SITE IMPROVEMENT PLANS
FOR
McFARLAND STREAM MITIGATION
CANYON LAKES
IN
BAINBRIDGE TOWNSHIP, GEAUGA COUNTY, STATE OF OHIO
TOTAL MITIGATED STREAM LENGTH = 513LF

08/01/2014 – ACOE PERMITTING

DEVELOPER/OWNER:

CANYON LAKES COLONY COMPANY
P.O BOX 23429
CHAGRIN FALLS, OH 44023
PHONE: (440) 543-9318
CONTACT: LAURA CRAMER

CIVIL ENGINEER LANDSCAPE ARCHITECT AND SURVEYOR

NEFF AND ASSOCIATES
6405 YORK ROAD
PARMA HEIGHTS, OH 44130
PHONE: (440) 884-3100
FAX: (440) 884-6443
CONTACT: BRIAN UHLENBROCK, ASLA

WETLAND / MITIGATION CONSULTANT:

DAVEY RESOURCE GROUP
10 ELLWOOD AVENUE
TONAWANDA, NY 14223
PHONE: (716) 870-5286
CONTACT: ROSTY CARYK

UTILITY COMPANIES IN PROJECT AREA

GEAUGA COUNTY WATER RESOURCES (SANITARY & WATER)
470 CENTER STREET, BLDG #3
CHARDON, OHIO 44024
ATTN: GERARD MORGAN, P.E.
PHONE: (440) 279-1981

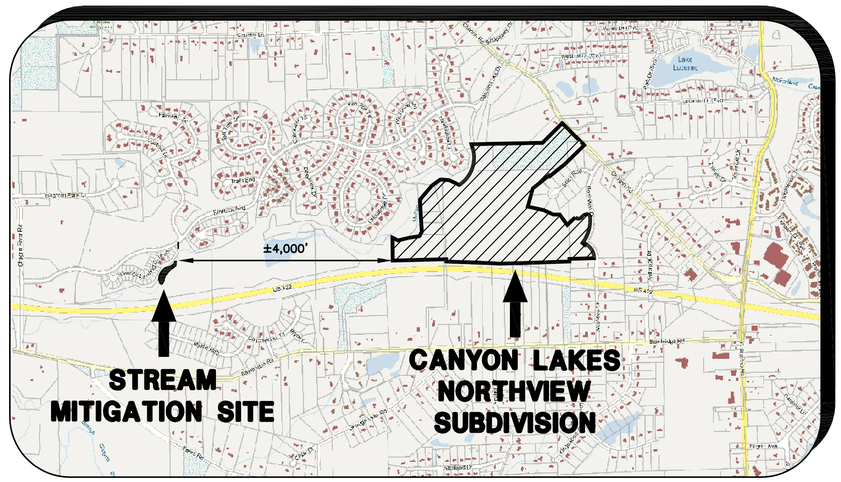
ALLTEL (PHONE)
2055 HAMBDEN ROAD
P.O. BOX 428
CHARDON, OHIO 44024
ATTN: JEFF GULYAS
PHONE: (330) 650-8404

FIRST ENERGY (ELECTRIC)
7757 AUBURN ROAD, UNIT #23
CONCORD, OHIO 44077
ATTN: RALPH DELLIGATTI
PHONE: (440) 350-7741

GEAUGA COUNTY SOIL & WATER CONSERVATION DISTRICT
PATERSON CENTER
14269 CLARIDON-TROY ROAD
P.O. BOX 410
BURTON, OHIO 44021
ATTN: CARMELLA SHALE, P.E.
PHONE: (440) 834-1122

DOMINION EAST OHIO (GAS)
1201 E. 55TH STREET
CLEVELAND, OHIO 44103
ATTN: MARTY FLYNN
PHONE: (216) 736-6736

ADELPHIA
7757 AUBURN ROAD, SUITE 8
PAINESVILLE, OHIO 44077
ATTN: LARRY BOCK
PHONE: (216) 575-8016 X6036



VICINITY MAP
NOT TO SCALE

INDEX TO DRAWINGS:

TITLE SHEET . . . . . SM0.0 ●

SURVEY:
EXISTING CONDITIONS & DEMOLITION PLAN . . . . . SM1.0 ●

EARTHWORKS:
STREAM GRADING PLAN & PROFILE . . . . . SM3.0 ●
STREAM SECTIONS . . . . . SM3.1 ●

UTILITIES:
N/A . . . . . SM4.0 ☐

LAYOUT PLAN:
N/A . . . . . SM5.0 ☐

LANDSCAPE PLAN:
STREAM MITIGATION LANDSCAPE PLAN . . . . . SM6.0 ●

DETAILS:
MITIGATION DETAILS AND NOTES . . . . . SM7.0 ●
MITIGATION DETAILS AND NOTES . . . . . SM7.1 ●

SUBMITTED BY:

DANIEL J. NEFF – REG. ENGINEER No. 50573 DATE

NOTES

1. CONTRACTOR TO CONTACT THE OHIO UTILITIES PROTECTION SERVICE (OUPS) 1-800-362-2764, 48 HOURS PRIOR TO COMMENCING ANY WORK.
2. THE LOCATIONS OF UNDERGROUND FACILITIES SHOWN ON THIS PLAN ARE BASED ON FIELD SURVEYS AND LOCAL UTILITY COMPANY RECORDS. IT SHALL BE THE CONTRACTORS FULL RESPONSIBILITY TO CONTACT THE VARIOUS UTILITY COMPANIES TO LOCATE THEIR FACILITIES PRIOR TO STARTING CONSTRUCTION. NO ADDITIONAL COMPENSATION SHALL BE PAID TO THE CONTRACTOR FOR DAMAGE AND REPAIR TO THESE FACILITIES CAUSED BY HIS WORK.
3. CONTRACTOR SHALL MAINTAIN SITE AS DIRECTED BY THE OHIO EPA AND THE ARMY CORPS OF ENGINEERS.
4. CONTRACTOR SHALL HAVE A COPY OF APPLICABLE ARMY CORP OF ENGINEERS & OEPA PERMITS ON SITE DURING CONSTRUCTION.
5. STREAM CENTERLINE SHALL BE CLEARLY MARKED AND APPROVED BY THE OWNERS MITIGATION CONSULTANT PRIOR TO CONSTRUCTION.
6. THERE SHALL BE NO SPOILS TAKEN OFF SITE, ALL MATERIAL SHALL BE USED OR STORED IN A LOCATION ON SITE THAT IS ACCEPTABLE TO THE OWNER.
7. PROTECT ALL EXISTING TREES TO REMAIN FROM DISTURBANCE. TREES TO BE REMOVED SHALL BE CLEARLY MARKED WITH RIBBON PRIOR TO CONSTRUCTION. CONTRACTOR SHALL NOT PLACE CONSTRUCTION MATERIALS, OR DRIVE EQUIPMENT OVER ROOTZONE OF EXISTING TREES, UNLESS WITHIN PROPOSED STREAM CORRIDOR. CONTRACTOR SHALL USE THE LIGHTEST AND SMALLEST EQUIPMENT POSSIBLE TO COMPLETE JOB. CONTRACTOR SHALL STAY WITHIN LIMITS OF DISTURBANCE AT ALL TIMES.
8. UNDER NO CIRCUMSTANCES SHALL CONTRACTOR DRIVE EQUIPMENT WITHIN OR DISTURB EXISTING WETLANDS,
9. ALL STONE REMOVED DURING EXCAVATION SHALL BE STOCKPILED ON SITE FOR USE IN NEW STREAM BED.
10. POST GRADING CONDITIONS MAY DICTATE MINOR CHANGES TO THE EXACT LOCATIONS AND TYPES OF BANK TREATMENTS TO MAXIMIZE BANK STABILITY.
11. ALL WASHOUTS AND EROSION TO BE REPAIRED AND STABILIZED AT CONTRACTOR'S EXPENSE.
12. EXISTING FIELD CONDITIONS MAY REQUIRE ADJUSTMENTS TO DETAILS, GRADING, AND/OR LAYOUT OF PROPOSED STREAM AS DIRECTED BY THE OWNER'S STREAM MITIGATION CONSULTANT.
13. CONTRACTOR TO SEED ALL DISTURBED AREAS. SEEDING TYPES AND PERCENTAGES ARE LISTED ON THE LANDSCAPE PLANS.
14. CONTRACTOR SHALL STOCKPILE SUITABLE WOODY MATERIALS (e.g., LOGS, ROOT WADS) TO BE USED DURING BANK RESTORATION ALL UNUSED MATERIAL SHALL BE HAULED OFF SITE AND DISPOSED OF PROPERLY. INSTALL MATERIALS AS DIRECTED BY STREAM MITIGATION CONSULTANT.

LANDSCAPE NOTES

1. ANY PLANT MATERIAL SUBSTITUTIONS TO BE VERIFIED AND APPROVED BY OWNER OR LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
3. ALL WASHOUTS AND EROSION TO BE REPAIRED AND STABILIZED AT CONTRACTOR'S EXPENSE OR AS AGREED UPON WITH OWNER IN WRITING PRIOR TO STARTING WORK.
4. ENTIRE RESTORED AREAS TO BE PLANTED/SEEDED SHALL RECEIVE A MINIMUM OF 6" OF TOPSOIL PRIOR TO PLANTING OR SEEDING. TOPSOIL CAN BE TAKEN FROM ON-SITE STOCKPILES. REFER TO 'TOPSOIL MATERIAL NOTE'.
5. SEEDING:
   - A. PLACE A PORTION OF THE SEED IN A CLEAN, DRY 5 GALLON BUCKET. MIX 2 PARTS COARSE SAND WITH 1 PART SEED. THOROUGHLY MIX SEED AND SAND.
   - B. HAND BROADCAST SEED/ SAND MIXTURE ACROSS THE SPECIFIED TILLED AREA. APPLY HALF THE SEED/ SAND MIXTURE OVER THE ENTIRE AREA. APPLY THE SECOND HALF OVER THE SAME AREA UTILIZING THE SAME PROCEDURE. THIS METHOD PREVENTS USING ALL OF THE SEED BEFORE THE ENTIRE AREA IS COVERED.
   - C. LIGHTLY FIRM SEEDBED WITH A ROLLER WHERE SOIL MOISTURE PERMITS. DO NOT ROLL AREAS WHERE SOIL IS MOIST ENOUGH TO STICK TO ROLLER.
   - D. ALL NATIVE SEED TO BE REFRIGERATED FOR AT LEAST 90 DAYS PRIOR TO INSTALLATION
6. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE ACCEPTABLE SURVIVAL RATES OF ALL PLANTINGS. THE FOLLOWING SURVIVAL RATES ARE ACCEPTABLE.
   - A. SEEDED NATIVE COMMUNITIES – FOR ACCEPTANCE AT THE BEGINNING OF THE SECOND GROWING SEASON, THE FOLLOWING CONDITIONS SHALL BE MET.
     - A.1. COVERAGE – 80% OF EACH PLANT COMMUNITY SHALL BE COVERED WITH VEGETATION.
     - A.2. PRESENCE – 50% OF THE SPECIES PLANTED SHOULD BE ALIVE AND PRESENT.
     - A.3. ABUNDANCE – 50% OF THE VEGETATION SHOULD BE NATIVE SPECIES OF THE PERMANENT MATRIX.
7. THE SCHEDULED CONSTRUCTION SHALL OCCUR WHEN THE FORECAST CALLS FOR DRY WEATHER. THIS MOST LIKELY WILL REQUIRE PERIODIC WATERING TO MAINTAIN THE SURVIVAL RATES LISTED ABOVE AND TO MAINTAIN APPROPRIATE WATER LEVELS IN THE LOW AND HIGH MARSH AREAS. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER REGARDING WATER AVAILABLE FOR IRRIGATION.
8. AREAS SPECIFIED ON PLANS TO RECEIVE EROSION CONTROL MATTING SHALL BE NORTH AMERICAN GREEN S75BN OR APPROVED EQUAL. MATTING SHALL BE INSTALLED AND STAPLES AS SPECIFIED BY MANUFACTURER. IT IS ESSENTIAL THAT THE UPSLOPE SIDE OF THE MATTING BE PROPERLY BURIED (AS IN A CHANNEL APPLICATION) TO PREVENT WATER FROM RUNNING UNDER BLANKET. THIS WILL HELP KEEP SEED IN PLACE WHEN BASIN FILLS WITH WATER, IN ADDITION TO PREVENTING EROSION.
9. SEEDING W/ EROSION CONTROL BLANKET TO BE INSTALLED IMMEDIATELY FOLLOWING COMPLETION OF EARTHWORK ACTIVITIES.
10. DORMANT CUTTINGS, FASCINES AND LIVE STAKES MAY BE PLANTED EARLY SPRING OR LATE FALL, AND SHALL NOT BE PLANTED IN DRY SEASON.
11. CONTRACTOR SHALL SPRAY ALL NEW PLANTINGS WITH DEER REPELLANT SUCH AS LIQUID FENCE OR APPROVED SIMILAR FOR THE FIRST YEAR OF PLANT ESTABLISHMENT.

BENCH MARKS:

B.M. #1: TOP NORTH RIM ELEV. – SAN. MANHOLE AT FLINTLOCK & EDWARDS LANDING	ELEV.=937.36 (NAVD88)
B.M. #2: TOP OF IRON PIN IN MONUMENT BOX	ELEV.=934.78 (NAVD88)
B.M. #3: TOP OPERATING NUT OF FIRE HYDRANT	ELEV.=935.09 (NAVD88)

ALL VERTICAL BENCH MARK INFORMATION SHOWN PER G.P.S. VRS FIELD OBERSERVATIONS DATED DECEMBER 3RD, 2013 AND IS BASED ON THE NAVD 1988

2 WORKING DAYS
BEFORE YOU DIG
CALL TOLL FREE 800-362-2764
OHIO UTILITIES PROTECTION SERVICE

NEFF & ASSOCIATES
Civil Engineers + Landscape Architects + Planners + Surveyors
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Tel: 440.884.3100 | Fax: 440.884.6443

SHEET NO.
SM0.0

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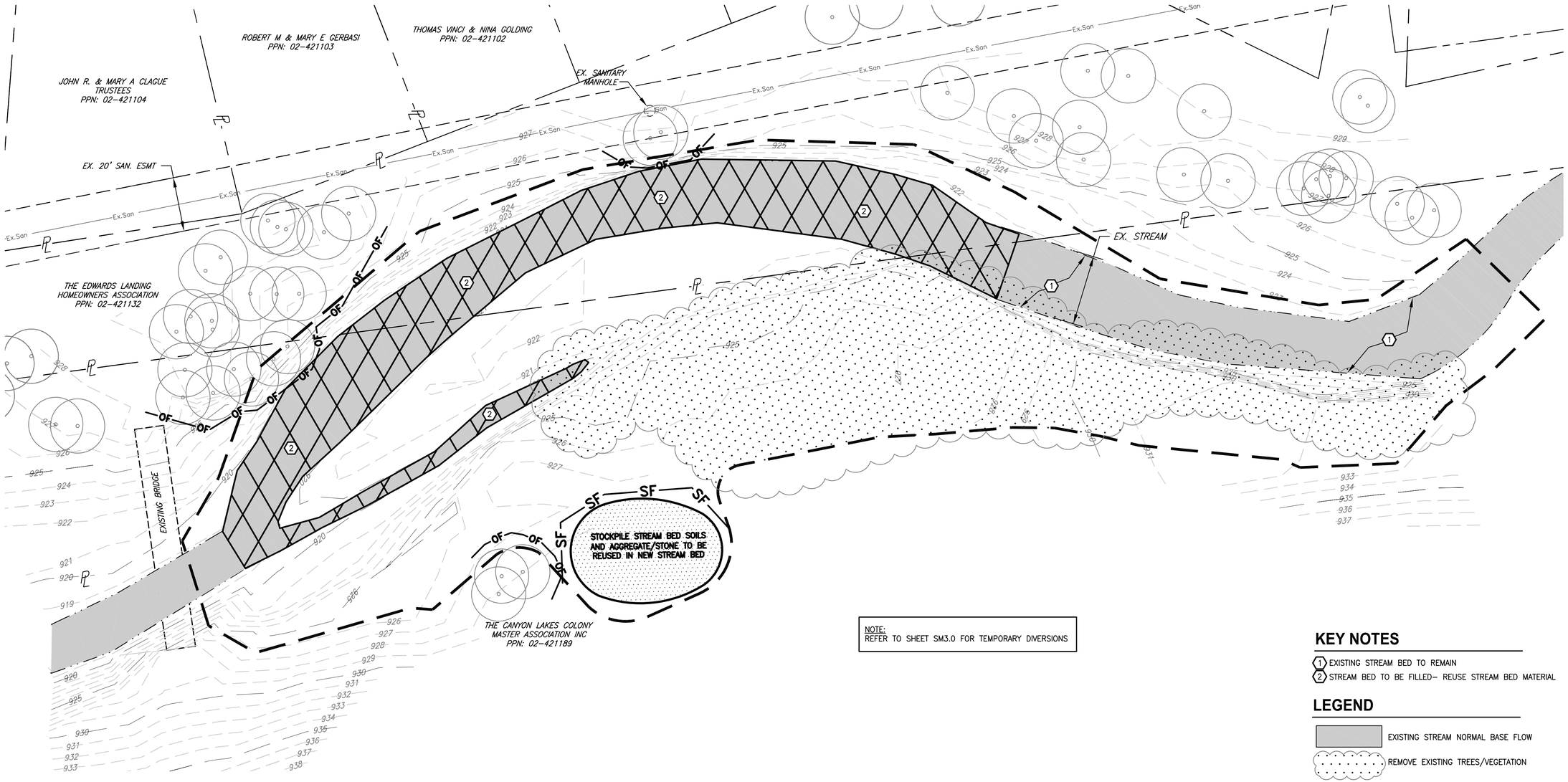

NOTE:
REFER TO SHEET SM3.0 FOR TEMPORARY DIVERSIONS

KEY NOTES

1. EXISTING STREAM BED TO REMAIN
2. STREAM BED TO BE FILLED– REUSE STREAM BED MATERIAL

LEGEND

- EXISTING STREAM NORMAL BASE FLOW
- REMOVE EXISTING TREES/VEGETATION
- —SF— SILT FENCE
- —OF— ORANGE FENCE

SCALE
1 INCH = 20 FEET
22 x 34
SHEETS ONLY

NORTH

CANYON LAKES STREAM MITIGATION

EXISTING CONDITIONS & DEMOLITION PLAN

BAINBRIDGE TOWNSHIP, GEAUGA COUNTY, STATE OF OHIO

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Tel: 440.884.3100 | Fax: 440.884.3104
WWW.NEFFANDASSOC.COM

REV NO	DATE	DESCRIPTION
	08/01/14	ACOE PERMITTING

DWG NAME	DRAWN BY	CHK'D BY	JOB NO
13716-STREAM-MIT	DP	NAME	13716

SHEET NO.
SM1.0

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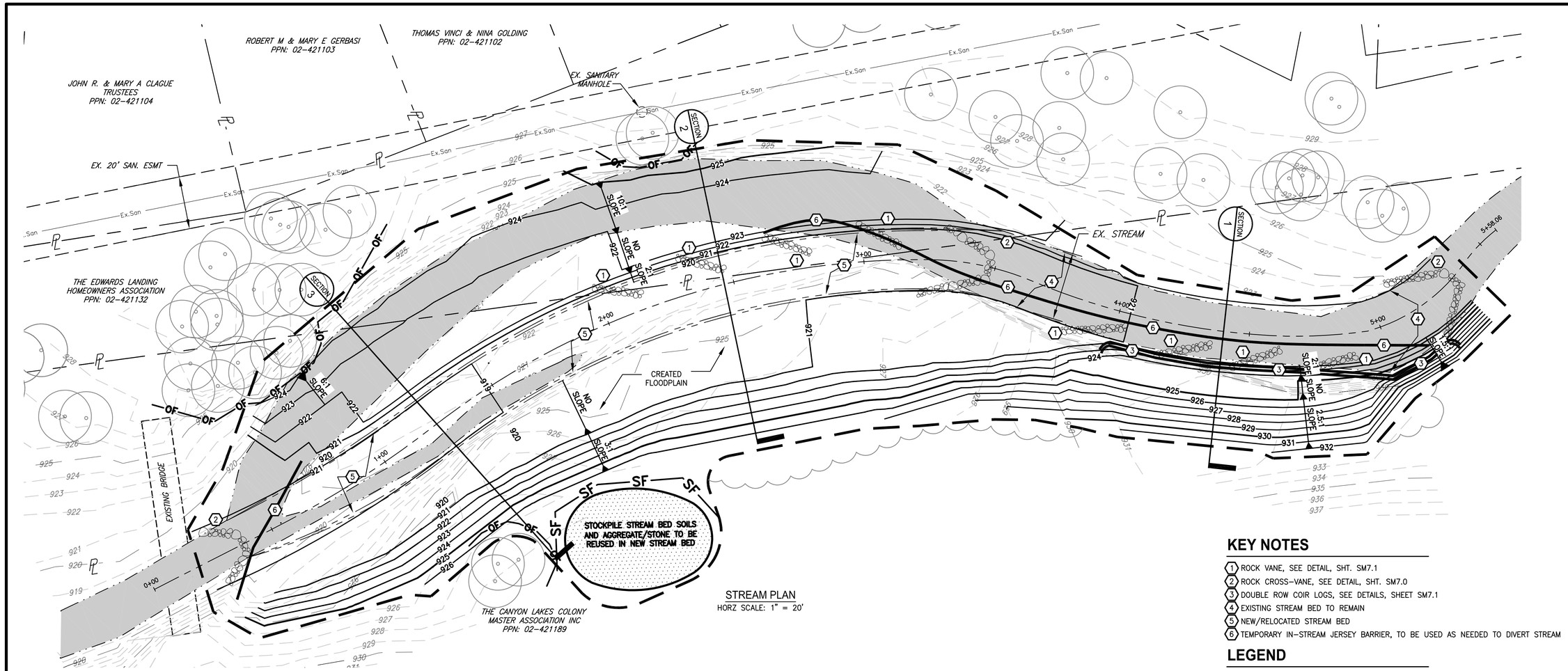


STREAM PLAN
HORZ SCALE: 1" = 20'

SCALE
1 INCH = 20 FEET
22 x 34
SHEETS ONLY

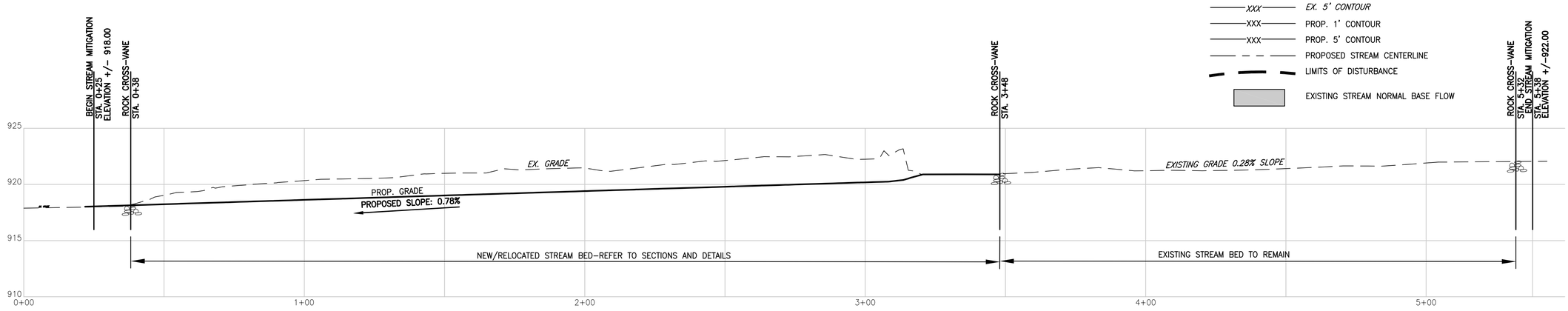
NORTH

KEY NOTES

1. ROCK VANE, SEE DETAIL, SHT. SM7.1
2. ROCK CROSS-VANE, SEE DETAIL, SHT. SM7.0
3. DOUBLE ROW COIR LOGS, SEE DETAILS, SHEET SM7.1
4. EXISTING STREAM BED TO REMAIN
5. NEW/RELOCATED STREAM BED
6. TEMPORARY IN-STREAM JERSEY BARRIER, TO BE USED AS NEEDED TO DIVERT STREAM

LEGEND

- XXX — EX. 1' CONTOUR
- XXX — EX. 5' CONTOUR
- XXX — PROP. 1' CONTOUR
- XXX — PROP. 5' CONTOUR
- PROPOSED STREAM CENTERLINE
- LIMITS OF DISTURBANCE
- EXISTING STREAM NORMAL BASE FLOW



McFARLAND STREAM PROFILE
HORZ SCALE: 1" = 5', VERT SCALE: 1" = 5'

CANYON LAKES STREAM MITIGATION

STREAM GRADING PLAN & PROFILE

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DWG NAME	DRAWN BY	CHK'D BY	JOB NO
13716-STREAM-MIT	DP	NAME	13716

SHEET NO.
SM3.0

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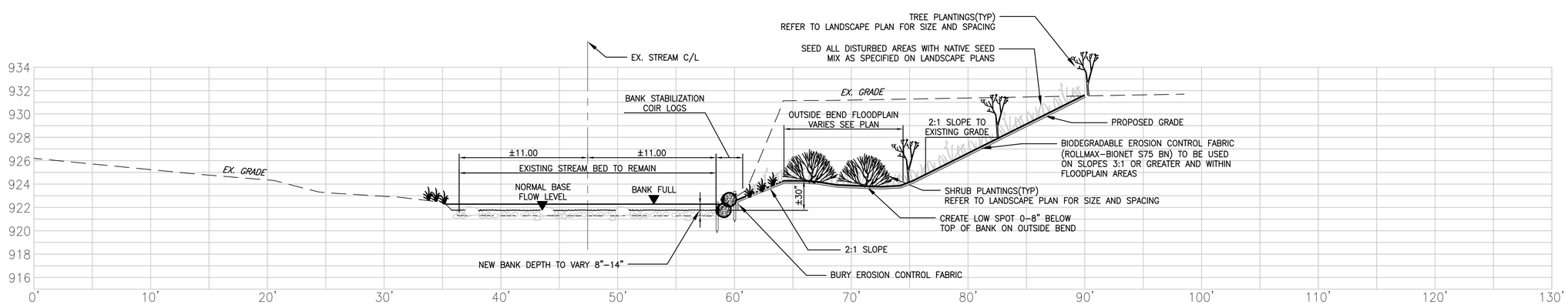
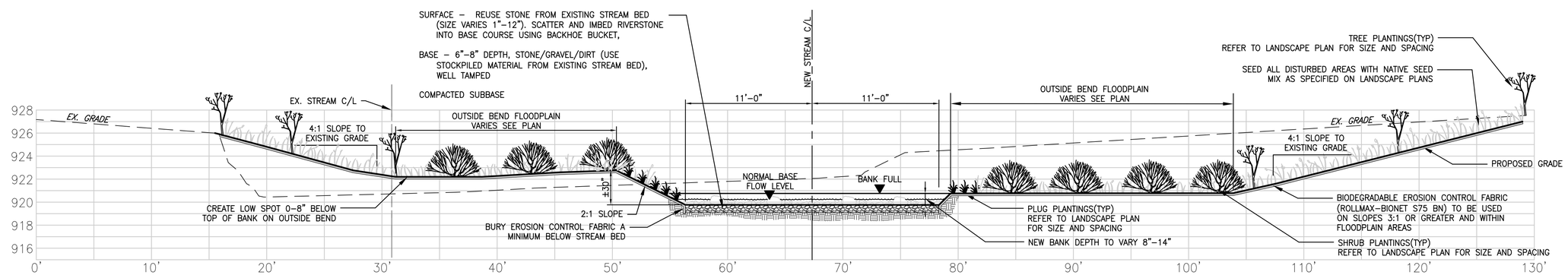


SECTION 1 - NORTH

HORZ SCALE: 1" = 5', VERT SCALE: 1" = 5'



SECTION 2 - NORTH

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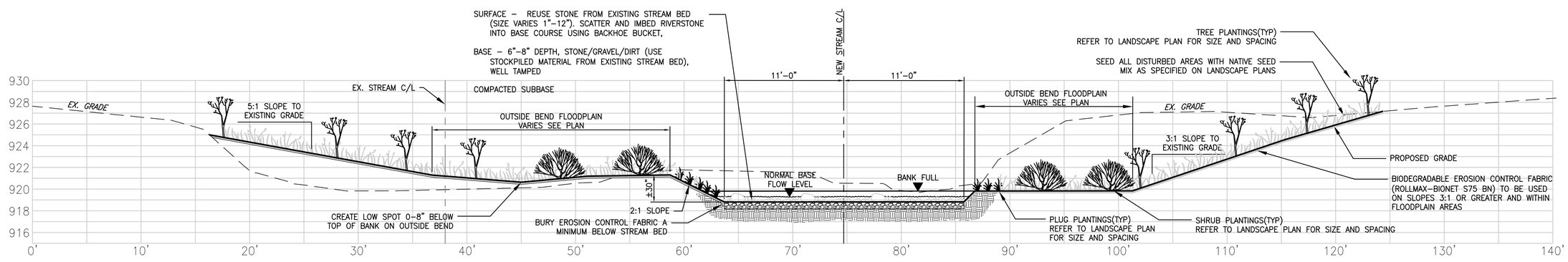
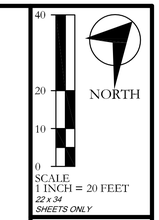


SECTION 3 - SOUTH

HORZ SCALE: 1" = 5', VERT SCALE: 1" = 5'



CANYON LAKES STREAM MITIGATION

STREAM SECTIONS

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REV NO	DATE	DESCRIPTION

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13716-STREAM-MIT	DP	NAME	13716

SHEET NO.

SM3.1

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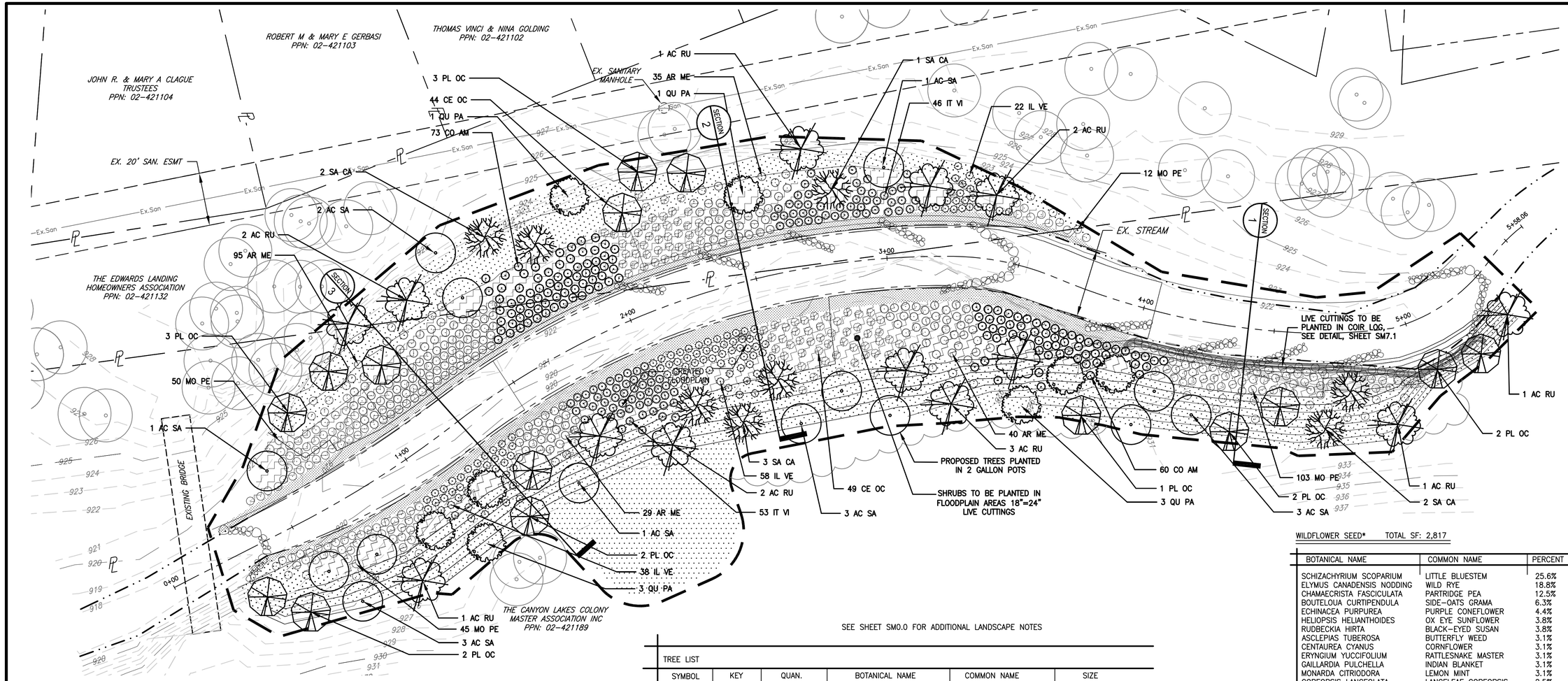

SEE SHEET SM0.0 FOR ADDITIONAL LANDSCAPE NOTES

TREE LIST

SYMBOL	KEY	QUAN.	BOTANICAL NAME	COMMON NAME	SIZE
	AC RU	13	ACER RUBRUM	RED MAPLE	2 GAL. POT
	AC SA	14	ACER SACCHARINUM	SUGAR MAPLE	2 GAL. POT
	SA CA	8	SAMBUCUS CANADENSIS	AMERICAN ELDERBERRY	2 GAL. POT
	PL OC	15	PLATANUS OCCIDENTALIS	AMERICAN SYCAMORE	2 GAL. POT
	QU PA	8	QUERCUS PALUSTRIS	PIN OAK	2 GAL. POT

WILDFLOWER SEED* TOTAL SF: 2,817

BOTANICAL NAME	COMMON NAME	PERCENT
SCHIZACHYRIUM SCOPARIUM	LITTLE BLUESTEM	25.6%
ELYMUS CANADENSIS NODDING	WILD RYE	18.8%
CHAMAECRISTA FASCICULATA	PARTRIDGE PEA	12.5%
BOUTELOUA CURTIPENDULA	SIDE–OATS GRAMA	6.3%
ECHINACEA PURPUREA	PURPLE CONEFLOWER	4.4%
HELIOPSIS HELIANTHOIDES	OX EYE SUNFLOWER	3.8%
RUDBECKIA HIRTA	BLACK–EYED SUSAN	3.8%
ASCLEPIAS TUBEROSA	BUTTERFLY WEED	3.1%
CENTAUREA CYANUS	CORNFLOWER	3.1%
ERYNGIUM YUCCIFOLIUM	RATTLESNAKE MASTER	3.1%
GAILLARDIA PULCHELLA	INDIAN BLANKET	3.1%
MONARDA CITRIODORA	LEMON MINT	3.1%
COREOPSIS LANCEOLATA	LANCELEAF COREOPSIS	2.5%
MONARDA FISTULOSA	WILD BERGAMOT	1.9%
ASCLEPIAS SYRIACA	COMMON MILKWEED	0.6%
ASTER NOVAE–ANGLIAE	NEW ENGLAND ASTER	0.6%
LESPEDEZA CAPITATA	ROUNDHEADED BUSHCLOVER	0.6%
LOBELIA SIPHILITICA	GREAT LOBELIA	0.6%
PENSTEMON DIGITALIS	FOXGLOVE BEARDTONGUE	0.6%
PYCNANTHEMUM VIRGINIANUM	VIRGINIA MOUNTAIN MINT	0.6%
RUDBECKIA TRILOBA	BROWN–EYED SUSAN	0.6%
SOLIDAGO RIGIDA	STIFF GOLDENROD	0.6%
		100%

*SEED MIX BASED ON NATIVE SHORT GRASS MEADOW SEED MIX BY OHIO PRAIRIE NURSERY.
WWW.OHIOPRAIRIENURSERY.COM

FLOOD PLAIN WILDLIFE MIX TOTAL SF: 6,393

TO BE PLANTED ADJACENT TO STREAM BANKS IN FLOODZONE AREAS
RATE – 15 LBS PER ACRE
MIX 1 LB. OF ANNUAL RYE GRASS PER 10 LBS. OF WETLAND SEED

BOTANICAL NAME	COMMON NAME	PERCENT
PANICUM CLANDESTINUM	TIOGA DEER TONGUE	15%
CAREX VULPINOIDEA	FOX SEDGE	15%
ELYMUS RIPARIUS	RIVERBANK WILD RYE	9%
ELYMUS VILLOSUS	SILKY WILD RYE	8%
ASCLEPIAS SYRIACA	COMMON MILKWEED	7%
VERBESINA ALTERNIFOLIA	WINGSTEM	5%
ASTER UMBELLATUS	FLAT TOPPED/ UMBRELLA ASTER	5%
BIDENS CERNUA	NODDING BUR MARIGOLD	5%
ANDROPOGON GERARDII	BIG BLUESTEM	3%
EUPATORIUM MACULATUM	SPOTTED JOE PYE WEED	3%
RUDBECKIA HIRTA	BLACK EYED SUSAN	3%
MONARDA FISTULOSA	WILD BERGAMOT	3%
PANICUM VIRGATUM	SWITCH GRASS	2%
SENNA MARILANDICA	MARYLAND SENNA	2%
VERNONIA NOVEBORACENSIS	NEW YORK IRONWEED	2%
ZIZIA AUREA	GOLDEN ALEXANDERS	2%
ASTER NOVAE–ANGLIAE	NEW ENGLAND ASTER	1%
DILPHIUM PERFOLIATUM	CUP PLANT	1%
GEUM LACINIATUM	ROUGH AVENS	1%
		100%

TOPSOIL MATERIAL NOTES:
PLANTING SOIL TO MEET SPECIFICATIONS OF ASTM D 5268 TOPSOIL, WITH PH RANGE OF 5.5 TO 7, A MIN. OF 2% ORGANIC MATERIAL CONTENT. EXISTING, NATIVE SURFACE TOPSOIL FORMED UNDER NATURAL CONDITIONS WITH THE DUFF LAYER RETAINED DURING EXCAVATION PROCESS AND EXISTING, IN PLACE, SURFACE SOIL.

IMPORTED TOPSOIL OR MANUFACTURED TOPSOIL FROM OFF–SITE SOURCES; DO NOT OBTAIN FROM AGRICULTURAL LAND, BOGS, OR MARSHES.

VERIFY SUITABILITY OF SOIL TO PRODUCE VIABLE PLANTING SOIL. CLEAN SOIL OF ROOTS, PLANTS, SOD, STONES, CLODS, CLAY LUMPS, POCKETS OF COARSE SAND, CONCRETE SLURRY, CONCRETE LAYERS OR CHUNKS, CEMENT, PLASTER, BUILDING DEBRIS, AND OTHER EXTRANEOUS MATERIALS HARMFUL TO PLANT GROWTH.

SHRUB LIST

SYM.	KEY	QUAN.	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	WETLAND IND. STA.
	AR ME	203	ARONIA MELANOCARPA	BLACK CHOKEBERRY	18"–24" LIVE CUTTINGS	*3' TRI. SPACING	FAC
	CE OC	97	CEPHALANTHUS OCCIDENTALIS	BUTTONBUSH	18"–24" LIVE CUTTINGS	*3' TRI. SPACING	OBL
	CO AM	137	CORNUS AMOMUM	SILKY DOGWOOD	18"–24" LIVE CUTTINGS	*3' TRI. SPACING	FACW
	IL VE	121	ILEX VERTICILLATA	WINTERBERRY	18"–24" LIVE CUTTINGS	*3' TRI. SPACING	FACW+
	IT VI	102	ITEA VIRGINICA 'HENRY'S GARNET'	VIRGINIA SWEETSPIRE	18"–24" LIVE CUTTINGS	*3' TRI. SPACING	OBL
	MO PE	226	MORELLA PENSYLVANICA	NORTHERN BAYBERRY	18"–24" LIVE CUTTINGS	*3' TRI. SPACING	FAC

HERBACEOUS PLANT LIST TOTAL SF: 21,950

KEY	QUAN.	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	WETLAND IND. STA.
EL RI*	EQUAL PARTS	ELYMUS RIPARIUS	RIVERBANK WILD RYE	2" PLUG	**2' TRI. SPACING	FACW
AN GE*	EQUAL PARTS	ANDROPOGON GERARDII	BIG BLUESTEM	2" PLUG	**2' TRI. SPACING	FAC
PA VI*	EQUAL PARTS	PANICUM VIRGATUM	SWITCH GRASS	2" PLUG	**2' TRI. SPACING	FAC
CA ST*	EQUAL PARTS	CAREX STRICTA	TUSSOCK SEDGE	2" PLUG	**2' TRI. SPACING	OBL
CA VU*	EQUAL PARTS	CAREX VULPINOIDEA	FOX SEDGE	2" PLUGS	**2' TRI. SPACING	OBL
EL VI*	EQUAL PARTS	ELYMUS VIRGINICUS	VIRGINIA WILD RYE	2" PLUG	**2' TRI. SPACING	FACW–

* –ALL FLOOD PLAIN AREAS MUST ALSO BE PLANTED WITH FLOOD PLAIN WILDLIFE MIX, SEE SPECS ABOVE.
**–SEE SHT. C7.1, DTL. 5 FOR SPACING

LEGEND

- LIMITS OF DISTURBANCE
- EXISTING TREE
- HERBACEOUS PLANTS/PLUGS
- FLOODPLAIN WILDLIFE MIX
- WILDFLOWER SEED

REV NO	DATE	DESCRIPTION
	08/01/14	ACOE PERMITTING

DWG NAME	DRAWN BY	CHK'D BY	JOB NO
13716-STREAM-MIT	DP	NAME	13716

SCALE
1 INCH = 20 FEET
22 x 34
SHEETS ONLY

NORTH

CANYON LAKES STREAM MITIGATION

STREAM MITIGATION LANDSCAPE PLAN

BAINBRIDGE TOWNSHIP, GEAUGA COUNTY, STATE OF OHIO

NEFF & ASSOCIATES
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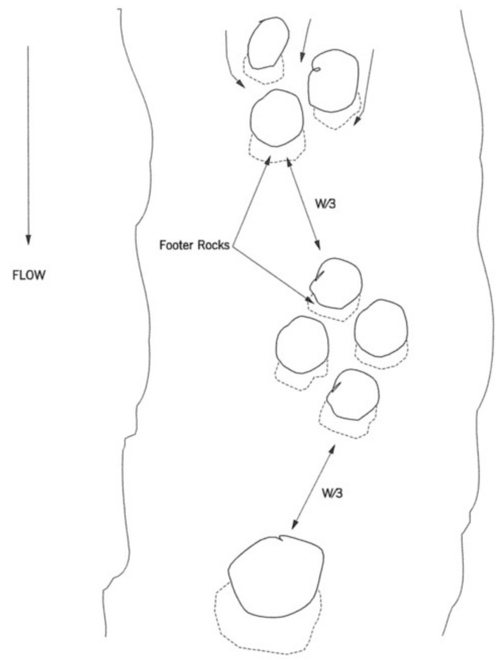
Maryland's Guidelines To Waterway Construction
DETAIL 3.1: BOULDER PLACEMENT

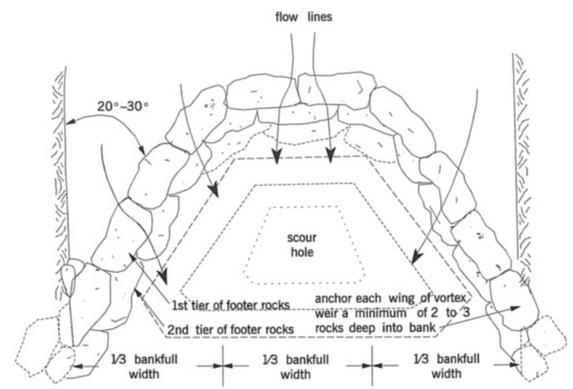


CHANNEL STABILIZATION AND REHABILITATION TECHNIQUES	*REVISED NOVEMBER 2000* *PAGE 3.1 – 3*	MARYLAND DEPARTMENT OF THE ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

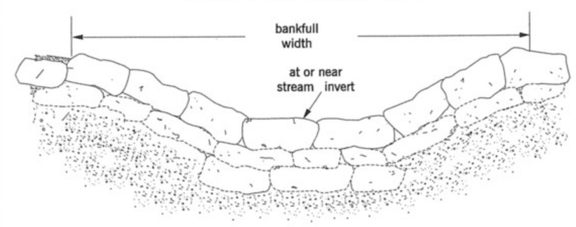
Maryland's Guidelines To Waterway Construction
DETAIL 3.8(a): CROSS VANES

Source: Rosgen, 1999

PLAN VIEW: CROSS VANE



SECTION VIEW: CROSS VANE

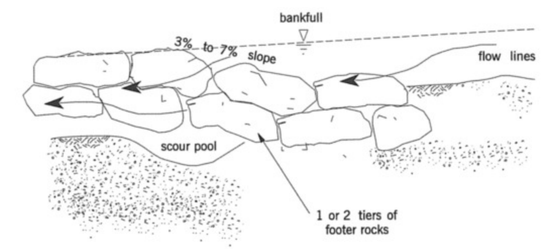


CHANNEL STABILIZATION AND REHABILITATION TECHNIQUES	*REVISED NOVEMBER 2000* *PAGE 3.8 – 3*	MARYLAND DEPARTMENT OF THE ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

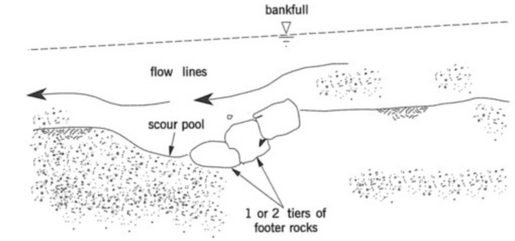
Maryland's Guidelines To Waterway Construction
DETAIL 3.8(b): CROSS VANES

Source: Rosgen, 1999

PROFILE: CROSS VANE ARM



PROFILE VIEW OF CENTER OF CROSS VANE



CHANNEL STABILIZATION AND REHABILITATION TECHNIQUES	*REVISED NOVEMBER 2000* *PAGE 3.8 – 4*	MARYLAND DEPARTMENT OF THE ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

40
20
10
0
SCALE
1 INCH = 20 FEET
22 x 34
SHEETS ONLY

NORTH

CANYON LAKES STREAM MITIGATION

MITIGATION DETAILS & NOTES

BAINBRIDGE TOWNSHIP, GEAUGA COUNTY, STATE OF OHIO

NEFF & ASSOCIATES
Civil Engineers • Landscape Architects • Planners • Surveyors
6405 York Road | Parma Heights, Ohio 44130
Tel: 440.884.3100 | Fax: 440.884.3104
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REV NO	DATE	DESCRIPTION
	08/01/14	ACOE PERMITTING

DWG NAME	DRAWN BY	CHK'D BY	JOB NO
13716-STREAM-MIT	DP	NAME	13716

SHEET NO.

SM7.0

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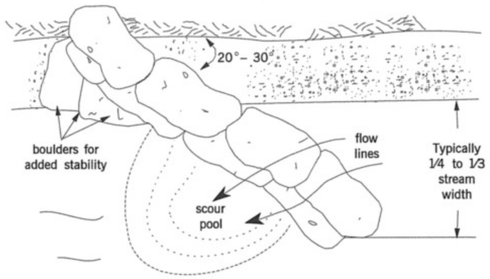
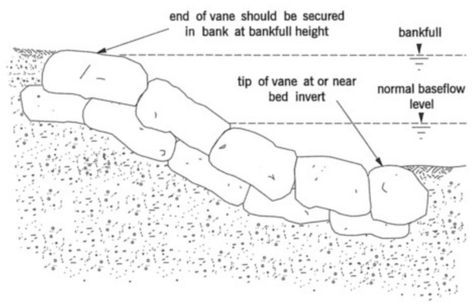
Maryland's Guidelines To Waterway Construction
DETAIL 3.3(a): ROCK VANES

Section & Plan Views Adapted From Rosgen (1999)

PLAN VIEW: ROCK VANE



SECTION VIEW: ROCK VANE

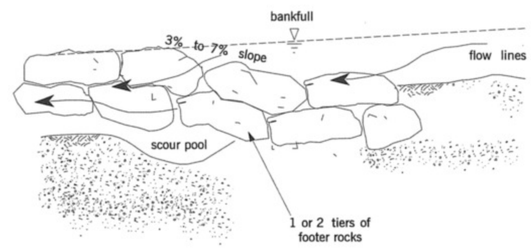


CHANNEL STABILIZATION AND REHABILITATION TECHNIQUES	*REVISED NOVEMBER 2000* *PAGE 3.3 - 3*	MARYLAND DEPARTMENT OF THE ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

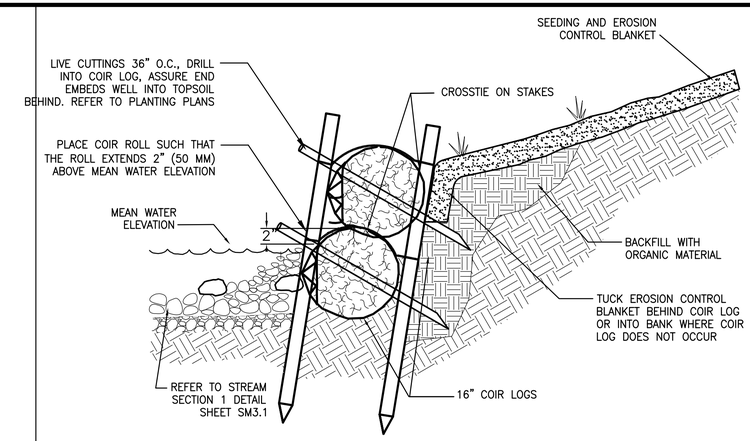
Maryland's Guidelines To Waterway Construction
DETAIL 3.3(b): ROCK VANES

Section & Plan Views Adapted From Rosgen (1999)

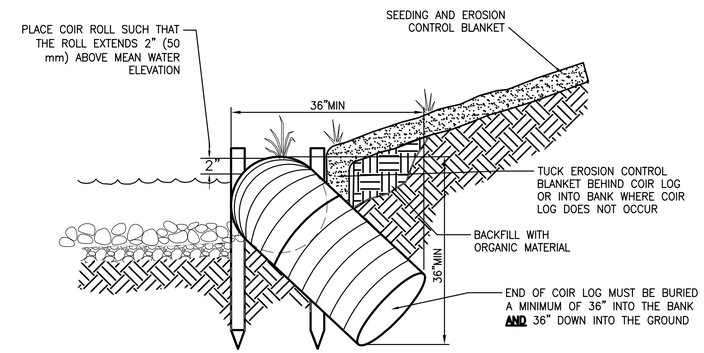
PROFILE VIEW: STRAIGHT VANE



CHANNEL STABILIZATION AND REHABILITATION TECHNIQUES	*REVISED NOVEMBER 2000* *PAGE 3.3 - 4*	MARYLAND DEPARTMENT OF THE ENVIRONMENT WATER MANAGEMENT ADMINISTRATION



1 COIR LOG DETAIL (MIDDLE OF LOG)
NOT TO SCALE



2 COIR LOG DETAIL (END OF LOG)
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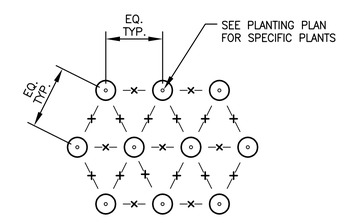

3 SHRUB CUTTINGS SPACING DETAIL
DETAIL PROVIDED BY DAVEY RESOURCE

40 20 10 0
NORTH
SCALE
1 INCH = 20 FEET
22 x 34 SHEETS ONLY

CANYON LAKES STREAM MITIGATION

MITIGATION DETAILS & NOTES

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13716-STREAM-MIT	DP	NAME	13716

SHEET NO.
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