	DW	JW	JH	UEI
0	11.19.08	ISSUED FOR UNITED STATES DEPARTMENT OF STATE (7.31.08 CL)	11042	UEI	UEI	RB	JW	JH	UEI

PROFESSIONAL ENGINEER/RPT | PERMIT/ ENG. APPROVAL | DATE

REV. NO. | DATE | PERMIT NUMBER:

UNIVERSAL ENSCO, INC.

TransCanada — In business to deliver

FIA # 4387	CHAINAGE: M.P. 469.9	DISCIPLINE # 03

WILLOW MARSH BAYOU HDD INSTALLATION
KEYSTONE XL PROJECT
JEFFERSON COUNTY, TEXAS

SCALE AS SHOWN	DRAWING No 4387-03-ML-03-005	REV 6

TC_UD_BR.DWG 22X34

CADD DRAWING: DO NOT MAKE MANUAL REVISIONS

PLOTTED SIZE: ANSI D (22x34)