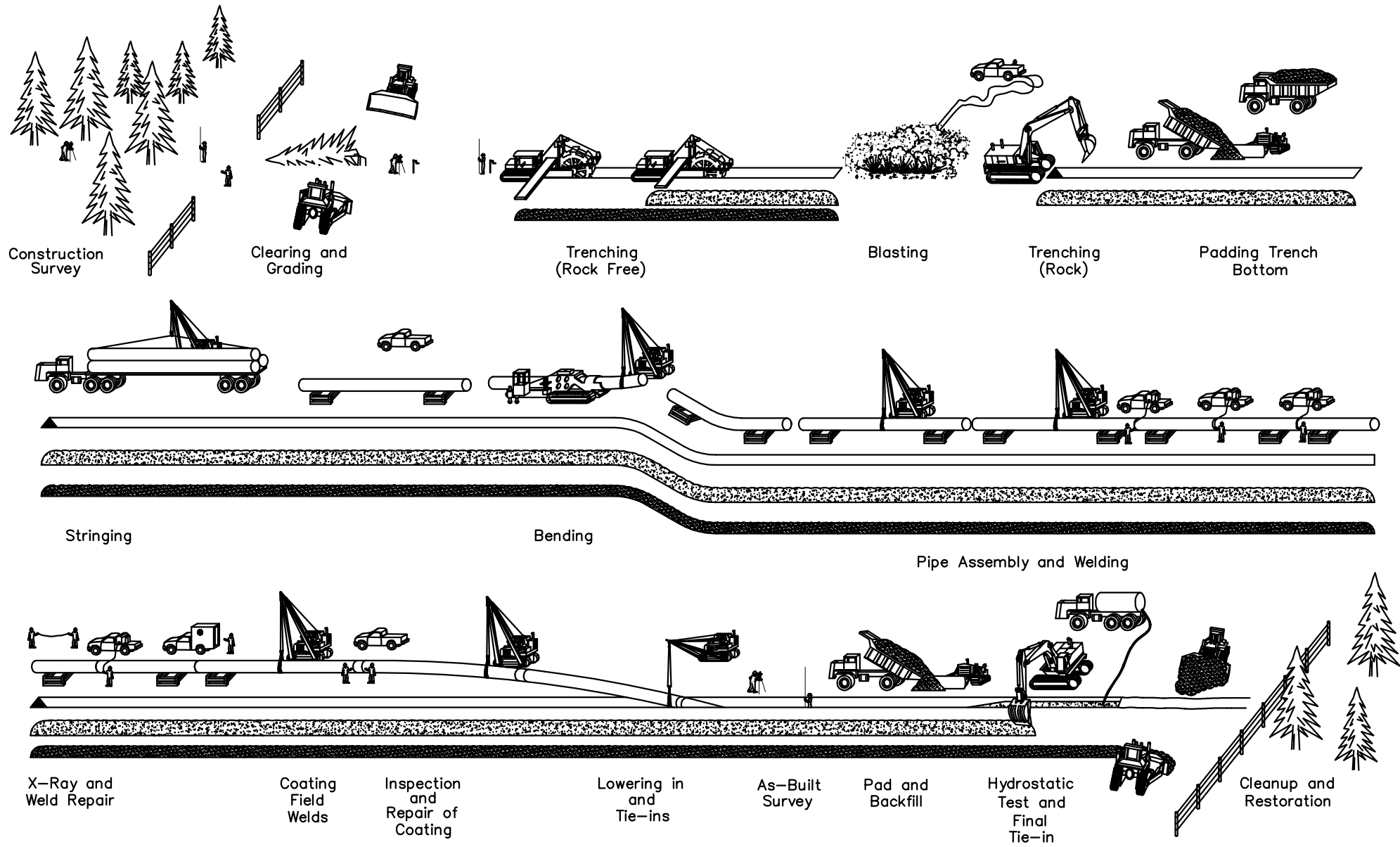


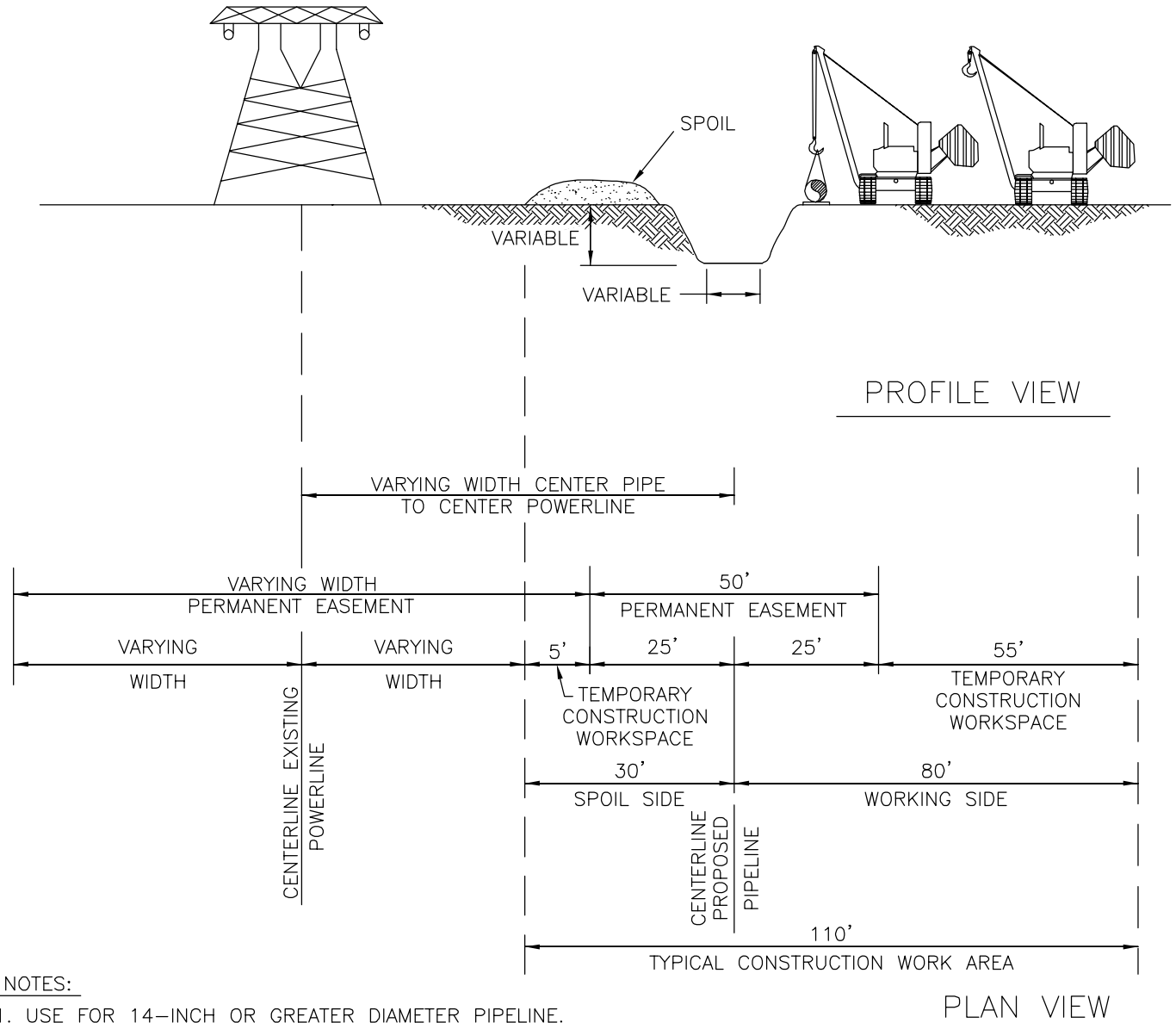
APPENDIX C
Typical Construction Standards



Appendix C-1

LEACH XPRESS		
TYPICAL		
PIPELINE CONSTRUCTION SEQUENCE		
DRAWN BY	DATE	DWG. NO.
CHECKED BY	SCALE N.T.S.	FIGURE 1-1
APPROVED BY	SHEET 1 OF 1	

TYPICAL PARALLELING CONFIGURATION WITH POWERLINE



NOTES:

1. USE FOR 14-INCH OR GREATER DIAMETER PIPELINE.
2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL.
3. VARIATIONS FOR STAGING AREAS MAY BE NECESSARY DUE TO SITE-SPECIFIC TERRAIN FEATURES; HOWEVER, UNLESS OTHERWISE INDICATED IN COLUMBIA'S ENVIRONMENTAL MANAGEMENT & CONSTRUCTION PLANS, THE MAXIMUM WIDTH OF CONSTRUCTION WORK AREA WILL BE 110 FEET.

PRELIMINARY

Appendix C-2

TYPICAL PARALLELING CONFIGURATION WITH POWERLINE

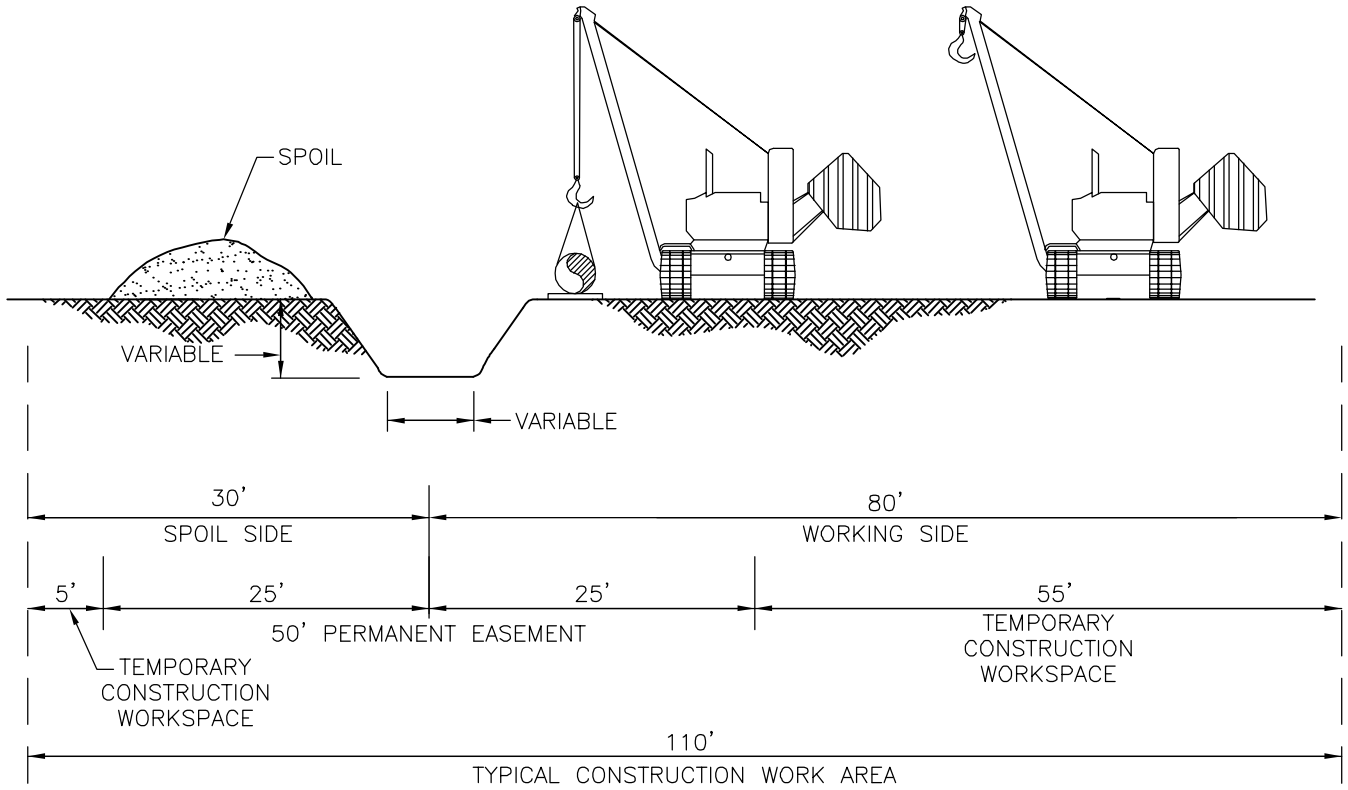
LEACH XPRESS PROJECT

File No.:

DRAWN BY	DATE	DWG. NO.
CHECKED BY	SCALE	N.T.S.
APPROVED BY	SHEET	1 of 1

TYPICAL 1

TYPICAL GREENFIELD WORKSPACE



PLAN/PROFILE VIEW

NOTES:

1. USE FOR 14-INCH OR GREATER DIAMETER PIPELINE.
2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL.
3. VARIATIONS FOR STAGING AREAS MAY BE NECESSARY DUE TO SITE-SPECIFIC TERRAIN FEATURES; HOWEVER, UNLESS OTHERWISE INDICATED IN COLUMBIA'S ENVIRONMENTAL MANAGEMENT & CONSTRUCTION PLANS, THE MAXIMUM WIDTH OF CONSTRUCTION WORK AREA WILL BE 110 FEET.

PRELIMINARY

Appendix C-3

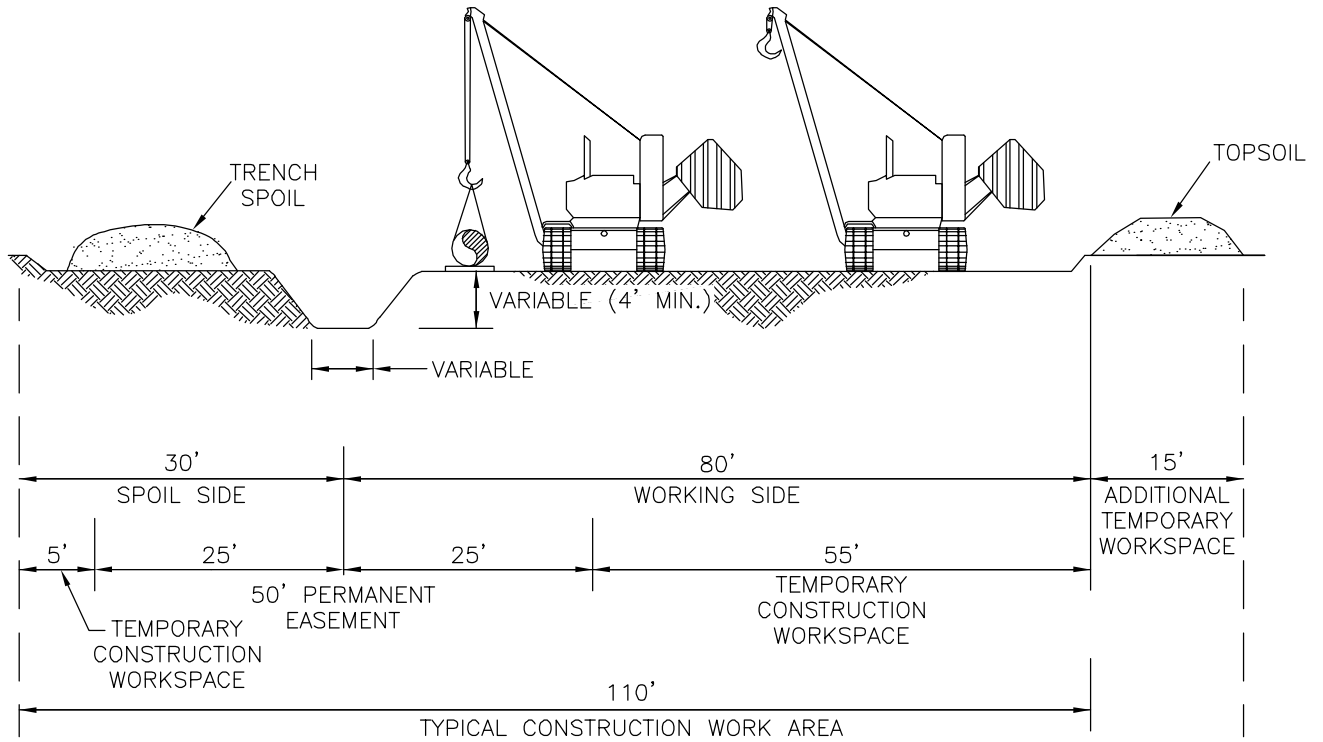
TYPICAL GREENFIELD WORKSPACE

LEACH XPRESS PROJECT

File No.:

DRAWN BY	DATE	DWG. NO. TYPICAL 2
CHECKED BY	SCALE N.T.S.	
APPROVED BY	SHEET 1 of 1	

TYPICAL AGRICULTURAL WORKSPACE



PLAN/PROFILE VIEW

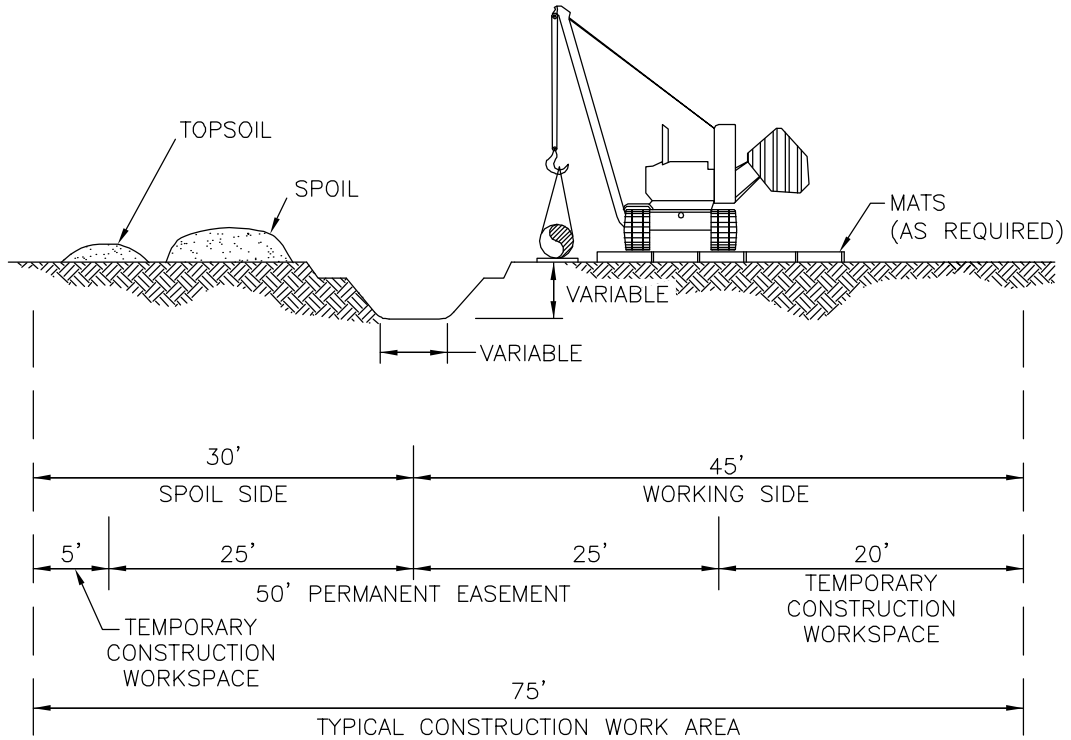
NOTES:

1. USE FOR 14-INCH OR GREATER DIAMETER PIPELINE.
2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL.
3. VARIATIONS FOR STAGING AREAS MAY BE NECESSARY DUE TO SITE-SPECIFIC TERRAIN FEATURES; HOWEVER, UNLESS OTHERWISE INDICATED IN COLUMBIA'S ENVIRONMENTAL MANAGEMENT & CONSTRUCTION PLANS, THE MAXIMUM WIDTH OF CONSTRUCTION WORK AREA WILL BE 110 FEET.
4. OTHER CONFIGURATIONS OF TOPSOIL AND SUBSOIL ARE ACCEPTABLE PROVIDED THEY ARE KEPT SEPARATE.
5. UP TO 12 INCHES OF TOPSOIL REMOVED.
6. TOPSOIL AND SUBSOIL PILES WILL BE ADEQUATELY PROTECTED FROM EROSION AND SEDIMENTATION BY USE OF SEDIMENT FILTER DEVICES OR MULCH.

PRELIMINARY

Appendix C-4	TYPICAL AGRICULTURAL WORKSPACE			
	File No.:	LEACH XPRESS PROJECT		
		DRAWN BY	DATE	DWG. NO. TYPICAL 3
		CHECKED BY	SCALE N.T.S.	
APPROVED BY	SHEET 1 of 1			

TYPICAL WETLAND CROSSING



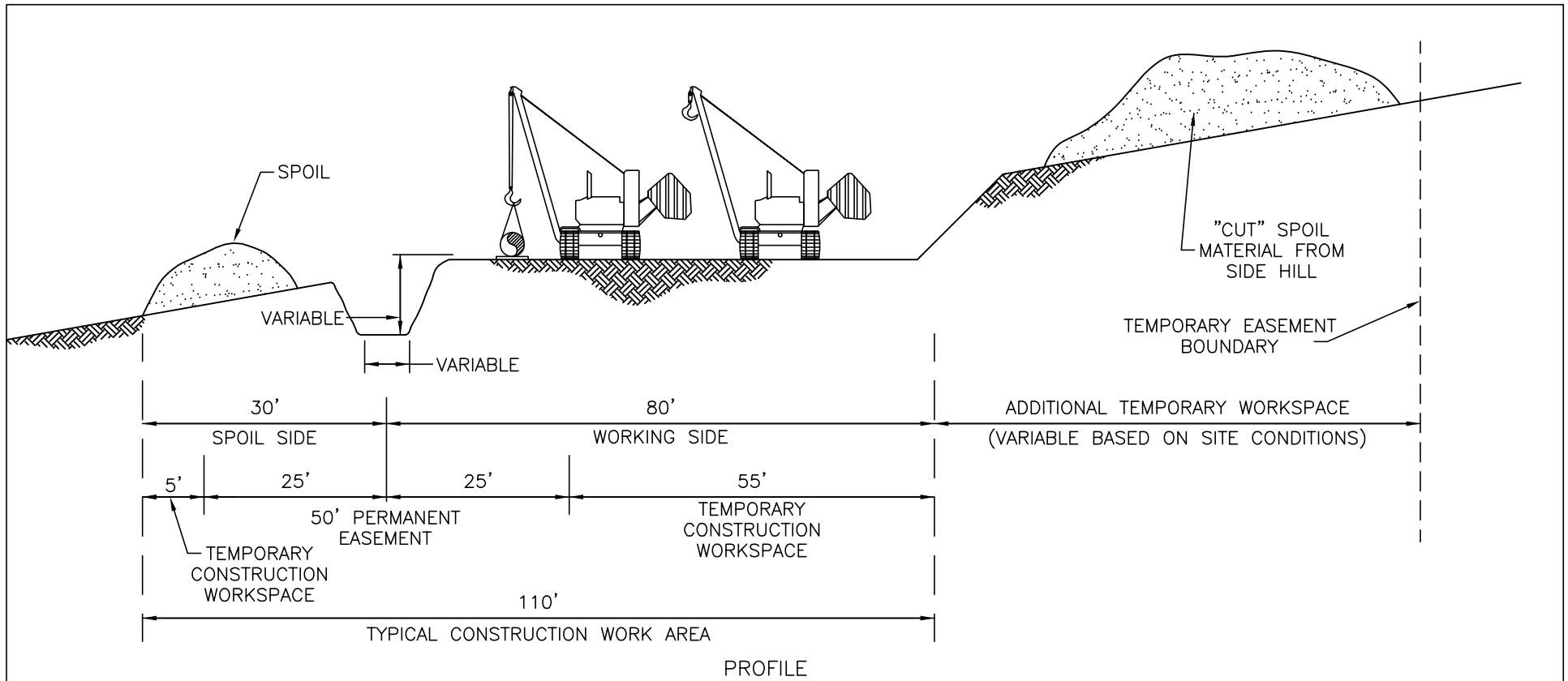
PLAN/PROFILE VIEW

NOTES:

1. IN WETLAND AREAS WHICH CONTAIN NO STANDING WATER OR IF SOILS ARE SATURATED OR FROZEN, TOPSOIL (TOP 12 INCHES) AND SUBSOIL WILL BE STOCKPILED SEPARATELY WITHIN THE WETLAND CONSTRUCTION WORK AREA.
2. WETLANDS WITH STANDING WATER, SATURATED OR FROZEN SOIL, OPERATE EQUIPMENT PER REQUIREMENTS IN SECTION III.B-2. (ECS)
3. A SEDIMENT FILTER DEVICE WILL BE PLACED ACROSS THE WORK AREA AT THE WETLAND'S EDGE, IMMEDIATELY UPSLOPE OF THE WETLAND BOUNDARY.
4. A SEDIMENT FILTER DEVICE WILL BE PLACED AT THE EDGE OF THE WORK AREA AND AROUND SOIL AND SUBSOIL PILES AS NECESSARY.

PRELIMINARY

Appendix C-5	TYPICAL WETLAND CROSSING			
	File No.:	LEACH XPRESS PROJECT		
		DRAWN BY	DATE	DWG. NO. TYPICAL 4
		CHECKED BY	SCALE N.T.S.	
APPROVED BY	SHEET 1 of 1			



NOTES:

1. USE FOR 14-INCH OR GREATER DIAMETER PIPELINE.
2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL.
3. VARIATIONS FOR STAGING AREAS MAY BE NECESSARY DUE TO SITE-SPECIFIC TERRAIN FEATURES; HOWEVER, UNLESS OTHERWISE INDICATED IN COLUMBIA'S ENVIRONMENTAL MANAGEMENT & CONSTRUCTION PLANS, THE MAXIMUM WIDTH OF CONSTRUCTION WORK AREA WILL BE 110 FEET.

PRELIMINARY

Appendix C-6

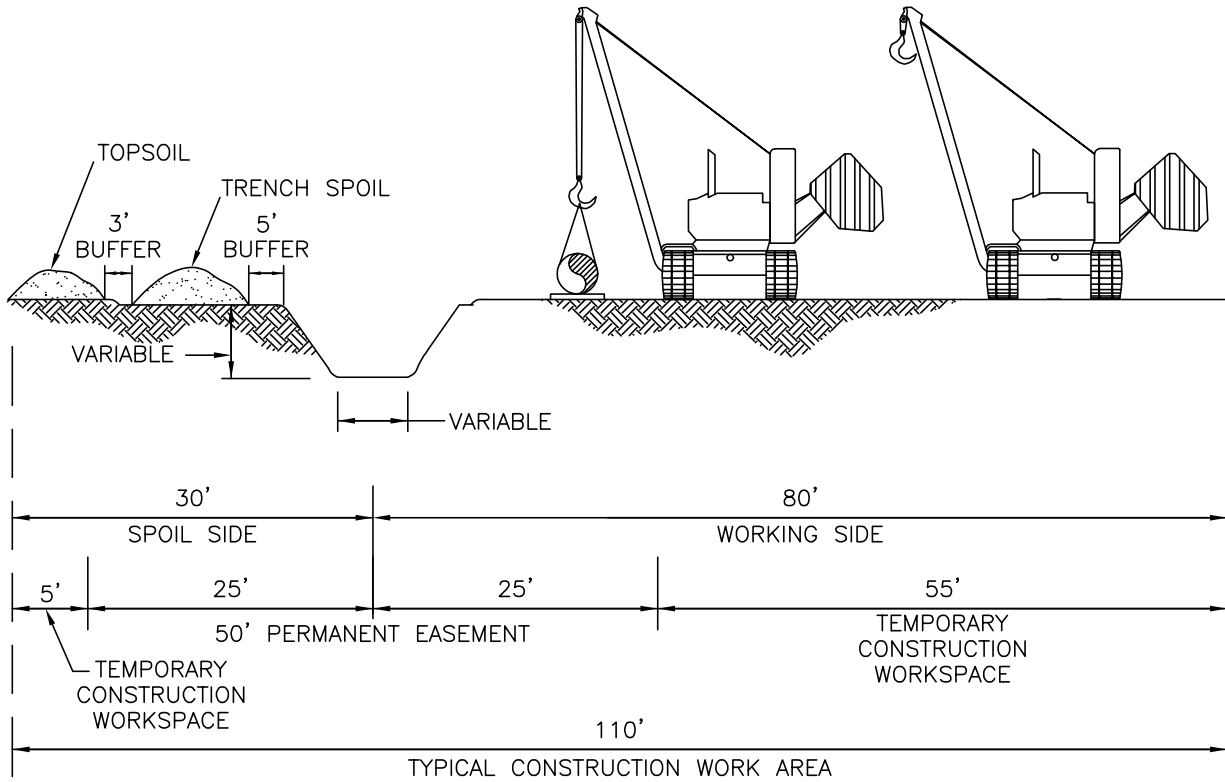
**TYPICAL SIDE SLOPE CONSTRUCTION
WORKSPACE**

LEACH XPRESS PROJECT

File No.:

DRAWN BY	DATE	DWG. NO. TYPICAL 5
CHECKED BY	SCALE N.T.S.	
APPROVED BY	SHEET 1 OF 1	

TYPICAL GREENFIELD WORKSPACE DITCH AND SPOIL SIDE TOP SOIL SALVAGE



PLAN/PROFILE VIEW

NOTES:

1. USE FOR 14-INCH OR GREATER DIAMETER PIPELINE.
2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL.
3. VARIATIONS FOR STAGING AREAS MAY BE NECESSARY DUE TO SITE-SPECIFIC TERRAIN FEATURES; HOWEVER, UNLESS OTHERWISE INDICATED IN COLUMBIA'S ENVIRONMENTAL MANAGEMENT & CONSTRUCTION PLANS, THE MAXIMUM WIDTH OF CONSTRUCTION WORK AREA WILL BE 110 FEET.

PRELIMINARY

TYPICAL GREENFIELD WORKSPACE DITCH AND SPOIL SIDE TOP SOIL SALVAGE

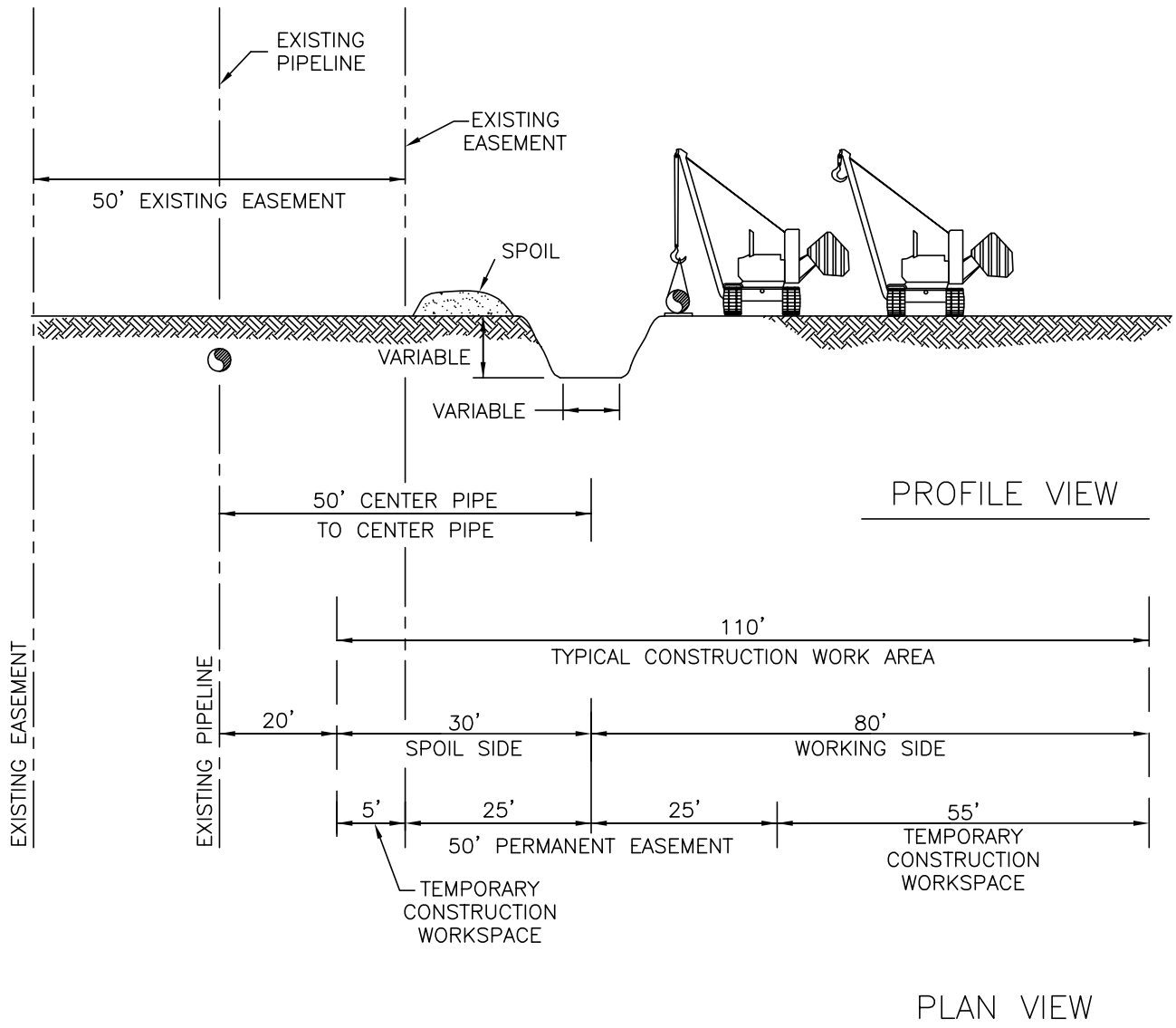
LEACH XPRESS PROJECT

Appendix C-7

File No.:

DRAWN BY	DATE	DWG. NO.
CHECKED BY	SCALE N.T.S.	TYPICAL 6
APPROVED BY	SHEET 1 of 1	

TYPICAL CONFIGURATION FOR PARALLELING TO EXISTING PIPELINES



NOTES:

1. USE FOR 14-INCH OR GREATER DIAMETER PIPELINE.
2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL.
3. VARIATIONS FOR STAGING AREAS MAY BE NECESSARY DUE TO SITE-SPECIFIC TERRAIN FEATURES; HOWEVER, UNLESS OTHERWISE INDICATED IN COLUMBIA'S ENVIRONMENTAL MANAGEMENT & CONSTRUCTION PLANS, THE MAXIMUM WIDTH OF CONSTRUCTION WORK AREA WILL BE 110 FEET.

PRELIMINARY

Appendix C-8

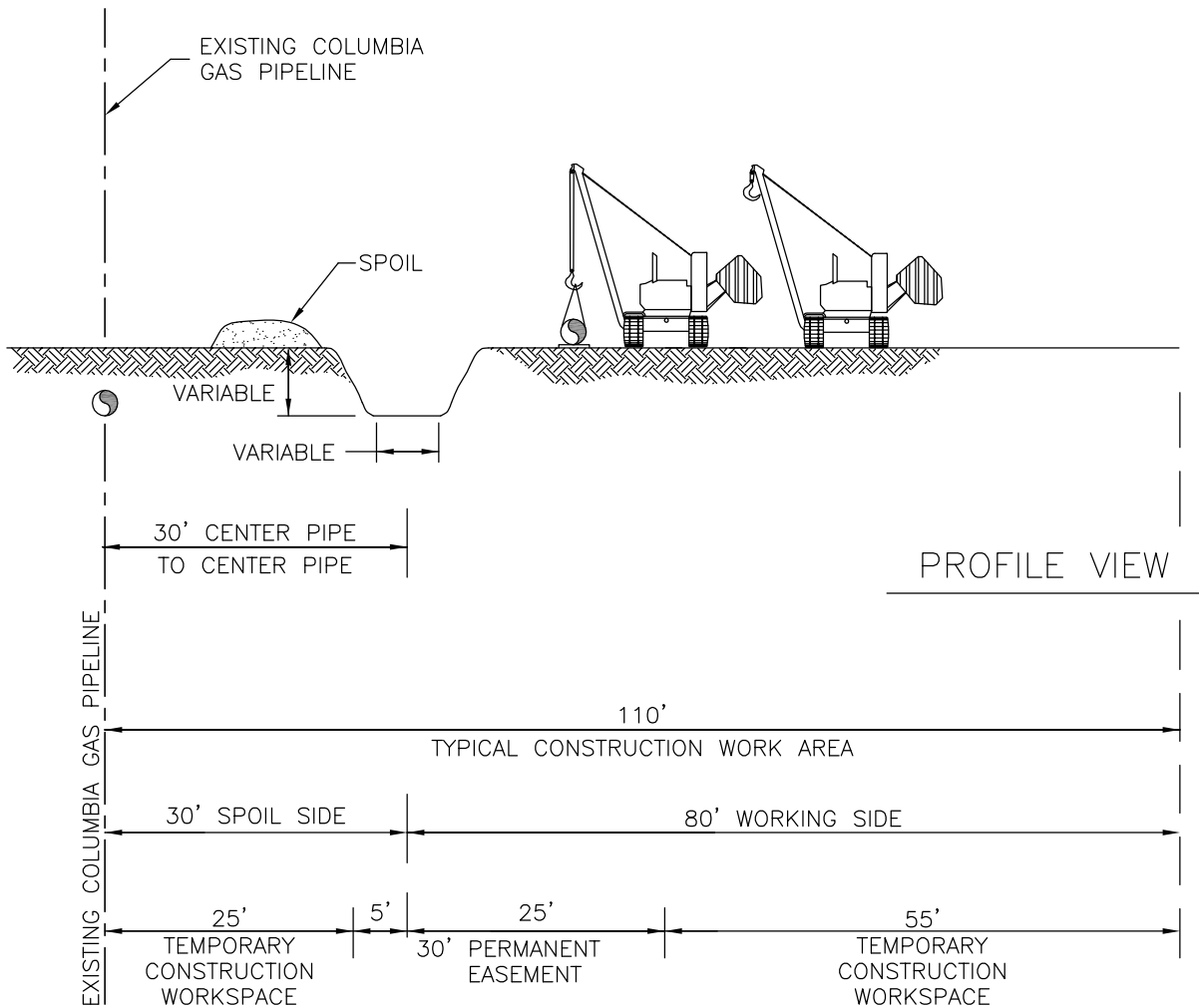
TYPICAL CONFIGURATION FOR PARALLELING TO EXISTING PIPELINES

LEACH XPRESS PROJECT

File No.:

DRAWN BY	DATE	DWG. NO.
CHECKED BY	SCALE N.T.S.	TYPICAL 7
APPROVED BY	SHEET 1 of 1	

TYPICAL CONFIGURATION FOR CO-LOCATING WITH EXISTING COLUMBIA PIPELINES - 30' EASEMENT



NOTES:

1. USE FOR 14-INCH OR GREATER DIAMETER PIPELINE.
2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL.
3. VARIATIONS FOR STAGING AREAS MAY BE NECESSARY DUE TO SITE-SPECIFIC TERRAIN FEATURES; HOWEVER, UNLESS OTHERWISE INDICATED IN COLUMBIA'S ENVIRONMENTAL MANAGEMENT & CONSTRUCTION PLANS, THE MAXIMUM WIDTH OF CONSTRUCTION WORK AREA WILL BE 110 FEET.

PRELIMINARY

PLAN VIEW

Appendix C-9

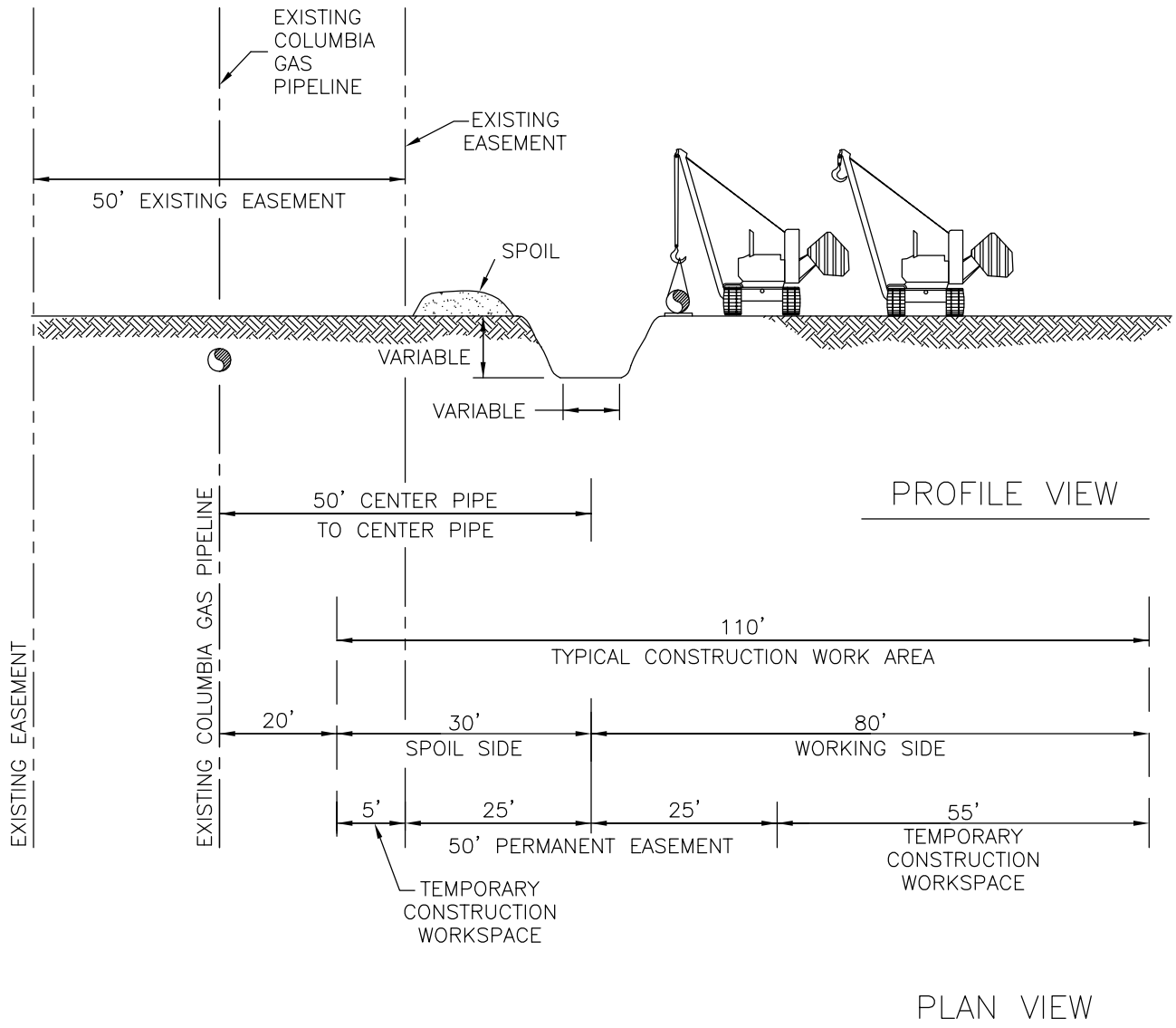
TYPICAL CONFIGURATION FOR CO-LOCATING WITH EXISTING COLUMBIA PIPELINES - 30' EASEMENT

LEACH XPRESS PROJECT

File No.:

DRAWN BY	DATE	DWG. NO.
CHECKED BY	SCALE N.T.S.	TYPICAL 8A
APPROVED BY	SHEET 1 of 1	

TYPICAL CONFIGURATION FOR PARALLELING TO EXISTING COLUMBIA PIPELINES - 50' EASEMENT



NOTES:

1. USE FOR 14-INCH OR GREATER DIAMETER PIPELINE.
2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL.
3. VARIATIONS FOR STAGING AREAS MAY BE NECESSARY DUE TO SITE-SPECIFIC TERRAIN FEATURES; HOWEVER, UNLESS OTHERWISE INDICATED IN COLUMBIA'S ENVIRONMENTAL MANAGEMENT & CONSTRUCTION PLANS, THE MAXIMUM WIDTH OF CONSTRUCTION WORK AREA WILL BE 110 FEET.

PRELIMINARY

Appendix C-10

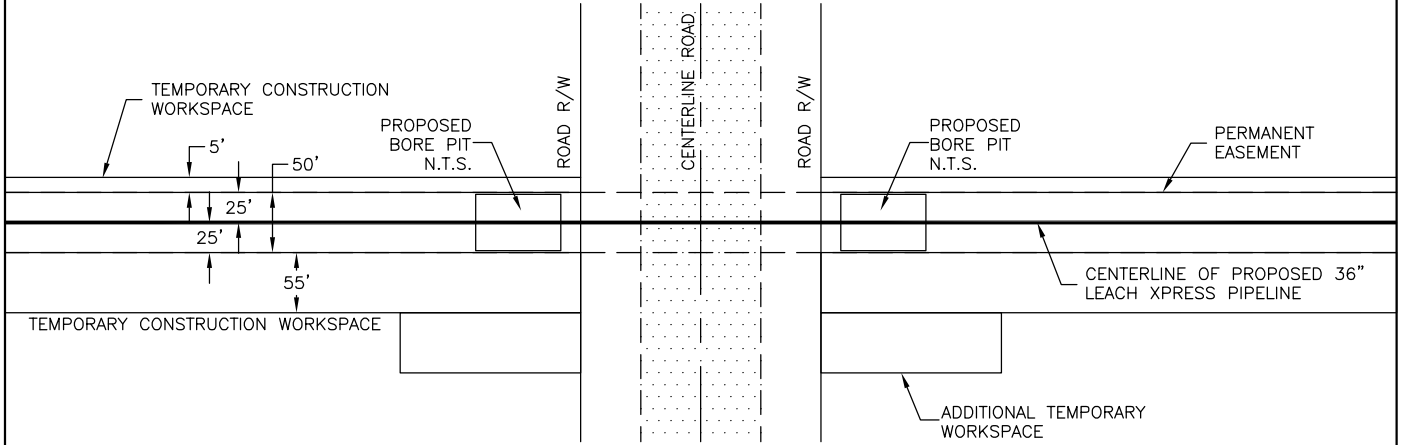
TYPICAL CONFIGURATION FOR PARALLELING TO EXISTING COLUMBIA PIPELINES - 50' EASEMENT

LEACH XPRESS PROJECT

File No.:

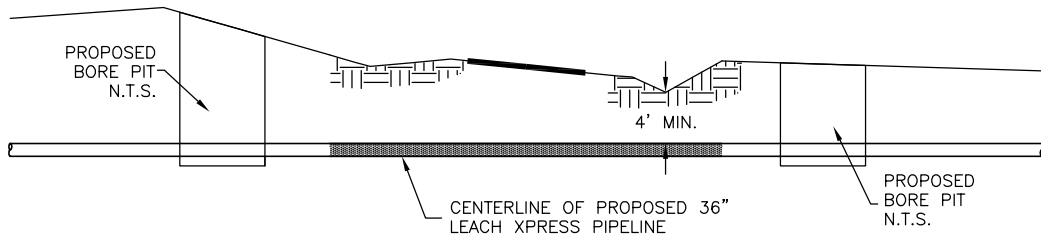
DRAWN BY	DATE	DWG. NO.
CHECKED BY	SCALE N.T.S.	TYPICAL 8B
APPROVED BY	SHEET 1 of 1	

TYPICAL BORED ROAD CROSSING



PLAN VIEW

N.T.S.



PROFILE VIEW

N.T.S.

NOTES:

1. CONSTRUCTION WORK AREA WILL TYPICALLY BE 160 FEET WIDE.

PRELIMINARY

TYPICAL BORED ROAD CROSSING

LEACH XPRESS PROJECT

Appendix C-11

File No.:

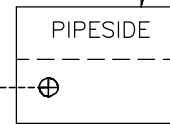
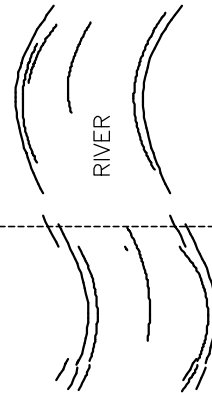
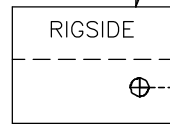
DRAWN BY	DATE	DWG. NO. TYPICAL 9
CHECKED BY	SCALE N.T.S.	
APPROVED BY	SHEET 1 of 1	

ENTRY SIDE

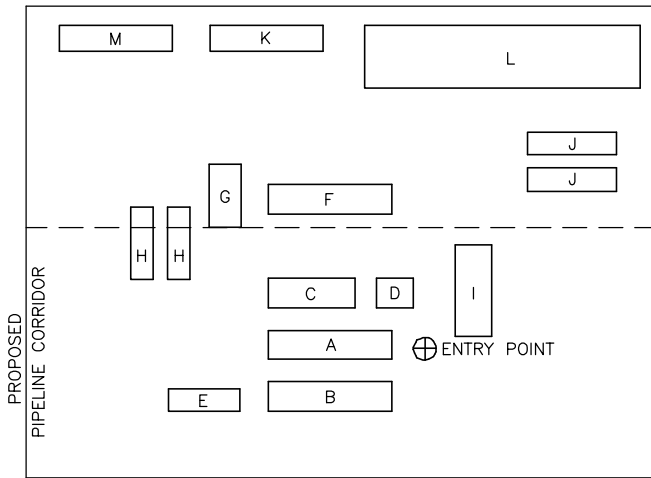
EXIT SIDE

SEE DETAIL "A"

SEE DETAIL "B"

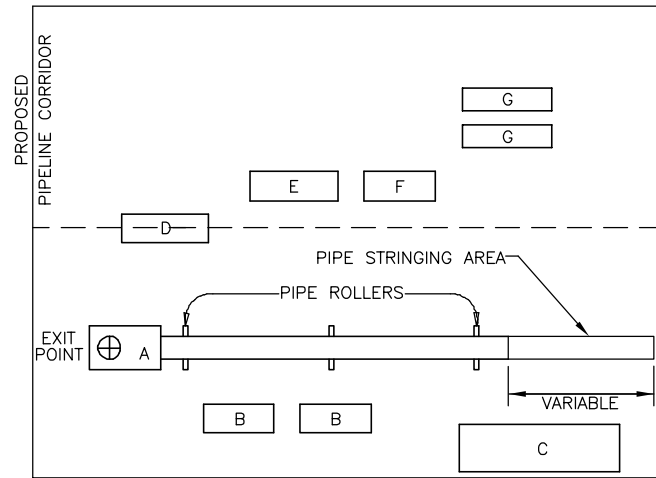


VARIABLE



- A = DRILL RIG
- B = DRILLER'S CONSOLE GENERATOR
- C = DRILL PIPE
- D = CRANE
- E = PARTS VAN
- F = MUD CLEANING UNIT
- G = MUD MIXING TANK
- H = MUD PUMPS
- I = MUD PIT
- J = FRAC TANKS
- K = DRILLING MUD PALLETS
- L = PARKING
- M = OFFICE TRAILER

DETAIL "A"
N.T.S.



- A = EXIT PIT
- B = LIFT EQUIPMENT
- C = WELDING AREA
- D = PIT
- E = MUD CLEANING
- F = GENERATOR
- G = FRAC TANKS

DETAIL "B"
N.T.S.

PRELIMINARY

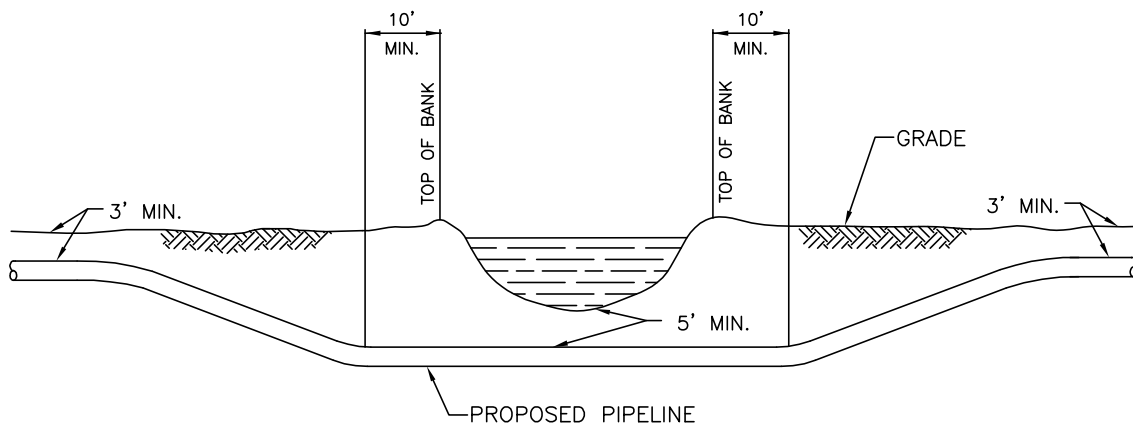
Appendix C-12

TYPICAL HDD CONFIGURATION

LEACH XPRESS PROJECT

File No.:

DRAWN BY	DATE	DWG. NO. TYPICAL 10
CHECKED BY	SCALE N.T.S.	
APPROVED BY	SHEET 1 OF 1	



TYPICAL WATERBODY CROSSING

PRELIMINARY

Appendix C-13

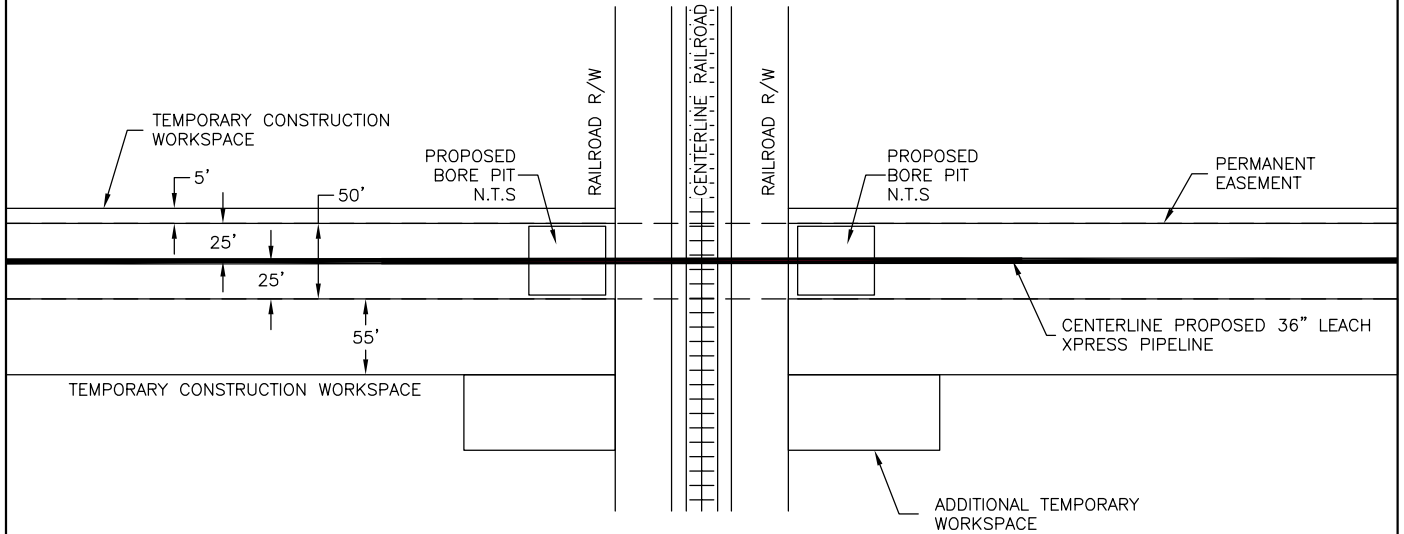
TYPICAL WATERBODY CROSSING

LEACH XPRESS PROJECT

File No.:

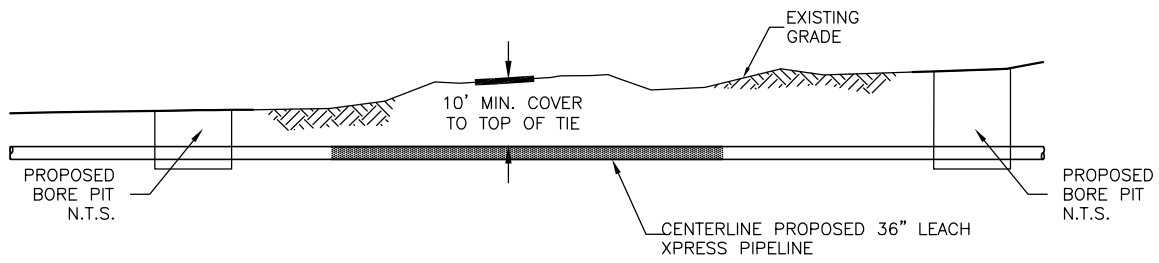
DRAWN BY	DATE	DWG. NO.
CHECKED BY	SCALE N.T.S.	TYPICAL 11
APPROVED BY	SHEET 1 OF 1	

TYPICAL BORED RAILROAD CROSSING



PLAN VIEW

N.T.S.



PROFILE VIEW

N.T.S.

NOTES:

1. CONSTRUCTION WORK AREA WILL TYPICALLY BE 160 FEET WIDE.

PRELIMINARY

Appendix C-14

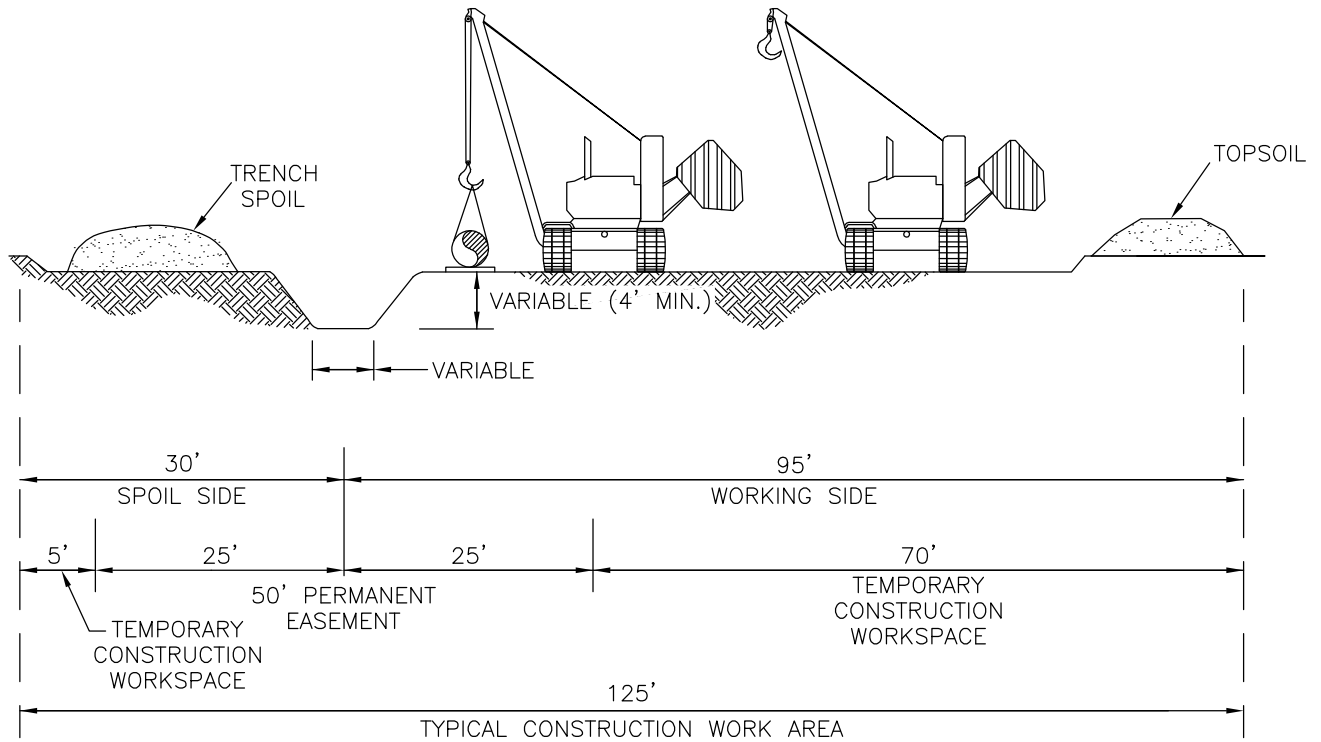
TYPICAL BORED RAILROAD CROSSING

LEACH XPRESS PROJECT

File No.:

DRAWN BY	DATE	DWG. NO. TYPICAL 12
CHECKED BY	SCALE N.T.S.	
APPROVED BY	SHEET 1 of 1	

TYPICAL STEEP SLOPE WORKSPACE - LEX MP 0.00-38.98



PLAN/PROFILE VIEW

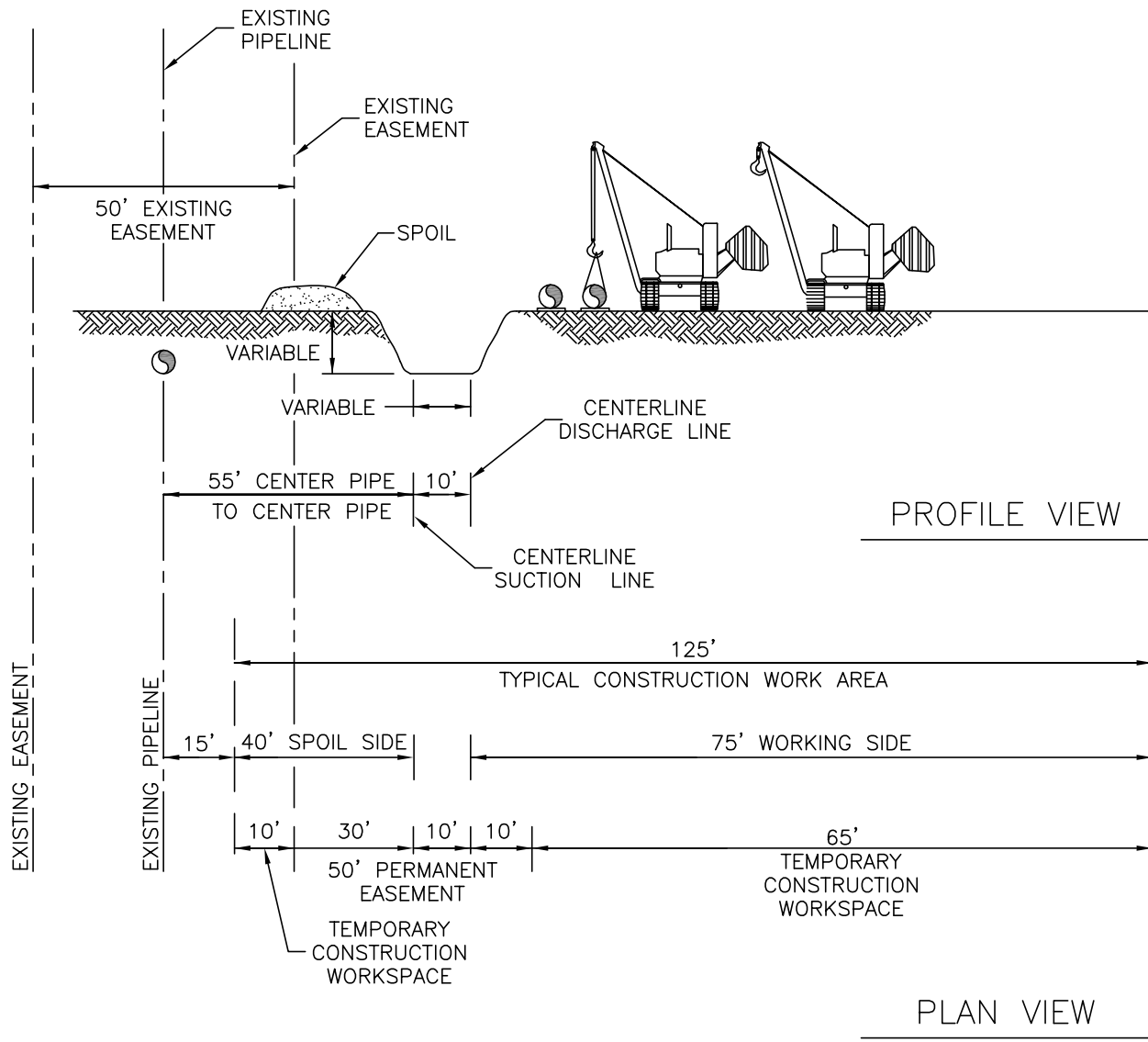
NOTES:

1. USE FOR 14-INCH OR GREATER DIAMETER PIPELINE.
2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL.
3. VARIATIONS FOR STAGING AREAS MAY BE NECESSARY DUE TO SITE-SPECIFIC TERRAIN FEATURERS; HOWEVER, UNLESS OTHERWISE INDICATED IN COLUMBIA'S ENVIRONMENTAL MANAGEMENT & CONSTRUCTION PLANS, THE MAXIMUM WIDTH OF CONSTRUCTION WORK AREA WILL BE 125 FEET.
4. OTHER CONFIGURATIONS OF TOPSOIL AND SUBSOIL ARE ACCEPTABLE PROVIDED THEY ARE KEPT SEPARATE.
5. UP TO 12 INCHES OF TOPSOIL REMOVED.
6. TOPSOIL AND SUBSOIL PILES WILL BE ADEQUATELY PROTECTED FROM EROSION AND SEDIMENTATION BY USE OF SEDIMENT FILTER DEVICES OR MULCH.
7. A TYPICAL CORRIDOR WIDTH OF 125 FEET IN UPLANDS IS REQUIRED FOR LEX FROM MP 0.00 TO MP 39.98, AS ADDITIONAL SPACE WILL BE NEEDED TO PROVIDE FOR SAFE AND EFFICIENT CONSTRUCTION OF THE PIPELINE THROUGH HILLY TERRAIN AND STEEP SLOPE CONDITIONS.

PRELIMINARY

Appendix C-15	TYPICAL STEEP SLOPE WORKSPACE - LEX MP 0.00-38.98			
	File No.:	LEACH XPRESS PROJECT		
		DRAWN BY	DATE	DWG. NO. TYPICAL 13
		CHECKED BY	SCALE N.T.S.	
APPROVED BY	SHEET 1 of 1			

TYPICAL SUCTION AND DISCHARGE LINE WORKSPACE



NOTES:

1. USE FOR 14-INCH OR GREATER DIAMETER PIPELINE.
2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL.
3. VARIATIONS FOR STAGING AREAS MAY BE NECESSARY DUE TO SITE-SPECIFIC TERRAIN FEATURES; HOWEVER, UNLESS OTHERWISE INDICATED IN COLUMBIA'S ENVIRONMENTAL MANAGEMENT & CONSTRUCTION PLANS, THE MAXIMUM WIDTH OF CONSTRUCTION WORK AREA WILL BE 125 FEET.

PRELIMINARY

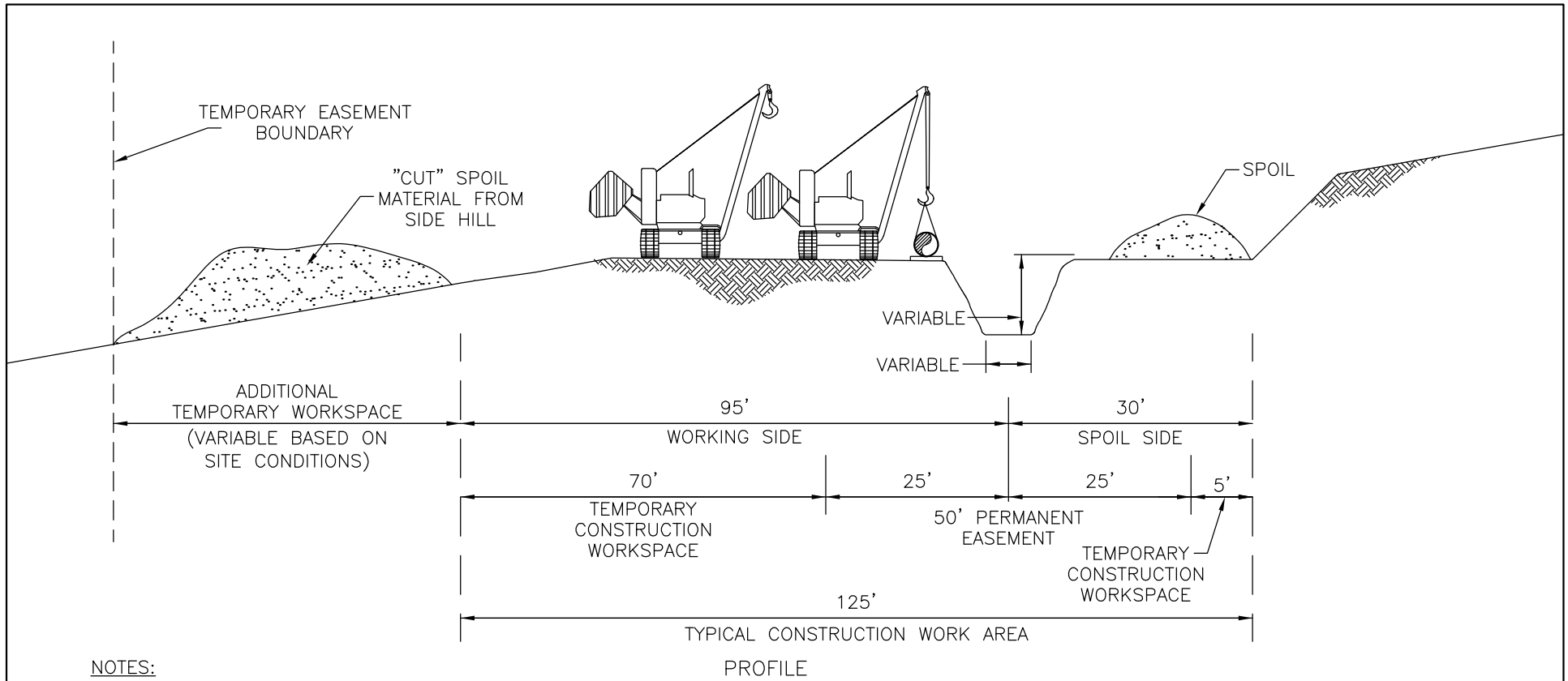
Appendix C-16

TYPICAL SUCTION AND DISCHARGE LINE WORKSPACE

LEACH XPRESS PROJECT

File No.:

DRAWN BY	DATE	DWG. NO.
CHECKED BY	SCALE N.T.S.	TYPICAL 14
APPROVED BY	SHEET 1 of 1	



NOTES:

1. USE FOR 14-INCH OR GREATER DIAMETER PIPELINE.
2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL.
3. VARIATIONS FOR STAGING AREAS MAY BE NECESSARY DUE TO SITE-SPECIFIC TERRAIN FEATURES; HOWEVER, UNLESS OTHERWISE INDICATED IN COLUMBIA'S ENVIRONMENTAL MANAGEMENT & CONSTRUCTION PLANS, THE MAXIMUM WIDTH OF CONSTRUCTION WORK AREA WILL BE 110 FEET.
4. A TYPICAL CORRIDOR WIDTH OF 125 FEET IN UPLANDS IS REQUIRED FOR LEX FROM MP 0.00 TO MP 39.98, AS ADDITIONAL SPACE WILL BE NEEDED TO PROVIDE FOR SAFE AND EFFICIENT CONSTRUCTION OF THE PIPELINE THROUGH HILLY TERRAIN AND STEEP SLOPE CONDITIONS.

PRELIMINARY

Appendix C-17

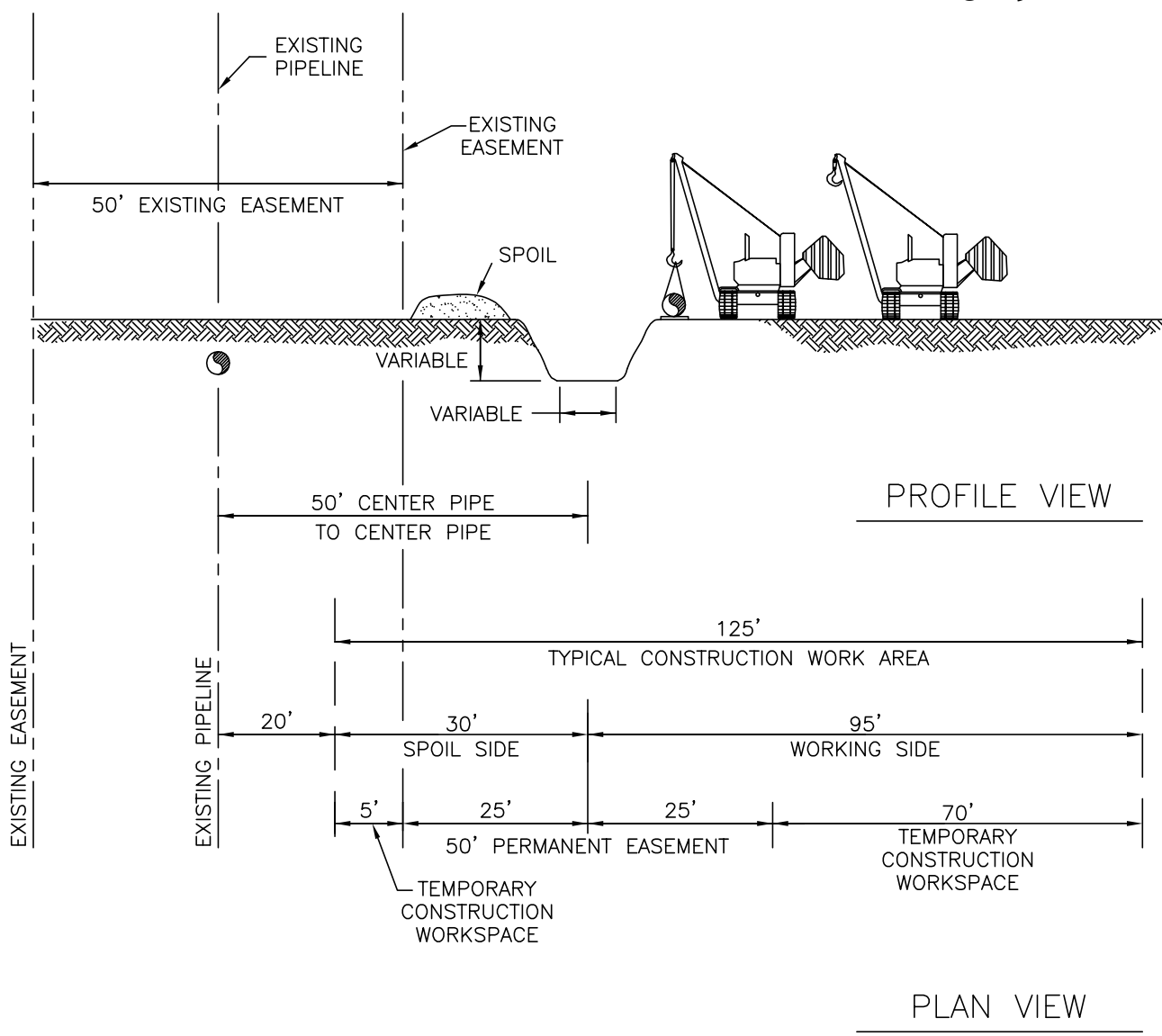
**TYPICAL STEEP SLOPE WITH
SIDE SLOPE WORKSPACE-
LEX MP 0.00-38.98**

LEACH XPRESS PROJECT

File No.:

DRAWN BY	DATE	DWG. NO. TYPICAL 15
CHECKED BY	SCALE N.T.S.	
APPROVED BY	SHEET 1 OF 1	

TYPICAL CONFIGURATION FOR PARALLELING TO EXISTING PIPELINES - LEX MP 0.00-38.98



NOTES:

1. USE FOR 14-INCH OR GREATER DIAMETER PIPELINE.
2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL.
3. VARIATIONS FOR STAGING AREAS MAY BE NECESSARY DUE TO SITE-SPECIFIC TERRAIN FEATURES; HOWEVER, UNLESS OTHERWISE INDICATED IN COLUMBIA'S ENVIRONMENTAL MANAGEMENT & CONSTRUCTION PLANS, THE MAXIMUM WIDTH OF CONSTRUCTION WORK AREA WILL BE 125 FEET.

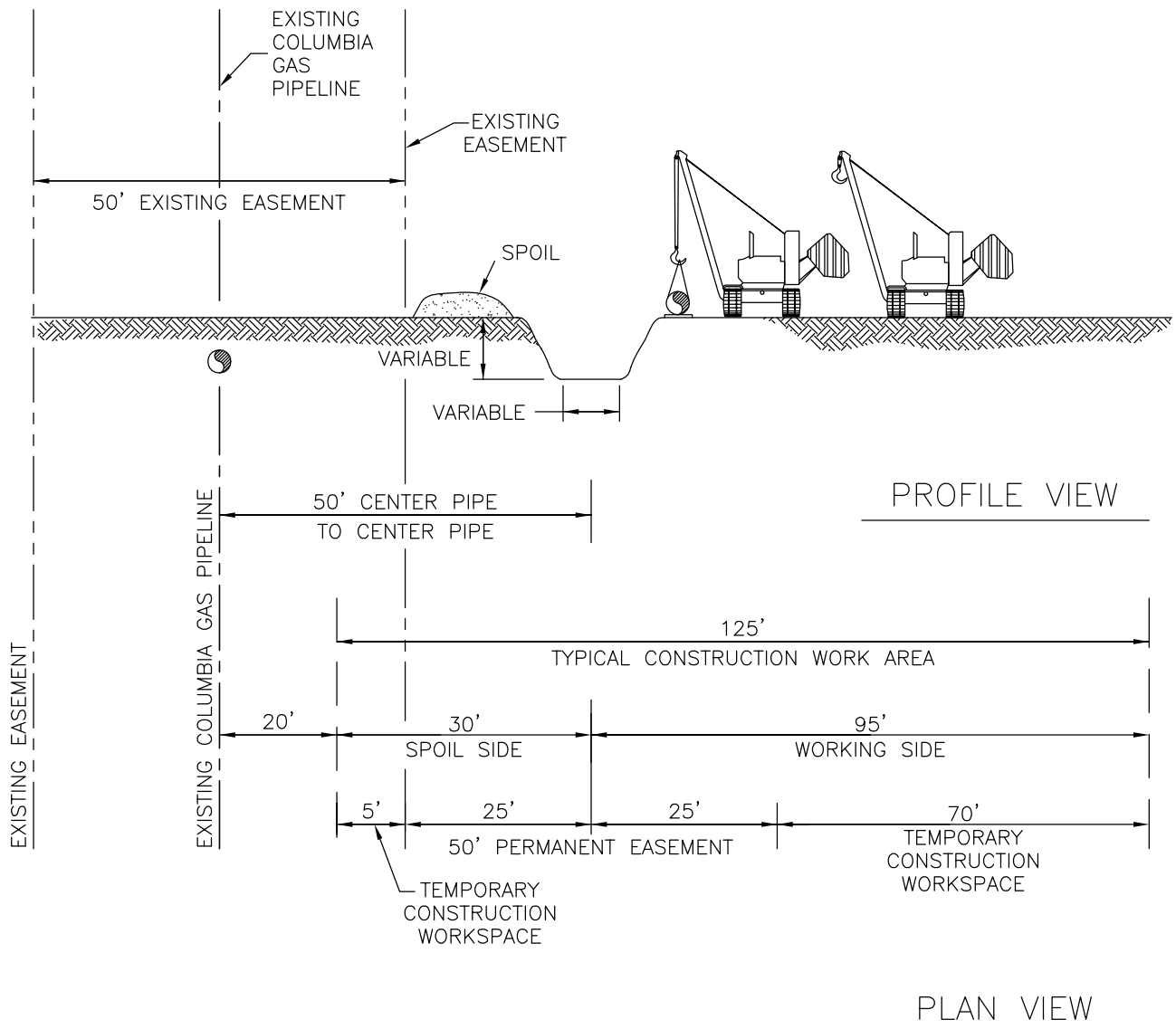
PRELIMINARY

Appendix C-18

TYPICAL CONFIGURATION FOR PARALLELING TO EXISTING PIPELINES - LEX MP 0.00-38.98

File No.:	LEACH XPRESS PROJECT		
	DRAWN BY	DATE	DWG. NO.
	CHECKED BY	SCALE	N.T.S.
	APPROVED BY	SHEET	1 of 1
			TYPICAL 16

TYPICAL CONFIGURATION FOR PARALLELING TO EXISTING COLUMBIA PIPELINES - LEX MP 0.00-38.98



NOTES:

1. USE FOR 14-INCH OR GREATER DIAMETER PIPELINE.
2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL.
3. VARIATIONS FOR STAGING AREAS MAY BE NECESSARY DUE TO SITE-SPECIFIC TERRAIN FEATURES; HOWEVER, UNLESS OTHERWISE INDICATED IN COLUMBIA'S ENVIRONMENTAL MANAGEMENT & CONSTRUCTION PLANS, THE MAXIMUM WIDTH OF CONSTRUCTION WORK AREA WILL BE 125 FEET.

PRELIMINARY

Appendix C-19

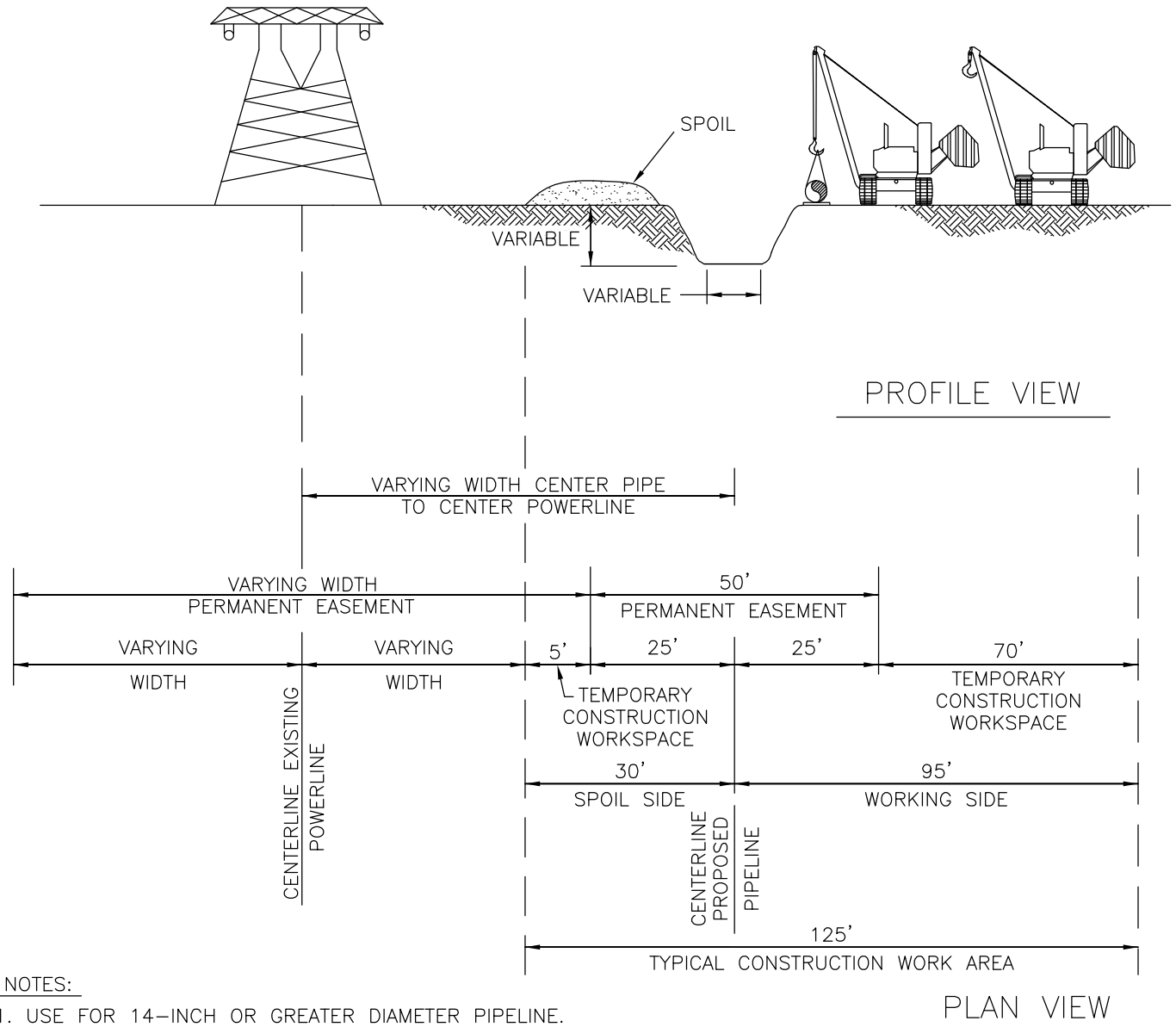
TYPICAL CONFIGURATION FOR PARALLELING TO EXISTING COLUMBIA PIPELINES - LEX MP 0.00-38.98

LEACH XPRESS PROJECT

File No.:

DRAWN BY	DATE	DWG. NO.
CHECKED BY	SCALE N.T.S.	TYPICAL 17
APPROVED BY	SHEET 1 of 1	

TYPICAL PARALLELING CONFIGURATION WITH POWERLINE - LEX MP 0.00-38.98



NOTES:

1. USE FOR 14-INCH OR GREATER DIAMETER PIPELINE.
2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL.
3. VARIATIONS FOR STAGING AREAS MAY BE NECESSARY DUE TO SITE-SPECIFIC TERRAIN FEATURES; HOWEVER, UNLESS OTHERWISE INDICATED IN COLUMBIA'S ENVIRONMENTAL MANAGEMENT & CONSTRUCTION PLANS, THE MAXIMUM WIDTH OF CONSTRUCTION WORK AREA WILL BE 125 FEET.

PRELIMINARY

Appendix C-20

TYPICAL PARALLELING CONFIGURATION WITH POWERLINE - LEX MP 0.00-38.98

LEACH XPRESS PROJECT

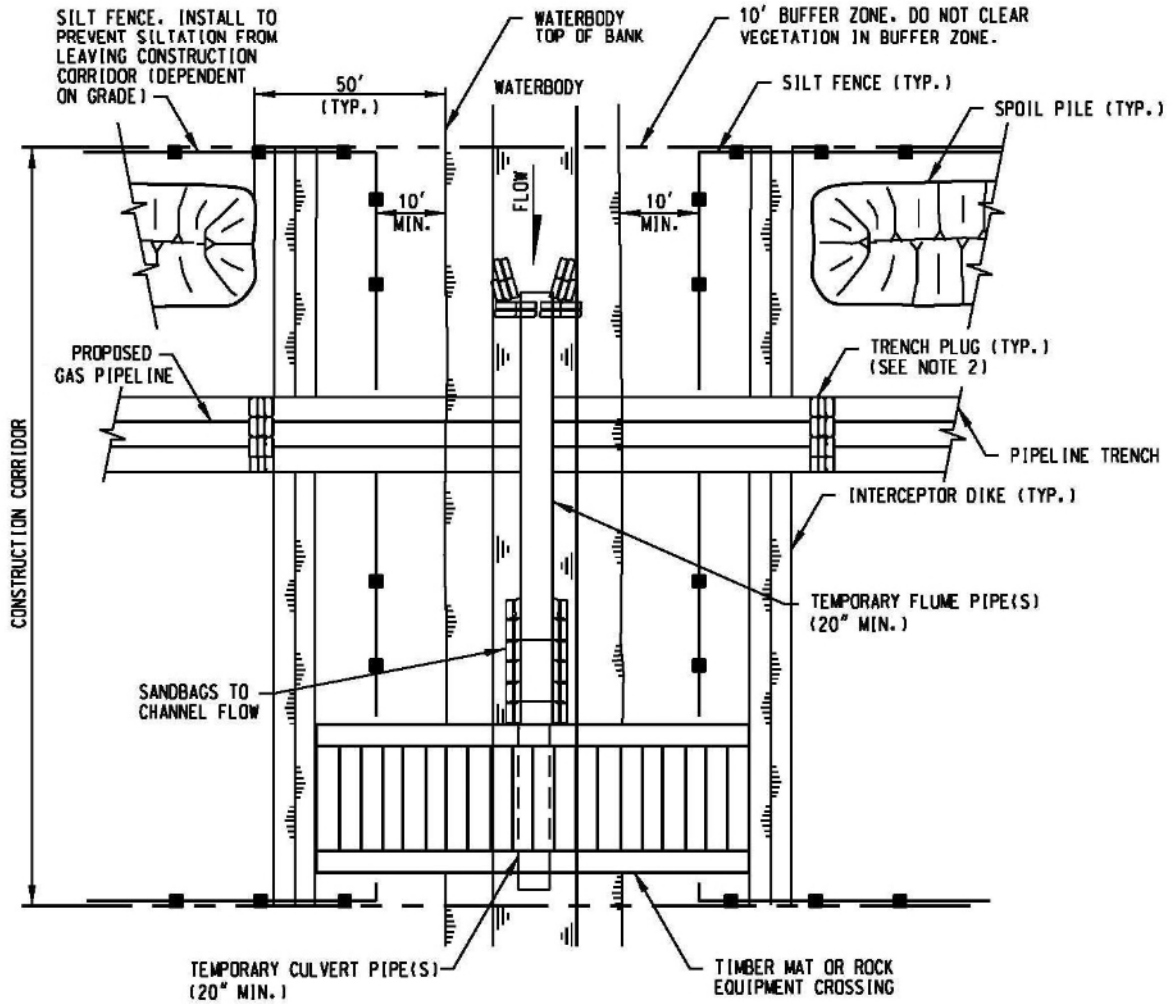
File No.:

DRAWN BY	DATE
CHECKED BY	SCALE N.T.S.
APPROVED BY	SHEET 1 of 1

DWG. NO.

TYPICAL 18

TYPICAL FLUMED CROSSING METHOD



1. SILT FENCE AND INTERCEPTOR DIKE TO BE REMOVED ACROSS PIPELINE TRENCH DURING CONSTRUCTION OF PIPELINE. SILT FENCE AND INTERCEPTOR DIKES TO BE REPLACED AFTER BACKFILL OF TRENCH.
2. USE HARD OR SOFT PLUGS PRIOR TO PIPE INSTALLATION. INSTALL PERMANENT TRENCH PLUGS AFTER PIPE INSTALLATION AND PRIOR TO BACKFILLING PIPELINE TRENCH.

PRELIMINARY

Appendix C-21

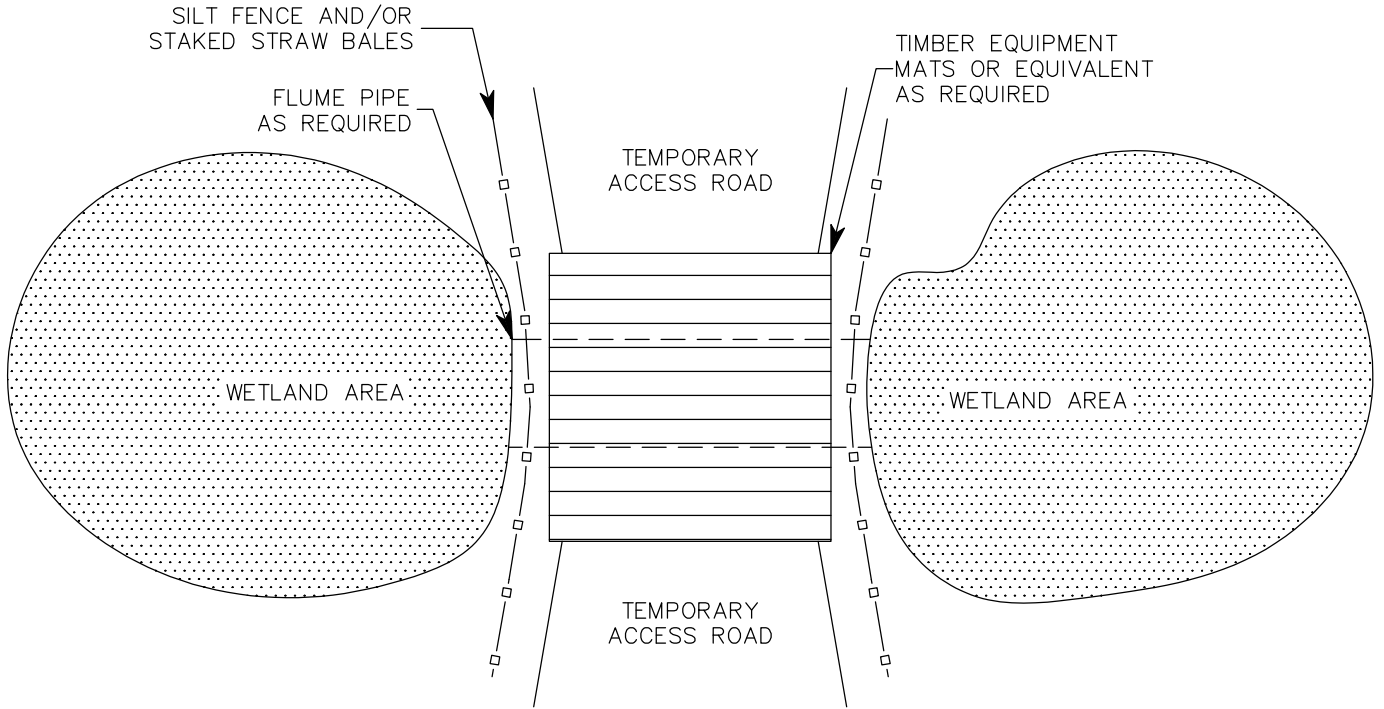
TYPICAL FLUMED CROSSING METHOD

LEACH XPRESS PROJECT

File No.:

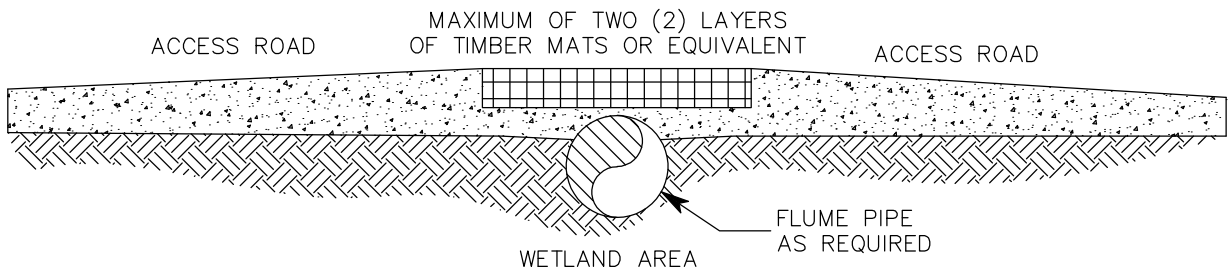
DRAWN BY	DATE	DWG. NO.
CHECKED BY	SCALE N.T.S.	TYPICAL 19
APPROVED BY	SHEET 1 of 1	

TYPICAL CONSTRUCTION WETLANDS ACCESS ROAD



PLAN VIEW

N.T.S.



PROFILE VIEW

N.T.S.

PRELIMINARY

TYPICAL CONSTRUCTION WETLANDS ACCESS ROAD

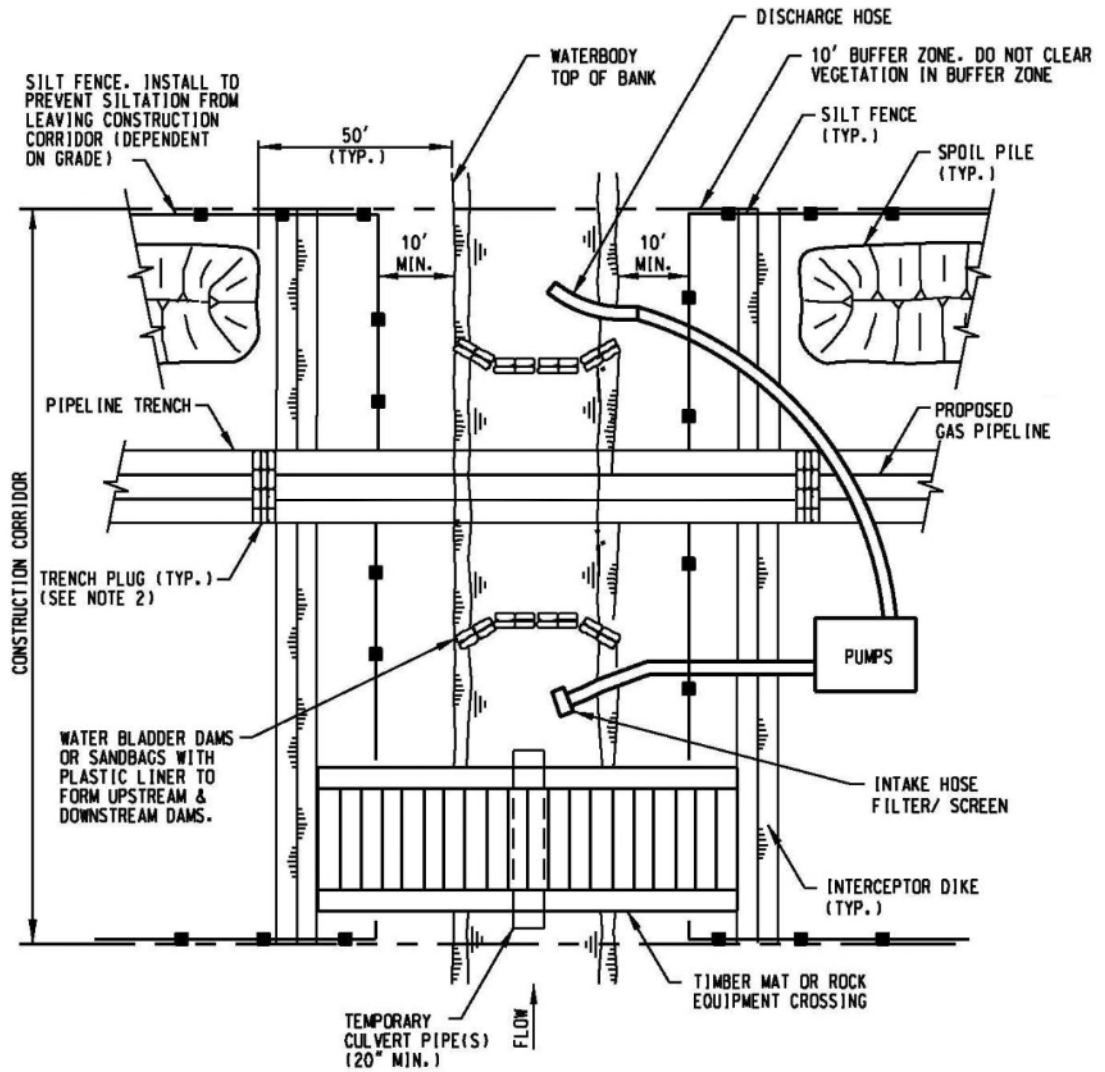
Appendix C-22

LEACH XPRESS PROJECT

File No.:

DRAWN BY	DATE	DWG. NO.
CHECKED BY	SCALE N.T.S.	TYPICAL 20
APPROVED BY	SHEET 1 of 1	

TYPICAL DAM AND PUMP CROSSING METHOD



1. SILT FENCE AND INTERCEPTOR DIKE TO BE REMOVED ACROSS PIPELINE TRENCH DURING CONSTRUCTION OF PIPELINE. SILT FENCE AND INTERCEPTOR DIKES TO BE REPLACED AFTER BACKFILL OF TRENCH.
2. USE HARD OR SOFT PLUGS PRIOR TO PIPE INSTALLATION. INSTALL PERMANENT TRENCH PLUGS AFTER PIPE INSTALLATION AND PRIOR TO BACKFILLING PIPELINE TRENCH.

PRELIMINARY

TYPICAL DAM AND PUMP CROSSING METHOD

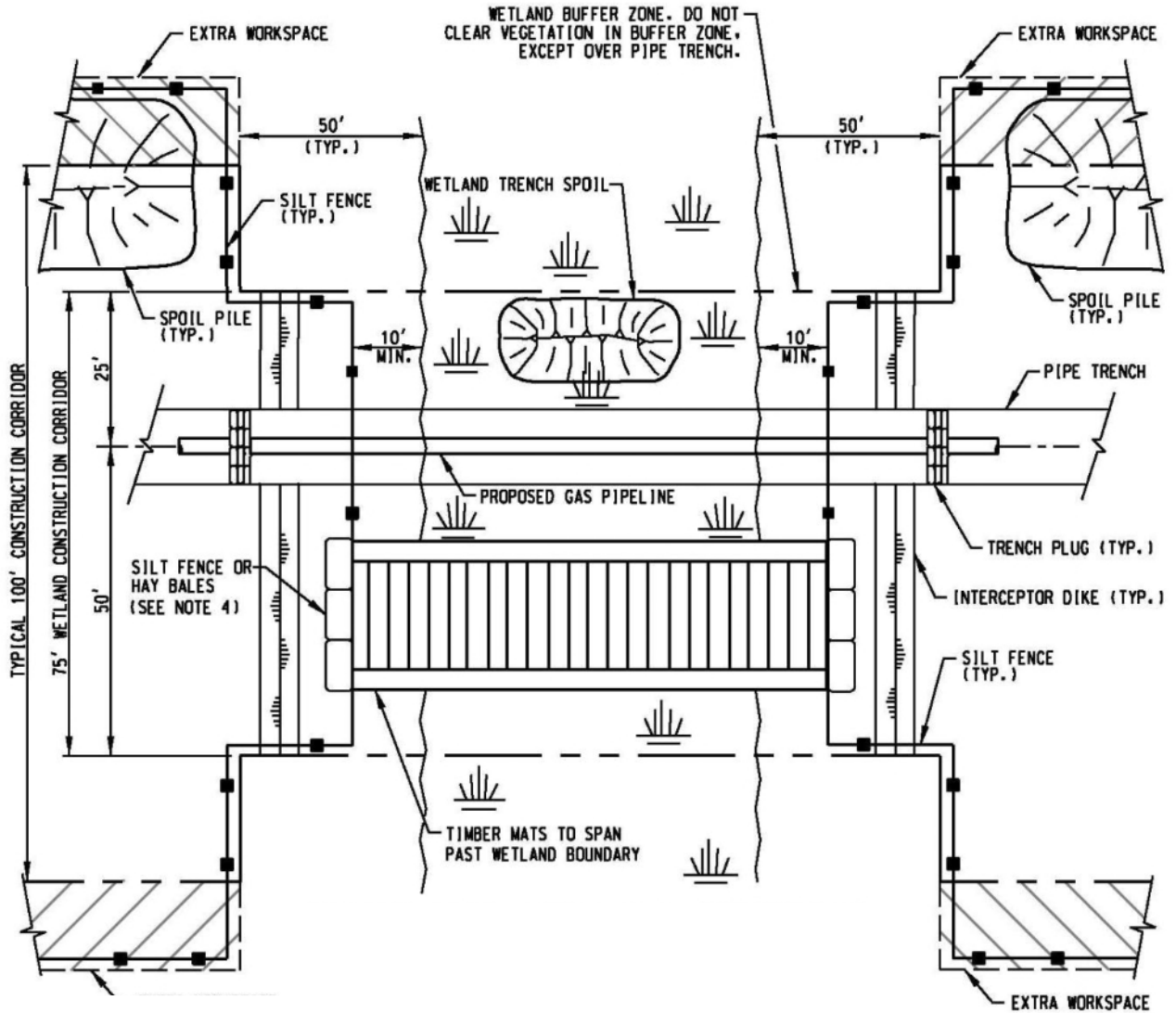
LEACH XPRESS PROJECT

Appendix C-23

File No.:

DRAWN BY	DATE	DWG. NO.
CHECKED BY	SCALE N.T.S.	TYPICAL 21
APPROVED BY	SHEET 1 of 1	

TYPICAL SATURATED WETLAND CROSSING



NOTE:

1. INSTALL PERMANENT INTERCEPTOR DIKES AT THE BASE OF ALL SLOPES ADJACENT TO THE WETLAND.
2. CONTRACTOR SHALL POSTPONE GRADING OF WORK AREA ADJACENT TO WETLAND UNTIL STAGING AREA IS PREPARED AND WORK IN THE WETLAND IS READY TO COMMENCE.
3. SILT FENCE OR HAY BALES SHALL BE PLACED IN THE GAP AT THE TIMBER MATS BY THE END OF EACH DAY OR PRIOR TO APPROACHING RAIN TO PREVENT SEDIMENT FLOW INTO WETLAND.
4. USE ADDITIONAL TIMBER MAT LAYERS TO RAISE CROSSING ABOVE GRADE WHERE POOR SOIL CONDITIONS EXIST.
5. SILT FENCE AND INTERCEPTOR DIKE TO BE REMOVED ACROSS PIPE TRENCH AND DURING CONSTRUCTION OF PIPELINE. SILT FENCE AND INTERCEPTOR DIKE TO BE REPLACED AFTER BACKFILL OF TRENCH.

PRELIMINARY

Appendix C-24

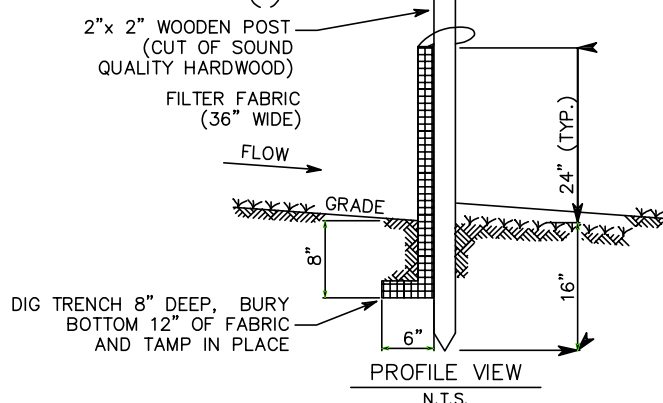
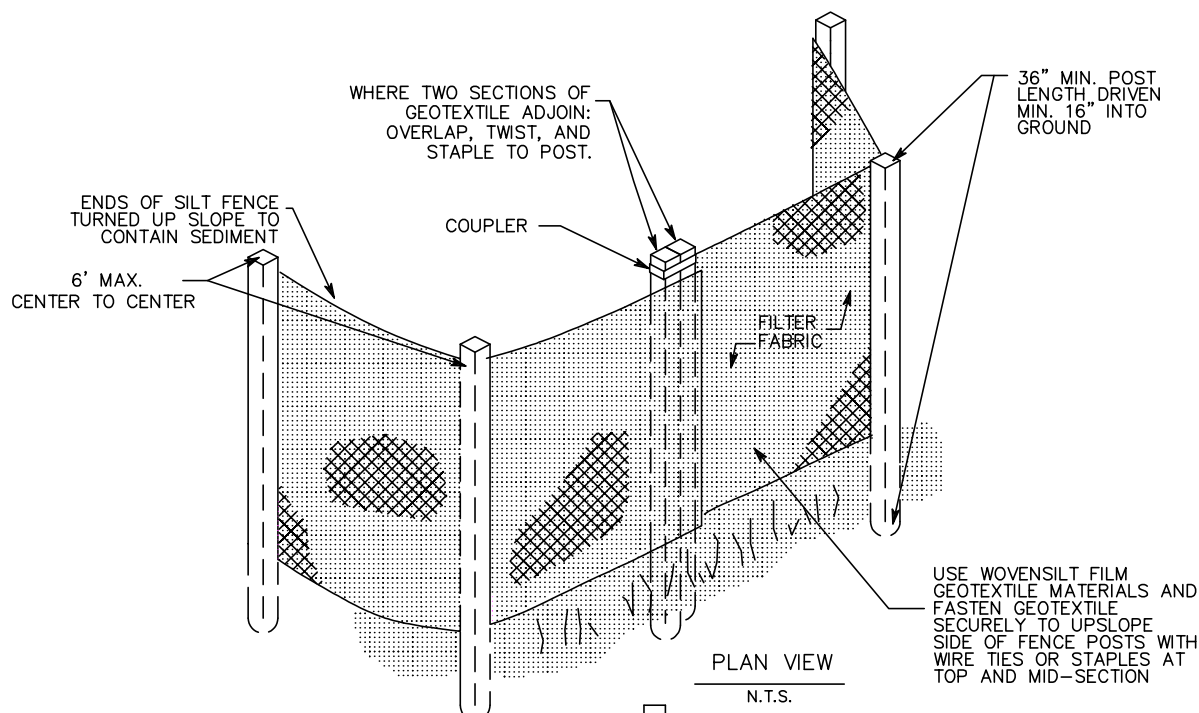
TYPICAL SATURATED WETLAND CROSSING

LEACH XPRESS PROJECT

File No.:

DRAWN BY	DATE	DWG. NO. TYPICAL 22
CHECKED BY	SCALE N.T.S.	
APPROVED BY	SHEET 1 of 1	

TYPICAL CONSTRUCTION SILT FENCE



INSTALLATION REQUIREMENTS:

- WHEN USING SILT FENCE, PLACE IT:
 - ◆ BETWEEN DISTURBED AREAS AND DOWN-SLOPE ENVIRONMENTAL RESOURCE AREAS
 - ◆ AT THE BASE OF ALL SLOPES NEXT TO WETLANDS, WATERBODIES, AND ROAD CROSSINGS
 - ◆ AT THE INLET AND OUTLET OF OPEN DRAINAGE STRUCTURES
 - ◆ EXTEND BOTH ENDS OF THE SILT FENCE A MINIMUM OF FIVE HORIZONTAL FEET UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT TO PREVENT RUNOFF FROM GOING AROUND THE ENDS OF THE SILT FENCE.
- USE SANDBAGS OR BACKFILLING TO KEY IN THE BOTTOM OF THE FABRIC WHERE IT IS NOT FEASIBLE TO TRENCH IT IN (LEDGES, ROCKY SOIL, LARGE ROOTS, ETC.)

MAINTENANCE REQUIREMENTS:

- INSPECT SILT FENCE:
 - ◆ DAILY IN AREAS OF ACTIVE CONSTRUCTION
 - ◆ WEEKLY IN AREAS WITH NO CONSTRUCTION
 - ◆ WITHIN 24 HOURS FOLLOWING EACH MAJOR STORM EVENT
- REPAIR OR REPLACE SILT FENCE IF GEOTEXTILE IS TORN OR UNDERMINING OF THE SILT FENCE OCCURS
- REMOVE ACCUMULATED SEDIMENTS TO AN UPLAND AREA WHEN BULGES DEVELOP IN SILT FENCE OR WHEN SEDEMENT REACHES 25% OF FENCE HEIGHT.

PRELIMINARY

Appendix C-25

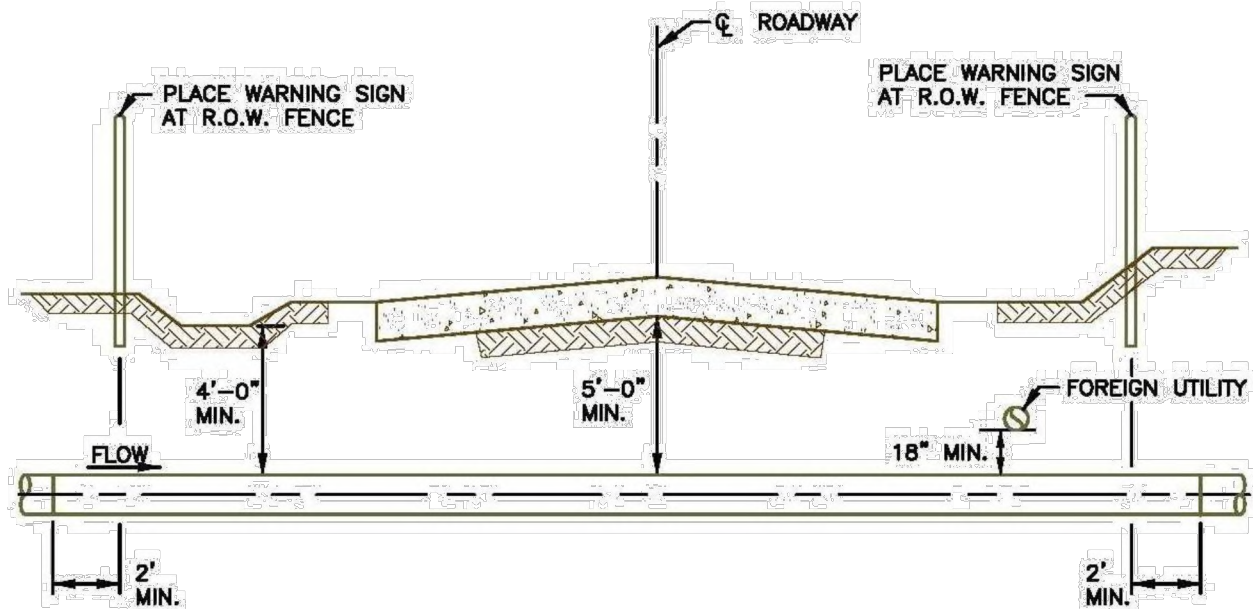
TYPICAL CONSTRUCTION SILT FENCE

LEACH XPRESS PROJECT

File No.:

DRAWN BY	DATE	DWG. NO. TYPICAL 23
CHECKED BY	SCALE N.T.S.	
APPROVED BY	SHEET 1 of 1	

TYPICAL OPEN-CUT ROAD CROSSING



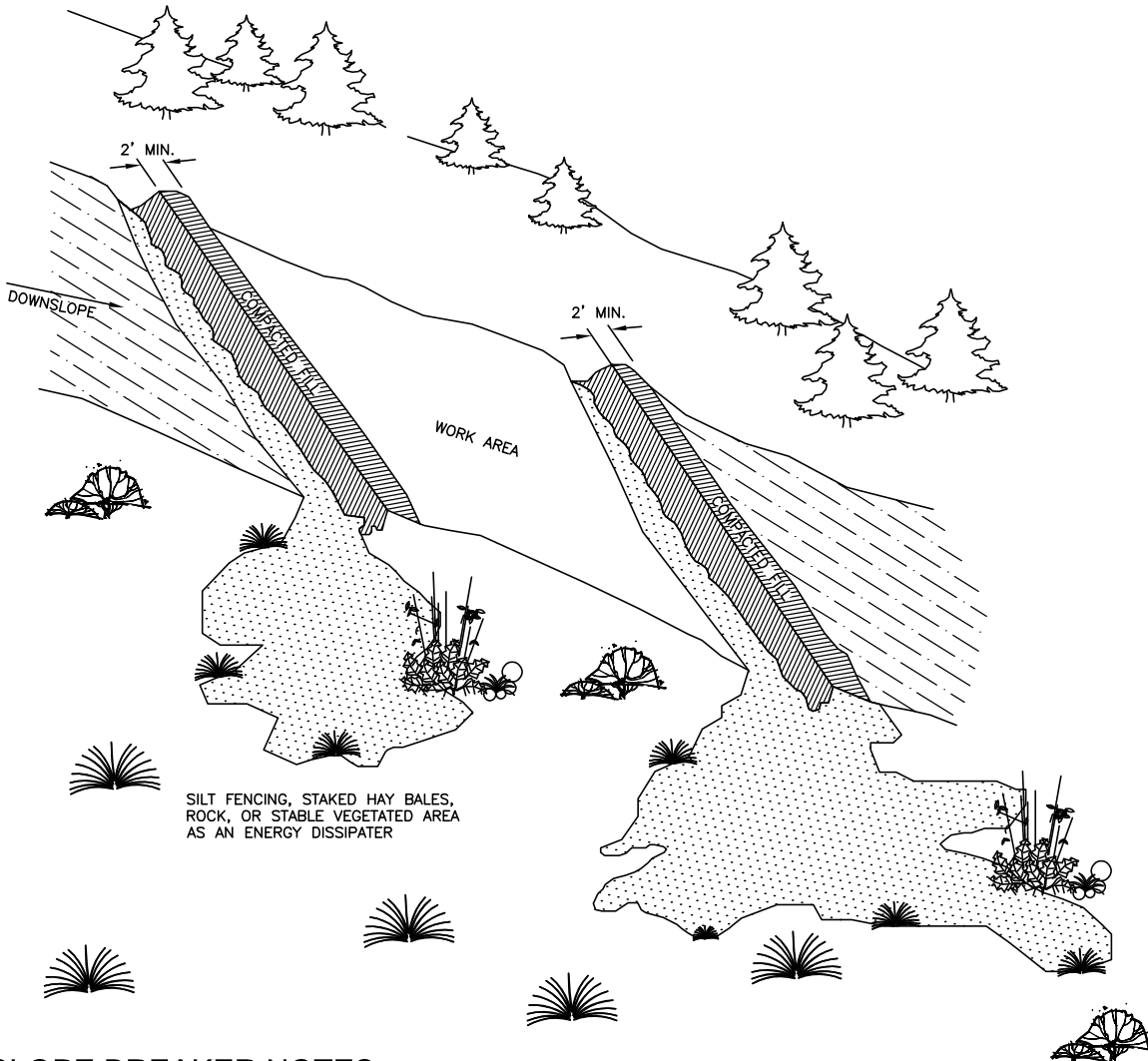
NOTES:

1. CONTRACTOR SHALL INSTALL THE HEAVY WALL STEEL PIPE, BACKFILL AND REPLACE ROAD SURFACE IN ACCORDANCE WITH PERMIT ISSUED BY THE GOVERNMENT BODY HAVING JURISDICTION AND/OR IN ACCORDANCE WITH THE SPECIFICATIONS, WHICHEVER IS THE MOST STRINGENT.
2. THE PIPELINE SHALL CROSS AS NEAR TO RIGHT ANGLE AS POSSIBLE AND ECONOMICALLY PRACTICAL.
3. THE HEAVY WALL STEEL PIPE SHALL BE INSTALLED FROM THE R.O.W. LIMIT TO THE RIGHT-OF-WAY LIMIT AND EXTEND A MINIMUM OF 2 FEET BEYOND THE R.O.W. LIMITS.
4. THE HEAVY WALL STEEL PIPE WITHIN THE RIGHT-OF-WAY LIMITS SHALL BE FULLY EXTENDED DURING INSTALLATION.
5. ANY OPEN CUT TRENCH SHALL BE IN ACCORDANCE WITH STATE OR COUNTY SPECIFICATIONS AS DEFINED IN THE SPECIFICATION AND STANDARD. THE TRENCH SHALL BE BACKFILLED IN 8" LIFTS AND COMPACTED TO 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE PROCTOR COMPACTION TEST (ASTM D698).
6. AS AN ALTERNATE, AND WHEN APPROVED BY ENGINEER, CONCRETE SLURRY (200PSI CONCRETE) MAY BE USED AS BACKFILL MATERIAL ABOVE THE PIPE.
7. REPLACE SUB-GRADE AND ROAD SURFACE MATERIAL WITH EQUAL OR GREATER THICKNESS AND WITH EQUAL OR GREATER MATERIAL AND SPECIFICATIONS TO PROVIDE A SMOOTH AND CONTINUOUS ROAD SURFACE.

PRELIMINARY

Appendix C-26	TYPICAL OPEN-CUT ROAD CROSSING		
	LEACH XPRESS PROJECT		
	File No.:		DWG. NO. TYPICAL 24
	DRAWN BY	DATE	
	CHECKED BY	SCALE N.T.S.	
	APPROVED BY	SHEET 1 of 1	

TYPICAL SLOPE BREAKER - TEMPORARY AND PERMANENT



SILT FENCING, STAKED HAY BALES,
ROCK, OR STABLE VEGETATED AREA
AS AN ENERGY DISSIPATER

SLOPE BREAKER NOTES:

1. SLOPE BREAKERS SHALL BE CONSTRUCTED OF COMPACTED NATIVE SOIL AND INSTALLED AT LOCATIONS AS SHOWN ON THE CONSTRUCTION DRAWINGS OR AS DIRECTED BY THE ENVIRONMENTAL INSPECTION.
2. SLOPE BREAKER SHALL BE CREATED AS SHOWN OR OTHER PATTERN AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR TO DIRECT THE WATER OFF THE WORK AREA.
3. THE SLOPE BREAKER SHALL BE 18" DEEP (AS MEASURED FROM THE TROUGH TO THE TOP OF THE SLOPE BREAKER) THE TROUGH WILL BE A MINIMUM OF 5' WIDE ACROSS THE WIDTH OF THE WORK AREA.
4. THE OUTLET OF THE SLOPE BREAKER MUST FREELY DISCHARGE ALL RUNOFF OFF THE DISTURBED WORK AREA INTO A STABLE WELL VEGETATED AREA OR INTO AN ENERGY DISSIPATER.
5. WHERE SLOPE BREAKERS EXTEND BEYOND THE EDGE OF THE CONSTRUCTION WORK AREA TO DIRECT RUNOFF INTO STABLE, WELL VEGETATED AREAS THESE LOCATIONS MUST BE APPROVED BY THE ENVIRONMENTAL INSPECTOR.

SLOPE (%)	SPACING (FEET)
5-15	300
>15-30	200
>30	100

PRELIMINARY

Appendix C-27

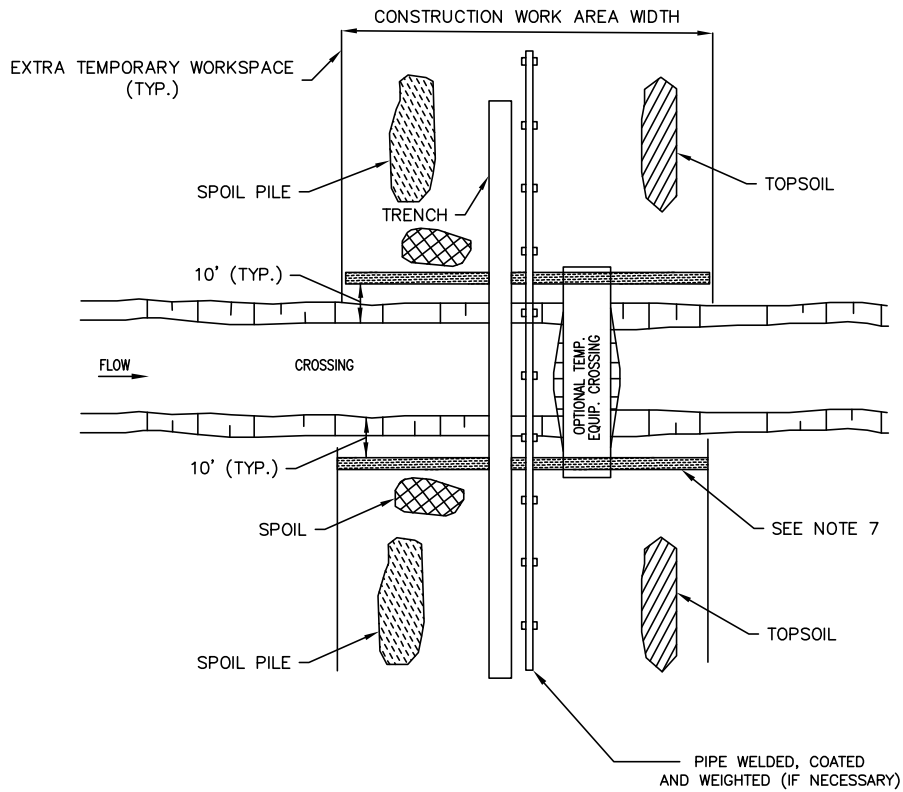
TYPICAL SLOPE BREAKER - TEMPORARY AND PERMANENT

LEACH XPRESS PROJECT

File No.:

DRAWN BY	DATE	DWG. NO. TYPICAL 25
CHECKED BY	SCALE N.T.S.	
APPROVED BY	SHEET 1 of 1	

TYPICAL WATER CROSSING - OPEN CUT NO FLOW



PLAN VIEW
N.T.S.

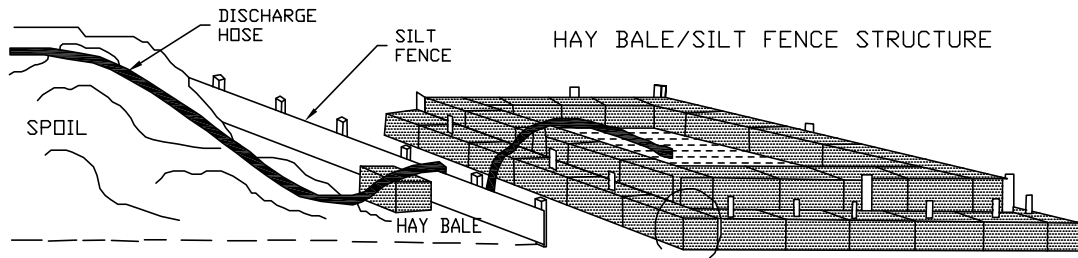
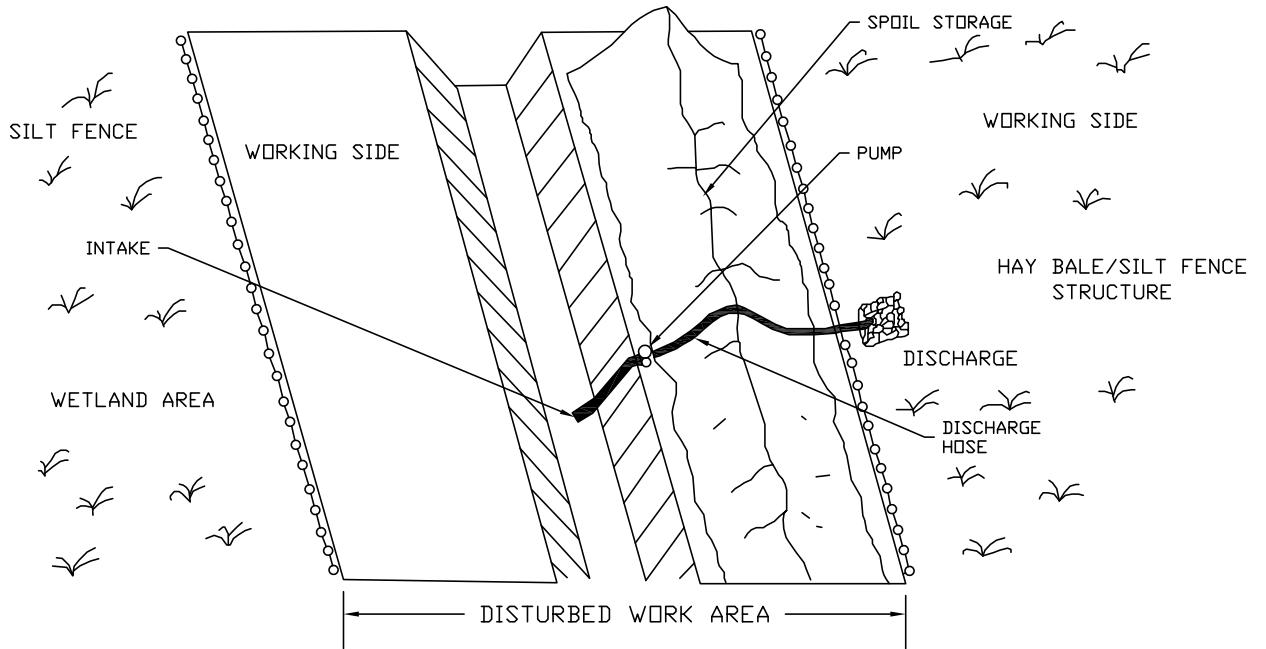
NOTES:

1. THIS METHOD APPLIES TO CROSSINGS WHERE NO FLOWING WATER IS PRESENT AT THE TIME OF CROSSING.
2. CONTRACTOR MAY MAINLINE TRENCH THROUGH THE CROSSING OR UP TO BOTH SIDES OF THE CROSSING, STRING, WELD, COAT AND WEIGHT (IF NECESSARY). USING THE MAINLINE CREW WITH THE PIPE SKIDDED OVER THE CROSSING.
3. NO REFUELING OF MOBILE EQUIPMENT OR CONCRETE COATING ACTIVITIES WITHIN 100 FEET OF CROSSING
4. IN AGRICULTURAL LAND, STRIP TOPSOIL FROM SPOIL, STORAGE AREA, STOCKPILE TOPSOIL AND SPOIL SEPARATELY, TOPSOIL AND SPOIL WILL NOT BE STOCKPILED IN THE CROSSING CHANNEL AND WILL BE PLACED IN A MINIMUM OF 10 FEET FROM CROSSING BANKS WITHIN THE CONSTRUCTION WORK AREA.
5. RESTORE CROSSING CHANNEL TO PRE-CONSTRUCTION PROFILE AND SUBSTRATE
6. RESTORE CROSSING BANK TO APPROXIMATE ORIGINAL CONDITION AND STABILIZE AS REQUIRED. STABILIZE CROSSING BANKS; INSTALL TEMPORARY SEDIMENT BARRIERS WITHIN 24 HOURS OF COMPLETING THE CROSSING
7. AS DIRECTED BY THE PIPELINE DIRECTOR, EROSION CONTROL MEASURES SHALL BE INSTALLED ACROSS THE WORK AREA FOLLOWING CLEARING AND GRADING AND MAINTAINED UNTIL CONSTRUCTION OF THE CROSSING EROSION CONTROL MEASURES SHALL RE INSTALLED IMMEDIATELY FOLLOWING BACKFILLING OF TRENCH AND STABILIZATION OF BANKS, BARRIERS MAY BE TEMPORARY REMOVED TO ALLOW CONSTRUCTION ACTIVITIES BUT MUST BE REPLACED AT THE END OF EACH WORK DAY.

PRELIMINARY

Appendix C-28	TYPICAL WATER CROSSING - OPEN CUT NO FLOW		
	LEACH XPRESS PROJECT		
	File No.:		
	DRAWN BY	DATE	DWG. NO.
	CHECKED BY	SCALE N.T.S.	TYPICAL 26
	APPROVED BY	SHEET 1 of 1	

EROSION CONTROL AND SEDIMENT FILTRATION MEASURES



PRELIMINARY

EROSION CONTROL AND SEDIMENT FILTRATION MEASURES

FOR DEWATERING THE PIPELINE TRENCH
AND ROADBORES WITHIN WETLANDS AND
SPARSELY VEGETATED AREAS -
EXHIBIT 1

Appendix C-29

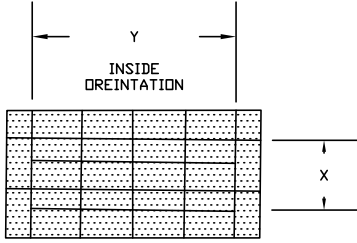
LEACH XPRESS PROJECT

File No.:

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APPROVED BY	SHEET 1 of 1

DWG. NO.
TYPICAL 27

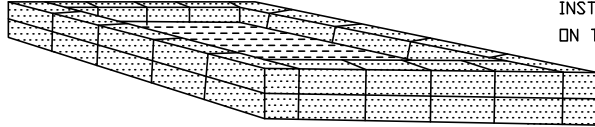
EROSION CONTROL AND SEDIMENT FILTRATION MEASURES



STEP 1

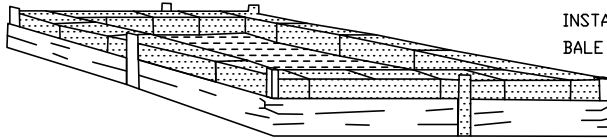
ARRANGE THE STRAW BALES TO THE X AND Y DIMENSIONS (INSIDE) AS SPECIFIED BASED ON THE FLOW RATE OF THE PUMP TO BE USED FOR DEWATERING. ANCHOR STRAW BALES PER TYPICAL 30.

STEP 2



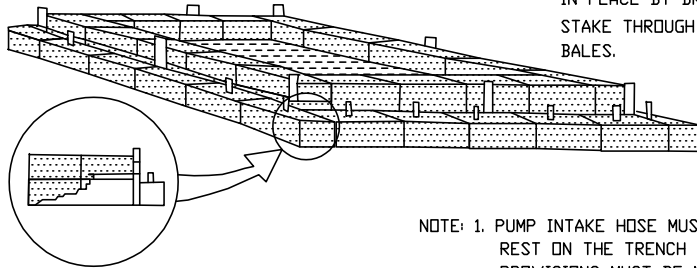
INSTALL ANOTHER LAYER OF STRAW BALES ON THE OUTER EDGE AS SHOWN. DIG IN STRAW BALES PER TYPICAL 30.

STEP 3



INSTALL SILT FENCE ALL AROUND THE STRAW BALE STRUCTURE AS SHOWN IN TYPICAL 31.

STEP 4



INSTALL ANOTHER LAYER OF STRAW BALES ON THE OUTSIDE OF THE SILT FENCE AND SECURE IN PLACE BY DRIVING A REBAR OR WOODEN STAKE THROUGH EACH OF THE OUTER STRAW BALES.

NOTE: 1. PUMP INTAKE HOSE MUST BE SECURED AND NOT BE ALLOWED TO REST ON THE TRENCH BOTTOM THROUGHOUT DEWATERING. PROVISIONS MUST BE MADE TO ELEVATE THE INLET HOSE TO AT LEAST ONE FOOT ABOVE THE BOTTOM UNTIL BOTTOM DEWATERING IS NECESSARY.

2. WHEN SILT FENCE STAKES CANNOT BE DRIVEN INTO GROUND, LINE THE BOTTOM AND EXTERIOR OF STRAW BALES WITH GEOTEXTILE FABRIC.

PRELIMINARY

Appendix C-30

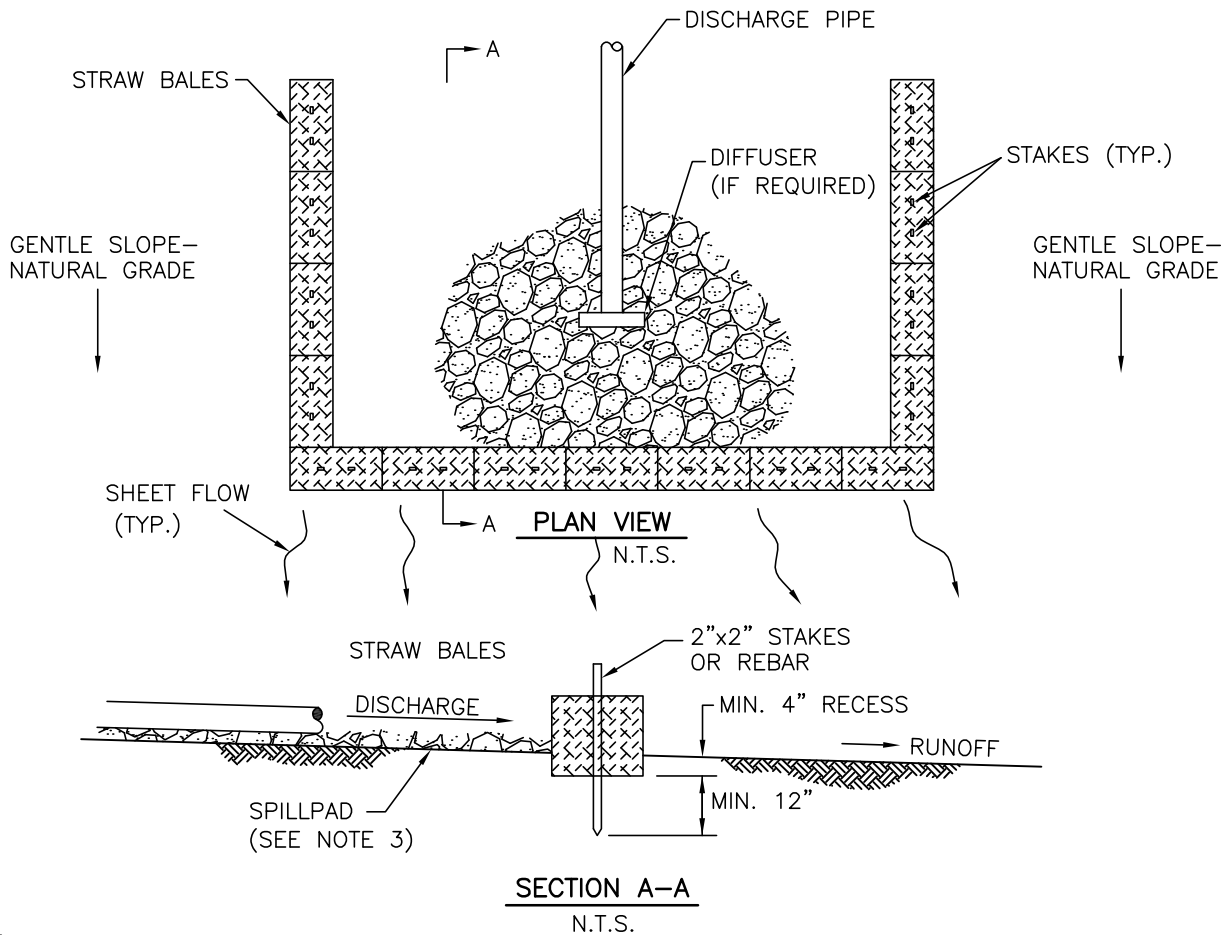
EROSION CONTROL AND SEDIMENT FILTRATION MEASURES FOR DEWATERING THE PIPELINE TRENCH AND ROADBORES WITHIN WETLANDS AND SPARSELY VEGETATED AREAS - EXHIBIT 2

File No.:

LEACH XPRESS PROJECT

DRAWN BY	DATE	DWG. NO. TYPICAL 28
CHECKED BY	SCALE N.T.S.	
APPROVED BY	SHEET 1 of 1	

TYPICAL STRAW BALE DEWATERING STRUCTURE (SMALL VOLUME)



NOTES:

1. INSTALL A STRAW BALE DEWATERING STRUCTURE WHEREVER IT IS NECESSARY AND AS DIRECTED BY THE COMPANY'S INSPECTOR TO PREVENT THE FLOW OF HEAVILY SILT LADEN WATER INTO WATER BODIES OR WETLANDS.
2. DISCHARGE SITE SHALL BE WELL VEGETATED AND THE TOPOGRAPHY OF THE SITE SUCH THAT WATER WILL FLOW INTO THE DEWATERING STRUCTURE AND AWAY FROM ANY WORK AREAS. THE AREA DOWN SLOPE FROM THE DEWATERING SITE MUST BE REASONABLY PLANE OR STABILIZED BY VEGETATION OR OTHER MEANS TO ALLOW THE FILTERED WATER TO CONTINUE AS SHEET FLOW.
3. DIRECT THE PUMPED WATER INTO A STABLE SPILLPAD CONSTRUCTED OF STRAW BALES, ROCK FILL, WEIGHTED TIMBERS OR WOVEN GEOTEXTILE STAKED TO THE GROUND SURFACE (SUCH AS MIRAFI 600X, TERRAFIX 400W) OR A COMPANY APPROVED EQUIVALENT. FORCE THE DISCHARGE WATER BEYOND THE SPILL PAD INTO SHEET FLOW USING STRAW BALES AND NATURAL TOPOGRAPHY. ANCHOR STRAW BALES SECURELY IN PLACE WITH TWO WOODEN STAKES OR REBAR. ENTRENCH ("KEY") STRAW BALES INTO THE GROUND TO A DEPTH OF 4".
4. DISCHARGE RATES SHALL BE SUCH THAT WATER WILL NOT OVERFLOW THE TOP OF THE STRUCTURE.
5. MANUFACTURED FILTER BAGS ARE A SUITABLE ALTERNATIVE TO STRAW BALE STRUCTURES FOR TRENCH DEWATERING. FILTER BAGS SHALL BE INSTALLED AS SPECIFIED BY THE MANUFACTURER. DISPOSE OF FULL FILTER BAGS AT AN APPROVED OFF-SITE FACILITY.
6. INSTALL AN ENERGY DISSIPATOR IF THE DISCHARGE VELOCITY MAY ERODE THE SOIL.

PRELIMINARY

TYPICAL STRAW BALE DEWATERING STRUCTURE (SMALL VOLUME)

Appendix C-31

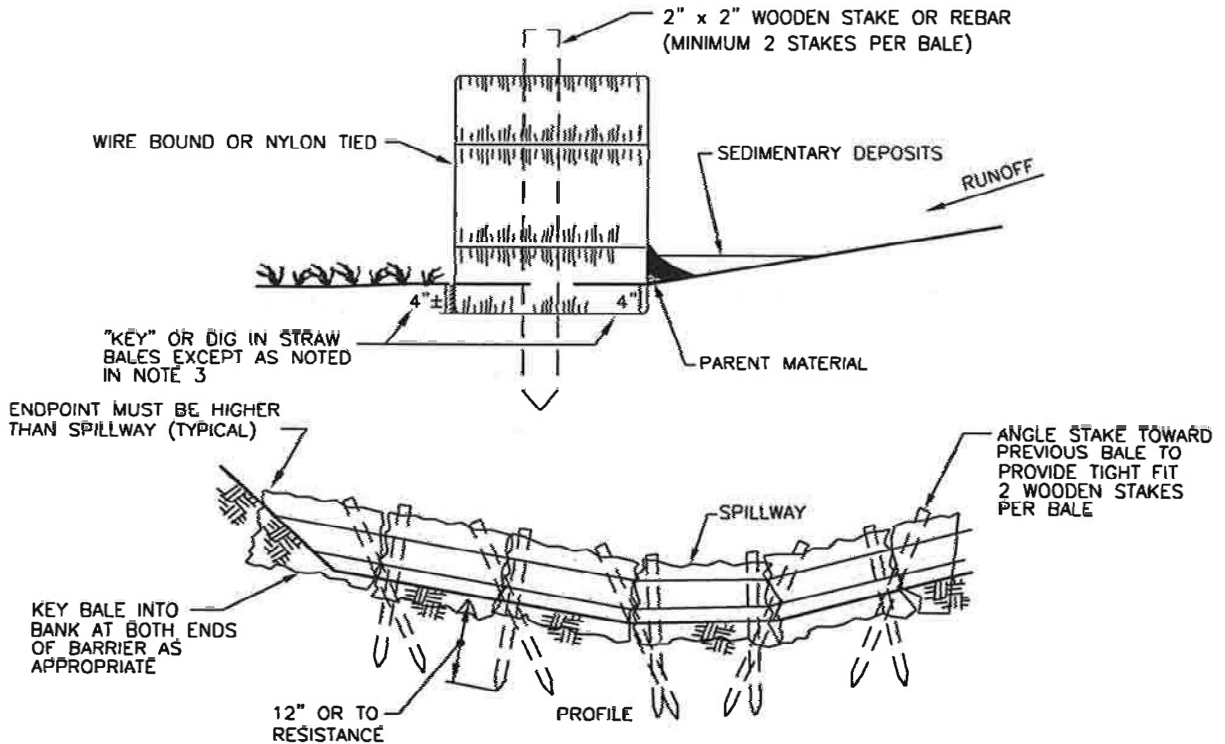
LEACH XPRESS PROJECT

File No.:

DRAWN BY	DATE	DWG. NO.
CHECKED BY	SCALE	N.T.S.
APPROVED BY	SHEET	1 of 1

TYPICAL 29

STRAW BALE SEDIMENT BARRIER



NOTE:

1. STRAW BALE SEDIMENT BARRIERS MAY BE INSTALLED AT THE FOLLOWING LOCATIONS
 - THE BASE OF ALL SLOPES ABOVE ROADS, SPRINGS, WETLANDS, IMPOUNDMENTS AND STREAMS
 - THE DOWNSLOPE EDGE WHERE ANY OF THE ABOVE-MENTIONED LOCATIONS ARE ADJACENT TO THE WORK AREA;
 - BETWEEN TOPSOIL/SPOIL STOCKPILES AND STREAMS OR WETLANDS AS NEEDED;
 - ALONG THE WORK AREA BOUNDARIES IN WETLAND CONSTRUCTION;
 - ACROSS CONSTRUCTION WORK AREA AT ALL WATER BODY CROSSINGS;
 - AS SPECIFIED IN THE SPILL PREVENTION, CONTAINMENT, AND COUNTERMEASURE PLAN;
 - AS DIRECTED BY THE COLUMBIA INSPECTOR
2. STRAW BALE SEDIMENT BARRIERS SHALL CONSIST OF A ROW OF STRAW BALES, PLACED ON THE FIBER-CUT EDGE (TIES NOT IN CONTACT WITH THE GROUND). BALES SHALL BE TIGHTLY ABUTTED TO ONE ANOTHER. THE BARRIER SHALL BE ONE BALE HIGH. ONLY CERTIFIED "NOXIOUS WEED-FREE" STRAW SHALL BE USED WHENEVER POSSIBLE.
3. ENTRENCH ("KEY") STRAW BALES INTO THE GROUND TO A DEPTH OF 4' EXCEPT IN FROZEN, SATURATED, OR EXTREMELY ROCKY SOILS. PLACE PARENT MATERIAL ON UPSTREAM SIDE OF STRAW BALES TO PREVENT UNDERMINING.
4. WALK ON STRAW BALES TO INSURE ADEQUATE BALE-TO-SOIL CONTACT.
5. ANCHOR STRAW BALES SECURELY IN PLACE WITH TWO WOODEN OR STEEL REBAR STAKES DRIVEN THROUGH THE TOPS OF THE BALE. THE STAKES SHALL PENETRATE THE GROUND AT A DISTANCE OF 12" UNLESS ROCK OR AN IMPERMEABLE LAYER IS ENCOUNTERED:
 - THE FIRST, CENTER AND END BALES OF THE BARRIER SHALL HAVE STAKES DRIVEN VERTICALLY THROUGH THE BALE;
 - BALES, OTHER THAN THOSE LOCATED AT THE ENDS OR CENTER OF THE BARRIER, SHALL HAVE THE FIRST STAKE DRIVEN THROUGH THE TIP OF THE BALE AT AN ANGLE SO THAT THE STAKE PASSES THROUGH THE PREVIOUS PLACED BALE IN ORDER TO PROVIDE TIGHT CONTACT BETWEEN BALES. THE SECOND STAKE SHALL BE DRIVEN VERTICALLY THROUGH THE TOP OF THE BALE.
6. TIES TO BE IN HORIZONTAL POSITION.

PRELIMINARY

Appendix C-32

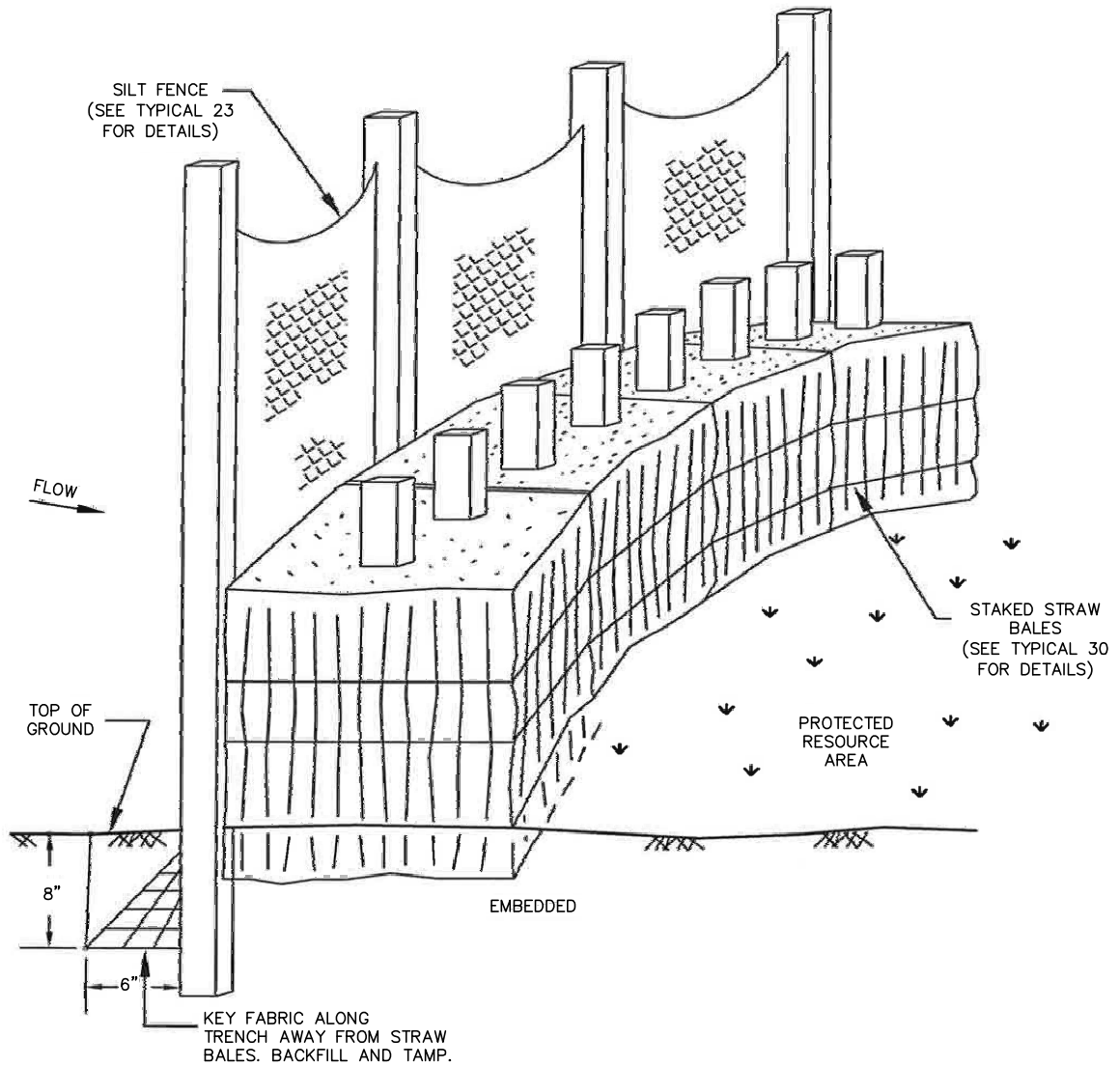
STRAW BALE SEDIMENT BARRIER

LEACH XPRESS PROJECT

File No.:

DRAWN BY	DATE	DWG. NO.
CHECKED BY	SCALE N.T.S.	TYPICAL30
APPROVED BY	SHEET 1 of 1	

TYPICAL STRAW BALE AND SILT FENCE



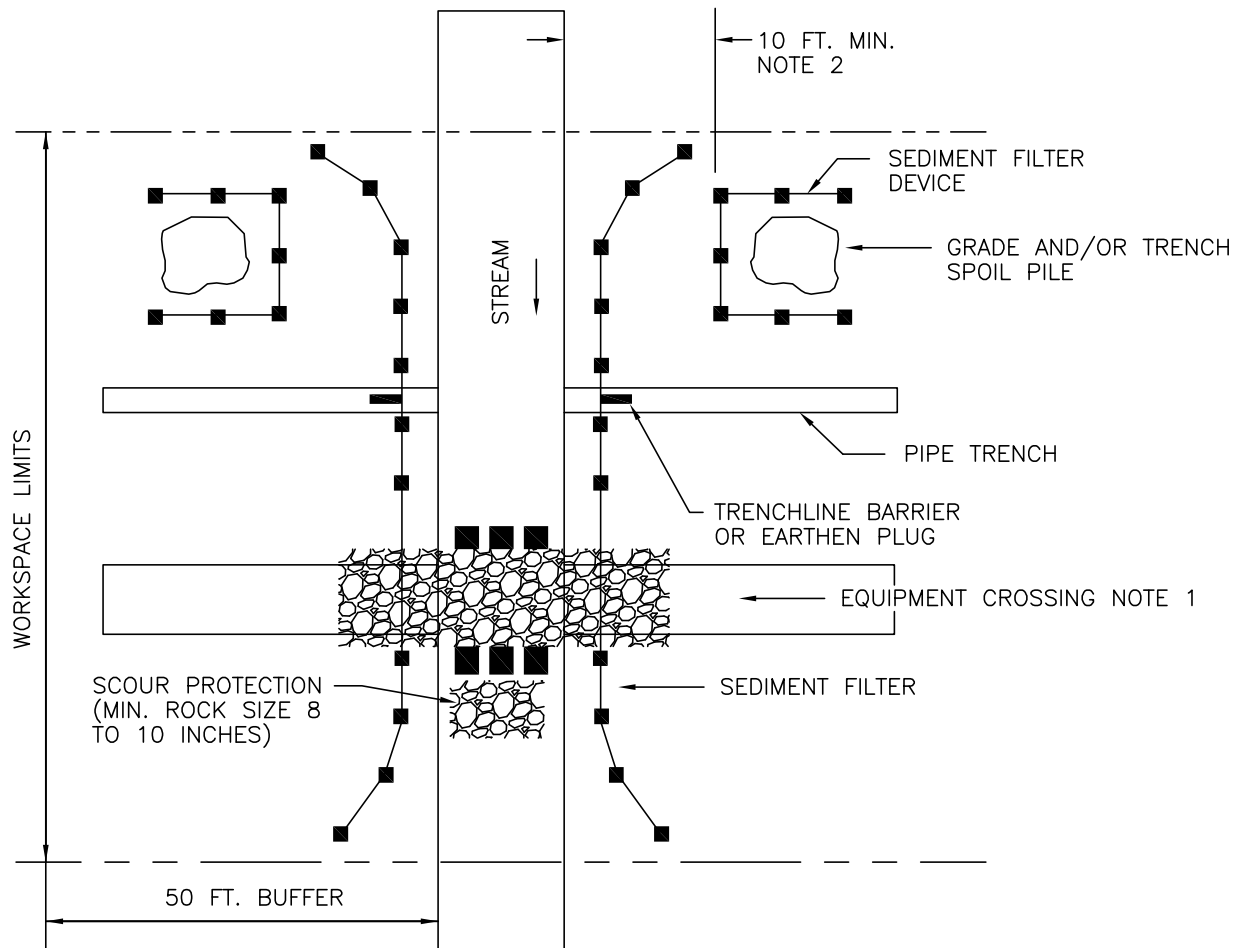
NOTE:

1. WHERE EXTREMELY ERODIBLE SOIL CONDITIONS EXIST AND AT THE DIRECTION OF THE INSPECTOR, A COMBINED STRAW BALE AND SILT FENCE SEDIMENT CONTROL BARRIER SHALL BE INSTALLED. FOR INSTALLATION CONDITIONS AND INSTRUCTIONS SEE: TYPICAL 23 AND TYPICAL 30

PRELIMINARY

Appendix C-33	TYPICAL STRAW BALE AND SILT FENCE		
	LEACH XPRESS PROJECT		
	File No.:		
	DRAWN BY	DATE	DWG. NO.
	CHECKED BY	SCALE N.T.S.	TYPICAL 31
	APPROVED BY	SHEET 1 of 1	

TYPICAL WATER CROSSING - OPEN CUT WITH FLOW



NOTES:

1. EQUIPMENT CROSSINGS ARE TO BE PREPARED AS ILLUSTRATED IN TYPICAL 20.
2. GRADE AND TRENCH SPOIL WILL BE STOCKPILED AT LEAST 10 FEET FROM THE WATERS' EDGE.

PRELIMINARY

Appendix C-34

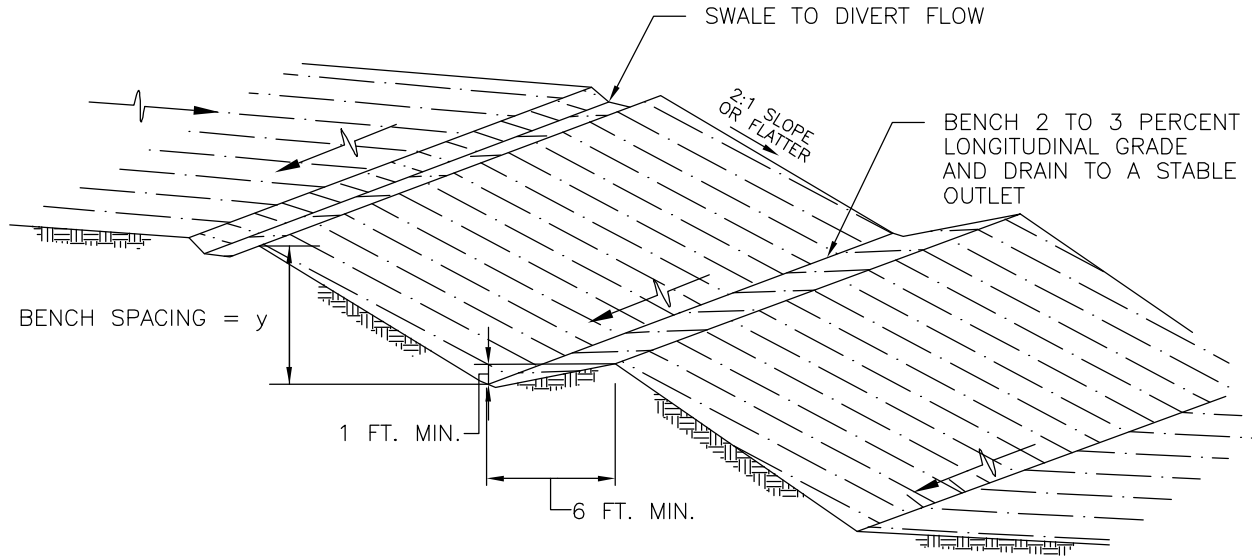
TYPICAL WATER CROSSING - OPEN CUT WITH FLOW

LEACH XPRESS PROJECT

File No.:

DRAWN BY	DATE	DWG. NO.
CHECKED BY	SCALE N.T.S.	TYPICAL 32
APPROVED BY	SHEET 1 of 1	

TYPICAL BENCHING



SLOPE	y (MAX.)
2:1	20 FT
3:1	30 FT
4:1	40 FT

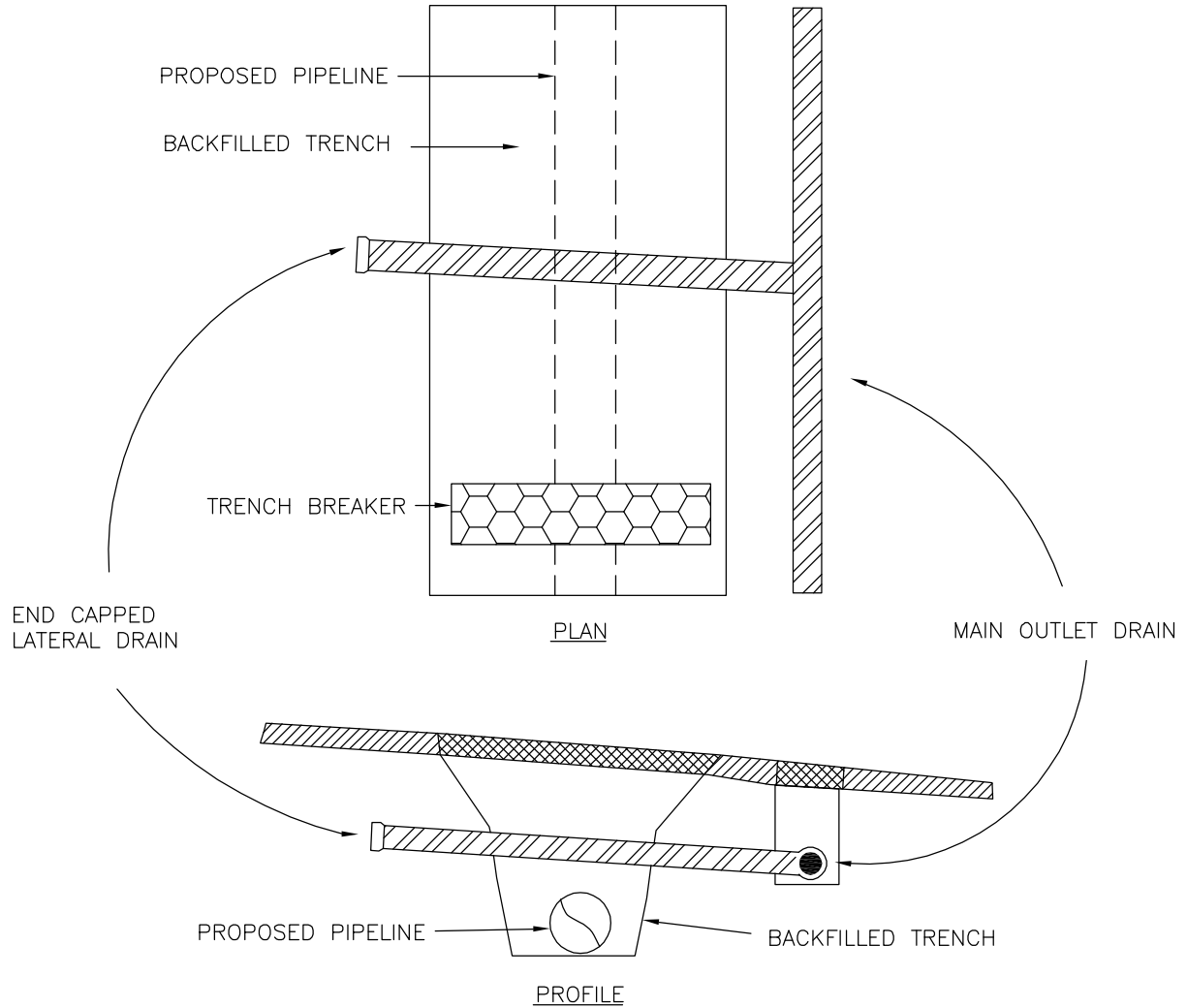
CONSTRUCTION SPECIFICATIONS:

1. USE FILL MATERIAL FREE OF BRUSH, RUBBISH, ROCKS, LOGS, STUMPS, BUILDING DEBRIS, AND OTHER OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.
2. DO NOT INCORPORATE FROZEN, SOFT, MUCKY, OR HIGHLY COMPRESSIBLE MATERIALS INTO FILL SLOPES OR STRUCTURAL FILLS. DO NOT PLACE FILL ON A FROZEN FOUNDATION.
3. PLACE ALL FILL IN LOOSE LIFTS NOT TO EXCEED 8 INCHES AND THEN COMPACT.
4. COMPACT ALL FILLS AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, OR OTHER RELATED PROBLEMS. COMPACT FILL INTENDED TO SUPPORT STRUCTURES, CONDUITS, ETC., IN ACCORDANCE WITH LOCAL REQUIREMENTS OR CODES.

PRELIMINARY

Appendix C-35	TYPICAL BENCHING			
	LEACH XPRESS PROJECT			
	File No.:	DRAWN BY	DATE	DWG. NO.
		CHECKED BY	SCALE N.T.S.	TYPICAL 33
APPROVED BY		SHEET 1 of 1		

TYPICAL FRENCH DRAIN (INTERCEPT DRAIN CROSS-TRENCH)

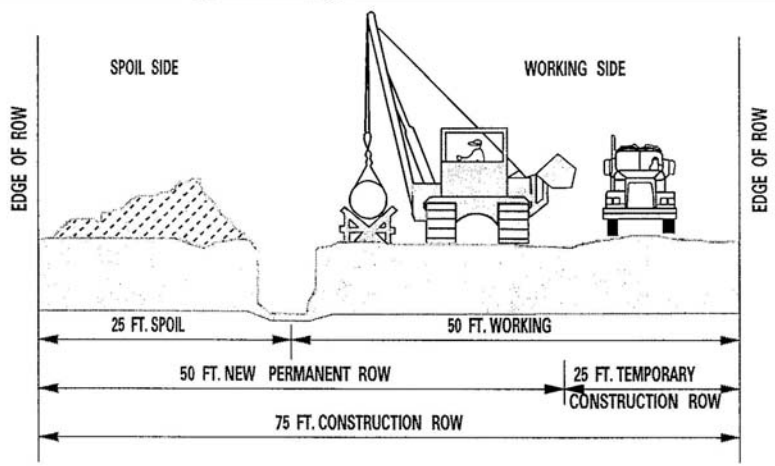


NOTES:

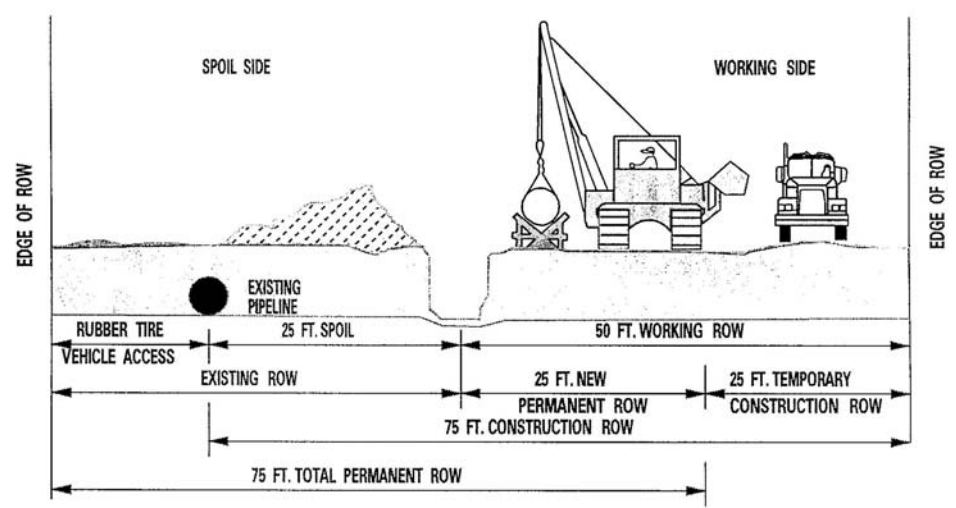
1. TRENCH BREAKERS PREVENT GULLY EROSION WHILE THE TRENCH IS OPEN AND HELP TO INHIBIT WATER PIPING ALONG THE PIPELINE AFTER BACKFILLING.
2. INTERCEPT DRAINS RECEIVE SOIL MOISTURE DRAINING NATURALLY FROM THE UNDISTURBED SOIL PROFILE INTO THE DISTURBED BACKFILL SOIL WITHIN THE TRENCH. THE INTERCEPT DRAIN LINES HELP PREVENT SATURATED SOIL CONDITIONS ALONG THE PIPELINE.
3. INSTALL INTERCEPTOR DRAINS AT INTERVALS AS NEEDED TO REDUCE DRAINAGE THROUGH TRENCH BACKFILL.
4. USE FILL MATERIAL FREE OF BRUSH, RUBBISH, ROCKS, LOGS, STUMPS, BUILDING DEBRIS, AND OTHER OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.

PRELIMINARY

Appendix C-36	TYPICAL FRENCH DRAIN (INTERCEPT DRAIN CROSS-TRENCH)		
	LEACH XPRESS PROJECT		
	File No.:	DRAWN BY	DATE
		CHECKED BY	SCALE N.T.S.
	APPROVED BY	SHEET 1 of 1	
	DWG. NO.		
	TYPICAL 34		



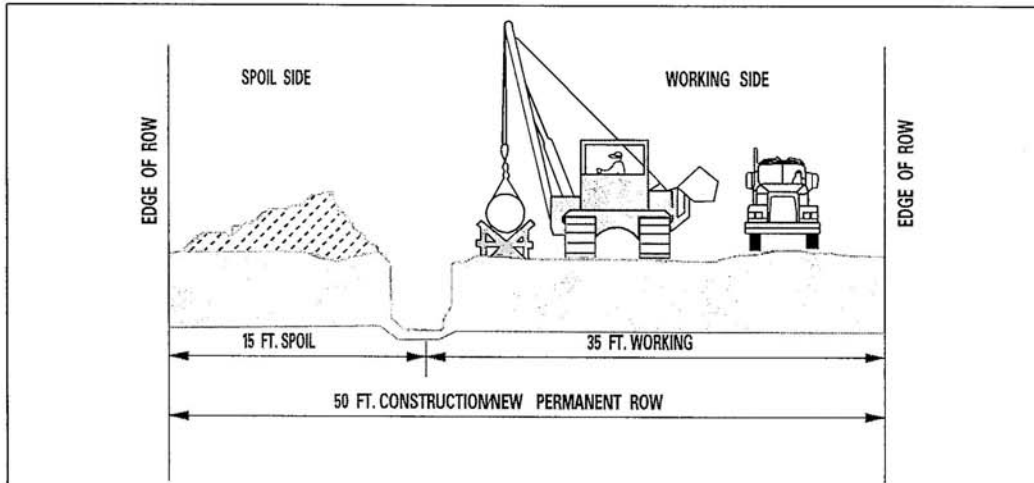
NEW ROW



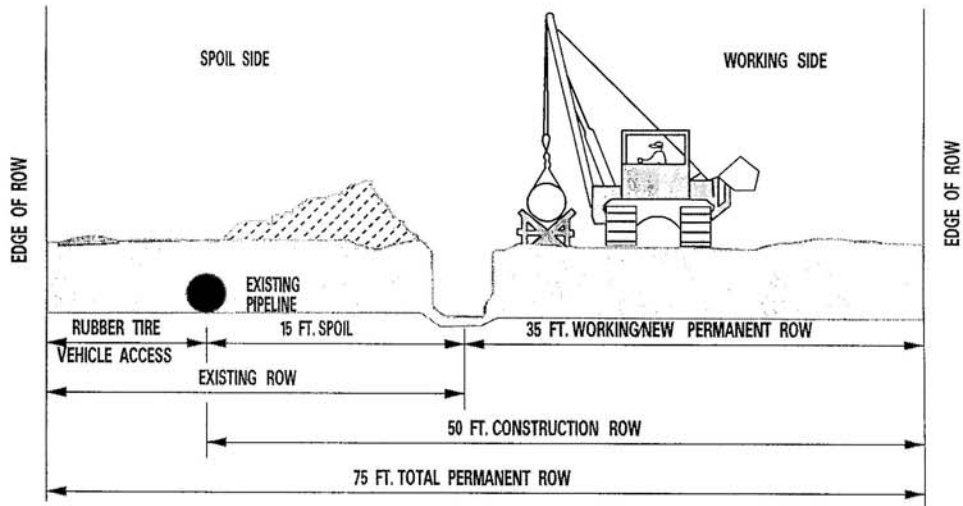
PARALLEL TO EXISTING ROW

- NOTES:
1. USE FOR 14-INCH OR GREATER DIAMETER PIPELINE.
 2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL.
 3. VARIATIONS FOR STAGING AREAS MAY BE NECESSARY DUE TO SITE-SPECIFIC TERRAIN FEATURES; HOWEVER, UNLESS OTHERWISE INDICATED IN COLUMBIA'S ENVIRONMENTAL MANAGEMENT & CONSTRUCTION PLANS, THE MAXIMUM WIDTH OF CONSTRUCTION ROW WILL BE 75 FEET.

NOT TO SCALE



NEW ROW



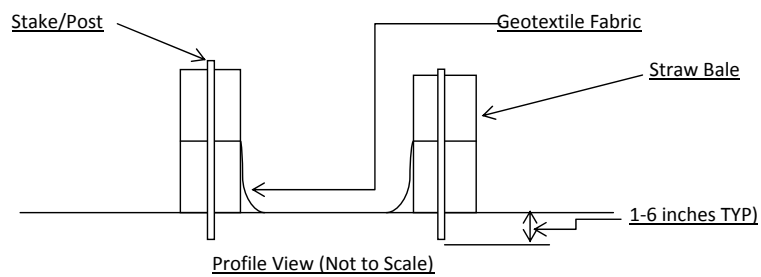
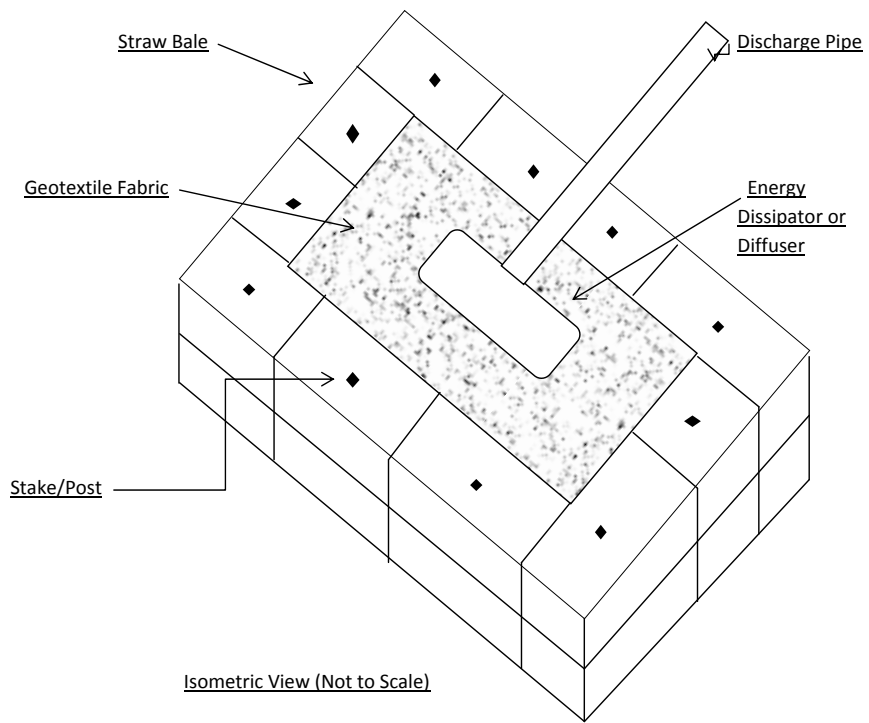
PARALLEL TO EXISTING ROW

- NOTES:
1. USE FOR 12-INCH OR LESS DIAMETER PIPELINE.
 2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL.
 3. VARIATIONS FOR STAGING AREAS MAY BE NECESSARY DUE TO SITE-SPECIFIC TERRAIN FEATURES; HOWEVER, UNLESS OTHERWISE INDICATED IN COLUMBIA'S ENVIRONMENTAL MANAGEMENT & CONSTRUCTION PLANS, THE MAXIMUM WIDTH OF CONSTRUCTION ROW WILL BE 50 FEET.

NOT TO SCALE

Appendix C-38

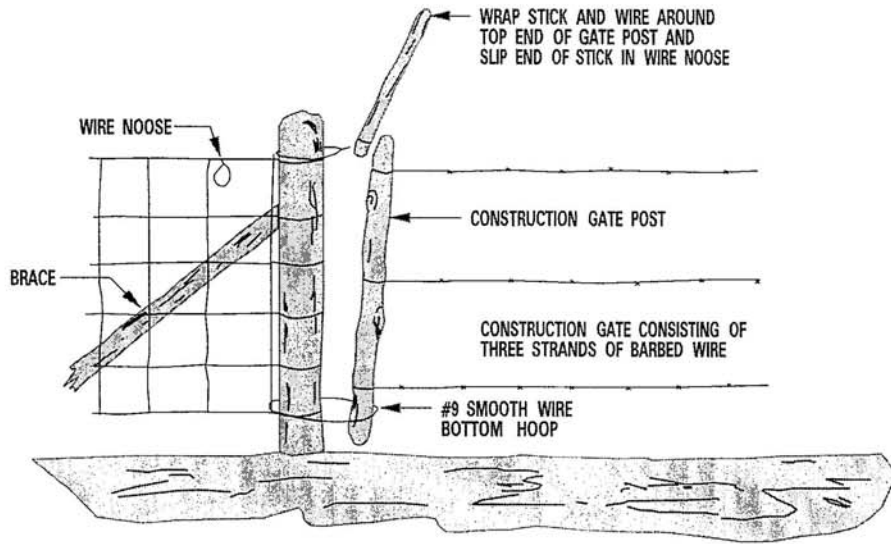
**TYPICAL 50 FT.
CONSTRUCTION
RIGHT-OF-WAY**



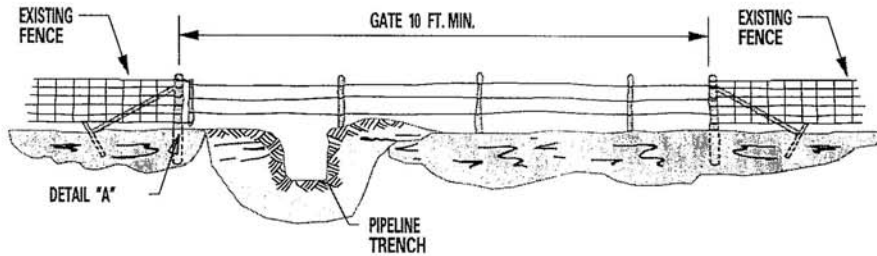
NOT TO SCALE

Appendix C-39

**Hydrostatic
Test
Dewatering Pit**



DETAIL "A"

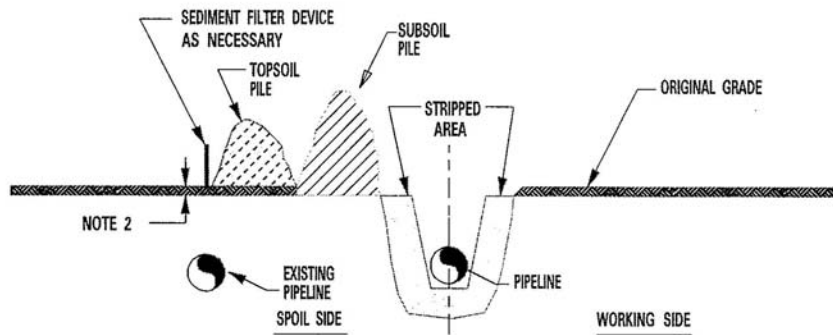


- NOTES:
1. IF EXISTING FENCE POSTS ARE STEEL "T" BAR TYPE, THEN REMOVE THE STEEL "T" BAR POST ON BOTH SIDES OF THE GATE OPENING AND REPLACE WITH TEMPORARY WOODEN POSTS, BRACED AS SHOWN.
 2. SUITABLE SUBSTITUTES FOR THE STICK AND WIRE GATE FASTENER ARE PERMISSIBLE.

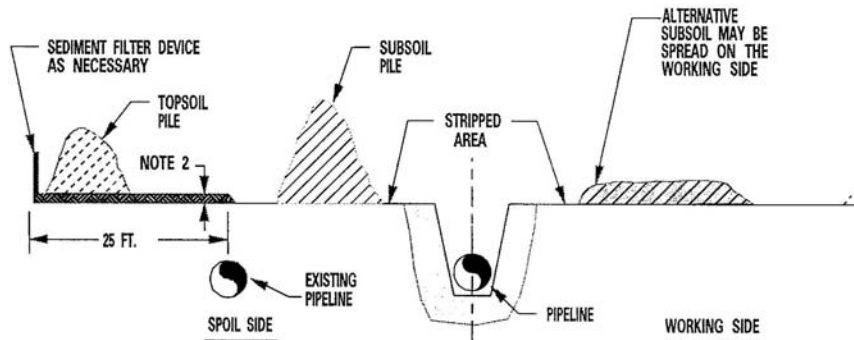
NOT TO SCALE

Appendix C-40

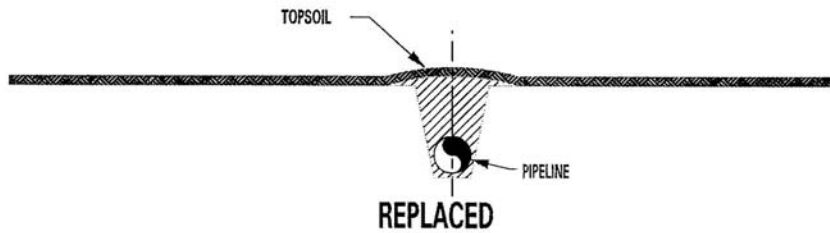
TEMPORARY
CONSTRUCTION
GATE



TRENCHLINE AND SPOIL SIDE METHOD



ENTIRE CONSTRUCTION ROW METHOD



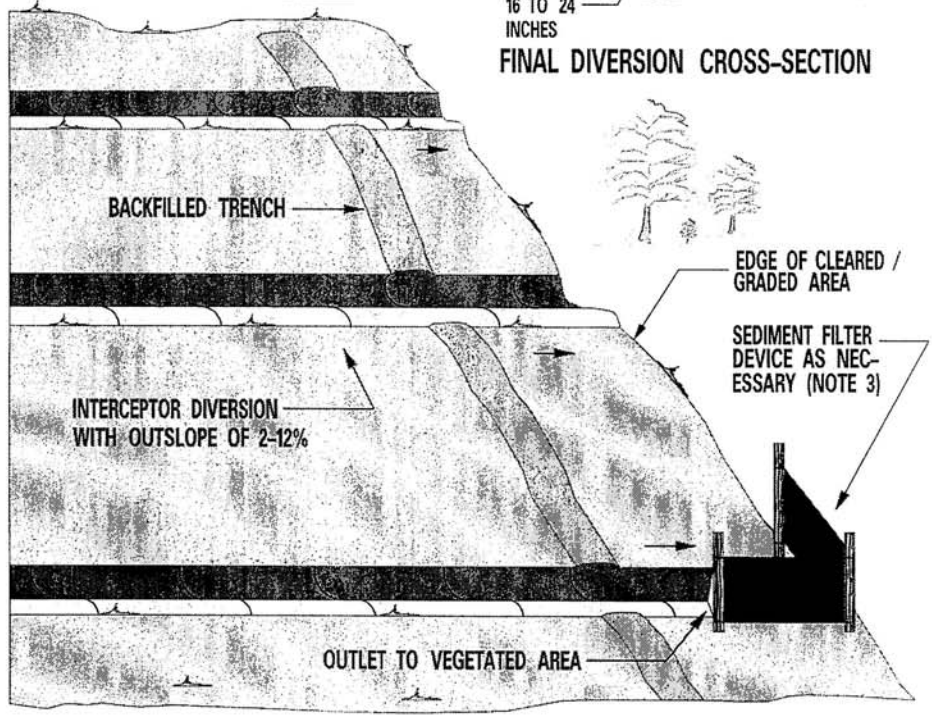
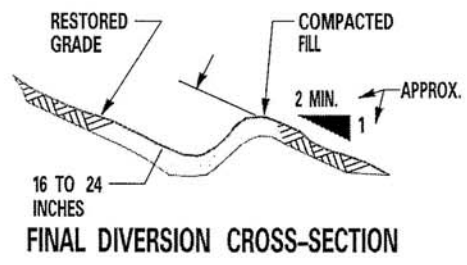
REPLACED

- NOTES:
1. OTHER CONFIGURATIONS OF TOPSOIL AND SUBSOIL ARE ACCEPTABLE PROVIDED THEY ARE KEPT SEPARATE.
 2. UP TO 12 INCHES OF TOPSOIL REMOVED.
 3. TOPSOIL AND SUBSOIL PILES WILL BE ADEQUATELY PROTECTED FROM EROSION AND SEDIMENTATION BY USE OF SEDIMENT FILTER DEVICES OR MULCH.

NOT TO SCALE

NOTE 1	
SLOPE	SPACING
< 5%	NONE
5-15%	300 FEET
15-30%	200 FEET
> 30 + %	100 FEET

**INTERCEPTOR SPACING
(MINIMUM REQUIRED)**



- NOTES:
1. SPACING USED FOR BOTH TEMPORARY AND FINAL INTERCEPTOR DIVERSIONS.
 2. TEMPORARY INTERCEPTOR DIVERSIONS WILL BE MAINTAINED DURING THE CONSTRUCTION PHASE UNTIL FINAL INTERCEPTOR DIVERSIONS ARE INSTALLED.
 3. IF EXISTING GROUND COVER IS SPARSE, SECURE SEDIMENT FILTER DEVICE IN OUTLET.
 4. THE DIVERSION MAY BE EXTENDED UP TO 5 FEET OFF THE ROW, IF NECESSARY, TO PROVIDE AN ADEQUATE OUTLET.
 5. DIVERSION OUTLETS WILL ALTERNATE FROM SIDE TO SIDE WHENEVER POSSIBLE.

NOT TO SCALE

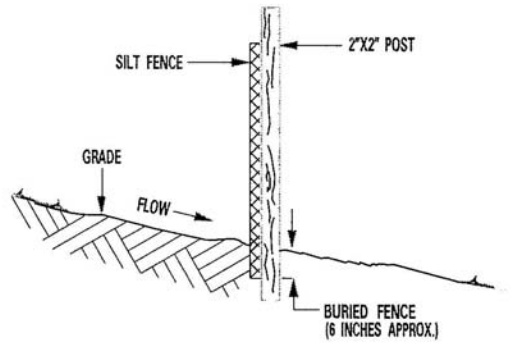
INTERCEPTOR DIVERSIONS /SLOPE BREAKERS

Interceptor diversions are the most common and effective device used for erosion control on construction ROW. During construction, temporary diversions are installed to control water on the graded ROW. During restoration final diversions are installed to protect the ROW from erosion until the vegetation reestablishes on the disturbed areas.

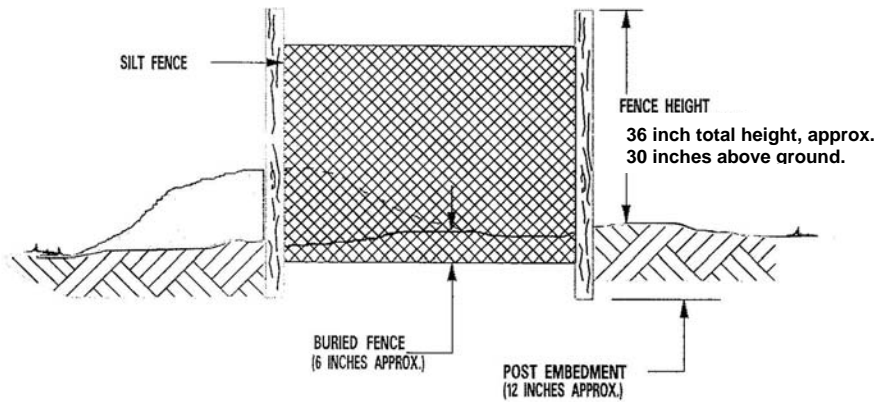
Temporary diversions are generally made by building a curb 8 to 14 inches high across the ROW. The curbs are shaped to allow passage of construction equipment and inspector vehicles. The diversion should have a gradient of 2%– 12%, and must drain either into the trench or off the ROW. Where water is directed off the ROW, the outlet will be protected by a sediment filter device or heavy vegetation. Temporary diversions may be broken down by construction equipment during the workday, but will be restored by the end of each day. Temporary diversions will be spaced along the ROW in accordance with Figure 6A. The actual number of temporary diversions may vary from that of final diversions because the construction ROW's artificial grade may reduce the slope. Temporary diversions may be constructed out of silt fence, staked hay or straw bales or sand bags with the Environmental Inspectors approval. Position the outfall of each temporary slope breaker to prevent sediment discharge into wetland, waterbodies, or other sensitive areas.

Final diversions typically consist of a curb 16 to 24 inches high below a shallow swale. The curb is constructed of compacted earth fill with side slopes of 2:1 or flatter to allow passage of maintenance equipment. The diversions should extend across the entire ROW and drain water with a 2% to 12% gradient. The outlets of final diversions are stabilized with sediment filter devices, rock, brush, or heavy vegetation. Final diversions will be spaced along the ROW in accordance with Figure 6A (or as shown on the Environmental Construction Drawings), and will tie into existing diversions where present. In places where final grade creates side slopes or slopes which break in more than one direction, diversion installation may need to vary to create an outslope of 2% to 12% which will carry water off the ROW.

Alternative diversion construction may be used in areas where an earthen diversion is impractical. In these instances, temporary diversions may be constructed with sediment filter devices as noted above.



SIDE VIEW



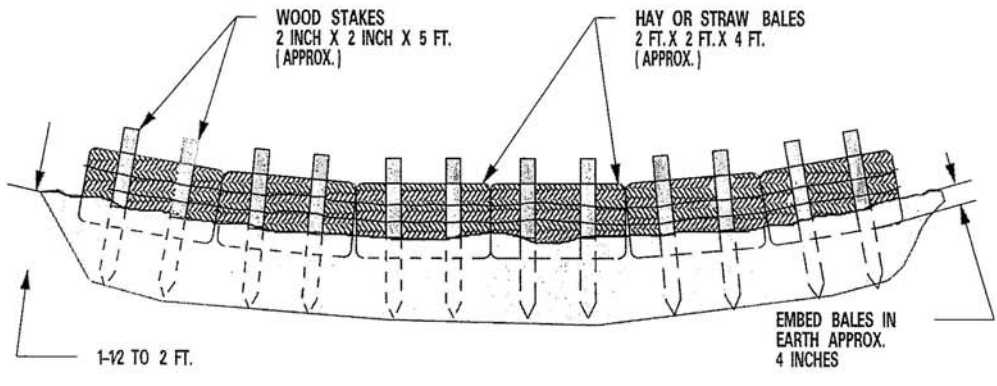
FRONT VIEW

NOTE: SILT FENCE CAN ALSO BE INSTALLED (USING THE SAME SPECIFICATIONS AS PRESENTED ABOVE) IN OTHER SITUATIONS FOR EROSION AND SEDIMENTATION CONTROL.

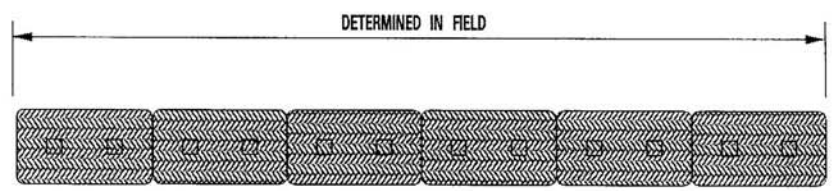
SEDIMENT FILTER DEVICE SILT FENCING

Stakes should be spaced 8 feet apart.

NOT TO SCALE



SIDE VIEW

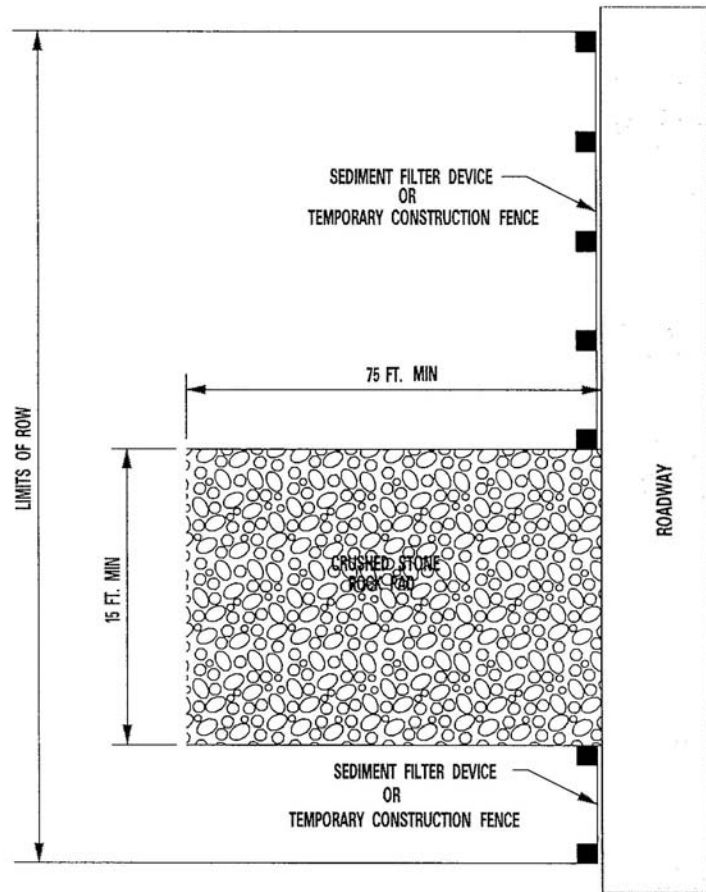


TOP VIEW

- NOTES:**
1. IF BALES ARE TO BE PLACED ON TOP OF HEAVY VEGITATION, EMBEDDING THE BALES MAY NOT BE NECESSARY.
 2. REBAR (3 / 8" TO 3 / 4" DIAMETER) CAN BE SUBSTITUTED FOR WOOD STAKES.

NOT TO SCALE

Appendix C-45	SEDIMENT FILTER DEVICE STAKED BALES	
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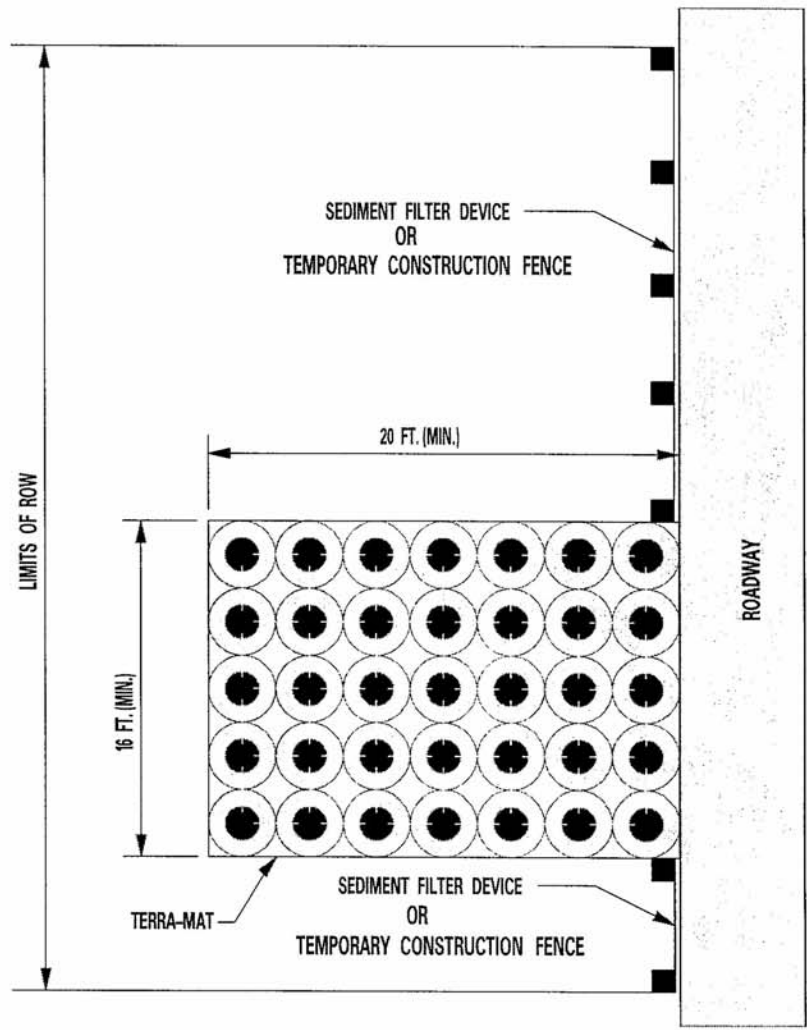


- NOTES:
1. CRUSHED STONE SIZE WILL BE AASHTO NUMBER 1 COARSE AGGREGATE OR EQUIV.(4 INCH DIAMETER MINIMUM.)
 2. ROCK PAD WILL BE AT LEAST 6 INCHES THICK.
 3. THE ROAD ENTRANCE SHOULD HAVE A GEOTEXTILE FABRIC BENEATH THE ROCK PAD. (SEE SECTION II.E)
 4. IF ROCK PAD BECOMES COVERED WITH MUD SO AS TO BECOME INEFFECTIVE, ADDITIONAL STONE WILL BE ADDED.
 5. ALL STONE AND FABRIC MUST BE REMOVED DURING ROW RESTORATION.
 6. THE ROCK PAD MAY BE ENLARGED TO INCLUDE A TURNING RADIUS.

NOT TO SCALE

Appendix C-46

**TEMPORARY ROAD
ENTRANCE
ROCK PADS**

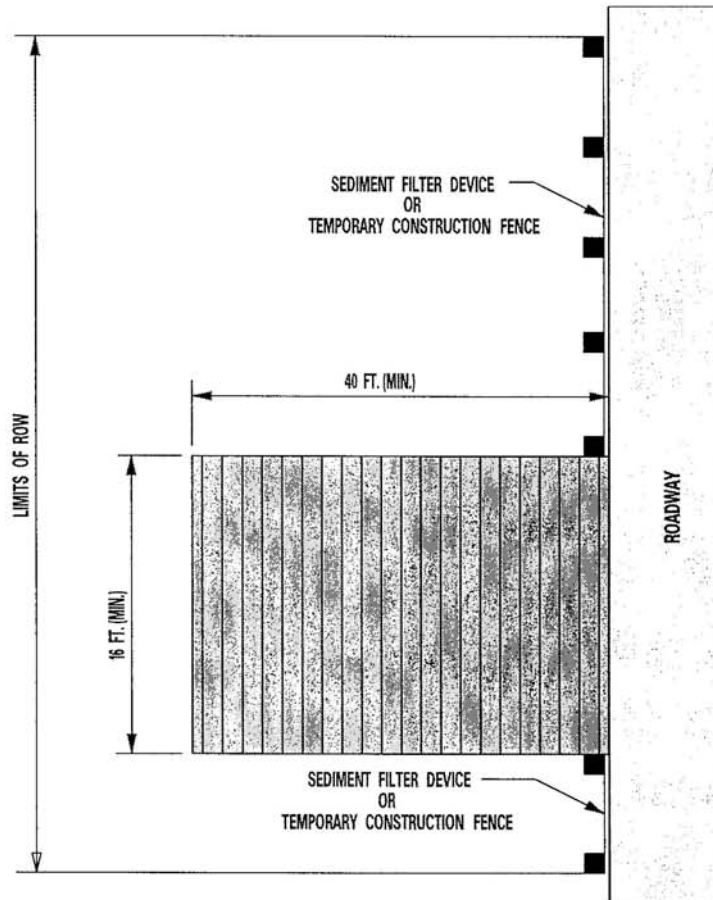


- NOTES:
1. TERRA-MATS ARE CONSTRUCTED BY OVERLAPPING TIRES AND INTERCONNECTED CABLE.
 2. TERRA-MATS WILL BE UNDERLAIN WITH GEOTEXTILE FABRIC.
 3. TERRA-MATS SHOULD BE MAINTAINED SO AS NOT TO ALLOW EXCESS MUD TO ACCUMULATE.

NOT TO SCALE

Appendix C-47

**TEMPORARY ROAD
ENTRANCE
TERRA-MATS**

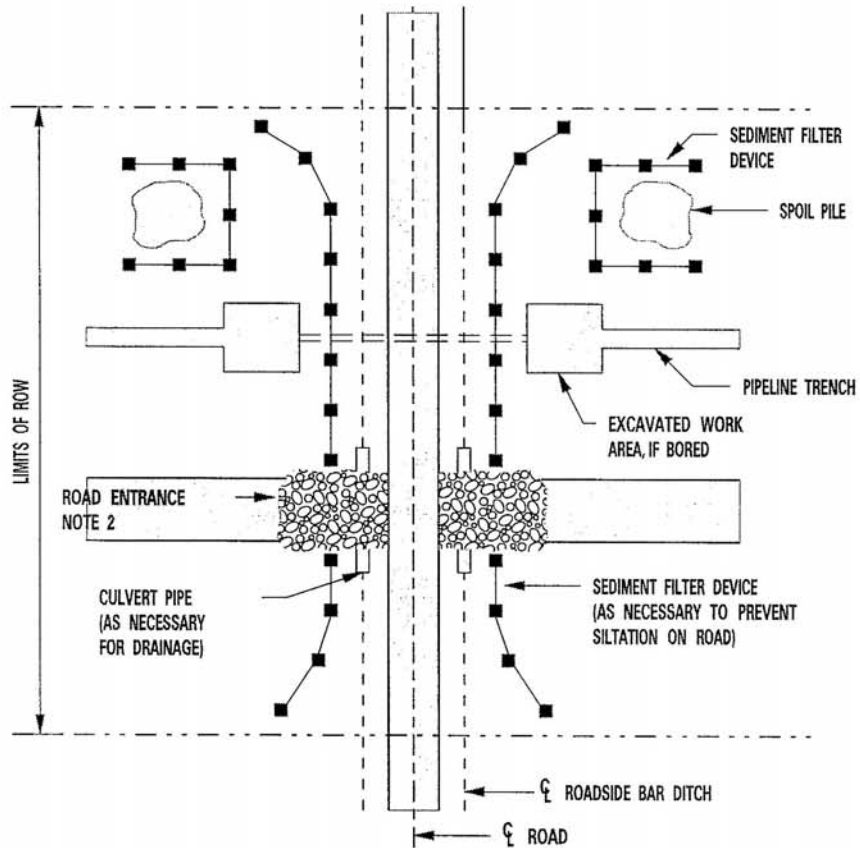


- NOTES:
1. BOARD ROADS TO BE USED IN WETLANDS AND ROADWAY ENTRANCES FOR TEMPORARY ACCESS ROADS.
 2. BOARD ROADS ARE CONSTRUCTED BY LAYERING A BASE OF THE INTERLOCKING MATS PARALLEL TO THE ROAD IN A STAGGERED MANNER. OTHER METHODS OF BOARD ROAD CONSTRUCTION MAY BE USED IF APPROVED BY THE EM & CP PREPARER.
 3. BOARD ROADS WILL BE UNDERLAIN WITH GEOTEXTILE FABRIC.

NOT TO SCALE

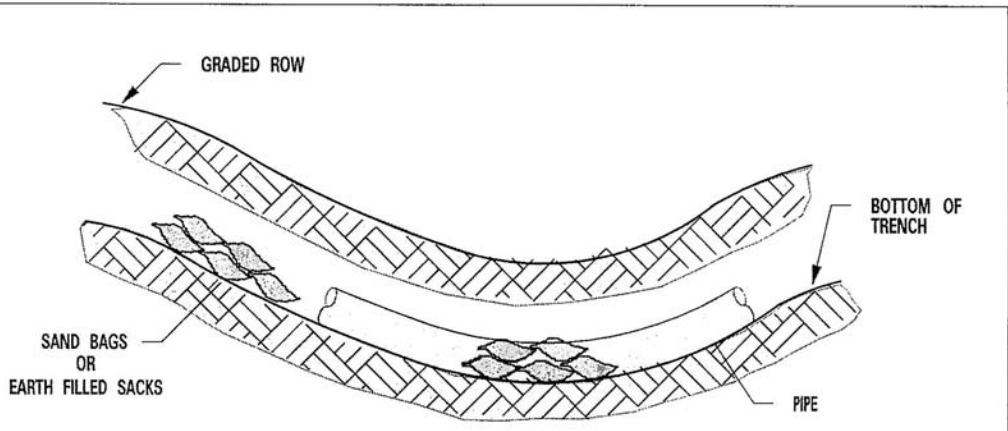
Appendix C-48

**TEMPORARY ROAD
ENTRANCE
BOARD ROAD**

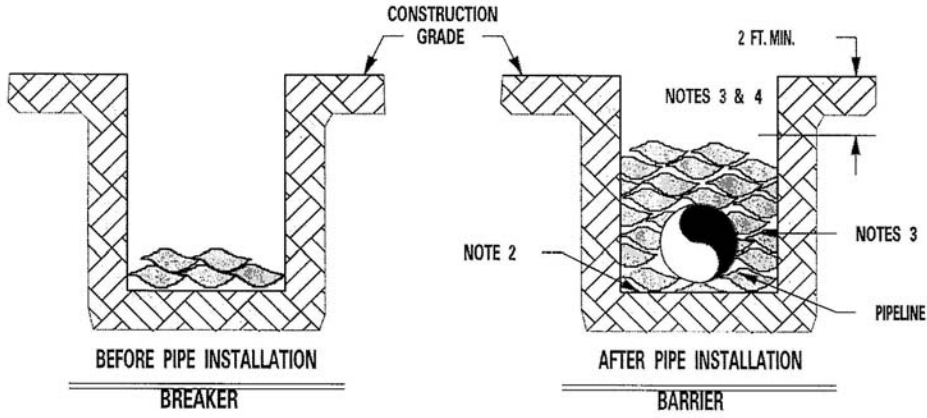


- NOTES: 1. SIMILAR PROCEDURES WILL BE USED AT RAILROAD CROSSINGS.
2. REFER TO FIGURES 9, 10, AND 11 FOR TYPES OF ROAD ENTRANCES.

NOT TO SCALE



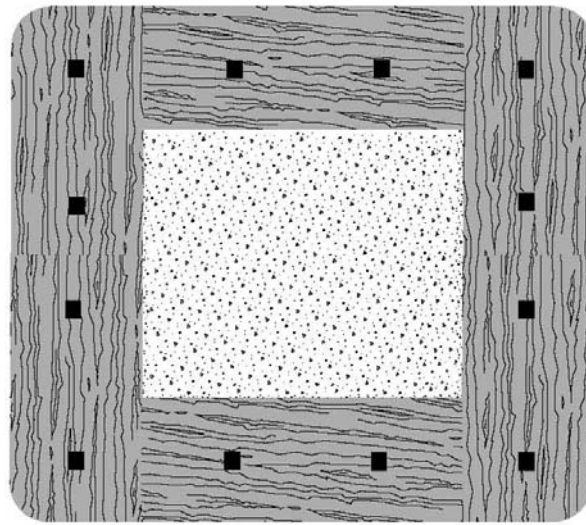
SIDE VIEW



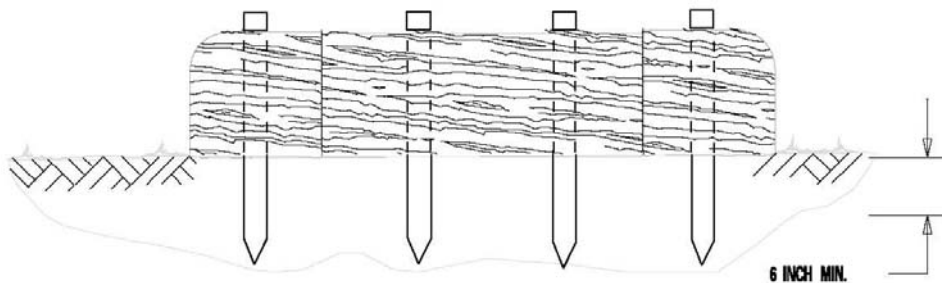
FRONT VIEW

- NOTES:
1. INSTALL AT EVERY SECOND INTERCEPTOR DIVERSION PROMPTLY AS TRENCH IS COMPLETED. (SEE FIGURE 6A)
 2. PRIOR TO LOWERING IN, REMOVE ALL DECOMPOSED MATERIAL AND ROCKS.
 3. INSTALL SACKS TO TOP OF TRENCH ON STEEP GRADES THAT ARE NOT USED FOR FARMING.
 4. TOP OF TRENCHLINE BARRIER WILL BE BELOW PLOW DEPTH IN AGRICULTURAL LAND.
 5. DOUBLE STAKED HAY /STRAW BALES MAY BE SUBSTITUTED FOR SAND BAGS (EARTH FILLED SACKS) AS TEMPORARY BREAKERS WHERE APPROPRIATE.

NOT TO SCALE



PLAN VIEW



SIDE VIEW

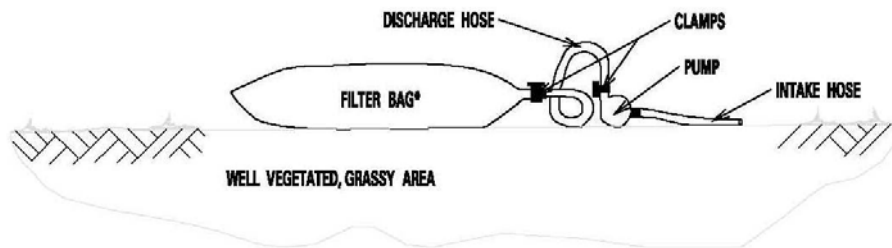
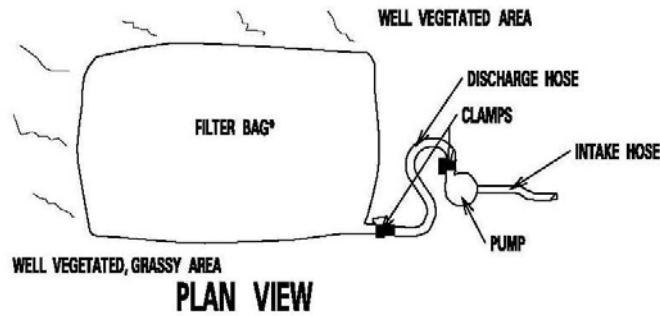
6 INCH MIN.

- NOTES:**
1. INSTALL BALES AS SHOWN. IF ADDITIONAL STORAGE VOLUME IS NECESSARY, SECURE ADDITIONAL BALES ON TOP OF INITIAL BOTTOM LAYER AND/OR BY INCREASING THE NUMBER BALES IN BOTTOM LAYER.
 2. SECURE EACH BALE & EACH LAYER OF BALES USING EITHER TWO REBARS OR TWO WOODEN STAKES PER BALE.
 3. PLACE A 5 TO 6 INCH DEEP LAYER OF 3/4 TO 1.0 INCH CLEAN STONE OR STRAW ON GROUND INSIDE BALES.
 4. THE SEDIMENT TRAP WILL NOT BE GREATER THAN TWO BALES IN HEIGHT FOR SIX-BALE BOTTOM CONSTRUCTION WITHOUT ADDITIONAL REINFORCEMENT OF TRAP WALLS.
 5. A FILTER BAG MAY ALSO BE UTILIZED INSIDE THE TRAP TO HELP FILTER THE DISCHARGE.

NOT TO SCALE

Appendix C-51

SEDIMENT TRAP

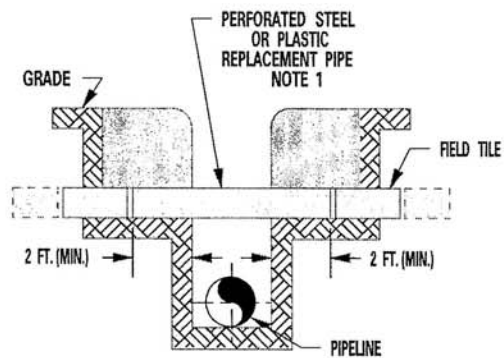


- NOTES:**
1. FILTER BAGS SHALL BE MADE FROM NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH, DOUBLE STITCHED "J" TYPE SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS.
 2. BAGS MUST BE PLACED WITHIN THE PERMITTED AREA IF ACCESSING THE BAG WITH MACHINERY IS REQUIRED FOR DISPOSAL PURPOSES. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME 1/2 FULL OF SEDIMENT. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE FILLED.
 3. BAGS SHOULD BE LOCATED IN WELL-VEGETATED (GRASSY) AREAS, AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE FLOW PATH CAN BE PROVIDED OR ALLOW DISCHARGE FROM BAG TO FLOW THROUGH A SERIES OF SEDIMENT LOGS ETC... BAGS CAN BE USED INSIDE SEDIMENT TRAPS (FIGURE 14A).
 4. BAGS SHALL NOT BE PLACED ON SLOPES GREATER THAN 5%.
 5. THE PUMP DISCHARGE HOSE SHALL BE INSERTED INTO THE BAGS IN THE MANNER SPECIFIED BY THE MANUFACTURER AND SECURELY CLAMPED. DO NOT ALTER OR CUT BAGS.

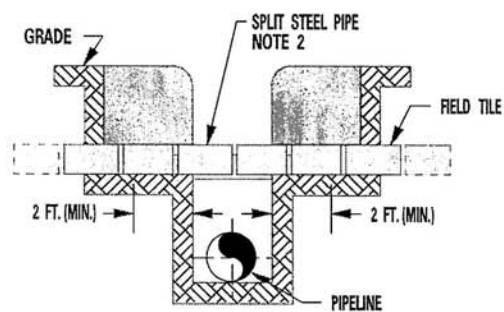
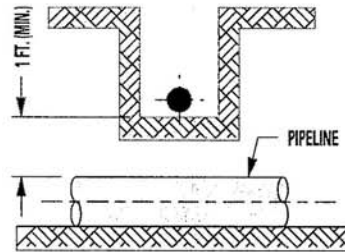
NOT TO SCALE

Appendix C-52

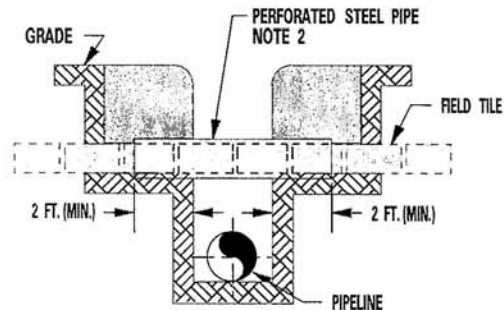
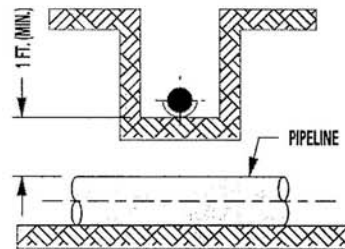
**FILTER BAG
(DIRT BAG)**



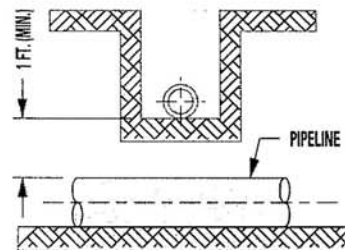
METHOD 1



METHOD 2

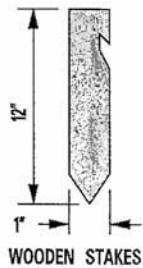
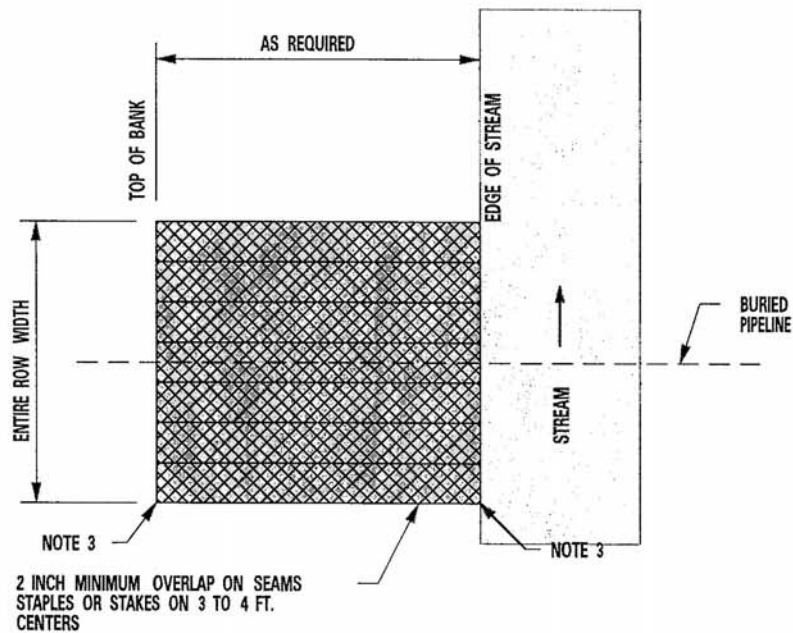


METHOD 3



- NOTES:
1. REPLACEMENT PIPE TO BE AS NEAR AS POSSIBLE TO THE DIAMETER OF THE FIELD TILE.
 2. STEEL CARRIER PIPE TO HAVE INSIDE DIAMETER AS NEAR AS POSSIBLE THE OUTSIDE DIAMETER OF THE FIELD TILE.
 3. MAINTAIN ORIGINAL FLOW LINE OF FIELD TILE IN ALL METHODS.

NOT TO SCALE

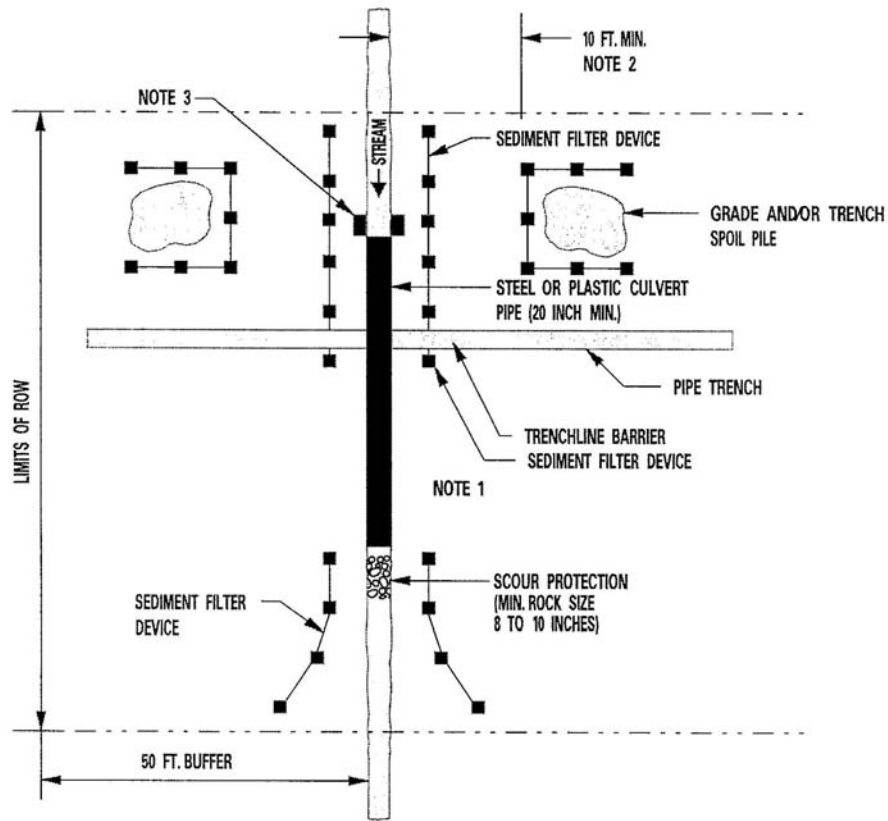


- NOTES:
1. INSTALL JUTE NETTING DURING RESTORATION.
 2. LIME, FERTILIZE, SEED AND MULCH AREA TO BE JUTE NETTED.
 3. TRENCH IN AND BURY UPHILL AND UPSTREAM EDGE OF JUTE NETTING.
 4. AN INTERCEPTOR DIVERSION WILL BE INSTALLED IMMEDIATELY ABOVE JUTE NETTING ON SLOPED BANKS.
 5. ON SHORT BANKS (LESS THAN 10'), JUTE NETTING CAN BE PERPENDICULAR TO BANK SLOPE.
 6. INSTALL ON STEEP SLOPES OR ON THE BANKS OF FLOWING STREAMS, OR IN UPLAND AREAS.

NOT TO SCALE

Appendix C-54

**EROSION
CONTROL
BLANKET**

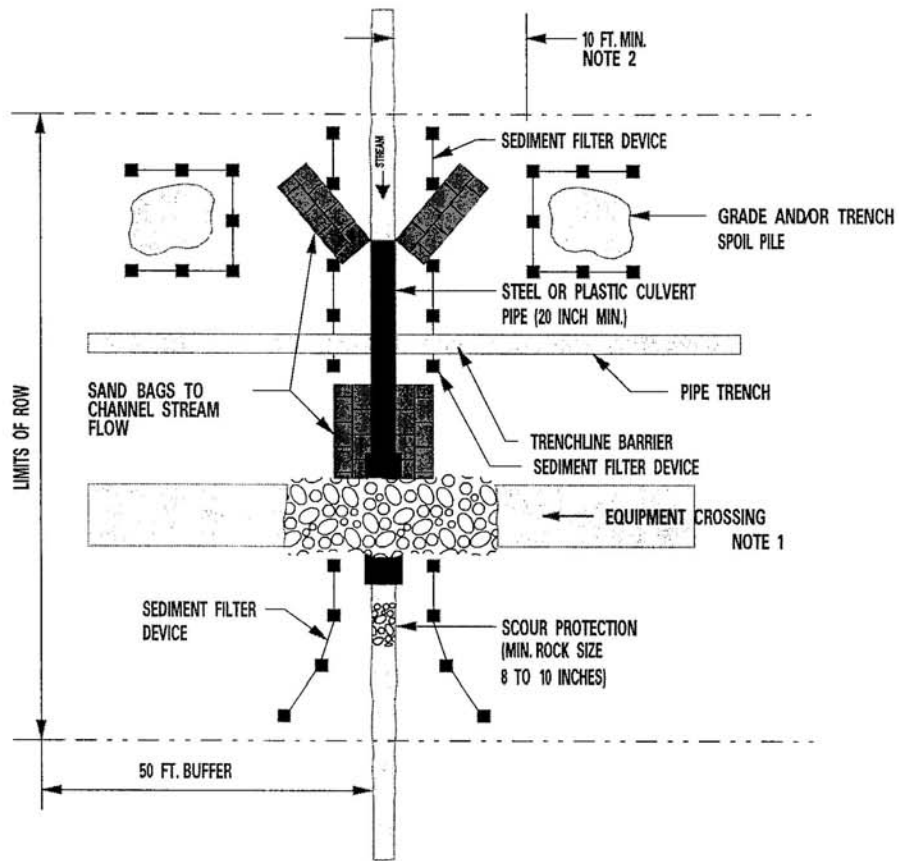


- NOTES:
1. EQUIPMENT CROSSINGS ARE TO BE PREPARED AS ILLUSTRATED IN FIGURES 21 & 22 IF NEEDED.
 2. GRADE AND TRENCH SPOIL WILL BE STOCKPILED AT LEAST 10 FEET FROM THE WATER'S EDGE, TOPOGRAPHY PERMITTING.
 3. SAND BAGS OR EARTH FILLED SACKS WILL BE PLACED AT UPSTREAM END OF CULVERT TO CHANNEL FLOW.

NOT TO SCALE

Appendix C-55

**TYPICAL
STREAM CROSSING
INTERMITTENT
STREAMS**

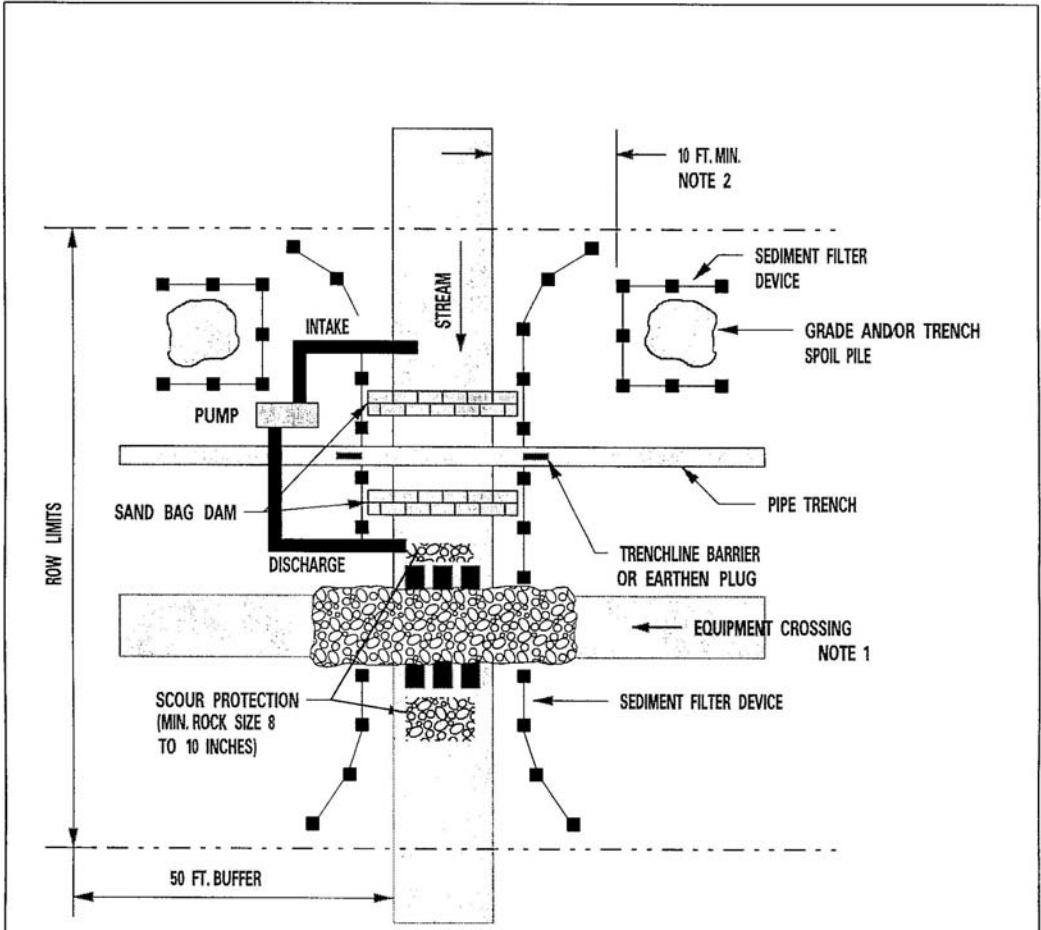


- NOTES:
1. EQUIPMENT CROSSINGS ARE TO BE PREPARED AS ILLUSTRATED IN FIGURES 21 & 22.
 2. GRADE AND TRENCH SPOIL WILL BE STOCKPILED AT LEAST 10 FEET FROM THE WATER'S EDGE.
 3. INSTALL FLUME PIPE AFTER BLASTING (IF NECESSARY), BUT BEFORE TRENCHING.
 4. PROPERLY ALIGN FLUME PIPE(S) TO PREVENT BANK EROSION OR STREAM BED SCOUR.
 5. COMPLETE STREAMBED AND BANK STABILIZATION BEFORE RETURNING FLOW TO THE WATERBODY CHANNEL.

NOT TO SCALE

Appendix C-56

**TYPICAL
STREAM CROSSING
DRY-DITCH**

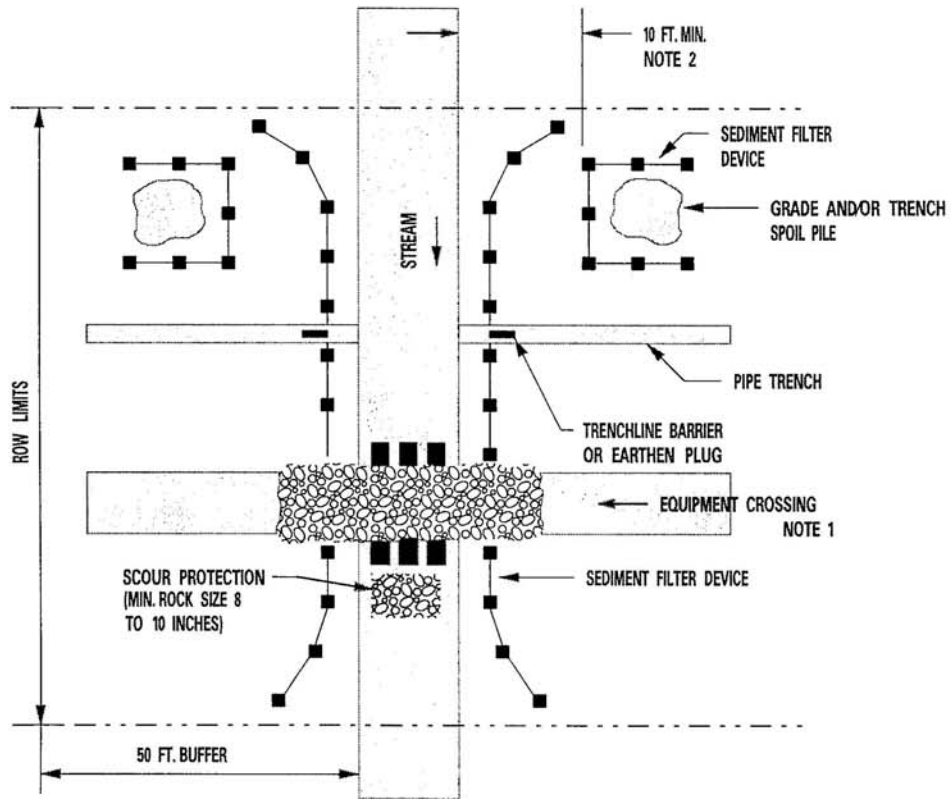


- NOTES:
1. EQUIPMENT CROSSINGS ARE TO BE INSTALLED AS ILLUSTRATED IN FIGURES 21 OR 22.
 2. GRADE AND TRENCH SPOIL WILL BE STOCKPILED AT LEAST 10 FEET FROM THE WATERS' EDGE, TOPOGRAPHY PERMITTING.
 3. PUMP INTAKES WILL BE SCREENED. PREVENT STREAMBED SCOUR AT DISCHARGE.
 4. SUFFICIENT PUMP CAPACITY WILL BE USED TO MAINTAIN STREAM FLOW AT ALL TIMES UNTIL BACKFILL AND REMOVAL OF SANDBAG DAM.
 5. BACKUP PUMPS (AS SAME NUMBER AND CAPACITY AS ACTIVE PUMPS) WILL BE READILY AVAILABLE IN WORKING CONDITION ON SITE AT CROSSING.
 6. CONSTRUCT DAMS WITH MATERIAL THAT PREVENT SEDIMENT AND OTHER POLLUTANTS FROM ENTERING THE WATERBODY.
 7. MONITOR THE DAM AND PUMPS TO ENSURE PROPER OPERATIONS THROUGHOUT THE WATERBODY CROSSING.

NOT TO SCALE

Appendix C-57

**TYPICAL
STREAM CROSSING
DAM AND PUMP**

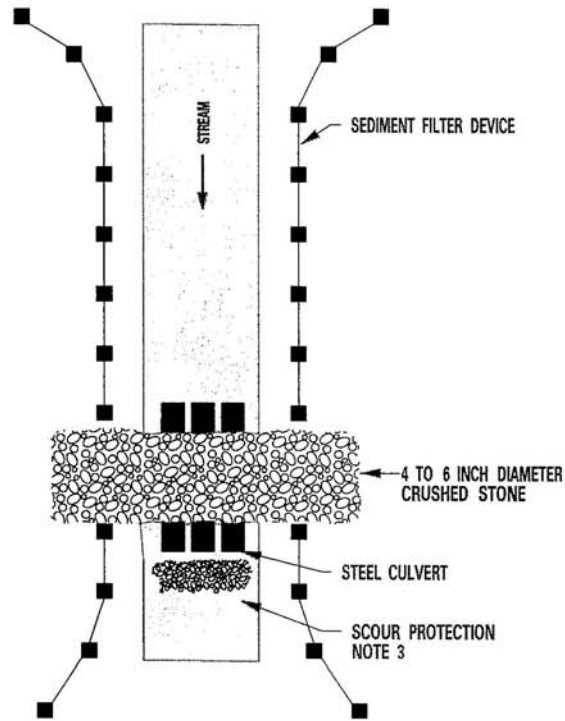


- NOTES: 1. EQUIPMENT CROSSINGS ARE TO BE PREPARED AS ILLUSTRATED IN FIGURES 21 & 22.
 2. GRADE AND TRENCH SPOIL WILL BE STOCKPILED AT LEAST 10 FEET FROM THE WATERS' EDGE.

NOT TO SCALE

Appendix C-58

**TYPICAL
 STREAM CROSSING
 WET-DITCH**

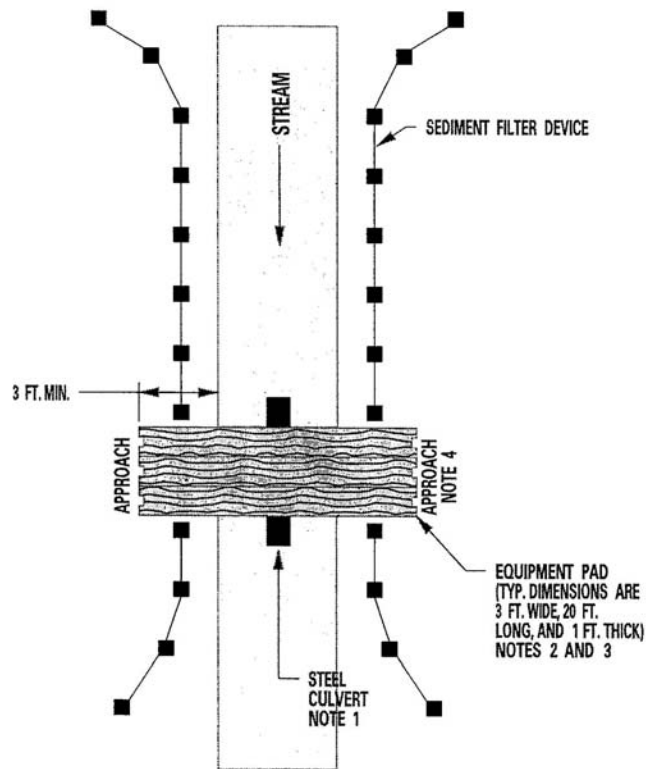


- NOTES:
1. MINIMUM CONTOURING OF THE BOTTOM NECESSARY TO LAY THE CULVERTS LEVEL MAY BE DONE.
 2. USE AS MANY CULVERTS AS REQUIRED TO SPAN ENTIRE STREAM BED. (CULVERTS SHALL BE PLACED SIDE BY SIDE.)
 3. STONES WILL BE PLACED AT THE OUTLET OF ALL CULVERTS TO PROVIDE SCOUR PROTECTION IN THE EXISTING CHANNELS. MINIMUM ROCK SIZE: 8 TO 10 INCHES.
 4. MINIMUM CULVERT DIAMETER 20 INCHES .
 5. MAINTAIN ROCK AS NOT TO ALLOW MUD TO ENTER THE STREAM.
 6. ALIGN CULVERTS TO PREVENT BANK EROSION.

NOT TO SCALE

Appendix C-59

**TEMPORARY
EQUIPMENT CROSSING
CULVERT AND STONE**

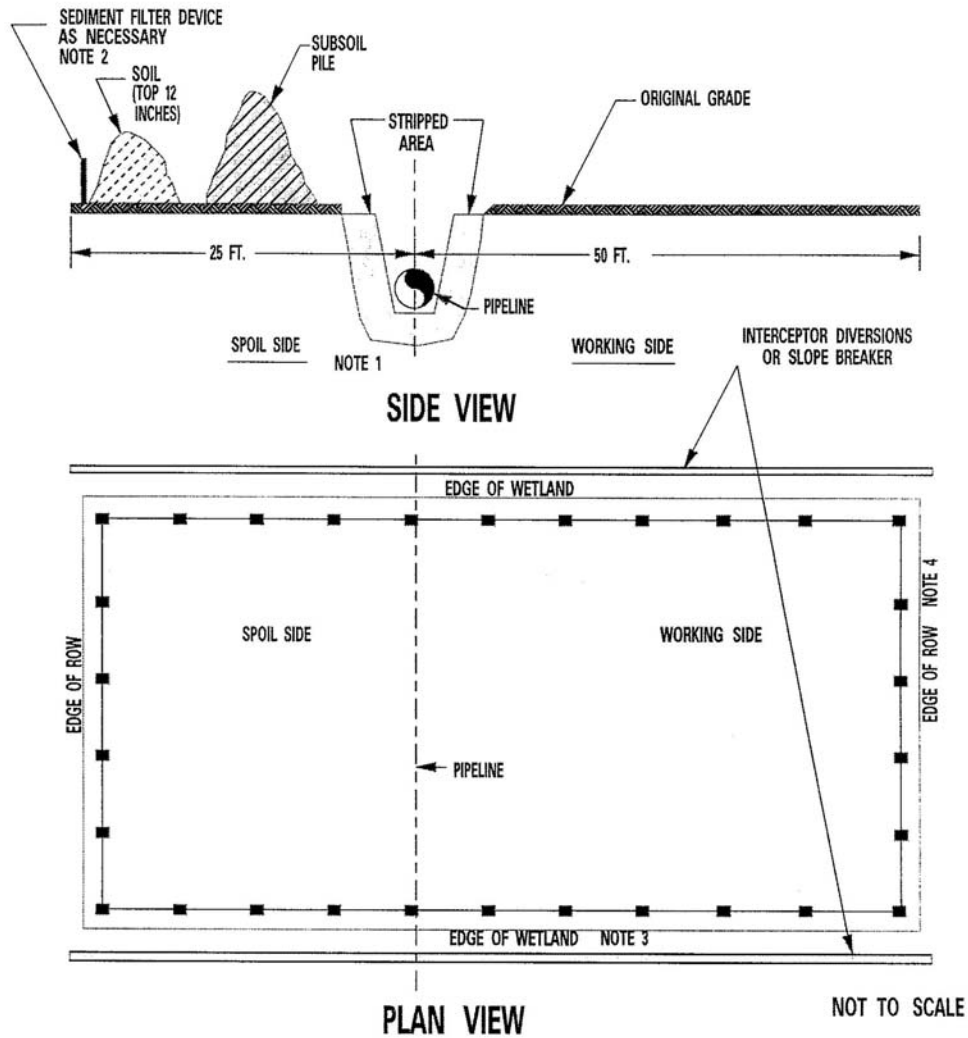


- NOTES:
1. CULVERT PIPE UTILIZED IF ADDITIONAL SUPPORT IS REQUIRED. ALIGN CULVERT TO PREVENT SCOUR OR BANK EROSION.
 2. ADDITIONAL PADS CAN BE PUT SIDE BY SIDE IF EXTRA WIDTH IS REQUIRED.
 3. EQUIPMENT PAD TYPICALLY CONSTRUCTED OF HARDWOOD; MUST ACCOMMODATE THE LARGEST EQUIPMENT USED.
 4. RAMP APPROACHES CAN EITHER BE GRADED OR DUG INTO GROUND. IF NECESSARY, CRUSHED STONE WILL BE USED TO RAMP UP TO THE EQUIPMENT PADS.
 5. MINIMUM CULVERT DIAMETER 20 INCHES.
 6. MAINTAIN PADS SO AS NOT TO ALLOW MUD TO ENTER THE STREAM

NOT TO SCALE

Appendix C-60

**TEMPORARY
EQUIPMENT CROSSING
EQUIPMENT PADS**

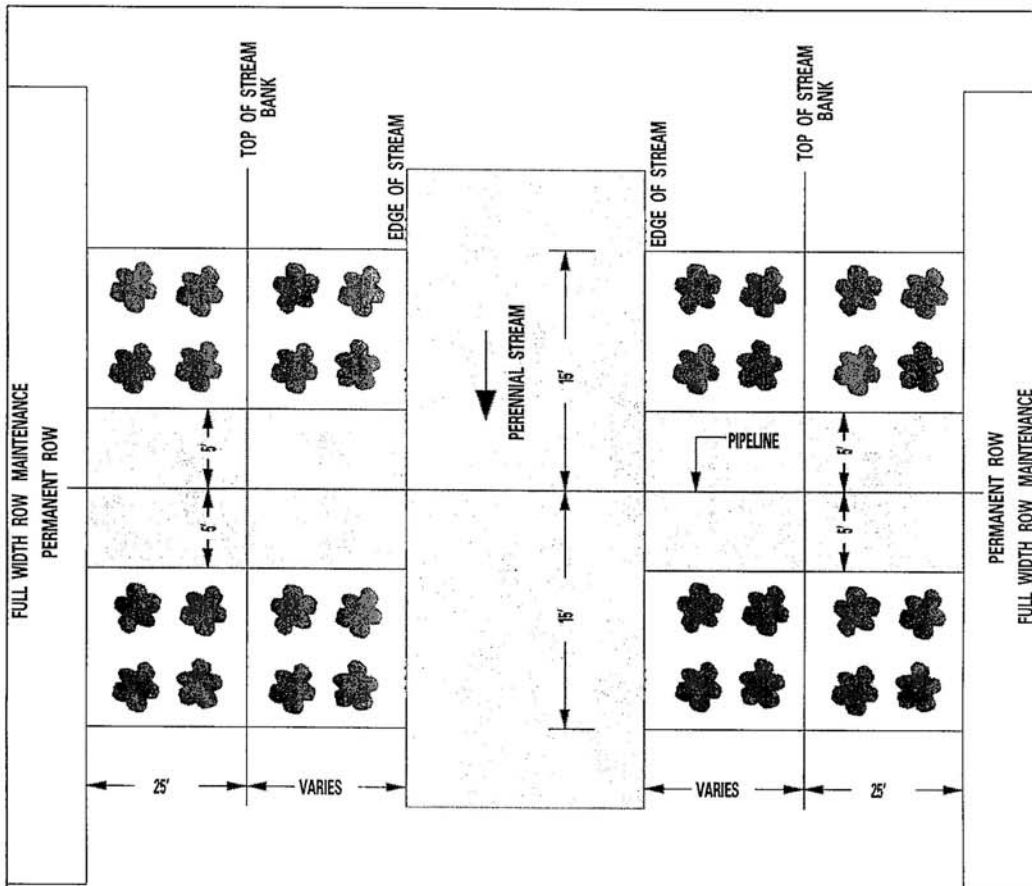


NOTES:

1. IN WETLAND AREAS WHICH CONTAIN NO STANDING WATER OR IF SOILS ARE SATURATED OR FROZEN, TOPSOIL (TOP 12 INCHES) AND SUBSOIL WILL BE STOCKPILED SEPARATELY WITHIN THE WETLAND CONSTRUCTION ROW.
2. WETLANDS WITH STANDING WATER, SATURATED OR FROZEN SOIL, OPERATE EQUIPMENT PER REQUIREMENTS IN SECTION III.B-2. (ECS)
3. A SEDIMENT FILTER DEVICE WILL BE PLACED ACROSS THE ROW AT THE WETLAND'S EDGE, IMMEDIATELY UPSLOPE OF THE WETLAND BOUNDARY.
4. A SEDIMENT FILTER DEVICE WILL BE PLACED AT THE EDGE OF THE ROW AND AROUND SOIL AND SUBSOIL PILES AS NECESSARY.

Appendix C-61

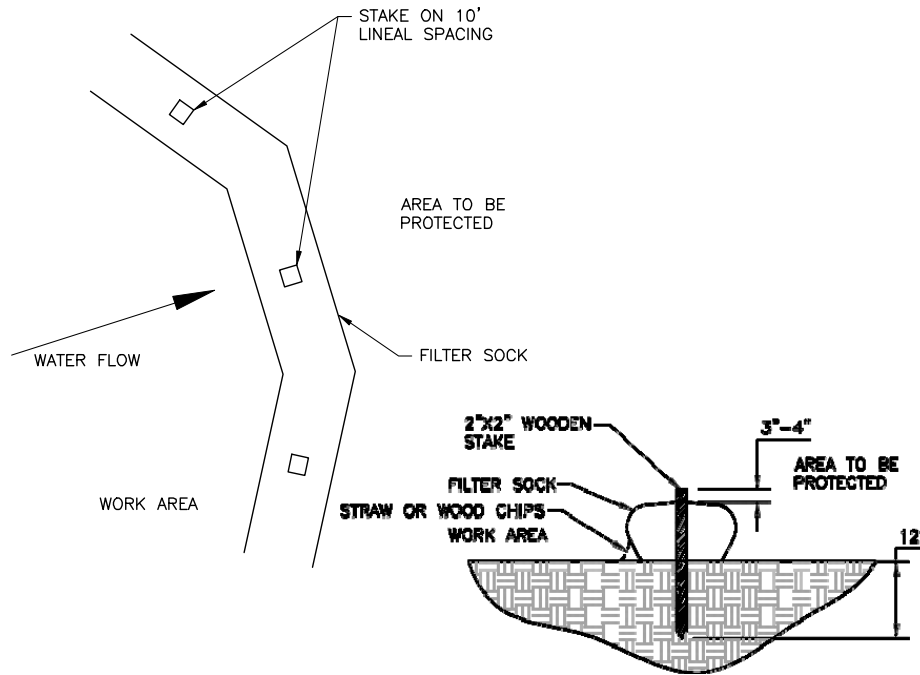
**TYPICAL
WETLAND
CROSSING**



 = TREES

- NOTES:
1. FULL WIDTH ROW MAINTENANCE PRACTICES WITHIN 25 FEET OF PERENNIAL STREAMBANKS ARE PROHIBITED.
 2. A CORRIDOR UP TO 10 FEET WIDE CENTERED ON THE PIPELINE OR APPURTENANCES MAY BE MAINTAINED IN A HERBACEOUS STATE.
 3. TREES LOCATED WITHIN 15 FEET OF THE PIPELINE AND GREATER THAN 15 FEET TALL MAY BE SELECTIVELY CUT AND REMOVED FROM THE ROW.

NOT TO SCALE



NOTES:

1. COMPOST FILTER SOCK TO BE FILTREXX SILTSOXX OR APPROVED EQUIVALENT.
2. 8", 12", 18", AND 24" COMPOST FILTER SOCK TO BE USED. SEE PLAN SHEET FOR SIZES AND LOCATIONS.
3. ACCUMULATED SEDIMENT SHALL BE REMOVED AND DISPOSED OF WHEN IT REACHES 1/4 THE ABOVE GROUND HEIGHT OF THE COMPOST FILTER SOCK.
4. COMPOST FILTER SOCK SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED COMPOST FILTER SOCK SHALL BE REPAIRED ACCORDING TO MANUFACTURER'S SPECIFICATIONS.

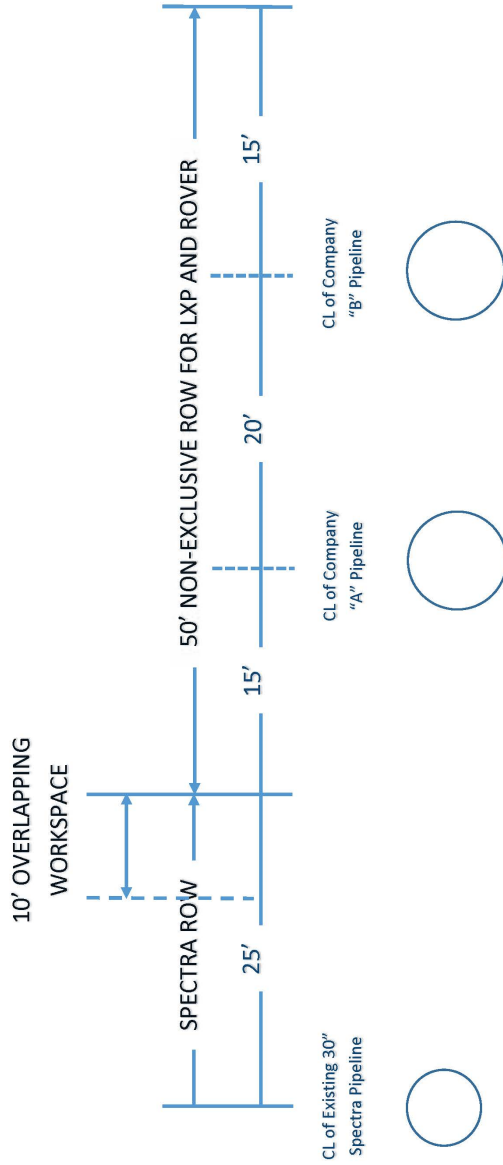
NOT TO SCALE

Appendix C-63

TYPICAL
COMPOST
FILTERSOCK

**Columbia Gas Transmission, LLC
Leach XPress Project**

Leach XPress Pipeline / Rover Pipeline Typical ROW Cross Section



Appendix C-64

**TYPICAL ROW CROSS
SECTION FOR
COLLOCATION
SEGMENTS**

NOT TO SCALE