

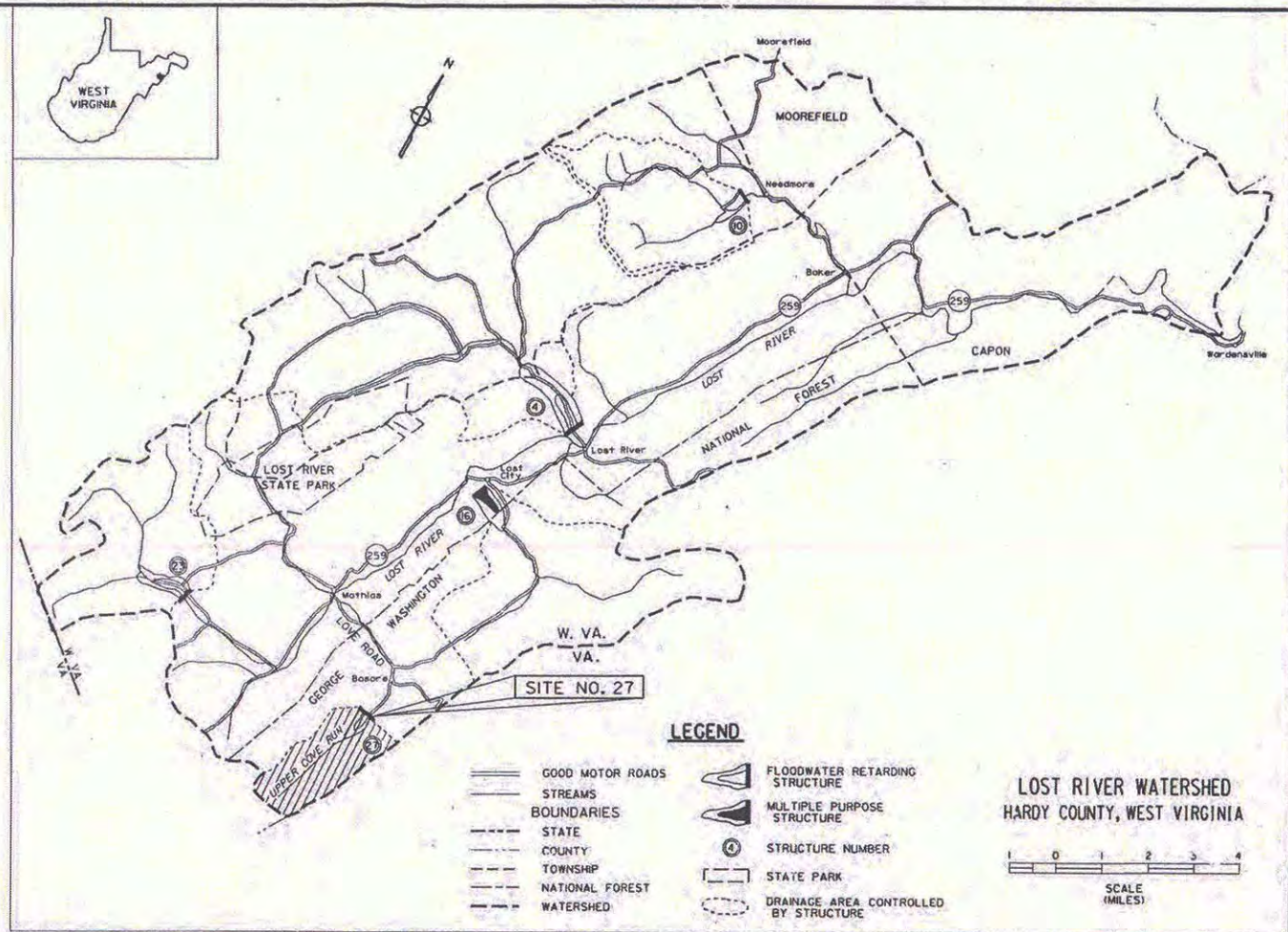
LOST RIVER SUB-WATERSHED OF THE POTOMAC RIVER WATERSHED PROJECT SITE No. 27 HARDY COUNTY, WEST VIRGINIA

DRAINAGE AREA	2,403 ACRES
FLOOD STORAGE TO EMERGENCY SPILLWAY CREST	498 ACRE FEET
WATER SURFACE AREA AT PERMANENT POOL	7.2 ACRES
HEIGHT OF DAM	75 FEET
VOLUME OF FILL	357,500 CUBIC YARDS

SOIL CONSERVATION SERVICE
of the
U. S. DEPARTMENT OF AGRICULTURE
cooperating with
POTOMAC VALLEY SOIL CONSERVATION DISTRICT
HARDY COUNTY COMMISSION
WEST VIRGINIA STATE SOIL CONSERVATION COMMITTEE
1994

SHEET NO.	TITLE	SHEET NO.	TITLE
1.	COVER SHEET	27.	WATER SUPPLY PIPE DETAILS - SHEET 1 OF 5
2.	GENERAL PLAN	28.	WATER SUPPLY PIPE DETAILS - SHEET 2 OF 5
3.	DAMSITE PLAN	29.	WATER SUPPLY PIPE DETAILS - SHEET 3 OF 5
4.	LAYOUT/GEOMETRY	30.	WATER SUPPLY PIPE DETAILS - SHEET 4 OF 5
5.	CENTERLINE DAM PROFILE	31.	WATER SUPPLY PIPE DETAILS - SHEET 5 OF 5
6.	TYPICAL DAM SECTIONS - SHEET 1 OF 2	32.	IMPACT BASIN DETAILS - SHEET 1 OF 5
7.	TYPICAL DAM SECTIONS - SHEET 2 OF 2	33.	IMPACT BASIN DETAILS - SHEET 2 OF 5
8.	FOUNDATION TREATMENT DETAILS	34.	IMPACT BASIN DETAILS - SHEET 3 OF 5
9.	DRAINAGE SYSTEM DETAILS - SHEET 1 OF 3	35.	IMPACT BASIN DETAILS - SHEET 4 OF 5
10.	DRAINAGE SYSTEM DETAILS - SHEET 2 OF 3	36.	IMPACT BASIN DETAILS - SHEET 5 OF 5
11.	DRAINAGE SYSTEM DETAILS - SHEET 3 OF 3	37.	BRONZE PLAQUE & MONUMENT
12.	DRAIN OUTLET - PLAN & PROFILE	38.	SEDIMENT CONTROL DETAILS
13.	DRAIN OUTLET DETAILS	39.	GUTTER AND WATERWAY DETAILS
14.	CONSTRUCTION DETAILS	40.	SEEDING AND FENCING PLAN
15.	EMERGENCY SPILLWAY PROFILE	40A.	PERMANENT SEEDING LIMITS FOR ADDITIONAL WASTE AREAS #1#2
16.	EMERGENCY SPILLWAY SECTIONS	40B.	SURVEY FOR PERMANENT SEEDING QUANTITIES
17.	PRINCIPAL SPILLWAY - PLAN & PROFILE	41.	FENCING DETAILS
18.	PRINCIPAL SPILLWAY SECTIONS	42.	MISCELLANEOUS DETAILS
19.	PRINCIPAL SPILLWAY - OUTLET DETAILS	43.	LOGS OF DRILL HOLES
20.	RISER STRUCTURAL DETAILS - SHEET 1 OF 4	44.	LOGS OF DRILL HOLES AND TEST HOLES
21.	RISER STRUCTURAL DETAILS - SHEET 2 OF 4	45.	LOGS OF TEST HOLES
22.	RISER STRUCTURAL DETAILS - SHEET 3 OF 4	46.	LOGS OF BORE HOLES - SHEET 1 OF 3
23.	RISER STRUCTURAL DETAILS - SHEET 4 OF 4	47.	LOGS OF BORE HOLES - SHEET 2 OF 3
24.	CONDUIT & CRADLE DETAILS	48.	LOGS OF BORE HOLES - SHEET 3 OF 3
25.	STEPPED CHANNEL TRASHRACK DETAILS	49.	LOGS OF TEST PITS - SHEET 1 OF 3
26.	RISER LADDER DETAILS	50.	LOGS OF TEST PITS - SHEET 2 OF 3
		51.	LOGS OF TEST PITS - SHEET 3 OF 3

GANNETT FLEMING, INC.
HARRISBURG, PENNSYLVANIA



Construction Completion Date: 10/14/98

Contractor:
Kanawha Stone Company, Inc.
P.O. Box 503
Nitro, Wv. 25143

Contract No.:
50-SSCC-5-6

Government Representative:
Roger L. Sites

Inspectors:
Michael S. Allen
Gundy Edmonds
David T. Hoffman
David S. Pierce



William Bingham

"As Built"

REVISION NUMBER	SHEET NUMBER	REVISION	REVISION DATE	REVISION BY
2	3	SLOPE CHANGE, ESW	9/95	W.F.C.
1	2,14,20,37	GENERAL REVISIONS	4/95	W.F.C.
1	13,16,24,27,28	LOCATION OF WATER SUPPLY PIPE	4/95	W.F.C.

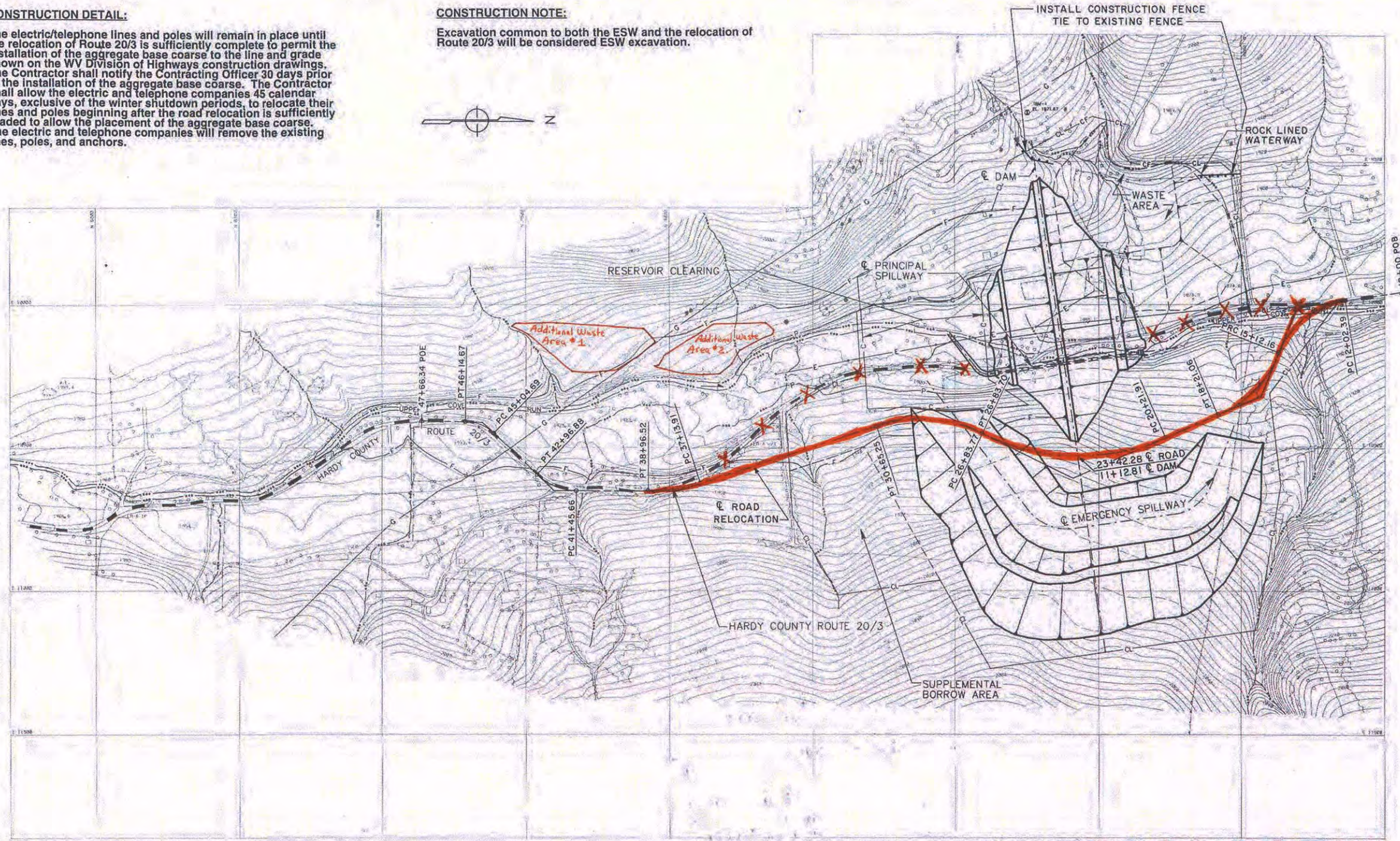
LOST RIVER SUB-WATERSHED SITE NO. 27 HARDY COUNTY, WEST VIRGINIA	
COVER SHEET	
U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
Designed <u>R.E. Holderbaum</u>	Date <u>6/94</u>
Drawn <u>K.P. Dundore</u>	Approved <u>[Signature]</u> Title <u>STATE CONSERVATION ENGINEER</u>
Traced <u>C.A.D.D.</u>	Title <u>HEAD, ENGINEERING STAFF, NNTC</u>
Checked <u>P.G. Schweigler</u>	Sheet No. <u>1</u> of <u>51</u>

CONSTRUCTION DETAIL:

The electric/telephone lines and poles will remain in place until the relocation of Route 20/3 is sufficiently complete to permit the installation of the aggregate base course to the line and grade shown on the WV Division of Highways construction drawings. The Contractor shall notify the Contracting Officer 30 days prior to the installation of the aggregate base course. The Contractor shall allow the electric and telephone companies 45 calendar days, exclusive of the winter shutdown periods, to relocate their lines and poles beginning after the road relocation is sufficiently graded to allow the placement of the aggregate base course. The electric and telephone companies will remove the existing lines, poles, and anchors.

CONSTRUCTION NOTE:

Excavation common to both the ESW and the relocation of Route 20/3 will be considered ESW excavation.



NOTE: THE \odot FOR THE RELOCATION OF RTE. 20/3 IS SHOWN FOR INFORMATION ONLY. LAYOUT DATA FOR THE RELOCATION OF RTE. 20/3 SHALL BE OBTAINED FROM THE WV DOH CONSTRUCTION DRAWINGS.

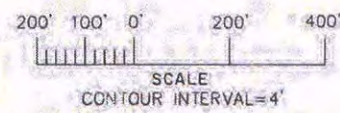
Construction Completion Date: 10/14/98

LEGEND

- \triangle LR-5 IP SURVEY BASELINE LOCATION AND IDENTIFICATION NUMBER
- \odot TBM #1 TEMPORARY BENCHMARK LOCATION AND IDENTIFICATION NUMBER
- \otimes UTILITY POLE
- E—E— O.H. ELECTRIC LINE
- G—G— FENCE
- G—G— GAS PIPELINE
- T—T— TREE LINE
- S—S— STREAM/DRAIN
- CL— CONSTRUCTION LIMITS
- P— PERMANENT POOL (EL. 1909.8 FT.)
- F— FLOOD POOL (EL. 1939.9 FT.)
- C— CLEARING LIMITS
- CF— CONSTRUCTION FENCE

"As Built"

PLAN



TOPOGRAPHIC MAPPING
PERFORMED BY L. ROBERT KIMBALL, INC. 1993
BASED ON AERIAL PHOTOGRAPHY

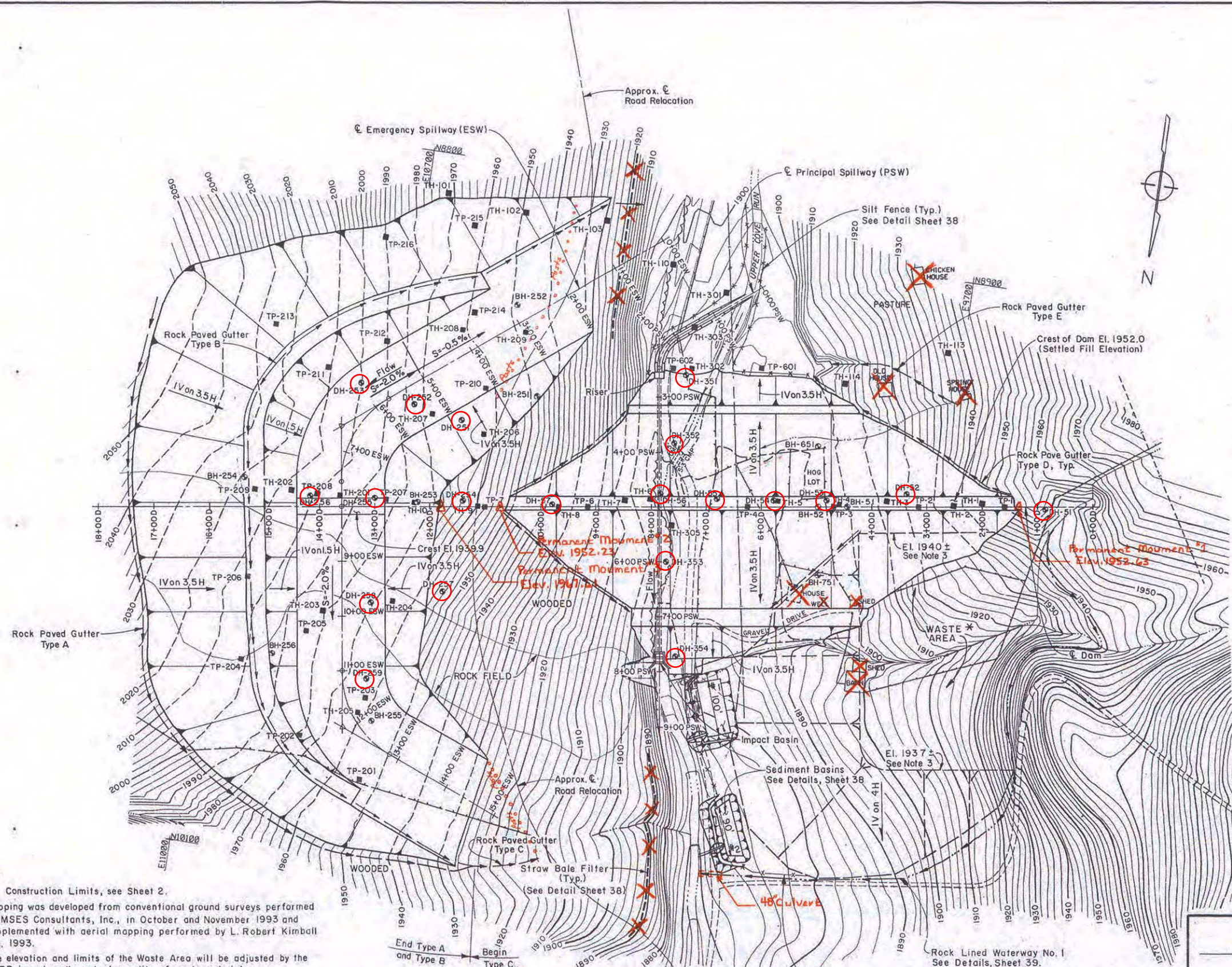
REV. # 1, BY W.F.CONLEY 4/95



William B. Bingham

GANNETT FLEMING, INC.
HARRISBURG, PA

LOST RIVER SUB-WATERSHED SITE NO. 27 HARDY COUNTY, WEST VIRGINIA			
GENERAL PLAN			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
DESIGNED	G. W. WARREN	DATE	6/94
DRAWN	JODY FLEMING	DATE	6/94
TRACED	C.A.D.D.	DATE	6/94
CHECKED	R. E. HOLDERBAUM	DATE	6/94
APPROVED BY		TITLE	
SHEET NO. 2		DRAWING NO.	
OF 51			



LEGEND

- STRAW BALE FILTER
- ROCK LINED WATERWAY
- ROCK PAVED GUTTER
- SILT FENCE OR GEOTEXTILE
- EXISTING ROAD OR DRIVE
- TOP OF ROCK
- EXISTING GROUND/LIMIT OF EXCAVATION
- ⊕ SECTION CUT DESIGNATION (A-SECTION LETTER, II-SHEET WHERE SECTION IS CUT OR SHOWN)
- RIPRAP
- × 1920.3 SPOT ELEVATION
- EXCAVATION OR FILL SLOPE
- CENTERLINE
- EXISTING CONTOUR ALTERED BY PROPOSED CONSTRUCTION
- EXISTING OR PROPOSED CONTOUR
- ⊕ BH-1 BORE HOLE OR DRILL HOLE LOCATION AND IDENTIFICATION NUMBER
- ⊕ TP-1 TEST PIT OR TEST HOLE LOCATION AND IDENTIFICATION NUMBER
- ⊕ UTILITY POLE
- O. H. ELECTRIC LINE
- GAS PIPELINE
- FENCE
- TREE LINE
- STREAM/DRAIN

"As Built"

NOTES:

1. For Construction Limits, see Sheet 2.
2. Mapping was developed from conventional ground surveys performed by MSES Consultants, Inc., in October and November 1993 and supplemented with aerial mapping performed by L. Robert Kimball Inc. 1993.
3. The elevation and limits of the Waste Area will be adjusted by the COTR based on the actual quantity of waste material.
4. For Rock Paved Gutter details, see Sheet 39.
5. Actual location of Sediment Basins to be approved in the field by the COTR.
6. Type C Rock Paved Gutter connects to Road Ditch.



PLAN



CONTOUR INTERVAL : 2 FEET

Silt Fence to Continue along Toe of Slope with Additional Rows Installed along Slope at Horizontal Intervals of ±100 Feet. Maintain Until Vegetation is Established.

Construction Completion Date: 10/14/98

* All disturbed portions of the designated Waste Area shall be covered with a minimum of 2 feet of earth cover.

REV. #2, BY W.F. CONLEY 9/95

LOST RIVER SUB-WATERSHED
SITE NO. 27
HARDY COUNTY, WEST VIRGINIA

DAMSITE PLAN

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	P. Schweiger	Date	6/94	Approved by	
Drawn	W. Olberg	Date	6/94	Title	
Traced	W. Olberg	Date	6/94	Title	
Checked	R. Holderbaum	Date	6/94	Sheet No.	3 of 51

GANNETT FLEMING, INC.
HARRISBURG, PENNSYLVANIA

William B. Bingham

DH #51 Elev. 1958.0

0.0 - 20.4	Clay; silty, yellowish, med. plastic, numerous subrounded to subangular sandstone cobbles & boulders - CL	0.0-20.4	Soil boring
		Nx=	RQD
		100%	97%
20.4 - 65.0	Shale; dark gray, limy, mod. soft, with interbedded shaly limestone, thin wavy calcite seams, clay seams at 29.5-29.8, 58.4-58.6, massive cores, little evidence of bedding, appears to be dipping about 45°, fractured from 28.4-29.5, Martinsburg shale	20.4-23.4 23.4-28.4 28.4-33.4 33.4-38.4 38.4-43.4 43.4-48.4 48.4-53.4 53.4-58.4 58.4-62.3 62.3-65.0	100% 90% 100% 96% 100% 100% 100% 100% 98% 100%

65.0 Bottom of hole

Water Level - 1947.7
Date - May 6, 1976

Pressure Test Data

23.0 - 28.0	0.6 gpm @ 10 psi
28.0 - 33.0	12.8 gpm @ 10 psi
33.0 - 65.0	0.0 gpm @ 15 psi

DH #52 Elev. 1923.6

0.0 - 12.6	Clay; silty, yellowish & gray brown, moist, loose, low plasticity, 20% fine sand, 10% cobbles, max. particle size 10", surface has many boulders, max. size 24", colluvial & alluvial CL	0.0-12.6	Soil boring
		Nx=	RQD
		86%	86%
		100%	100%
		94%	94%
		100%	100%
		100%	100%
		100%	100%
		100%	100%
		100%	100%
		100%	100%

64.0 Bottom of hole

Water Level - 1903.8

Pressure Test Data

13.0 - 64.0	0.0 gpm @ 15 psi
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DH #53 Elev. 1897.2

0.0 - 0.6	Silt; sandy, moist, brown, soft to dense, slightly organic, topsoil - ML	0.0-3.5 3.5-15.0 15.0-10.0 10.0-11.5	SB SB SB RB
0.6 - 10.0	Silt; clayey, boulders to 0.6, thick at 8-10', olive, dense, med. to high plasticity, lensed, colluvial - ML	17.5-19.0 19.0-24.0 24.0-29.0 29.0-34.0 34.0-39.0	Nx= RQD 100% 93% 100% 100% 100% 100% 100% 100%
10.0 - 16.4	Sand; silty, boulders 13.0-14.0, to 0.5" thick (sandstone), mod. soft, brown, wet, med. to low plasticity fines, alluvial - SM	29.0-34.0 34.0-39.0	100% 100% 100% 100%

16.4 - 17.5 Shale; highly weathered, mod. soft to soft, silty texture, olive

17.5 - 39.0 Shale; gray, mod. weathered, mod. soft, with interbedded limestone, thin calcite seams, 24.5, 26.9, 31.4, 32.0, 34.0, relief fracture at 26.2 shows some pyrite, breaks on 40-45°, massive cores

39.0 Bottom of hole

Water Level - 1896.0
Date - May 10, 1976

Pressure Test Data

18.0 - 23.0	0.5 gpm @ 10 psi
23.0 - 39.0	0.0 gpm @ 10 psi

DH #54 Elev. 1888.14

0.0 - 0.6	Silt; dark gray, moist, soft, organic, topsoil - ML	0.0-1.5 1.5-3.0 3.0-4.5 4.5-6.0 6.0-7.5 7.5-8.8	SB SB SB SB SB 50/0.3
0.6 - 5.0	Sand; silty, moist, soft, dark brown, some sandstone cobbles, low plasticity fines - SM	8.8-9.5 9.5-14.5 14.5-19.5 19.5-24.5 24.5-29.5 29.5-34.5	Nx= RQD 70% 60% 100% 100% 100% 100% 100% 96% 90% 60% 100% 100%
5.0 - 8.3	Sand; clayey, dark gray, soft, moist, med. to high plasticity, medium stiff thread, moist to wet at 4.2 - SC	29.5-34.5 34.5-39.5	100% 100% 100% 100%

8.3 - 39.5 Shale; dark gray to black, limy, mod. soft to mod. hard, interbedded with dark gray fine grained limestone, thin calcite seams in fractures & bedding and 1/2" to 2.0" crystalline calcite in bedding planes at 24.0, 27.5, 34.0, massive appearance to cores, bedding hard to distinguish, dipping about 20°, random calcite filled fractures to 34.0, solid core to 39.5, moderate reaction to HCl throughout, mod. weathered to 34.0, unweathered 34.0 to 39.5, Ordovician shale, Martinsburg

39.5 Bottom of hole

Water Level - 1885.7
Date - May 20, 1976

Pressure Test Data

10.0 - 15.0	13.2 gpm @ 10 psi
15.0 - 20.0	12.4 gpm @ 10 psi
20.0 - 25.0	4.6 gpm @ 10 psi
25.0 - 30.0	13.0 gpm @ 10 psi
30.0 - 35.0	0.0 gpm @ 10 psi
35.0 - 39.5	0.0 gpm @ 10 psi

DH #55 Elev. 1887.4

0.0 - 1.0	Sand; silty, moist, dense, dark brown, slightly organic, topsoil SM	0.0-1.5 1.5-2.5 2.5-4.0 4.0-9.3	N= SB SB SB SB
1.0 - 9.0	Sand; silty, cobbly, well graded, max. particle size 16", dark brown, moist to wet, loose, lensed, alluvium - SM	9.3-14.3 14.3-16.3 16.3-17.6 17.6-19.5 19.5-24.5 24.5-29.5 29.5-34.5 34.5-39.5	Nx= RQD 100% 100% 100% 100% 85% 85% 100% 100% 100% 100% 100% 100% 100% 100% 100% 100%

9.0 - 39.5 Shale; dark gray to very dark gray, med. to very fine grain, mod. weathered to 14.3, mod. soft to mod. hard, thin bedded to massive bedding (not definite) mod. reaction to HCl, calcite filled joints 25.9-26.2, 29.1-29.3, 35.1-35.4, 36.8-36.9, 1/8 to 1/2", good cores

39.5 Bottom of hole

Water Level - 1883.9

Pressure Test Data

10.0 - 15.0	10.0 gpm @ 10 psi
15.0 - 20.0	5.0 gpm @ 10 psi
20.0 - 39.5	0.5 gpm @ 20 psi

DH #56 Elev. 1885.26

0.0 - 3.5	Cobbles, gravelly, silty, max. particle size 24", fine to coarse grained sandstone & limestone, subrounded to subangular, mod. hard, bedload, alluvial - GM	0.0-3.5 3.5-8.0 8.0-9.0 9.0-9.9 9.9-13.0 13.0-18.0 18.0-23.0 23.0-28.0	N= SB Nx= RQD 38% 15% 100% 100% 44% 0% 100% 100% 100% 100% 100% 100% 100% 100%
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3.5 - 10.0 Shale; limy, mod. hard, gray, thin bedded, Fe stained, clay filled fractures 4.2-8.0, calcite seams 1/8" at 4.0-4.2, 8.2-8.8, cores badly broken 4.2-8.0, highly weathered to mod. weathered

10.0 - 28.0 Shale; limy, gray, silt texture, massive, mod. hard, 1/4" vertical calcite seam 23.0-23.3, 25.0-28.0, cores fractured at 27.6-28.0, bedding planes not definite

28.0 Bottom of hole

Water Level - 1884.8

Pressure Test Data

11.0 - 16.0	0.0 gpm @ 30 psi
15.0 - 28.0	0.0 gpm @ 30 psi

DH #57 Elev. 1939.5

0.0 - 1.0	Silt; dark gray to black, soft, moist, organic, topsoil - ML	0.0-3.5 3.5-5.0 5.0-8.5 8.5-10.0	N= SC SB SB SB
1.0 - 8.0	Sand; clayey, max. particle size 1/2", slow to no dilatancy, red to olive at 7.0, med. to high plasticity fines, moist, lensed, alluvial - SC	10.0-13.5 13.5-15.0 15.0-18.5 18.5-20.0 20.0-23.5 23.5-25.0 25.0-28.5 28.5-30.0 30.0-33.5 33.5-34.0	Nx= RQD 73% 13% 27% 0% 22% 0% 96% 90% 100% 100% 100% 100% 100% 100% 100% 100% 100% 100%

17.0 - 33.0 Silt; clayey, max. particle is fine grained sand, low plasticity, olive, wet, lensed, alluvial - ML

33.0 - 34.0 Clay; silty, max. particle size 1/4", med. plasticity fines, olive, moist, blocky, alluvial - CL

34.0 - 43.5 Shale; silt texture, highly weathered, gray, mod. soft, bedding planes not well defined, cores 1/2 to 3.0", numerous mud filled & Fe stained fractures and joints

43.5 - 64.0 Shale; interbedded with limy shale, dark gray, silt to fine grained sand, texture, unweathered, mod. soft, calcite seams, 43.5-43.7, 45.0, 46.2-46.5, 47.0, 47.6, 50.0, no definite bedding visible, cores break on 20-30° angle, good cores 0.2" to 2.5", vertical slickensides at 51.0'

64.0 Bottom of hole

Water Level - 1915.1

Pressure Test Data

44.0 - 64.0	0.0 gpm @ 10 psi
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DH #251 Elev. 1970.4

0.0 - 0.8	Silt; gray, moist, max. particle size 24.0", 30-40% subangular sandstone boulders, low dry strength, organic, topsoil - ML	0.0-10.0 10.0-11.5 11.5-15.5 15.5-17.0 17.0-20.5 20.5-22.0 22.0-26.0 26.0-27.5 27.5-31.0	N= SB SB SB SB SB SB SB SB
0.8 - 3.5	Silt; sandy, reddish olive, boulders to 2.0" to 2.0" in diameter, med. to high dilatancy, med. dry strength, med. to low plasticity fines, moist, lensed, colluvial - SM/ML	31.0-36.0	Nx= RQD 62% 26%

3.5 - 30.0 Clay; silty, olive & brown lenses, max. particle size 1/8", med. plasticity, slow dilatancy, moist, stiff, lensed, colluvial, cobbles from 29.0-30.0 - CL

30.0 - 31.0 Shale; highly weathered, silt texture, mod. soft, olive, no core recovery

31.0 - 36.0 Shale; mod. weathered, silt texture, mod. soft to mod. hard, 2-8" cores, dark gray, calcite filled vertical fractures from 33.0-33.7, 35.0-36.0

36.0 Bottom of hole

Water Level - 1940.2
Date - May 18, 1976

DH #252 Elev. 1983.9

0.0 - 1.0	Silt; sandy, dark brown, dry, organic (roots), topsoil - ML	0.0-35.5 35.5-37.5 37.5-42.5 42.5-47.5 47.5-52.5	N= SB Nx= RQD 40% 0% 76% 50% 100% 98% 100% 100%
1.0 - 22.9	Clay; silty, olive, moist, firm, medium plasticity, med. dilatancy, colluvial - CL		

22.9 - 24.0 Silt; clayey, olive with dark brown alluvial gravel, firm, moist to wet, med. plasticity fines, med. dilatancy, lensed, terrace - ML

24.0 - 35.0 Silt; clayey, olive to dark brown, firm, moist to wet, med. plasticity fines, residual - ML

35.0 - 42.3 Shale; silty texture, gray with Fe stained joints & fractures, highly weathered, mod. soft, thin bedded, cores 2.0" & less in size

42.3 - 52.5 Shale; with interbedded shaly limestone, silt to fine sand texture, unweathered, mod. soft to mod. hard, bedding pattern not well defined, soft seam 42.8-42.9, cores 1.0' to 0.2' in length

52.5 Bottom of hole

Water Level - 1961.0

DH #253 Elev. 2002.3

0.0 - 0.8	Silt; sandy, dark gray, moist, soft, organic, topsoil - ML	0.0-3.0 3.0-4.5 4.5-8.0 8.0-9.5 9.5-13.5	N= SB SB SB SB
0.8 - 3.2	Clay; silty, max. particle size 1/2", dilatancy slow to none, med. to high plasticity, tan to light brown, moist, stiff, stratified, gravel is angular shale, colluvial - CL	15.0-18.0 18.0-23.0 23.0-28.0 28.0-33.0 33.0-36.5 36.5-38.5 38.5-43.5 43.5-48.5 48.5-53.5 53.5-58.5 58.5-63.5 63.5-68.5	Nx= RQD 90% 90% 84% 68% 80% 80% 76% 56% 100% 91% 85% 85% 96% 96% 100% 100% 100% 100% 90% 90% 96% 94%

15.0 - 68.5 Shale; with interbedded limy shale, med. to fine grain, mod. weathered to 23.2, soft seams 22.7-23.2, 31.7-32.0, 32.6-32.7, 33.0, 33.2, calcite filled seam 37.5-37.7, 50.5, 51.0, 58.4-58.7, 66.2-66.5, remaining shale is mod. soft, bedding planes not well defined, good cores, fractures are mud filled, numerous thin calcite filled vertical fractures

68.5 Bottom of hole

Water Level - 1988.5
Date - May 25, 1976

DH #254 Elev. 1964.1 Construction Completion Date: 10/14/98

0.0 - 0.8	Silt; dark gray, numerous 14.0"-16.0" angular to subrounded sandstone cobbles, moist, organic, topsoil - ML	0.0-8.5 8.5-10.0 10.0-13.5 13.5-15.0 15.0-21.5	N= SB SB SB SB SB
0.8 - 3.0	Clay; silty, cobbly, max. particle size 16.0", 40-50% angular & subrounded sandstone cobbles, 40-50% clay, 10-20% silt, reddish brown, slow dilatancy, med. to high plasticity fines, moist, soft, homogeneous, alluvial - CL/ML	21.5-26.5 26.5-31.5 31.5-36.5 36.5-41.5 41.5-46.5 46.5-51.5 51.5-56.5 56.5-61.5	Nx= RQD 76% 40% 80% 56% 100% 100% 100% 100% 94% 94% 100% 100% 100% 100%

3.0 - 9.0 Clay; silty, max. particle size 4.0", 40% rounded to subrounded sandstone gravels, 10-20% silt, brown, med. plasticity, lensed, terrace - CL

9.0 - 21.5 Clay; silty, max. particle size 1/2", slow dilatancy, med. plasticity fines, dark brown, moist to wet, soft, alluvial, Lost H₂O 21.5 - CL

21.5 - 23.5 Shale; very highly weathered, silt texture, olive, soft to very soft, no definite bedding pattern, mud filled and Fe stained joints & fractures

23.5 - 35.8 Shale; interbedded with limy shale, dark gray to gray, med. to fine grained, mod. weathered, mod soft to mod. hard, calcite filled seam 28.8-29.1, mud filled seams 26.5-26.8, 28.5-28.7, 29.4-29.8, clay seams 31.8-32.0, 32.8-33.0, no definite bedding, good cores from 29.8, breaks on 5-15° angle

35.8 - 61.5 Shale; interbedded with lime shale, dark gray, mod. hard, unweathered, except a vertical Fe stained fracture 40.2-40.6, med. to fine grained, no definite bedding pattern, calcite filled fractures 42.5-44.0, 44.5-44.8, 47.2 (horiz.), 57.1-57.3, good cores 2.0"-2.0'

61.5 Bottom of hole

Water Level - 1932.7

Pressure Test Data

25.5 - 33.0	11.4 gpm @ 0 psi
33.0 - 61.5	0.0 gpm @ 10 psi

DH #255 Elev. 1986.1

0.0 - 1.5	Cobble; silty, max. particle size 30.0", subangular sandstone, medium to coarse grain, 40% low plasticity fines, moist, organic, colluvial, cobble, topsoil - GM	0.0-3.0 3.0-4.5 4.5-8.0 8.0-9.5 9.5-13.0 13.0-14.5 14.5-18.0 18.0-19.5 19.5-23.0 23.0-24.5 24.5-26.0	N= SB SB SB SB SB SB SB SB SB
1.5 - 26.0	Clay; silty, max. particle size 24.0" to 3.0" depth, then silty clay, 50% clay, 40% silt, 10% shale gravel, light reddish brown, lensed, moist to 15.0, then wet, dense, terrace - CL/ML		Nx= RQD 20% 0% 100% 23% 93% 47% 16% 16% 100% 32% 49% 0% 40% 40% 98% 68% 100% 100%

26.0 - 43.0 Shale; light gray, interbedded with thin limestone seams 2.0-4.0", limy, mod. soft to mod. hard, silty clay seams in joints & bedding, vertical 15-45 & 60° fractures, cores range from 5" sticks to broken angular fragments, Fe stain in joints & bedding; clay seams from 41.5 to 42.5, irregular wavy calcite filled fractures, dipping about 15°, mod weathered to highly weathered

43.0 - 52.5 Shale; light gray & dark gray, limy, mod. hard, thin wavy calcite filled seams & joints, good cores in 3" to 2.0" sticks, Fe stain in 45° fractures at 44.5 & 45.2, relatively unweathered

52.5 Bottom of hole

Water Level - 1971.1

Pressure Test Data

30.0 - 35.0	8.3 gpm @ 10 psi
35.0 - 52.0	0.0 gpm @ 10 psi

DH #256 Elev. 2001.9

0.0 - 2.5	Cobbles; silty, sandy, moist, soft, colluvial, topsoil - GM	0.0-3.5 3.5-5.0 5.0-8.5	N= SB SB SB
2.5 - 14.0	Clay; silty, max. particle size 1/2", light reddish brown, med. plasticity, moist, homogeneous, colluvial - ML/CL	8.5-10.0 10.0-13.5 13.5-15.0 15.0-18.5 18.5-20.0 20.0-23.5 23.5-25.0 25.0-30.0 30.0-31.5 31.5-33.5 33.5-35.0 35.0-37.5	Nx= RQD 70% 0% 100% 100% 100% 98% 100% 100% 100% 100% 100% 100% 100% 100% 100% 100% 100% 100%



LOST RIVER SUB-WATERSHED OF THE POTOMAC RIVER WATERSHED PROJECT FLOODWAY RETARDING DAM NO. 27 HARDY COUNTY, WEST VIRGINIA LOGS OF DRILL HOLES

U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

INVESTIGATED BY: F.E. ONELLION Date: 2-77
 TYPED BY: C. TENNANT Date: 2-77
 Traced: N/A
 Checked: R.R. Mc CROBY Date: 2-77

Approved by: [Signature] Title: [Blank]
 Title: [Blank]
 Sheet: No. 43 of 51 Drawing No. [Blank]

DH #256 (Cont'd)

43.2 - 63.5 Shale; gray to dark gray, interbedded with limy shale, medium to fine grain, unweathered, mod. soft, bedding not well defined, thin clay filled fracture 45.2 on 45° angle; calcite filled joint or fracture 44.0-45.0, 47.5-47.6, 48.1-48.2, 49.6-49.9, 53.2-53.5, 58.2

DH #257 Elev. 1954.4

0.0 - 1.0 Silt; cobbly, dark gray, moist, soft, max. particle size 2.0", subangular coarse to med. grain sand, organic, topsoil - ML

1.0 - 3.0 Silt; cobbly, max. particle size 24.0", dark brown, 40% sandstone subangular cobbles, firm, med. to low plasticity fines, colluvial ML

3.0 - 24.5 Clay; silty, max. particle size 3.0", less than 5% gravel, brown to dark brown, med. plasticity fines, firm, lensed, alluvial - ML/CL

24.5 - 31.5 Shale; dark gray, med. to fine grain, highly weathered to 25.0, then mod. weathered, dark gray, bedding pattern not well defined, calcite filled fractures up to 1.5" from 25.2-26.2, 28.5-29.1, Fe stained joints & fractures, 27.0-27.3, 28.7-30.5 (open fractures), good cores 24.8-26.8

DH #258 Elev. 1970.8

0.0 - 5.0 Sand; silty, reddish, mottled, about 30% low plastic fines - SM

5.0 - 22.5 Clay; silty, very fine sandy, mottled olive & red, soft, silty seams below 15.0', occasional sandstone gravel or cobble - CL

22.5 - 23.5 Shale; gray, mod. soft, mod. weathered, Fe stain in 150' bedding planes, vertical & 300' fractures

23.5 - 35.0 Shale; gray, limy, with thin 2.0-4.0" limestone seams, thin wavy calcite filled fractures, massive cores, Fe stain in joints & fractures to 30.1, 15 & 450' joints, mod. soft to mod. hard, Martinsburg shale

DH #259 Elev. 1965.3

0.0 - 5.0 Sand; silty, mottled reddish brown & olive, about 30% med. plastic fines, cobbles on surface, terrace SM

5.0 - 15.0 Clay; silty, sandy, moist, med. plastic, about 20% fine sand with soft silty seams - CL

15.0 - 17.0 Shale; highly weathered, mod. soft to soft, numerous soft clay seams which wash out, broken angular core fragments, olive & iron stained

17.0 - 27.0 Shale; gray, limy, mod. soft to mod. hard, interbedded with thin 2.0-4.0" limestone seams, wavy random calcite filled fractures, 450', Fe stained joint at 23.0', good cores in 3.0" to 2.5" sticks

DH #351 Elev. 1892.6

0.0 - 6.0 Gravel; silty, sandy, 25-35% low plasticity fines, subrounded sandstone gravel & cobbles, approximately 25% cobbles & boulders, max. particle size 3.0", lensed GM

6.0 - 33.5 Shale; gray to dark gray, interbedded with limy shale, med. to fine grain, unweathered, mod. soft to mod. hard, bedding planes not defined, good cores, mud filled fracture 47.5-47.7, massive, thin calcite seams 7.6, 12.8, 17.0, 20.5, 23.7, 27.2, Martinsburg shale

DH #352 Elev. 1890.6

0.0 - 8.5 Gravel; sandy, wet, subrounded gravels, cobbles & boulders, 30% sand, about 10% nonplastic fines, max. particle size 1.5", well graded gravel, cobbles & boulders GM/GP

8.5 - 33.5 Shale; gray to dark gray, med. to fine grain, mod. weathered to 15.3, unweathered 15.3-33.5, mod. soft, massive, bedding not well defined, vertical calcite seam 11.5-13.5, also 26.4-26.5, breaks on approximately 10-150 angle, some Fe stain 11.5 to 13.5

DH #353 Elev. 1882.2

0.0 - 3.5 Cobbles; max. particle size 24", 60-70% sandstone, limestone & shale cobbles, subangular to sub-rounded, 25 to 35% gravel, 5% sand, alluvial, bed load - GP

3.5 - 14.0 Shale; limy, gray, silt texture, highly weathered, mod. soft, numerous Fe stained fractures, massive formation, clay filled seams, especially at 12.3-12.5, cores 1/2" to 12", occasional calcite seam 1/8"

DH #354 Elev. 1881.2

0.0 - 5.0 Gravel; silty, sandy, cobbly, dark brown, approximately 10% nonplastic fines, 25% med. to fine sand, subrounded sandstone gravels and cobbles, max. 2.5" diameter, wet, alluvium - GM

DH #355 Elev. 1881.2

0.0 - 5.0 Gravel; silty, sandy, cobbly, dark brown, approximately 10% nonplastic fines, 25% med. to fine sand, subrounded sandstone gravels and cobbles, max. 2.5" diameter, wet, alluvium - GM

DH #352 Elev. 1890.6

0.0 - 8.5 Gravel; sandy, wet, subrounded gravels, cobbles & boulders, 30% sand, about 10% nonplastic fines, max. particle size 1.5", well graded gravel, cobbles & boulders GM/GP

8.5 - 33.5 Shale; gray to dark gray, med. to fine grain, mod. weathered to 15.3, unweathered 15.3-33.5, mod. soft, massive, bedding not well defined, vertical calcite seam 11.5-13.5, also 26.4-26.5, breaks on approximately 10-150 angle, some Fe stain 11.5 to 13.5

DH #353 Elev. 1882.2

0.0 - 3.5 Cobbles; max. particle size 24", 60-70% sandstone, limestone & shale cobbles, subangular to sub-rounded, 25 to 35% gravel, 5% sand, alluvial, bed load - GP

3.5 - 14.0 Shale; limy, gray, silt texture, highly weathered, mod. soft, numerous Fe stained fractures, massive formation, clay filled seams, especially at 12.3-12.5, cores 1/2" to 12", occasional calcite seam 1/8"

14.0 - 26.2 Shale; limy, gray, silt texture, mod. weathered, mod. soft, massive, occasional Fe stained vertical fractures, good cores, occasional calcite seams

26.2 - 33.5 Shale; limy, gray, silt texture, unweathered, mod. hard, massive, occasional small calcite seam

DH #354 Elev. 1881.2

0.0 - 5.0 Gravel; silty, sandy, cobbly, dark brown, approximately 10% nonplastic fines, 25% med. to fine sand, subrounded sandstone gravels and cobbles, max. 2.5" diameter, wet, alluvium - GM

5.0 - 29.0 Shale; gray to dark gray, med. to fine grain, mod. weathered to 9.2 then unweathered, mod. soft, bedding planes not evident, calcite seams 22.9-23.1 & 25.4, massive cores below 7.2, breaks on approximately 45° angles, Martinsburg shale

DH #355 Elev. 1881.2

0.0 - 5.0 Gravel; silty, sandy, cobbly, dark brown, approximately 10% nonplastic fines, 25% med. to fine sand, subrounded sandstone gravels and cobbles, max. 2.5" diameter, wet, alluvium - GM

5.0 - 29.0 Shale; gray to dark gray, med. to fine grain, mod. weathered to 9.2 then unweathered, mod. soft, bedding planes not evident, calcite seams 22.9-23.1 & 25.4, massive cores below 7.2, breaks on approximately 45° angles, Martinsburg shale

29.0 Bottom of hole

Water Level - 1877.2 Date - May 10, 1976

Pressure Test Data 5.0 - 10.0 11.4 gpm @ 15 psi 10.0 - 29.0 3.7 gpm @ 15 psi

Water Level - 1881.2 Date - April 16, 1976

Pressure Test Data 6.0 - 10.0 10.0 gpm @ 10 psi 10.0 - 15.0 8.0 gpm @ 8 psi 15.0 - 20.0 5.0 gpm @ 5 psi 20.0 - 33.5 0.5 gpm @ 0.5 psi

Water Level - 1881.1 Date - April 16, 1976

Pressure Test Data 10.0 - 15.0 13.6 gpm @ 10 psi 15.0 - 20.0 0.1 gpm @ 10 psi 20.0 - 35.5 0.0 gpm @ 10 psi

Water Level - 1881.1 Date - April 16, 1976

Pressure Test Data 10.0 - 15.0 13.6 gpm @ 10 psi 15.0 - 20.0 0.1 gpm @ 10 psi 20.0 - 35.5 0.0 gpm @ 10 psi

Water Level - 1881.1 Date - April 16, 1976

Pressure Test Data 10.0 - 15.0 13.6 gpm @ 10 psi 15.0 - 20.0 0.1 gpm @ 10 psi 20.0 - 35.5 0.0 gpm @ 10 psi

Water Level - 1881.1 Date - April 16, 1976

KEY TO DRILL HOLE LOGS

N Number of blows required for 1 foot standard penetration using 2.0" O.D. split barrel sampler, 140 lb. hammer, and 30" drop. ASTM D-1586
Nx Rock core, 2-1/8" diameter
9.0 Depth in hole (feet)
CL Unified Soil Classification Symbol
RB Roller bit to advance hole by wash boring
73% Percent rock core recovery in each drill run

All soil and rock descriptions and classifications were determined by visual examination.

TH #208 Elev. 1964.8

0.0 - 0.5 Silt; dark brown, moist, loose, nonplastic, organic, topsoil ML
0.5 - 4.5 Sand; clayey, gravelly, moist, reddish brown, mottled orange & olive, 30% med. plastic fines, 40% med. to fine sand, 30% angular to subrounded sandstone and shale gravels, max. 3.0" SC

4.5 - 9.6 Clay; silty, reddish brown, mottled orange and olive, moist, stiff, about 20% fine sand, 10% angular to subrounded gravels, max. 3" - CL
9.6 - 9.8 Shale; dark gray and black, platy angular pieces, soft to very soft with about 40% silty clay in bedding

TH #209 Elev. 1947.9

0.0 - 0.8 Silt; dark brown, loose, moist, organic
0.8 - 4.0 Sand; clayey, silty, reddish brown, mottled orange & olive, about 30% med. plastic fines, about 20% subrounded sandstone and shale gravels, max. 3", occasional cobble - SC

4.0 - 10.8 Clay; silty, reddish brown, mottled, med. plastic, about 15% fine sand, 10% subrounded gravel, max. 3", clay content increases and sand decreases with depth - CL
10.8 - 11.0 Shale; soft to very soft, dark gray, streaked black & Fe stained, clay filled bedding planes, "Martinsburg shale"

TH #301 Elev. 1895.3

0.0 - 0.8 Silt; sandy, dark brown, loose, moist, organic, topsoil - ML
0.8 - 5.5 Gravel; silty, sandy, dark brown, 20% low plastic fines, gravel is subrounded sandstone, about 25% cobbles and boulders, max. 1.5", water at 4.5', alluvial - GM

5.5 - 11.0 Gravel; silty, sandy, dark gray, wet, 20% low plastic fines, subrounded sandstone gravels & cobbles, 25% cobbles & boulders, max. 1.5", sand lenses, alluvial, river jack - GM
11.0 Bottom of hole, same material

TH #302 Elev. 1893.3

0.0 - 0.5 Silt; dark brown, moist, loose, organic, topsoil - ML
0.5 - 7.2 Gravel; dark brown, silty, sandy, about 30% low plastic fines, subrounded sandstone gravels and cobbles, about 25% cobbles and boulders, max. size 3.0' diameter, lensed with med. gravel lenses - GM

TH #303 Elev. 1894.8

0.0 - 0.5 Topsoil, sand, silty, dark brown, loose, nonplastic fines-SM
0.5 - 6.5 Gravel; silty sandy, dark brown, moist, 25% nonplastic fines, well graded sand-gravel-cobble mix, max. size 2.5", subrounded sandstone, coarse, alluvium - GM

TH #304 Elev. 1890.1

0.0 - 6.5 Gravel; sandy, wet, subrounded gravel, cobbles and boulders, 30% sand, about 10% nonplastic fines, max. boulder 1.5", well graded gravel-cobble & boulder mix, creek bank - GM/GP
6.5 Bottom of hole on dark gray, platy, soft shale

TH #305 Elev. 1883.4

0.0 - 4.5 Gravel; sandy, cobbly, dark brown, about 10% nonplastic fines, 25% med. to fine sand, subrounded sandstone gravels & cobbles, max. 2.5' diameter, wet, creek bed, alluvium GM/GP
4.5 Bottom of hole on gray, hard shale

LEGEND - TEST HOLE NUMBERING SYSTEM
Centerline of Dam 1 - 99
Borrow Area 101 - 199
Emergency Spillway 201 - 299
Centerline of Outlet Structure 301 - 399
Stream Channel 401 - 499
Relief Wells 501 - 599
Foundation Drain 601 - 699

UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS
GW Well graded gravels; gravel-sand mixtures
GP Poorly graded gravels
GM Silty gravels; gravel-sand-silt mixtures
GC Clayey gravels; gravel-sand-clay mixtures
SW Well graded sands; sand-gravel mixtures
SP Poorly graded sands
SM Silty sands; sand-silt mixtures
SC Clayey sands; sand-clay mixtures
ML Silts; silty, very fine sands; sandy or clayey silts
CL Clays of low to medium plasticity; silty, sandy or gravelly clays
CH Clays of high plasticity; fat clays
MH Elastic silts; micaceous or diatomaceous silts
OL Organic silts and organic silty clays of low plasticity
OH Organic clays or silts of medium to high plasticity

Construction Completion Date: 10/14/98



"As Bldg"

LOST RIVER SUB-WATERSHED OF THE POTOMAC RIVER WATERSHED PROJECT FLOODWATER RETARDING DAM NO. 27 HARDY COUNTY, WEST VIRGINIA LOGS OF DRILL HOLES AND TEST HOLES

U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE
INVESTIGATED BY F.E. ONELLION Date 2-77
TYPED BY C. TENNANT Date 2-77
Checked R.R. McCROBY Date 2-77

William B. Bingram