

Standard Detail & Specifications
Vegetative Stabilization

Mix #	Species	Seeding Rate	Optimum Seeding Dates												Planting Depth*
			O - Optimum Planting Period, A - Acceptable Planting Period												
TEMPORARY SEEDING BY RATES, DEPTHS AND DATES															
PERMANENT SEEDING AND SEEDING DATES															
1	Barley	125	4	O	A	O	A	O	A	O	A	O	A	O	1-2 inches
2	Oats	125	4	O	A	O	A	O	A	O	A	O	A	1-2 inches	
3	Rye	125	4	O	A	O	A	O	A	O	A	O	A	1-2 inches	
4	Perennial Ryegrass	125	4	O	A	O	A	O	A	O	A	O	A	1-2 inches	
5	Annual Ryegrass	125	4	O	A	O	A	O	A	O	A	O	A	1-2 inches	
6	Winter Wheat	125	4	O	A	O	A	O	A	O	A	O	A	1-2 inches	
7	Foral Millet	30 PLS	0.7	O										0.5 inches	
8	Pearl Millet	30 PLS	0.5	O										0.5 inches	

1. Winter seeding requires 3 tons per acre of straw mulch for proper stabilization.
 2. May be planted throughout summer if soil moisture is adequate or seeded area can be irrigated.
 3. Applicable on slopes 3:1 or less.
 4. Filly pounds per acre of Annual Lespedeza may be added to 1/2 the seeding rate of any of the above species.
 5. Use varieties currently recommended for Delaware. Contact a County Extension Office for information.
 6. Warm season grasses such as Millet or Hoopseed may be used between 5:1 and 8:1 if ground. Seed at 3-5 lbs. per acre. Good on low fertility and acid areas. Seed after frost through summer at depth of 0.5".
 7. Warm season grasses require a soil temperature of at least 50 degrees in order to germinate, and will remain dormant until then.

Source: Delaware ESC Handbook
 Symbol: **DE-ESC-3.4.3**
 Detail No. Sheet 1 of 4
 Date: 12/03

Standard Detail & Specifications
Vegetative Stabilization

Mix No.	Certified Seed*	Seeding Rate†	Optimum Seeding Dates												Remarks
			O - Optimum Planting Period, A - Acceptable Planting Period												
1	Tall Fescue	140	3.2	O	A	O	A	O	A	O	A	O	A	O	Good erosion control. Good for use on wet soils. Good for use on wet soils. Good for use on wet soils.
2	Perennial Ryegrass	140	3.2	O	A	O	A	O	A	O	A	O	A	O	Good erosion control. Good for use on wet soils. Good for use on wet soils.
3	Annual Ryegrass	140	3.2	O	A	O	A	O	A	O	A	O	A	O	Good erosion control. Good for use on wet soils. Good for use on wet soils.
4	Smooth Stalked Fescue	140	3.2	O	A	O	A	O	A	O	A	O	A	O	Good erosion control. Good for use on wet soils. Good for use on wet soils.
5	Perennial Ryegrass	140	3.2	O	A	O	A	O	A	O	A	O	A	O	Good erosion control. Good for use on wet soils. Good for use on wet soils.
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 Symbol: **DE-ESC-3.4.3**
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 Symbol: **DE-ESC-3.4.3**
 Detail No. Sheet 3 of 4
 Date: 12/03

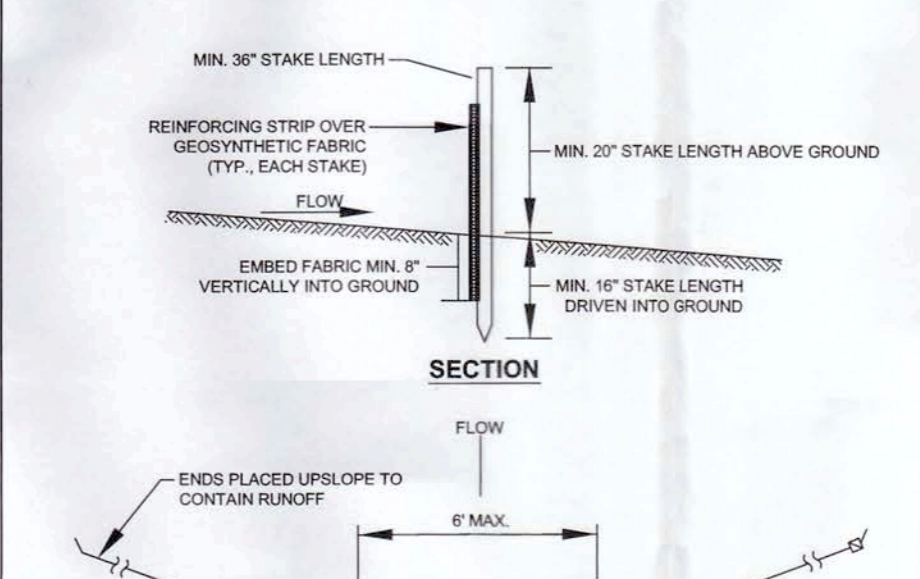
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 Symbol: **DE-ESC-3.4.3**
 Detail No. Sheet 4 of 4
 Date: 12/03

Standard Detail & Specifications
Silt Fence



CONSTRUCTION NOTES:
 1. SITE PREPARATION
 A. PRIOR TO SEEDING, INSTALL NEEDED EROSION AND SEDIMENT CONTROL PRACTICES SUCH AS DIVERSIONS, GRADE STABILIZATION STRUCTURES, BERMS, DIKES, GRASSED WATERWAY, AND SEDIMENT BASINS.
 B. FINAL GRADING AND SHAPING IS NOT NECESSARY FOR TEMPORARY SEEDINGS.
 2. SEEDBED PREPARATION
 IT IS IMPORTANT TO PREPARE A GOOD SEEDBED TO INSURE THE SUCCESS OF ESTABLISHING VEGETATION. THE SEEDBED SHOULD BE WELL PREPARED, LOOSE, UNIFORM, AND FREE OF LARGE CLODS, ROCKS, AND OTHER OBJECTIONABLE MATERIAL. THE SOIL SURFACE SHOULD NOT BE COMPACTED OR CRUSTED.
 3. SOIL AMENDMENTS
 A. LIME - APPLY LIME MATERIALS BASED ON THE RECOMMENDATIONS OF A SOIL TEST IN ACCORDANCE WITH THE APPROVED NUTRIENT MANAGEMENT PLAN. IF A NUTRIENT MANAGEMENT PLAN IS NOT REQUIRED, APPLY CALCIC LIME STONE AT THE RATE OF 1 TO 2 TONS PER ACRE. APPLY LIME STONE UNIFORMLY AND INCORPORATE INTO THE TOP 4 TO 6 INCHES OF SOIL.
 B. FERTILIZER - APPLY FERTILIZER BASED ON THE RECOMMENDATIONS OF A SOIL TEST IN ACCORDANCE WITH THE APPROVED NUTRIENT MANAGEMENT PLAN. IF A NUTRIENT MANAGEMENT PLAN IS NOT REQUIRED, APPLY A FORMULATION OF 10-10-10 AT THE RATE OF 600 POUNDS PER ACRE. APPLY FERTILIZER UNIFORMLY AND INCORPORATE INTO THE TOP 4 TO 6 INCHES OF SOIL.
 4. SEEDING
 A. FOR TEMPORARY STABILIZATION, SELECT A MIXTURE FROM SHEET 1. FOR A PERMANENT STABILIZATION, SELECT A MIXTURE FROM SHEET 2 OR SHEET 3 DEPENDING ON THE CONDITIONS.
 B. APPLY SEED UNIFORMLY WITH A BROADCAST SEEDER, DRILL, CULTIPACKER SEEDER OR HYDROSEEDER. ALL SEED WILL BE APPLIED AT THE RECOMMENDED RATE AND PLANTING DEPTH.
 C. SEED THAT HAS BEEN BROADCAST SHOULD BE COVERED BY RAKING OR DRAGGING AND THEN LIGHTLY TAMPAED INTO PLACE USING A ROLLER OR CULTIPACKER. IF HYDROSEEDING IS USED AND THE SEED AND FERTILIZER IS MIXED, THEY WILL BE MIXED ON SITE AND THE SEEDING SHALL BE DONE IMMEDIATELY AND WITHOUT INTERRUPTION.
 5. MULCHING
 ALL MULCHING SHALL BE DONE IN ACCORDANCE WITH DETAIL DE-ESC-3.4.5.

Source: Adapted from MD Sdts. & Specs. for ESC
 Symbol: **SF**
 Detail No. **DE-ESC-3.1.2.1**
 Sheet 1 of 2
 Date: 6/05

Standard Detail & Specifications
Mulching

MATERIALS AND AMOUNTS
 A. STRAW - STRAW SHALL BE UNROTTED SMALL GRAIN STRAW APPLIED AT THE RATE OF 1-1/2 TO 2 TONS PER ACRE, OR 70 TO 90 POUNDS (TWO BALES) PER 1,000 SQUARE FEET. MULCH MATERIALS SHALL BE RELATIVELY FREE OF WEEDS AND SHALL BE FREE OF NOXIOUS WEEDS SUCH AS THISTLES, JOHNSONGRASS, AND QUACKGRASS. SPREAD MULCH UNIFORMLY BY HAND OR MECHANICALLY. FOR UNIFORM DISTRIBUTION OF HAND SPREAD MULCH, DIVIDE AREA INTO APPROXIMATELY 1,000 SQUARE FEET SECTIONS AND PLACE 70-90 POUNDS (TWO BALES) OF MULCH IN EACH SECTION.
 B. WOOD CHIPS - APPLY AT THE RATE OF APPROXIMATELY 6 TONS PER ACRE OR 275 POUNDS PER 1,000 SQUARE FEET WHEN AVAILABLE AND WHEN FEASIBLE. THESE ARE PARTICULARLY WELL SUITED FOR UTILITY AND ROAD RIGHTS-OF-WAY. IF WOOD CHIPS ARE USED, INCREASE THE APPLICATION RATE OF NITROGEN FERTILIZER BY 20 POUNDS OF N PER ACRE (200 POUNDS OF 10-10-10 OR 66 POUNDS OF 30-0-0 PER ACRE).
 C. HYDRAULICALLY APPLIED MULCH - THE FOLLOWING CONDITIONS APPLY TO HYDRAULICALLY APPLIED MULCH:
 I. DEFINITIONS
 A. WOOD FIBER MULCH SHALL CONSIST OF SPECIALLY PREPARED WOOD THAT HAS BEEN PROCESSED TO A UNIFORM STATE, IS PACKAGED FOR SALE AS A HYDRAULIC SEEDING EQUIPMENT, AND CONSISTS OF A MINIMUM OF 70% VIRGIN OR RECYCLED WOOD FIBER COMBINED WITH 30% PAPER FIBER AND ADDITIVES.
 B. BLENDED FIBER MULCH SHALL CONSIST OF ANY HYDRAULIC MULCH THAT CONTAINS 30% PAPER FIBER. THE PAPER COMPONENT MUST CONSIST OF SPECIALLY PREPARED PAPER THAT HAS BEEN PROCESSED TO A UNIFORM/FIBROUS STATE AND IS PACKAGED FOR SALE AS A HYDRAULIC MULCH FOR USE WITH HYDRAULIC SEEDING EQUIPMENT.
 C. A BONDED FIBER MATRIX (BFM) CONSISTS OF LONG STRAND, SPECIALLY PREPARED WOOD FIBERS THAT HAVE BEEN PROCESSED TO A UNIFORM STATE HELD TOGETHER BY A WATER RESISTANT BONDING AGENT. BFM SHALL CONTAIN NO PAPER (CELLULOSE) MULCH BUT MAY CONTAIN SMALL PERCENTAGES OF SYNTHETIC FIBERS TO ENHANCE PERFORMANCE.
 D. REFER TO FIGURE 3.4.5A FOR CONDITIONS AND LIMITATIONS OF USE FOR EACH OF THE ABOVE CATEGORIES OF HYDRAULIC MULCH.
 II. ALL COMPONENTS OF THE HYDRAULICALLY APPLIED MULCHES SHALL BE PREPACKAGED BY THE MANUFACTURER TO ASSURE MATERIAL PERFORMANCE. FIELD MIXING OF THE MULCH COMPONENTS IS ACCEPTABLE, BUT MUST BE DONE PER MANUFACTURER RECOMMENDATIONS TO ENSURE THE PROPER RESULTS.

Source: Delaware ESC Handbook
 Symbol: **DE-ESC-3.4.5**
 Detail No. Sheet 1 of 3
 Date: 6/05

Standard Detail & Specifications
Mulching

III. HYDRAULIC MULCH SHALL BE APPLIED WITH A VIABLE SEED AND AT MANUFACTURER'S RECOMMENDED RATES. INCREASED RATES MAY BE NECESSARY BASED ON SITE CONDITIONS.
 IV. HYDRAULICALLY APPLIED MULCHES AND ADDITIVES SHALL BE MIXED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
 V. MATERIALS WITHIN THIS CATEGORY SHALL ONLY BE USED WHEN HYDRAULICALLY APPLIED MULCH HAS BEEN SPECIFIED FOR USE ON THE APPROVED SEDIMENT AND STORMWATER PLAN, OR SUPPLEMENTAL APPROVAL FROM THE PLAN APPROVAL AGENCY HAS BEEN OBTAINED IN WRITING FOR A SPECIFIC AREA.
 VI. APPLICATION
 A. APPLY PRODUCT TO GEOTECHNICALLY STABLE SLOPES THAT HAVE BEEN DESIGNED AND CONSTRUCTED TO DIVERT RUNOFF AWAY FROM THE FACE OF THE SLOPE.
 B. DO NOT APPLY TO SATURATED SOILS, OR IF PRECIPITATION IS ANTICIPATED WITHIN 24-48 HOURS.
 C. DURING THE SPRING (MARCH 1 TO MAY 31) AND FALL (SEPTEMBER 1 TO NOVEMBER 30) SEASONS, HYDRAULIC MULCHES MAY BE APPLIED IN A ONE-STEP PROCESS WHERE ALL COMPONENTS ARE MIXED TOGETHER IN SINGLE-TANK LOADS. IT IS RECOMMENDED THAT THE PRODUCT BE APPLIED FROM OPPOSING DIRECTIONS TO ACHIEVE OPTIMUM SOIL COVERAGE.
 D. DURING THE SUMMER (JUNE 1 TO AUGUST 31) AND WINTER (DECEMBER 1 TO FEBRUARY 28) SEASONS, THE FOLLOWING TWO-STEP PROCESS IS REQUIRED:
 STEP ONE - MIX AND APPLY SEED AND SOIL AMENDMENTS WITH A SMALL AMOUNT OF MULCH FOR VISUAL METERS.
 STEP TWO - MIX AND APPLY MULCH OF MANUFACTURER'S RECOMMENDED RATES OVER FRESHLY SEEDDED SURFACES. APPLY FROM OPPOSING DIRECTIONS TO ACHIEVE OPTIMUM SOIL COVERAGE.
 E. MINIMUM CURING TEMPERATURE IS 40° F (4° C). THE BEST RESULTS AND MORE RAPID CURING ARE ACHIEVED AT TEMPERATURES EXCEEDING 60° F (15° C). CURING TIMES MAY BE ACCELERATED IN HIGH TEMPERATURE, LOW HUMIDITY CONDITIONS ON DRY SOILS.
 VI. RECOMMENDED APPLICATION RATES ARE FOR INFORMATIONAL PURPOSES ONLY. CONFORMANCE WITH THIS STANDARD AND SPECIFICATION SHALL BE PERFORMANCE BASED AND REQUIRES 100% SOIL COVERAGE. ANY AREAS WITH BARE SOIL SHOWING SHALL BE TOP DRESSED UNTIL FULL COVERAGE IS ACHIEVED.

Source: Delaware ESC Handbook
 Symbol: **DE-ESC-3.4.5**
 Detail No. Sheet 2 of 3
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Standard Detail & Specifications
Mulching

2. ANCHORING MULCH - MULCH MUST BE ANCHORED IMMEDIATELY TO MINIMIZE LOSS BY WIND OR WATER. THIS MAY BE DONE BY ONE OF THE FOLLOWING METHODS, DEPENDING UPON SIZE OF AREA, EROSION HAZARD, AND COST.
 A. CRIMPING - A CRIMPER IS A TRACTOR DRAWN IMPLEMENT DESIGNED TO PUNCH AND ANCHOR MULCH INTO THE TOP TWO (2) INCHES OF SOIL. THIS PRACTICE AFFORDS MAXIMUM EROSION CONTROL, BUT IS LIMITED TO FLATTER SLOPES WHERE EQUIPMENT CAN OPERATE SAFELY. ON SLOPING LAND, CRIMPING SHOULD BE DONE ON THE CONTOUR WHENEVER POSSIBLE.
 B. TRACKING - TRACKING IS THE PROCESS OF CUTTING MULCH (USUALLY STRAW) INTO THE SOIL USING A BULLDOZER OR OTHER EQUIPMENT THAT RUNS ON CLEARED TRACKS. TRACKING IS USED PRIMARILY ON SLOPES 3:1 OR STEEPER AND SHOULD BE DONE UP AND DOWN THE SLOPE WITH CLEAT MARKS RUNNING ACROSS THE SLOPE.
 C. LIQUID MULCH BINDERS - APPLICATIONS OF LIQUID MULCH BINDERS SHOULD BE HEAVIER AT EDGES, IN VALLEYS, AND AT CRESTS OF BANKS AND OTHER AREAS WHERE THE MULCH WILL BE MOVED BY WIND OR WATER. ALL OTHER AREAS SHOULD HAVE A UNIFORM APPLICATION OF BINDER. THE USE OF SYNTHETIC BINDERS IS THE PREFERRED METHOD OF MULCH BINDING AND SHOULD BE APPLIED AT THE RATES RECOMMENDED BY THE MANUFACTURER.
 D. PAPER FIBER - THE FIBER BINDER SHALL BE APPLIED AT A NET DRY WEIGHT OF 750 LBS/AC. THE WOOD CELLULOSE FIBER SHALL BE MIXED WITH WATER, AND THE MIXTURE SHALL CONTAIN A MAXIMUM OF 50 LBS. OF WOOD CELLULOSE FIBER PER 100 GALLONS.
 E. NETTINGS - SYNTHETIC OR ORGANIC NETTINGS MAY BE USED TO SECURE STRAW MULCH. INSTALL AND SECURE ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.

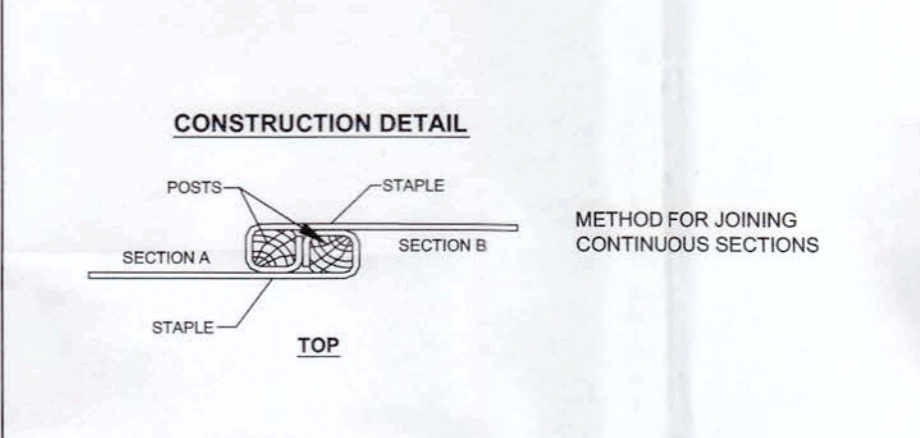
Source: Delaware ESC Handbook
 Symbol: **DE-ESC-3.4.5**
 Detail No. Sheet 3 of 3
 Date: 6/05

Standard Detail & Specifications
Mulching

Percent Erosion	Type of Mulch	MULCHING MATERIAL SELECTION GUIDE												
		June 15-Aug 31	Sept 1-Oct 31	Nov 1-Dec 31	Jan 1-Feb 28/29	Mar 1-May 31	June 1-Aug 31	Sept 1-Oct 31	Nov 1-Dec 31	Jan 1-Feb 28/29	Mar 1-May 31	June 1-Aug 31		
100%	Wood Chips	X	X	X	X	X	X	X	X	X	X	X	X	X
100%	Straw	X	X	X	X	X	X	X	X	X	X	X	X	X
100%	Hydraulic Mulch	X	X	X	X	X	X	X	X	X	X	X	X	X
100%	Paper Fiber	X	X	X	X	X	X	X	X	X	X	X	X	X
100%	Netting	X	X	X	X	X	X	X	X	X	X	X	X	X
100%	Crumping	X	X	X	X	X	X	X	X	X	X	X	X	X
100%	Tracking	X	X	X	X	X	X	X	X	X	X	X	X	X
100%	Liquid Mulch Binder	X	X	X	X	X	X	X	X	X	X	X	X	X
100%	Wood Cellulose Fiber	X	X	X	X	X	X	X	X	X	X	X	X	X

Source: Delaware ESC Handbook
 Symbol: **DE-ESC-3.4.5**
 Detail No. Sheet 3 of 3
 Date: 6/05

Standard Detail & Specifications
Silt Fence



CONSTRUCTION NOTES:
 1. GEOSYNTHETIC FABRIC TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES.
 2. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY SIX INCHES AND FOLDED.
 3. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN MULCH DEVELOPS IN THE SILT FENCE.

MATERIALS:
 1. STAPLES: STEEL, EITHER T OR U OR 2" HARDWOOD
 2. GEOSYNTHETIC FABRIC, TYPE GD-1
 3. REINFORCING STRIP: WOODEN LATH, PLASTIC STRIP OR OTHER APPROVED EQUIVALENT
 4. PREFABRICATED UNIT: GEOTAF, ENVIROFENCE, OR APPROVED EQUIVALENT

Source: Adapted from MD Sdts. & Specs. for ESC
 Symbol: **SF**
 Detail No. **DE-ESC-3.1.2.1**
 Sheet 2 of 2
 Date: 6/05

Standard Detail & Specifications
Site Pollution Prevention

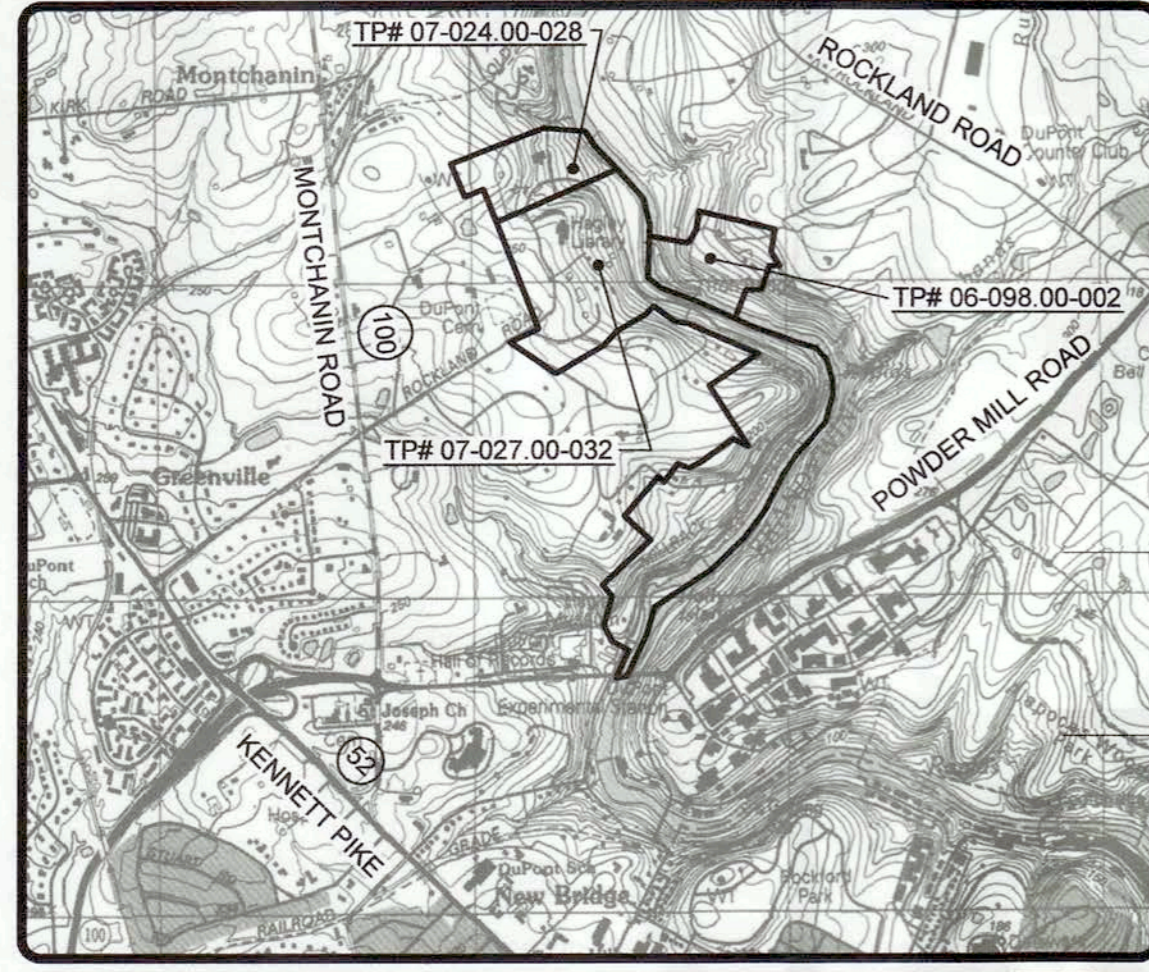
Notes:
 The Construction Site Pollution Prevention Plan should include the following elements:
 1. **Material Inventory**
 Document the storage and use of the following materials:
 a. Concrete
 b. Deleragets
 c. Paints (enamel and latex)
 d. Cleaning solvents
 e. Pesticides
 f. Wood scraps
 g. Fertilizers
 h. Petroleum based products
 2. **Good housekeeping practices**
 a. Store only enough product required to do the job.
 b. All materials shall be stored in a neat, orderly manner in their original labeled containers and covered.
 c. Substances shall not be mixed.
 d. When possible, all of a product shall be used up prior to disposal of the container.
 e. Manufacturers' instructions for disposal shall be strictly adhered to.
 f. The site foreman shall designate someone to inspect all BMPs daily.
 3. **Waste management practices**
 a. All waste materials shall be collected and stored in securely lidded dumpsters in a location that does not drain to a waterbody.
 b. Waste materials shall be salvaged and/or recycled whenever possible.
 c. The dumpsters shall be emptied a minimum of twice per week, or more if necessary. The licensed trash hauler is responsible for cleaning out dumpsters.

Source: Adapted from USEPA Pub. 840-B-92-002
 Symbol: **DE-ESC-3.6.1**
 Detail No. Sheet 1 of 3
 Date: 6/05

Standard Detail & Specifications
Site Pollution Prevention

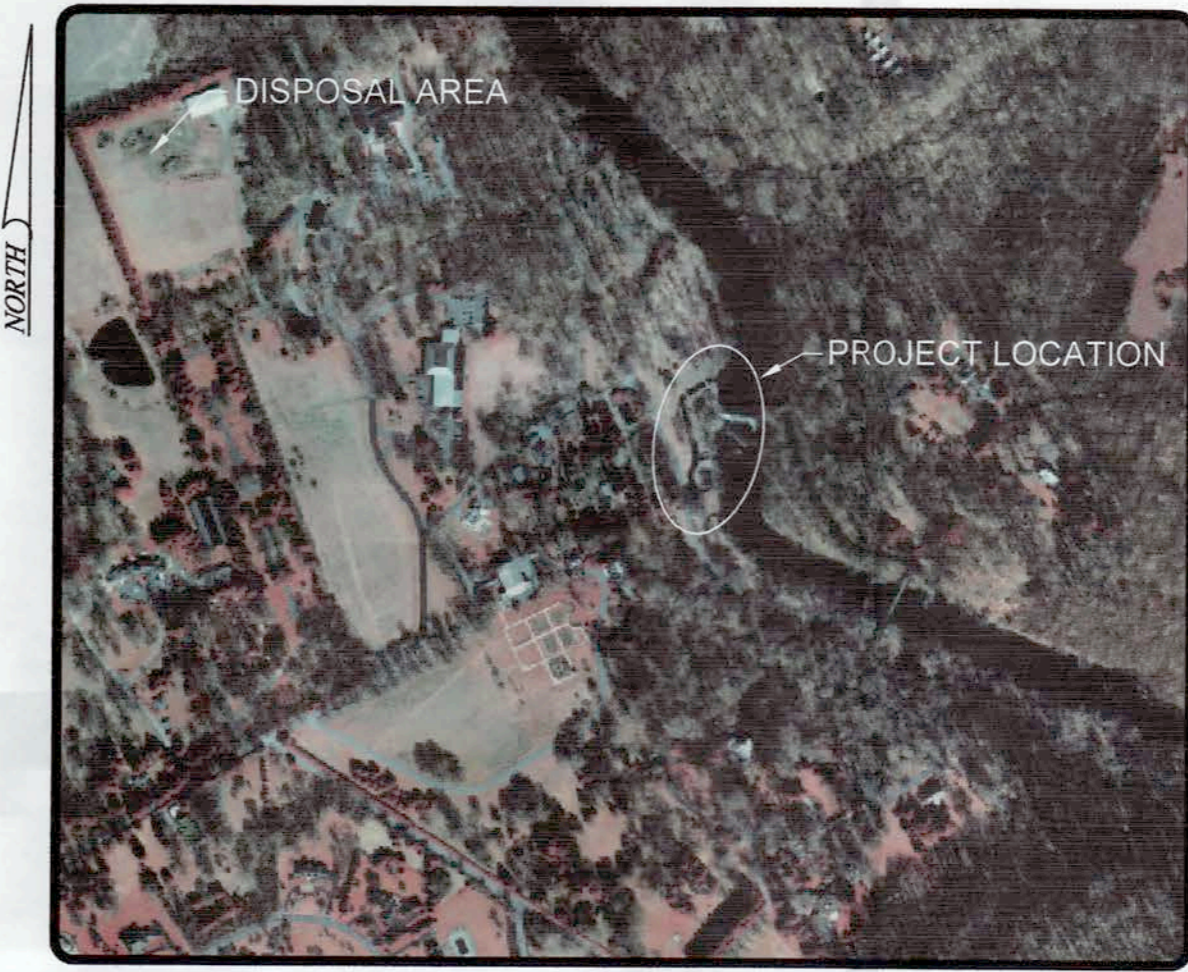
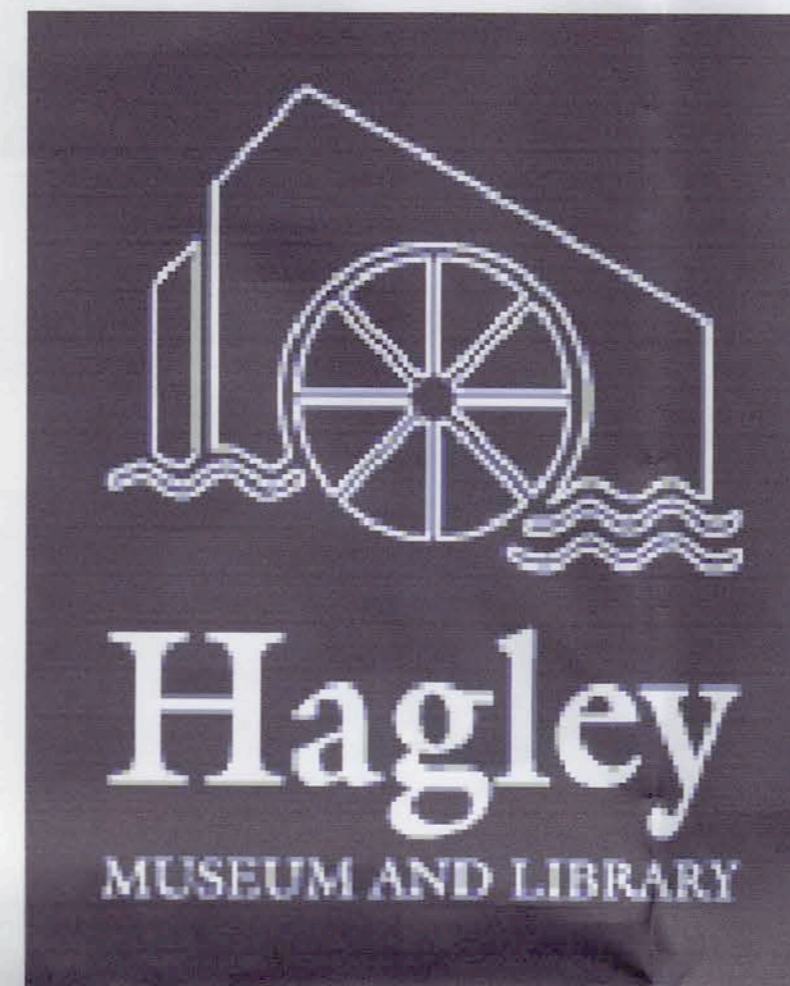
Notes (cont.)
 d. Trash shall be disposed of in accordance with all applicable Delaware laws.
 e. Trash cans shall be placed at all lunch spots and littering is strictly prohibited. Recycle bins shall be placed near the construction trailer.
 f. If fertilizer bags can not be stored in a weather-proof location, they shall be kept on a pallet and covered with plastic sheeting which is overlapped and anchored.
 4. **Equipment maintenance practices**
 a. If possible, equipment should be taken to off-site commercial facilities for washing and maintenance.
 b. If performed on-site, vehicles shall be washed with high-pressure water spray without detergents in an area contained by an impervious berm.
 c. Drip pans shall be used for all equipment maintenance.
 d. Equipment shall be inspected for leaks on a daily basis.
 e. Washout from concrete trucks shall be disposed of in a temporary pit for hardening and proper disposal.
 f. Fuel nozzles shall be equipped with automatic shut-off valves.
 g. All used products such as oil, antifreeze, solvents and tires shall be disposed of in accordance with manufacturers' recommendations and local, state and federal laws and regulations.
 5. **Spill prevention practices**
 a. Potential spill areas shall be identified and contained in covered areas with no connection to the storm drain system.
 b. Warning signs shall be posted in hazardous material storage areas.
 c. Preventive maintenance shall be performed on all tanks, valves, pumps, pipes and other equipment as necessary.
 d. Low or non-toxic substances shall be prioritized for use.

Source: Adapted from USEPA Pub. 840-B-92-002



VICINITY MAP SCALE: 1" = 2000'

THIS VICINITY MAP IS ADAPTED FROM THE USGS QUAD MAP FOR WILMINGTON NORTH, DEL. -PA., 1993.



LOCATION PLAN

THIS LOCATION PLAN IS ADAPTED FROM A 2002 AERIAL PHOTOGRAPH OF NEW CASTLE COUNTY.

RESTORATION OF THE ELEUTHERIAN MILLS DAM AND ADJACENT MILLRACE HAGLEY MUSEUM & LIBRARY

WILMINGTON~NEW CASTLE COUNTY~DELAWARE
FEBRUARY 2009

SHEET	TITLE
1	COVER SHEET
2	EXISTING SITE CONDITIONS PLAN
3	STAGING, PHASING AND DEWATERING
4	DAM RESTORATION PLAN & SECTION VIEW
5	MILLRACE RESTORATION PLAN VIEW & PHOTOGRAPHS
6	MILLRACE RESTORATION DETAILS
ES1	SEDIMENT DISPOSAL LOCATION PLAN - GRADING AND EROSION & SEDIMENT CONTROL
ES2	CONTRACTOR STAGING AREA PLAN - GRADING AND EROSION & SEDIMENT CONTROL
ES3	SEDIMENT DISPOSAL LOCATION DETAILS - GRADING AND EROSION & SEDIMENT CONTROL

PURPOSE STATEMENT:

THE PURPOSE OF THESE DRAWINGS IS TO PROVIDE THE DESIGN FOR THE PROPOSED RESTORATION OF THE EXISTING ELEUTHERIAN MILLS DAM AND ADJACENT MILLRACE. THE DAM REHABILITATION IS TO CONSIST OF PLACING PLANKING ON THE SLOPED DAM FACE TO RESORE THE AESTHETIC VIEW TO 1969 CONDITIONS. GROUTED ANCHORS AND A CONCRETE SLAB WILL BE INSTALLED TO SUPPORT THE PLANKING. THE PURPOSE OF THE MILLRACE REHABILITATION WILL BE TO RESTORE FLOW TO A SECTION OF THE MILLRACE. THE MILLRACE STONE WALLS WILL BE REPOINTED AND THE MILLRACE "EXITS" WILL BE CLEARED OF ACCUMULATED SEDIMENT/DEBRIS.

COVER SHEET
HAGLEY MUSEUM & LIBRARY

RESTORATION OF THE ELEUTHERIAN
MILLS DAM AND ADJACENT MILLRACE

WILMINGTON~NEW CASTLE COUNTY~DELAWARE

DATE: 19 FEBRUARY 2009
SCALE: NO SCALE
PROJECT NO. 5980.PD
SHEET: 1 OF 6

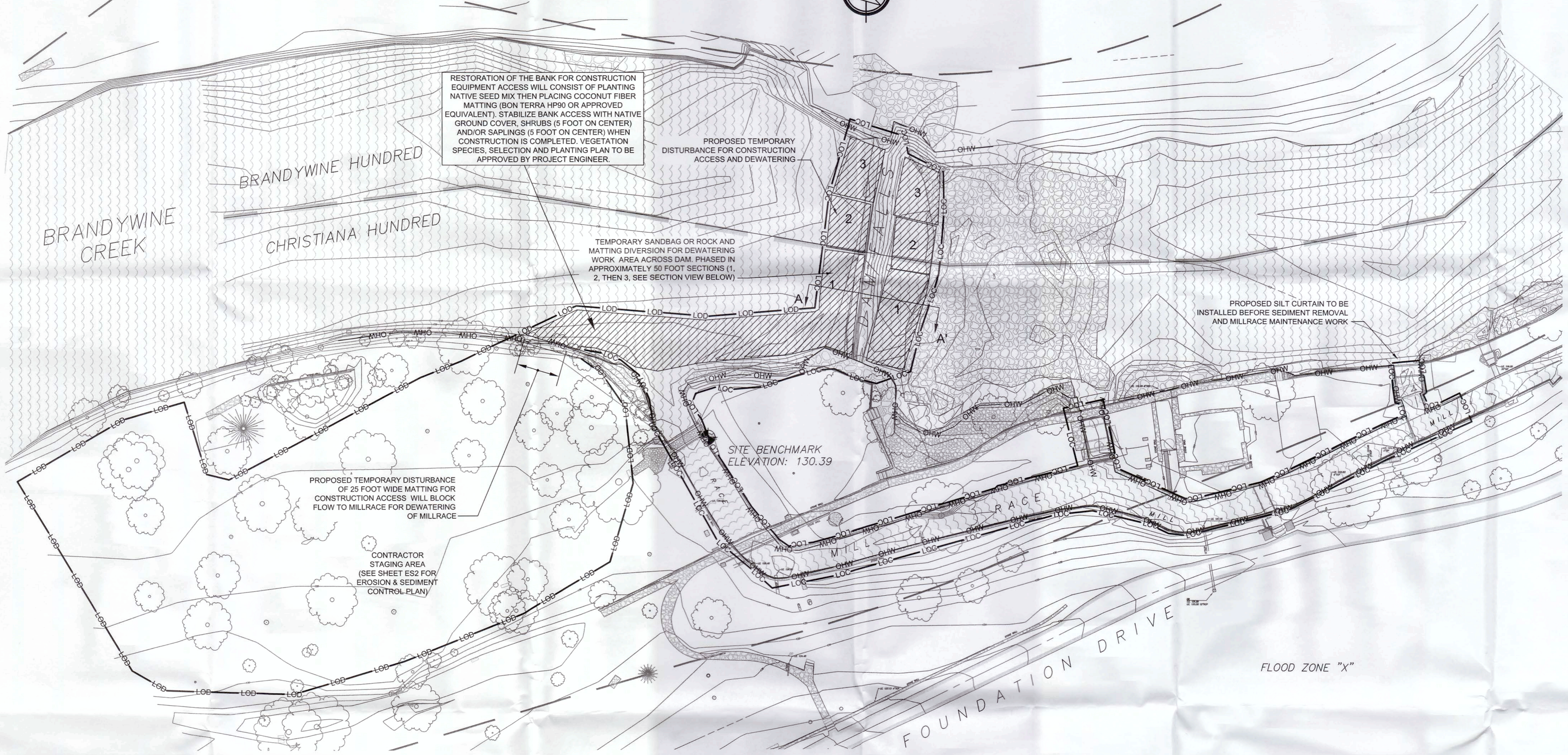
DUFFIELD ASSOCIATES
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FLOOD ZONE "X"



RESTORATION OF THE BANK FOR CONSTRUCTION EQUIPMENT ACCESS WILL CONSIST OF PLANTING NATIVE SEED MIX THEN PLACING COCONUT FIBER MATTING (BON TERRA HP90 OR APPROVED EQUIVALENT). STABILIZE BANK ACCESS WITH NATIVE GROUND COVER, SHRUBS (5 FOOT ON CENTER) AND/OR SAPLINGS (5 FOOT ON CENTER) WHEN CONSTRUCTION IS COMPLETED. VEGETATION SPECIES, SELECTION AND PLANTING PLAN TO BE APPROVED BY PROJECT ENGINEER.

PROPOSED TEMPORARY DISTURBANCE FOR CONSTRUCTION ACCESS AND DEWATERING

TEMPORARY SANDBAG OR ROCK AND MATTING DIVERSION FOR DEWATERING WORK AREA ACROSS DAM. PHASED IN APPROXIMATELY 50 FOOT SECTIONS (1, 2, THEN 3. SEE SECTION VIEW BELOW)

PROPOSED SILT CURTAIN TO BE INSTALLED BEFORE SEDIMENT REMOVAL AND MILLRACE MAINTENANCE WORK

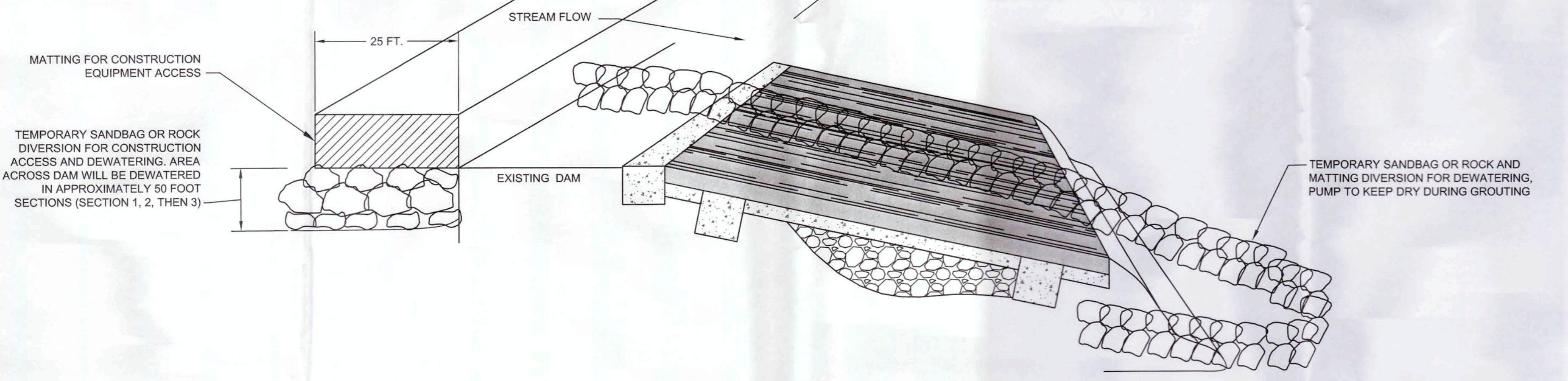
PROPOSED TEMPORARY DISTURBANCE OF 25 FOOT WIDE MATTING FOR CONSTRUCTION ACCESS WILL BLOCK FLOW TO MILLRACE FOR DEWATERING OF MILLRACE

CONTRACTOR STAGING AREA (SEE SHEET ES2 FOR EROSION & SEDIMENT CONTROL PLAN)

SITE BENCHMARK ELEVATION: 130.39

STAGING, PHASING AND DEWATERING

SCALE: 1" = 30'



SECTION A-A' DEWATERING AREA DETAIL

SCALE: 1" = 20'

LEGEND

- EVERGREEN TREE
- DECIDUOUS TREE
- SHRUB
- SIGN
- CATCH BASIN
- MANHOLE
- SPOT ELEVATION
- TOP OF WALL SPOT ELEVATION
- BOTTOM OF WALL SPOT ELEVATION
- FLOODPLAIN LINE
- STORM PIPE
- CONCRETE
- PAVEMENT
- STONE
- WATER
- LIMIT OF CONSTRUCTION
- LIMIT OF DISTURBANCE
- ORDINARY HIGH WATER
- CONSTRUCTION STAGING AREA
- HUNDRED BOUNDARY LINE

STAGING, PHASING AND DEWATERING
HAGLEY MUSEUM & LIBRARY
RESTORATION OF THE ELEUTHERIAN
MILLS DAM AND ADJACENT MILLRACE
 WILMINGTON-NEW CASTLE COUNTY-DELAWARE

DATE: 19 FEBRUARY 2009
 SCALE: AS SHOWN
 PROJECT NO. 5980.PD
 SHEET: 3 OF 6



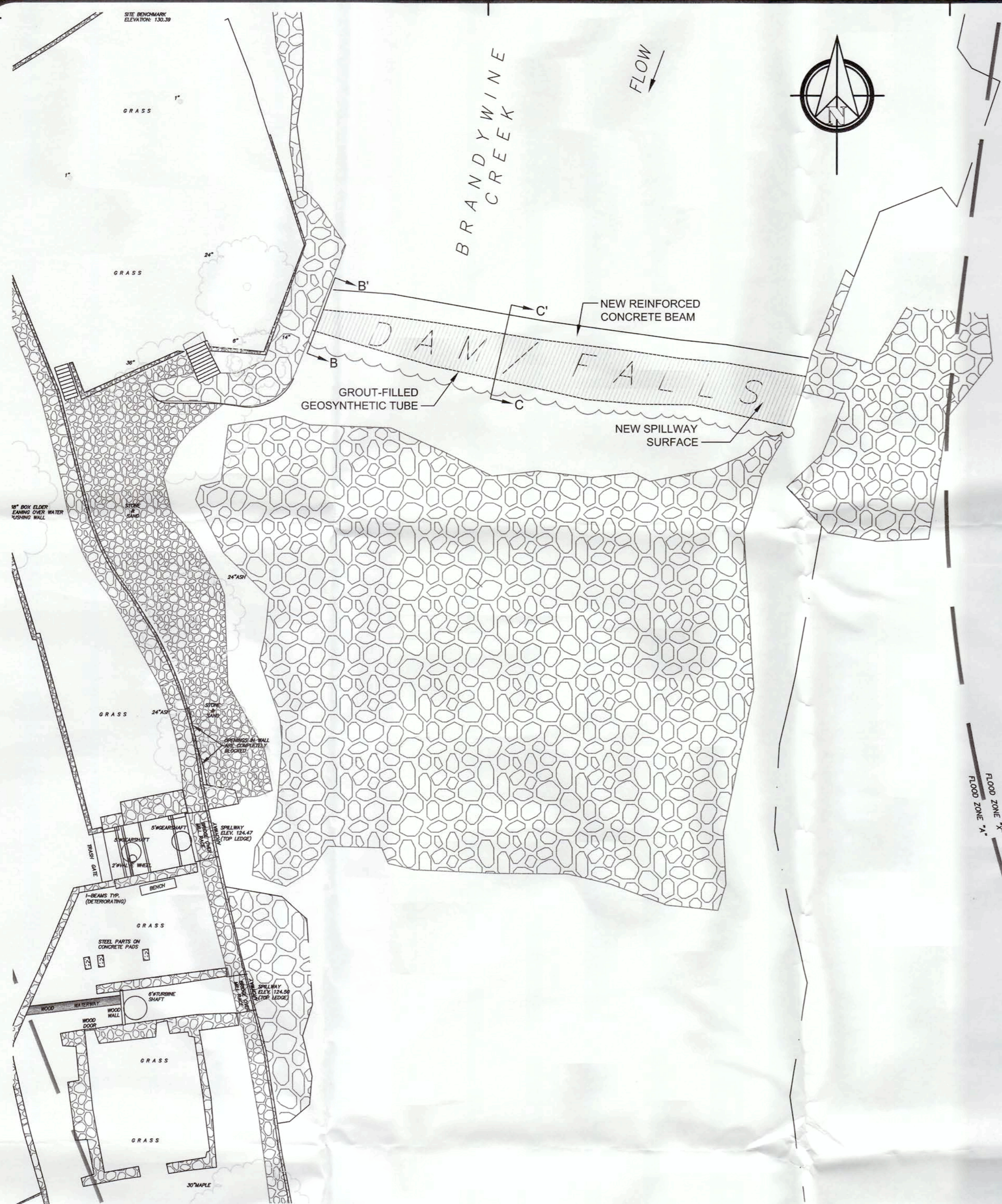
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			TAT	JFC
			JE	

FILE NAME: D-5980PD-03-R0

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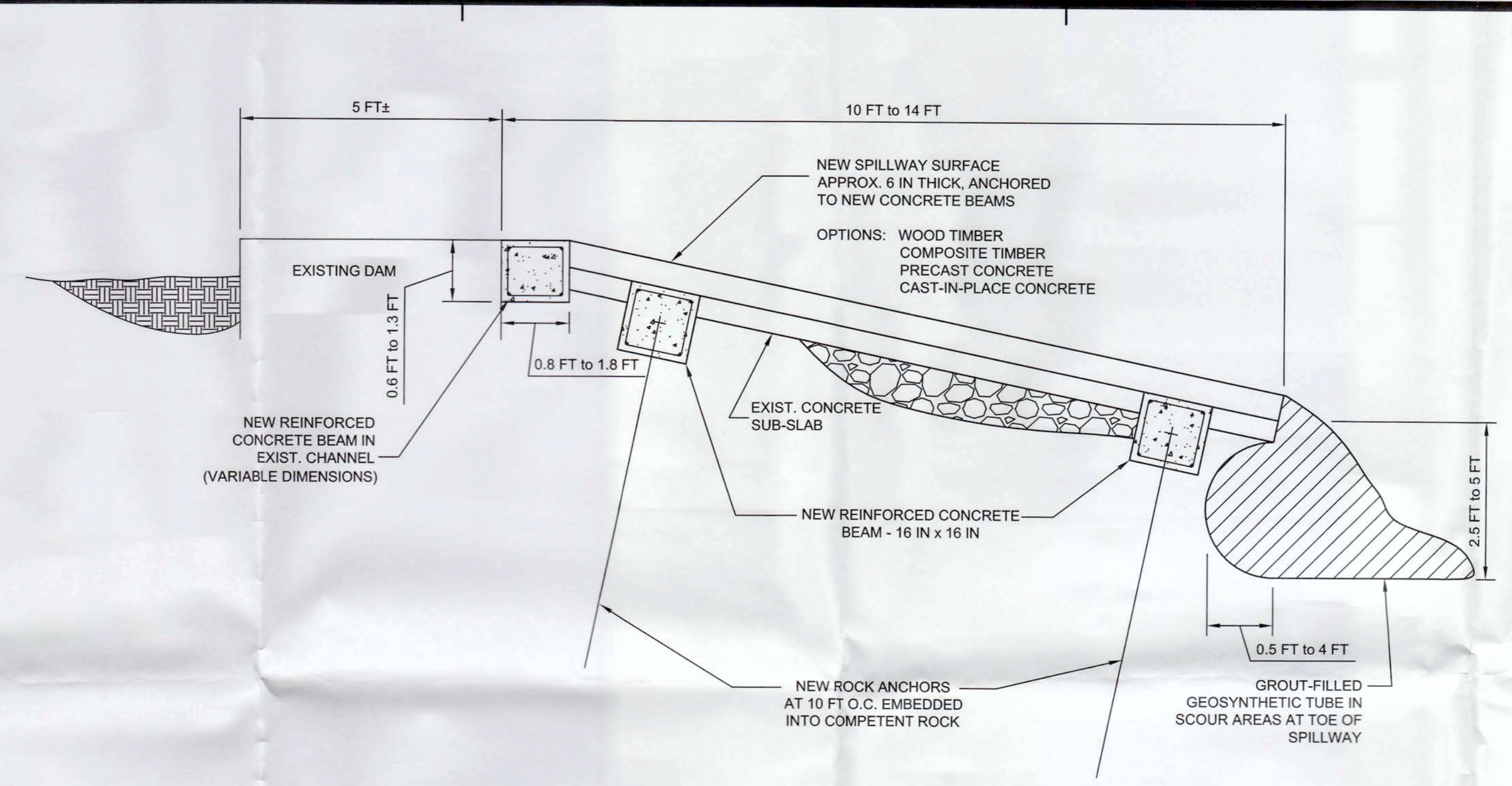
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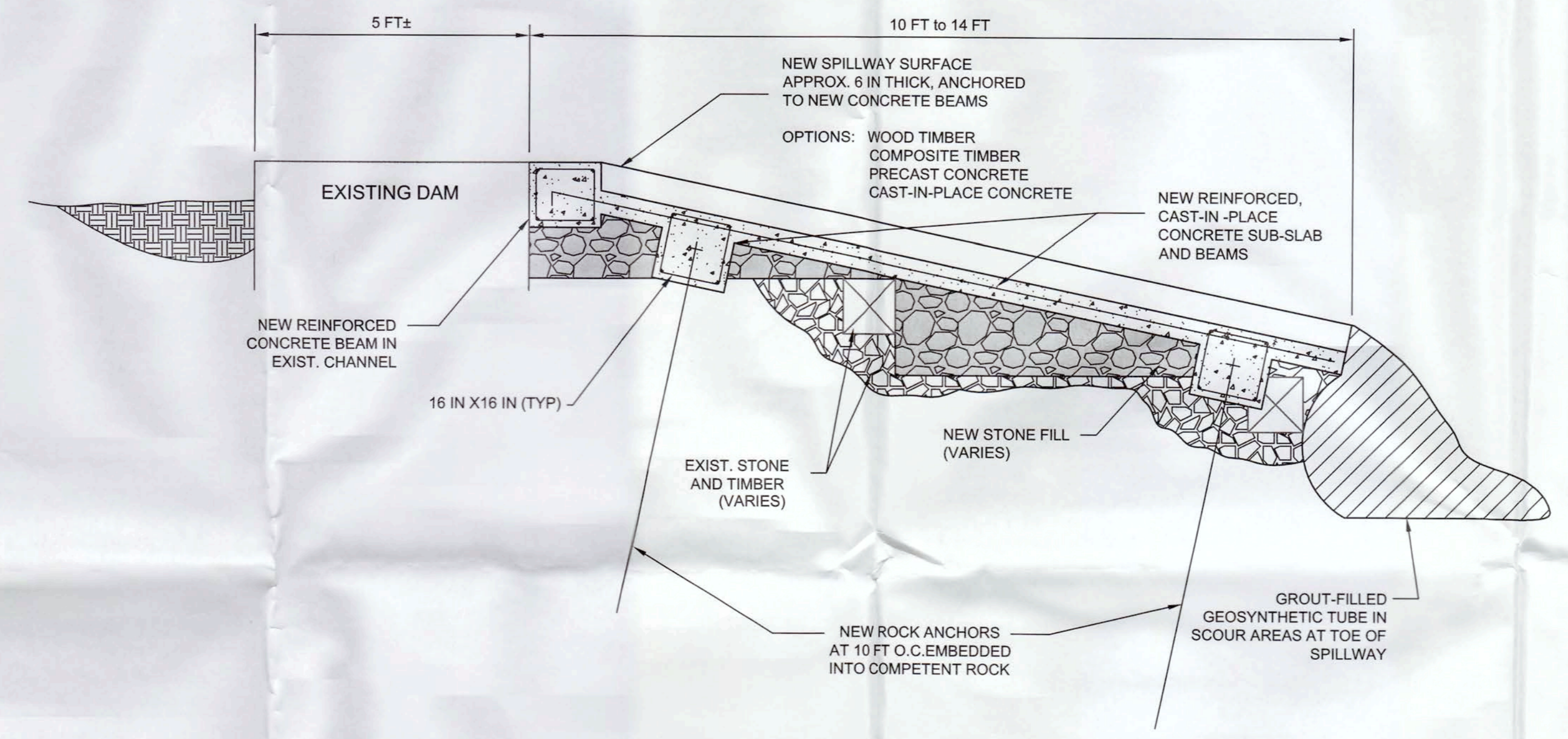
PROPOSED DAM RESTORATION PLAN
SCALE: 1" = 20'

LEGEND

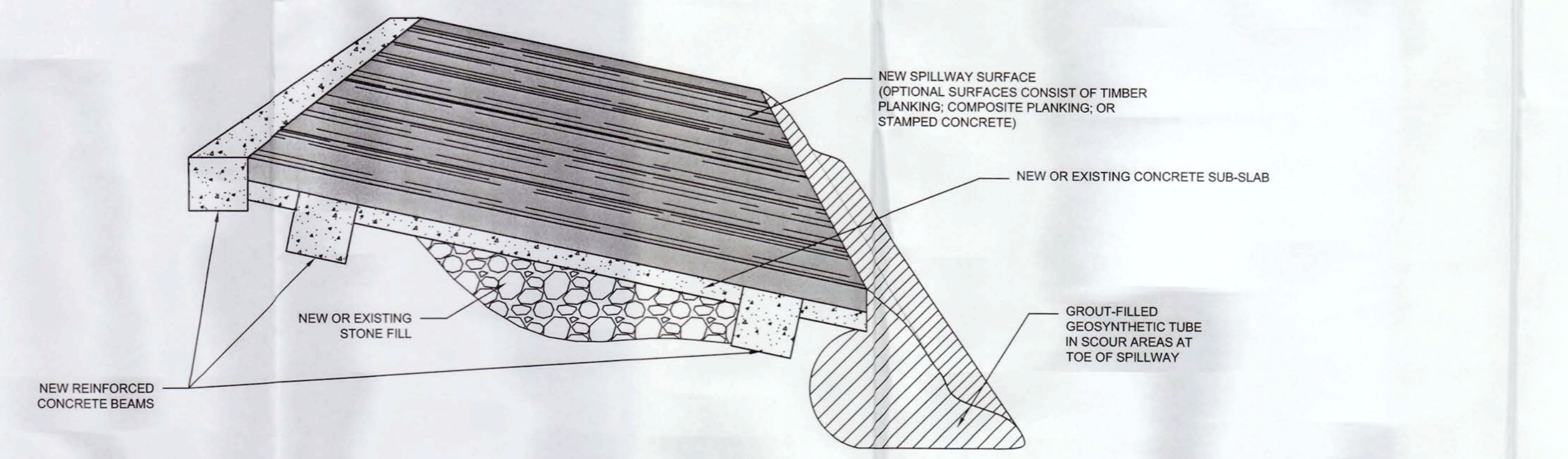
	EVERGREEN TREE WITH DIAMETER AT BREAST HEIGHT
	DECIDUOUS TREE WITH DIAMETER AT BREAST HEIGHT
	SHRUB
	SIGN
	CATCH BASIN
	MANHOLE
	SPOT ELEVATION
	TOP OF WALL SPOT ELEVATION
	BOTTOM OF WALL SPOT ELEVATION
	FLOODPLAIN LINE
	STORM PIPE
	CONCRETE
	PAVEMENT
	STONE
	WATER



PROPOSED RESTORATION SECTION: B-B' EASTERN 75 FT OF DAM
SCALE: 1" = 20'



PROPOSED RESTORATION SECTION: C-C' WESTERN 50 FT OF DAM
SCALE: 1" = 20'



PROPOSED RESTORATION - ISOMETRIC VIEW
SCALE: NOT TO SCALE

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Hagley
MUSEUM AND LIBRARY

DAM RESTORATION PLAN AND SECTION VIEW
HAGLEY MUSEUM & LIBRARY
RESTORATION OF THE ELEUTHERIAN MILLS DAM AND ADJACENT MILLRACE
WILMINGTON-NEW CASTLE COUNTY-DELAWARE

DATE: 19 FEBRUARY 2009
SCALE: 1" = 20'
PROJECT NO. 5980.PD
SHEET: 4 OF 6

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GENERAL NOTES:

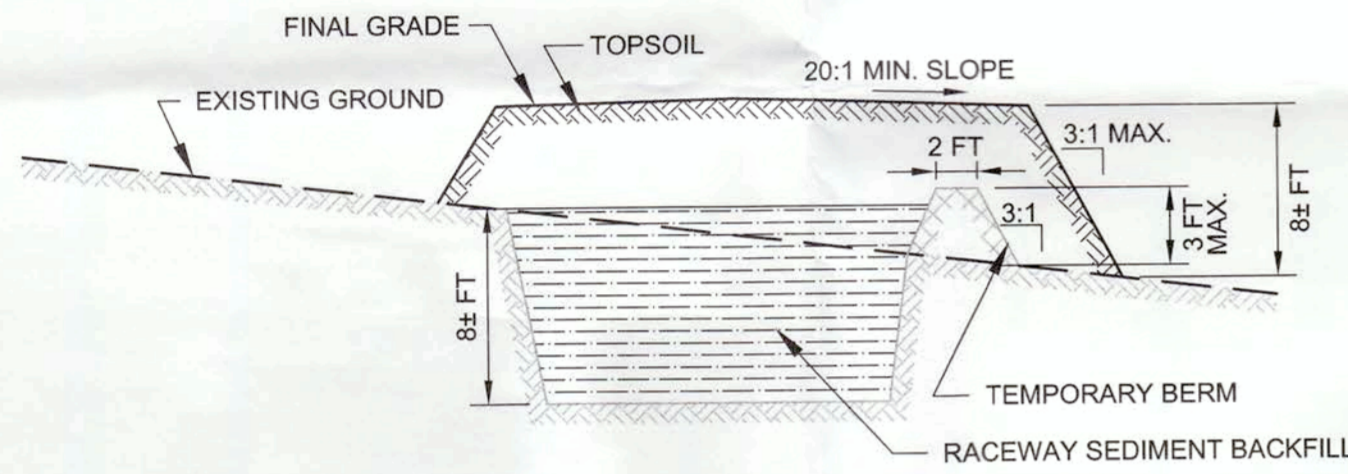
1. THE PURPOSE OF THIS PLAN IS TO PROVIDE FOR EROSION & SEDIMENT CONTROLS AND GRADING FOR DISPOSAL OF MILLRACE SEDIMENTS.
2. THIS SKETCH IS ADAPTED FROM A DRAWING TITLED "LINES AND GRADES PLAN, ELEUTHERIAN MILLS, HAGLEY FOUNDATION" PREPARED BY VANDEMARK & LYNCH, INC. AND DATED AUGUST 24, 1998.
3. PART OF THIS SITE LIES WITHIN A FLOODPLAIN, PER FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) COMMUNITY MAP NO. 10003C0065J, REVISED JANUARY 17, 2007. NO DISTURBANCE IN OR WITHIN 100 FEET OF THE FLOODPLAIN IS PROPOSED BY THIS APPLICATION.
4. NO WETLANDS WERE OBSERVED IN THE AREA OF DISTURBANCE, PER A LETTER OF NO FINDINGS DATED AUGUST 21, 2008 BY DUFFIELD ASSOCIATES, INC.
5. NO PART OF THIS SITE LIES WITHIN A WATER RESOURCE PROTECTION AREA (WRPA), PER "WATER RESOURCE PROTECTION AREAS FOR CITY OF NEWARK, CITY OF WILMINGTON, NEW CASTLE COUNTY, DELAWARE," MAP 1 OF 3, REVISED FEBRUARY 2006.
6. CRITICAL NATURAL RESOURCE AREAS EXIST ON THE SITE IN THE FORM OF EXISTING FOREST. NO CRITICAL NATURAL AREAS ARE PROPOSED TO BE DISTURBED BY THIS APPLICATION.
7. CONTRACTOR SHALL PRESERVE ALL TREES ON SITE EXCEPT WHERE NECESSARY TO CONSTRUCT SEDIMENT AND EROSION CONTROLS AND TO PERFORM PROPOSED GRADING.
8. STORMWATER MANAGEMENT REQUIREMENTS ARE REQUESTED TO BE WAIVED IN ACCORDANCE WITH DELAWARE SEDIMENT AND STORMWATER REGULATIONS SECTION 3.2.1.1.

STANDARD PLAN NOTES:

1. DRAINAGE, EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT SHALL BE IN ACCORDANCE WITH THE DELAWARE SEDIMENT AND STORMWATER REGULATIONS, AS AMENDED, AND THE NEW CASTLE COUNTY DRAINAGE CODE.
2. REVIEW AND APPROVAL OF THE STANDARD PLAN SUBMISSION SHALL NOT RELIEVE THE CONTRACTOR/PROPERTY OWNER FROM HIS OR HER RESPONSIBILITIES FOR COMPLIANCE WITH THE SEDIMENT AND STORMWATER REGULATIONS, AS AMENDED, NOR SHALL IT RELIEVE THE CONTRACTOR/PROPERTY OWNER FROM ERRORS OR OMISSIONS ON THE APPROVED PLAN.
3. THE APPLICANT SHALL NOTIFY NEW CASTLE COUNTY AT LEAST 48 HOURS PRIOR TO BEGINNING CONSTRUCTION.
4. ACREAGE OF DISTURBED AREA: 0.60 ACRES. LIMITS OF DISTURBANCE MUST BE DELINEATED IN THE FIELD.
5. INITIAL EARTH DISTURBANCE SHALL BE LIMITED TO THOSE AREAS NECESSARY TO INSTALL SEDIMENT AND EROSION CONTROL MEASURES.
6. OWNER/DEVELOPER IS NOT THE SAME OWNER/DEVELOPER OF TWO OR MORE CONTIGUOUS LOTS BEING DEVELOPED.
7. GRADING SHALL NOT IMPAIR SURFACE DRAINAGE, CREATE AN EROSION HAZARD OR CREATE A SOURCE OF SEDIMENT TO ANY ADJACENT WATERCOURSE OR PROPERTY OWNER.
8. ANY SEDIMENT TRANSPORTED OFF-SITE TO ROADS OR RIGHTS OF WAY INCLUDING DITCHES SHALL BE REMOVED IMMEDIATELY. ANY DAMAGE TO ROADS OR DITCHES SHALL BE REPAIRED AND STABILIZED TO ORIGINAL CONDITION.
9. ALL DISTURBED SOIL SURFACES, INCLUDING STOCKPILES AND PERIMETER SEDIMENT CONTROLS ARE SUBJECT TO EROSION AND SHALL BE STABILIZED EITHER TEMPORARILY OR PERMANENTLY WITHIN FOURTEEN (14) DAYS OF INACTIVITY.
10. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED PERIODICALLY AND AFTER EACH RAINFALL. MAINTENANCE MUST BE PERFORMED AFTER EACH INSPECTION AS NECESSARY.
11. EROSION AND SEDIMENT CONTROL PRACTICES SHALL COMPLY WITH THE MOST RECENT COPY OF THE DELAWARE EROSION AND SEDIMENT CONTROL HANDBOOK.
12. IF THE APPROVED PLAN IS NOT SUFFICIENT TO ADDRESS EROSION AND SEDIMENT CONTROL, ADDITIONAL SEDIMENT AND STORMWATER MANAGEMENT PRACTICES MAY BE REQUIRED AND THE PLAN REQUIRED TO BE MODIFIED, AS DEEMED NECESSARY BY THE NEW CASTLE COUNTY DEPARTMENT OF LAND USE.

SEQUENCE OF CONSTRUCTION FOR DISPOSAL & STAGING AREAS:

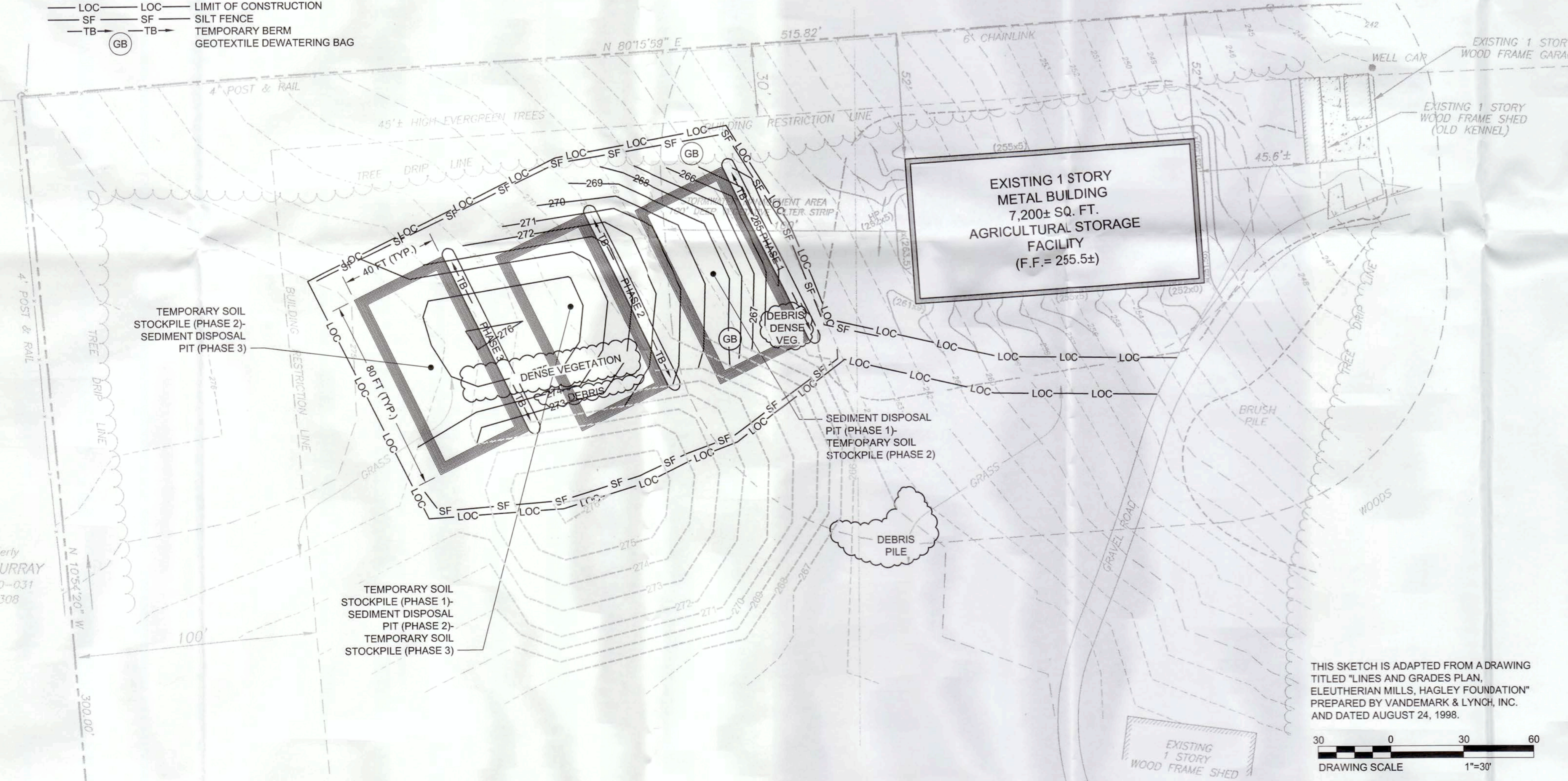
- PHASE 1**
1. INSTALL PERIMETER EROSION AND SEDIMENT CONTROLS. A GEOTEXTILE DEWATERING BAG SHALL BE ON SITE TO DEWATER SUMP AREAS AFTER STORM EVENTS, IF NECESSARY.
 2. STRIP AND STOCKPILE TOPSOIL FOR REUSE.
 3. EXCAVATE SEDIMENT DISPOSAL PIT AND PLACE EXCAVATED MATERIAL IN TEMPORARY SOIL STOCKPILE. CONSTRUCT TEMPORARY BERM.
 4. INSTALL TEMPORARY STABILIZATION AND MULCHING TO TEMPORARY SOIL STOCKPILES AND BERMS WITHIN 14 CALENDARY DAYS OF DISTURBANCE. PERFORM SLOPE TREATMENT BY TRACKING EQUIPMENT UP AND DOWN STOCKPILE SLOPES.
 5. BACKFILL SEDIMENT DISPOSAL PIT WITH SEDIMENTS FROM RACEWAY SEDIMENT REMOVAL.
 6. PLACE TEMPORARY SOIL STOCKPILE MATERIAL OVER TOP OF BACKFILLED SEDIMENTS. INSTALL TEMPORARY STABILIZATION AND MULCHING TO DISTURBED AREAS WITHIN 14 CALENDARY DAYS OF DISTURBANCE. PERFORM SLOPE TREATMENT BY TRACKING EQUIPMENT UP AND DOWN SLOPES.
- PHASE 2**
7. STRIP AND STOCKPILE TOPSOIL FOR REUSE.
 8. EXCAVATE SEDIMENT DISPOSAL PIT AND PLACE EXCAVATED MATERIAL IN TEMPORARY SOIL STOCKPILE OVER TOP OF PHASE 1 MATERIAL. CONSTRUCT TEMPORARY BERM.
 9. REPEAT STEPS 4 THROUGH 6 FOR PHASE 2 AREAS.
- PHASE 3**
10. REPEAT STEPS 7 THROUGH 9 FOR PHASE 3 AREAS, PLACING MATERIAL OVER TOP OF PHASE 2 SEDIMENTS.
- FINAL GRADING**
11. PLACE MINIMUM 4 INCHES OF TOPSOIL OVER PREVIOUSLY DISTURBED AREAS. GRADE TO DRAIN. MAXIMUM SLOPES SHALL BE 5:1 SLOPE. MINIMUM SLOPES SHALL BE 20:1 SLOPE.
 12. INSTALL PERMANENT VEGETATIVE STABILIZATION AND MULCHING. ANCHOR MULCHING BY TRACKING OR APPROVED MULCH BINDERS.
 13. AFTER PERMANENT VEGETATION ACHIEVES A DENSE AND VIGOROUS COVER, REMOVE PERIMETER EROSION AND SEDIMENT CONTROLS.



DETAIL: SEDIMENT DISPOSAL PIT AND TOPSOIL BERM (TYPICAL)
SCALE: NOT TO SCALE

LEGEND:

- - - - - PROPERTY LINE
- - - - - BUILDING RESTRICTION LINE
- - - - - EXISTING CONTOUR LINE
- - - - - PROPOSED CONTOUR LINE
- - - - - EXISTING TREELINE
- - - - - EXISTING BUILDING
- - - - - LIMIT OF CONSTRUCTION
- - - - - SILT FENCE
- - - - - TEMPORARY BERM
- - - - - GEOTEXTILE DEWATERING BAG



DATA COLUMN:

1. NCC APPLICATION NO.:
2. TAX PARCEL NO.: 07-024.00-028
3. OWNER: ELEUTHERIAN MILLS - HAGLEY FOUNDATION
BARLEY MILL ROAD
WILMINGTON, DE 19807
4. SOURCE OF TITLE: DEED BOOK: F97 PAGE: 91
5. ZONING DISTRICT: SUBURBAN ESTATE (SE)
6. MICROFILM NUMBER: 013776
7. SITE GROSS AREA: 21.8 ± AC
8. DISTURBED AREA: 0.60 ± AC
9. NET VOLUME: NET CUT: 0 ± CY
NET FILL: 1300 ± CY

CERTIFICATION OF ACCURACY

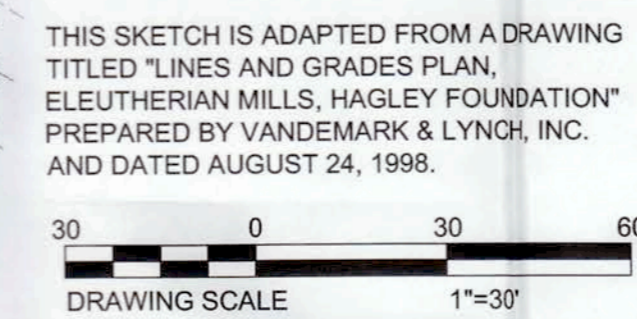
I, COLIN M. KRAUCUNAS, HEREBY CERTIFY THAT I AM A REGISTERED PROFESSIONAL ENGINEER WITH A BACKGROUND IN CIVIL ENGINEERING IN THE STATE OF DELAWARE AND THAT THE INFORMATION ON THIS PLAN IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY ACCEPTED SURVEYING STANDARDS AND PRACTICES AND BY THE NEW CASTLE COUNTY UNIFIED DEVELOPMENT CODE.

DATE: COLIN M. KRAUCUNAS, P.E.
DELAWARE #14308

CERTIFICATION OF OWNERSHIP

I, _____, HEREBY CERTIFY THAT LAND CLEARING, CONSTRUCTION AND DEVELOPMENT SHALL BE PURSUANT TO THE APPROVED PLAN; THAT RESPONSIBLE PERSONNEL INVOLVED WILL HAVE A CERTIFICATE OF TRAINING FROM DNREC (BLUE CARD HOLDER); AND THAT DNREC AND NEW CASTLE COUNTY PERSONNEL SHALL HAVE THE RIGHT TO CONDUCT ON-SITE INSPECTIONS. LAND DISTURBING ACTIVITIES WILL BE IN COMPLIANCE WITH APPLICABLE CODES AND REGULATIONS GOVERNING LAND DISTURBING ACTIVITIES IN NEW CASTLE COUNTY.

DATE: ELEUTHERIAN MILLS - HAGLEY FOUNDATION





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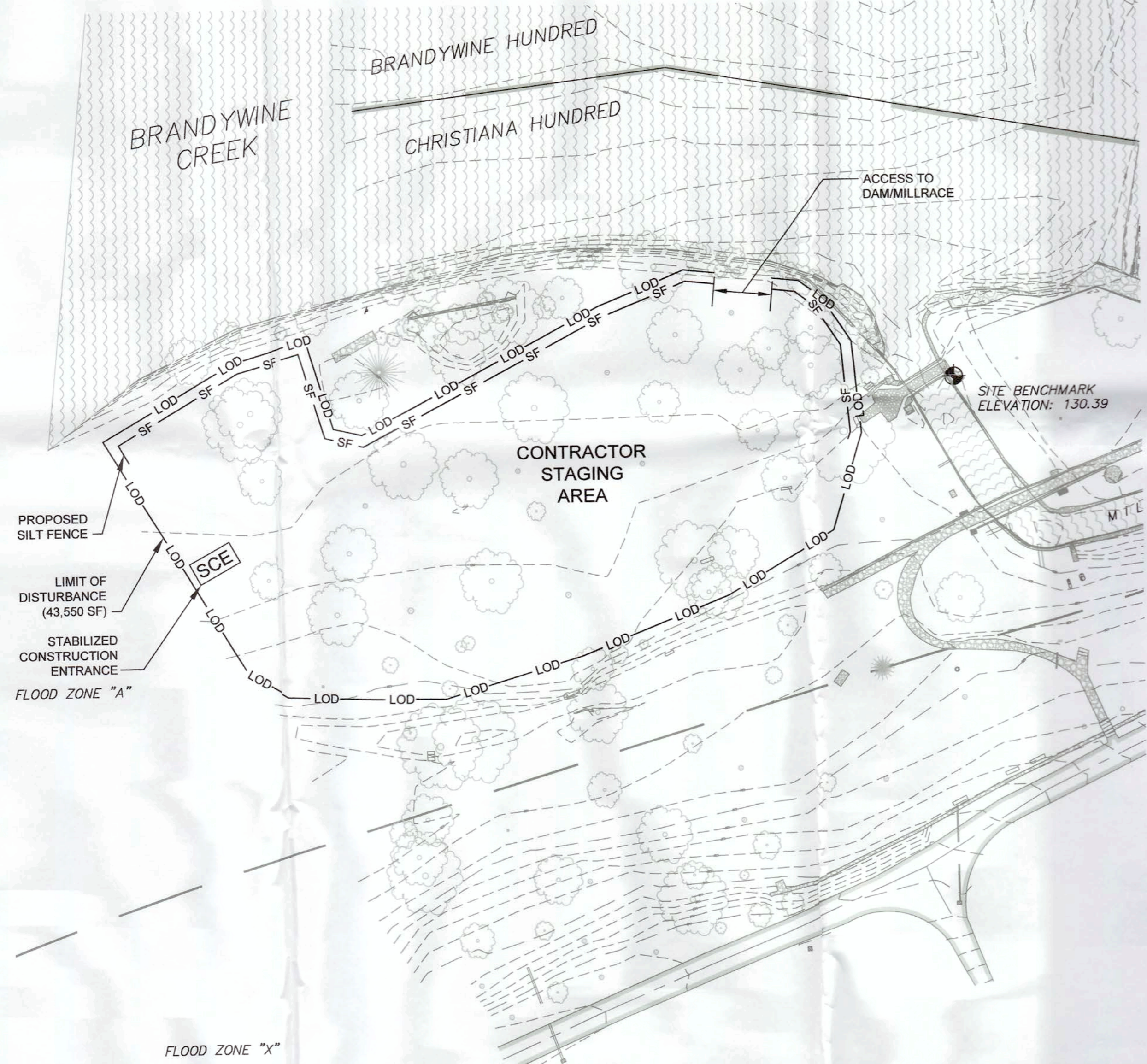
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SEDIMENT DISPOSAL LOCATION PLAN
GRADING AND EROSION & SEDIMENT CONTROL
RESTORATION OF THE ELEUTHERIAN
MILLS DAM AND ADJACENT MILLRACE
WILMINGTON ~ NEW CASTLE COUNTY ~ DELAWARE

DATE: 19 FEBRUARY 2009
SCALE: 1" = 30'
PROJECT NO. 5980.PD
SHEET: ES1 OF ES3



EROSION AND SEDIMENT CONTROL LAYOUT FOR CONTRACTOR STAGING AREA
SCALE: 1" = 40'

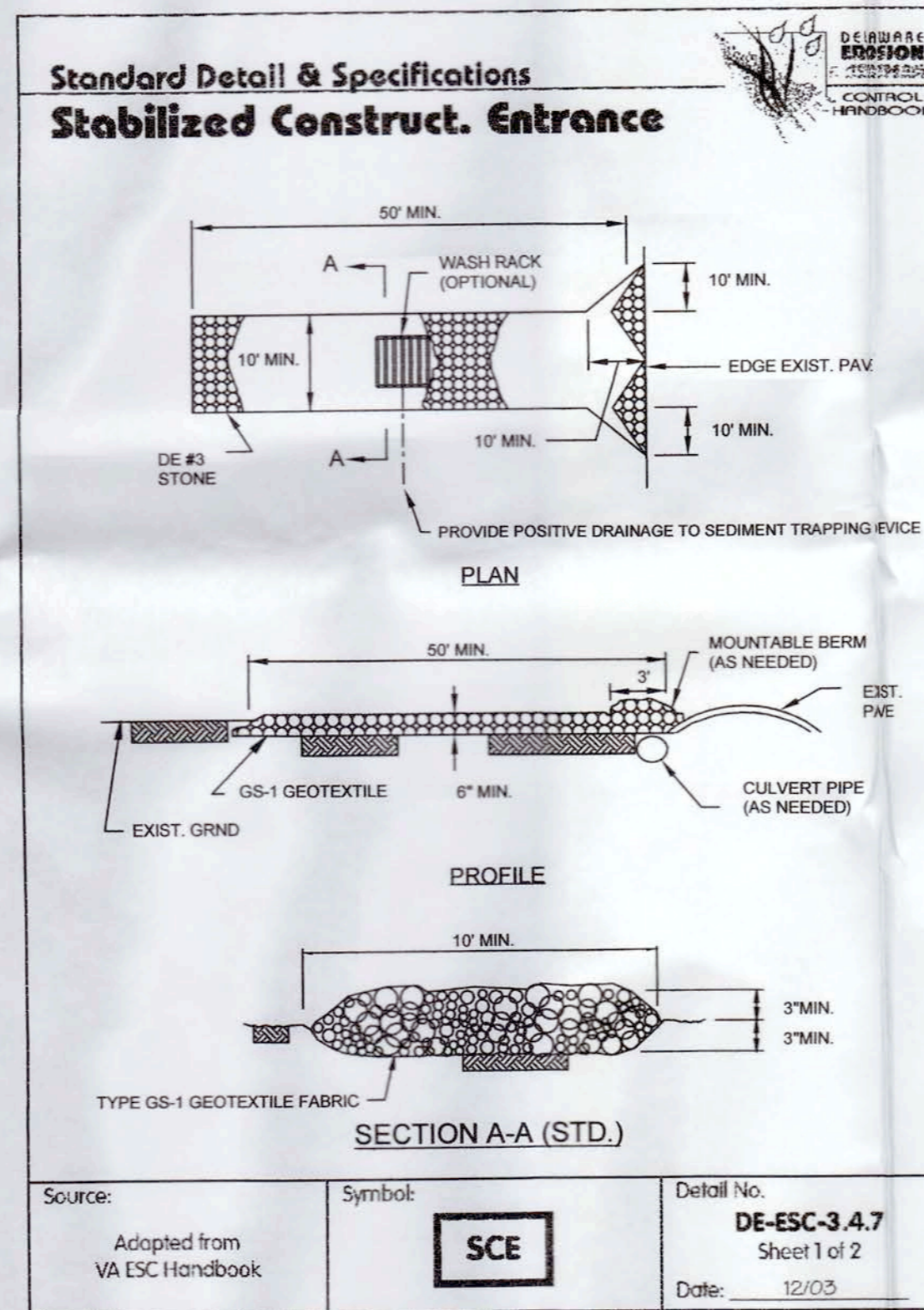


STAGING AREA LAYOUT
SCALE: 1" = 400' +/-

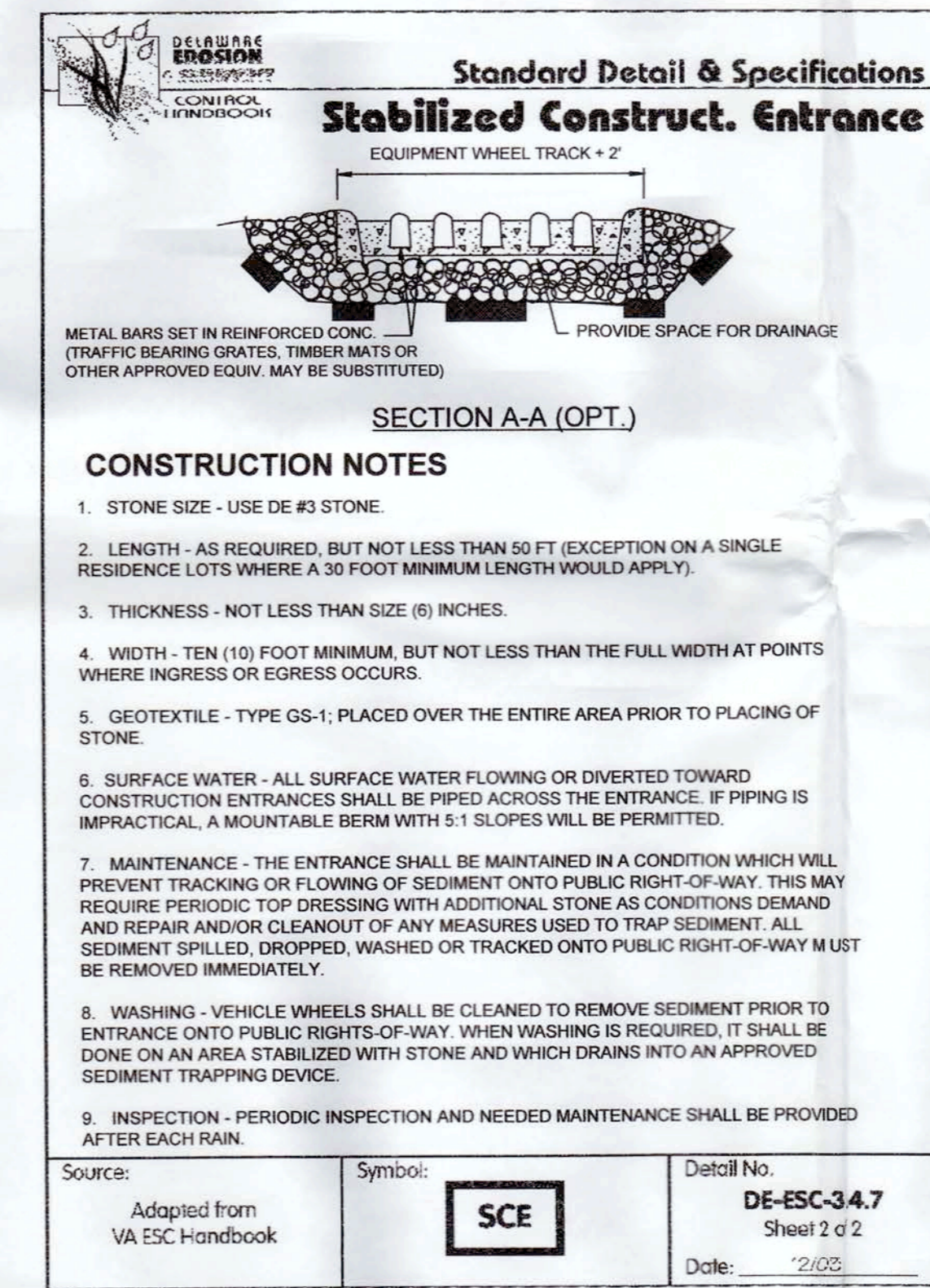


LEGEND

- EVERGREEN TREE
- DECIDUOUS TREE
- SHRUB
- SIGN
- CATCH BASIN
- MANHOLE
- SPOT ELEVATION
- TOP OF WALL SPOT ELEVATION
- BOTTOM OF WALL SPOT ELEVATION
- FLOODPLAIN LINE
- STORM PIPE
- CONCRETE PAVEMENT
- STONE
- WATER
- LOD
- SF



DETAIL: STABILIZED CONSTRUCTION ENTRANCE
SCALE: NOT TO SCALE



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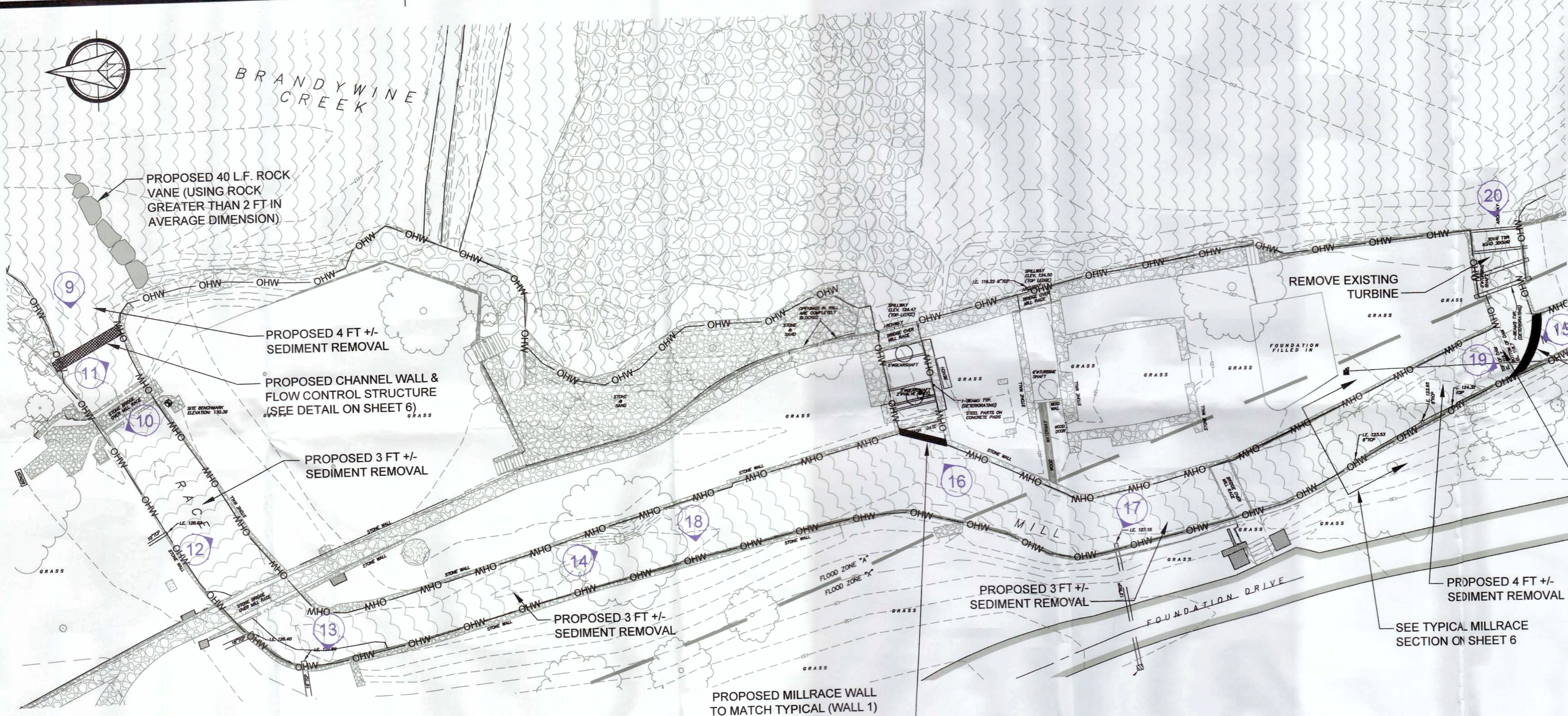


CONTRACTOR STAGING AREA PLAN
GRADING AND EROSION & SEDIMENT CONTROL
RESTORATION OF THE ELEUTHERIAN MILLS DAM AND ADJACENT MILLRACE
WILMINGTON ~ NEW CASTLE COUNTY ~ DELAWARE

DATE: 19 FEBRUARY 2009
SCALE: 1" = 40'
PROJECT NO. 5980.PD
SHEET: ES2 OF ES3

ISSUED FOR PERMIT

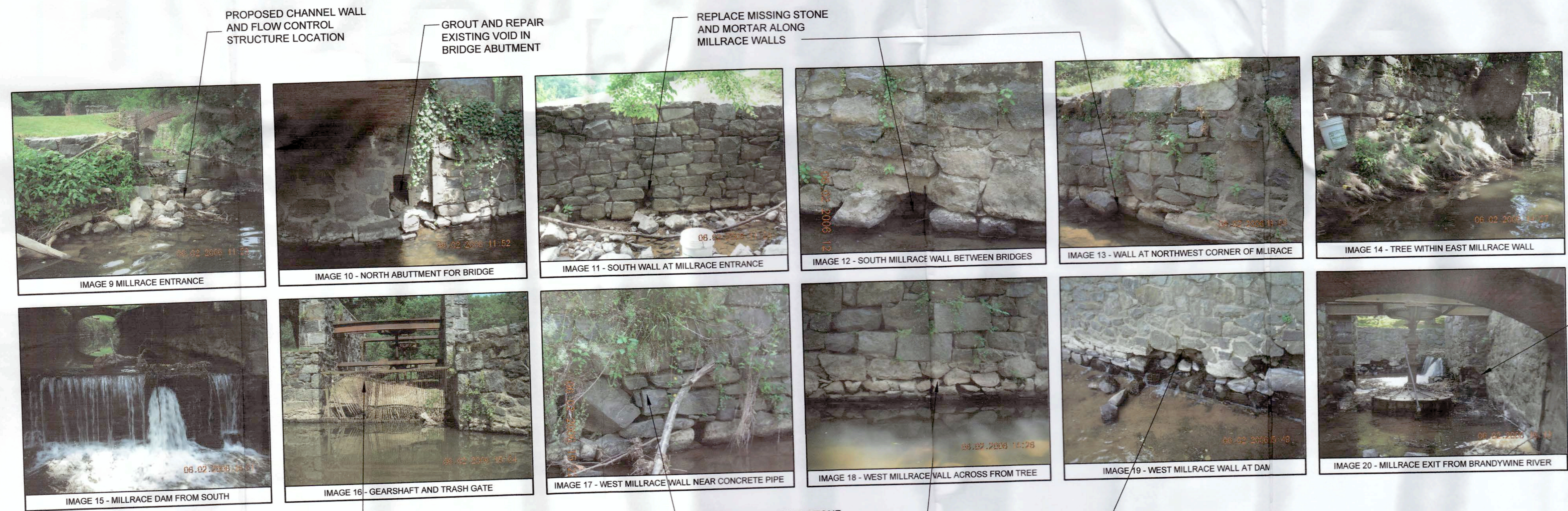
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LEGEND

- 10" EVERGREEN TREE WITH DIAMETER AT BREAST HEIGHT
- 8" SHRUB
- SIGN
- CATCH BASIN
- MANHOLE
- 134.3 SPOT ELEVATION
- T.W. TOP OF WALL SPOT ELEVATION
- B.W. BOTTOM OF WALL SPOT ELEVATION
- FLOODPLAIN LINE
- OHW ORDINARY HIGH WATER
- STORM PIPE
- CONCRETE
- PAVEMENT
- STONE
- WATER
- ① APPROXIMATE LOCATION WHERE PHOTOGRAPH WAS OBTAINED (IMAGES 9 - 20)

MILLRACE RESTORATION
SCALE: 1" = 20'



PHOTOGRAPHS
SCALE: NOT TO SCALE

RECONSTRUCT MILLRACE WALLS AND BASE AND REMOVE SEDIMENT 2 FT +/- WITHIN BRANDYWINE RIVER
REMOVE TURBINE FOR PLACEMENT ALONG SIDE OF MILLRACE FOR DEMONSTRATION PURPOSES

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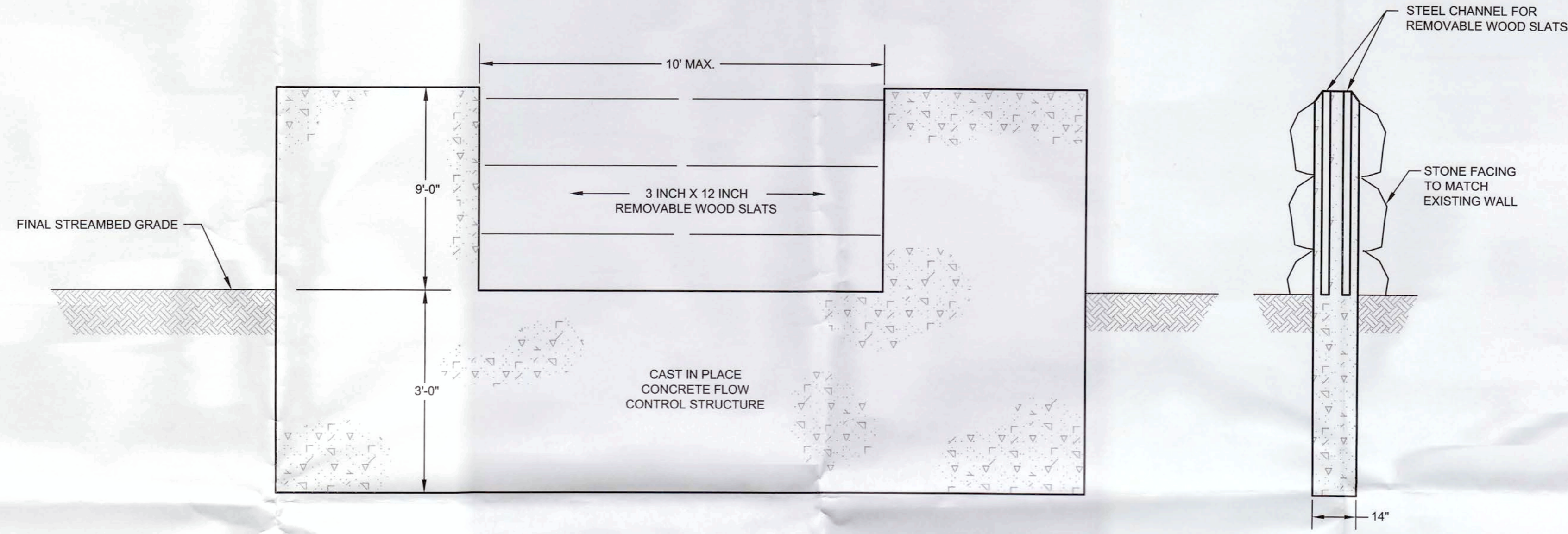
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MILLRACE RESTORATION PLAN VIEW AND PHOTOGRAPHS
HAGLEY MUSEUM & LIBRARY
RESTORATION OF THE ELEUTHERIAN MILLS DAM AND ADJACENT MILLRACE
WILMINGTON-NEW CASTLE COUNTY-DELAWARE

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SHEET: 5 OF 6

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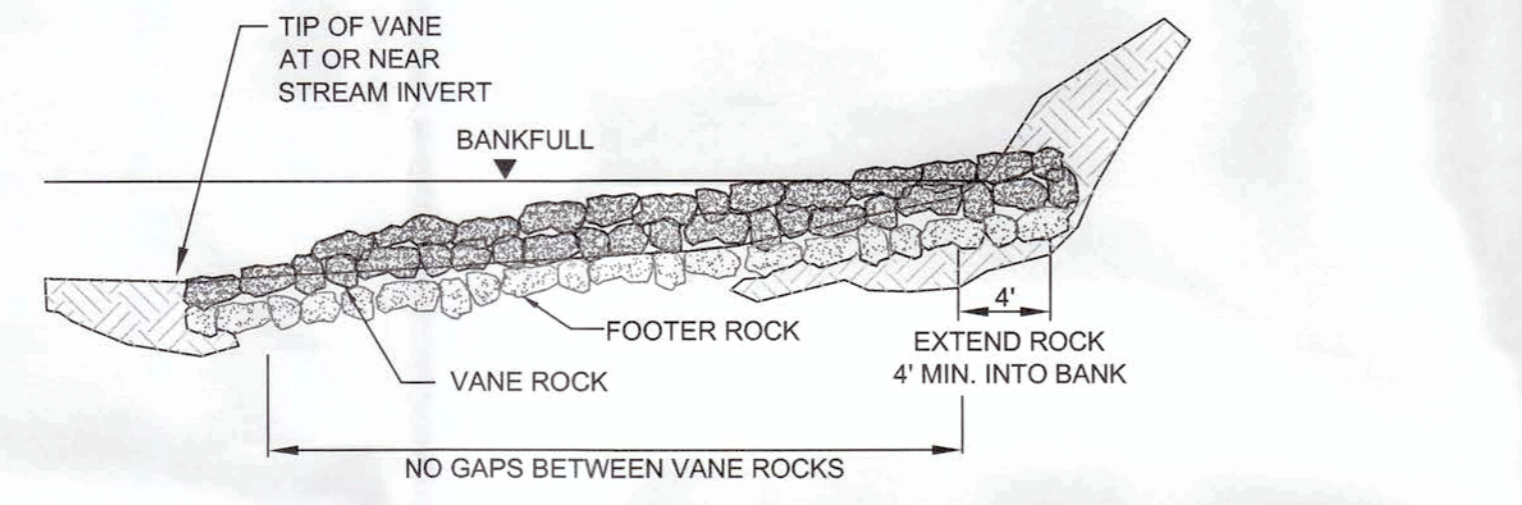
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ELEVATION SECTION

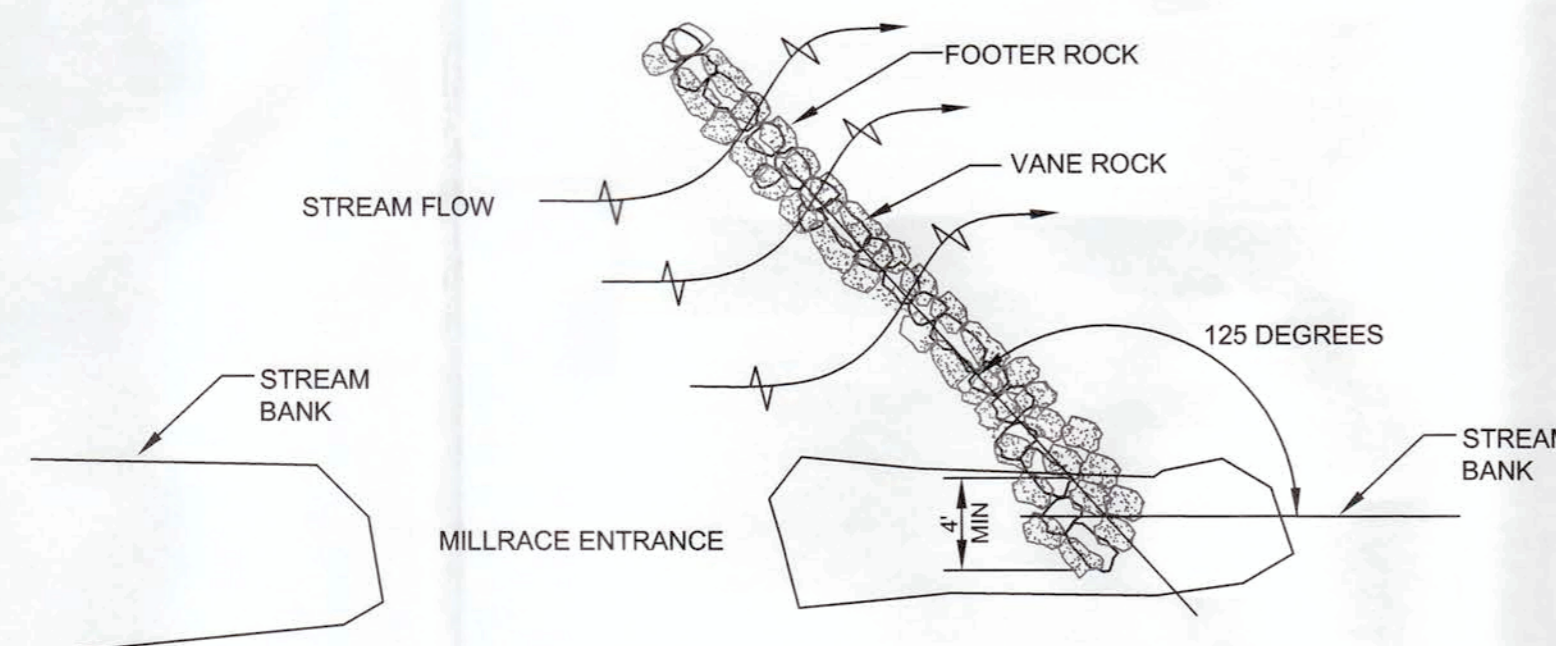
NOTE:
IF BEDROCK OR BOULDERS ARE ENCOUNTERED DURING EXCAVATION FOR BELOW GRADE PORTION OF FLOW CONTROL STRUCTURE, THE STRUCTURE WILL BE ANCHORED INTO NATURAL BEDROCK/BOULDER.

DETAIL: FLOW CONTROL STRUCTURE
SCALE: NOT TO SCALE



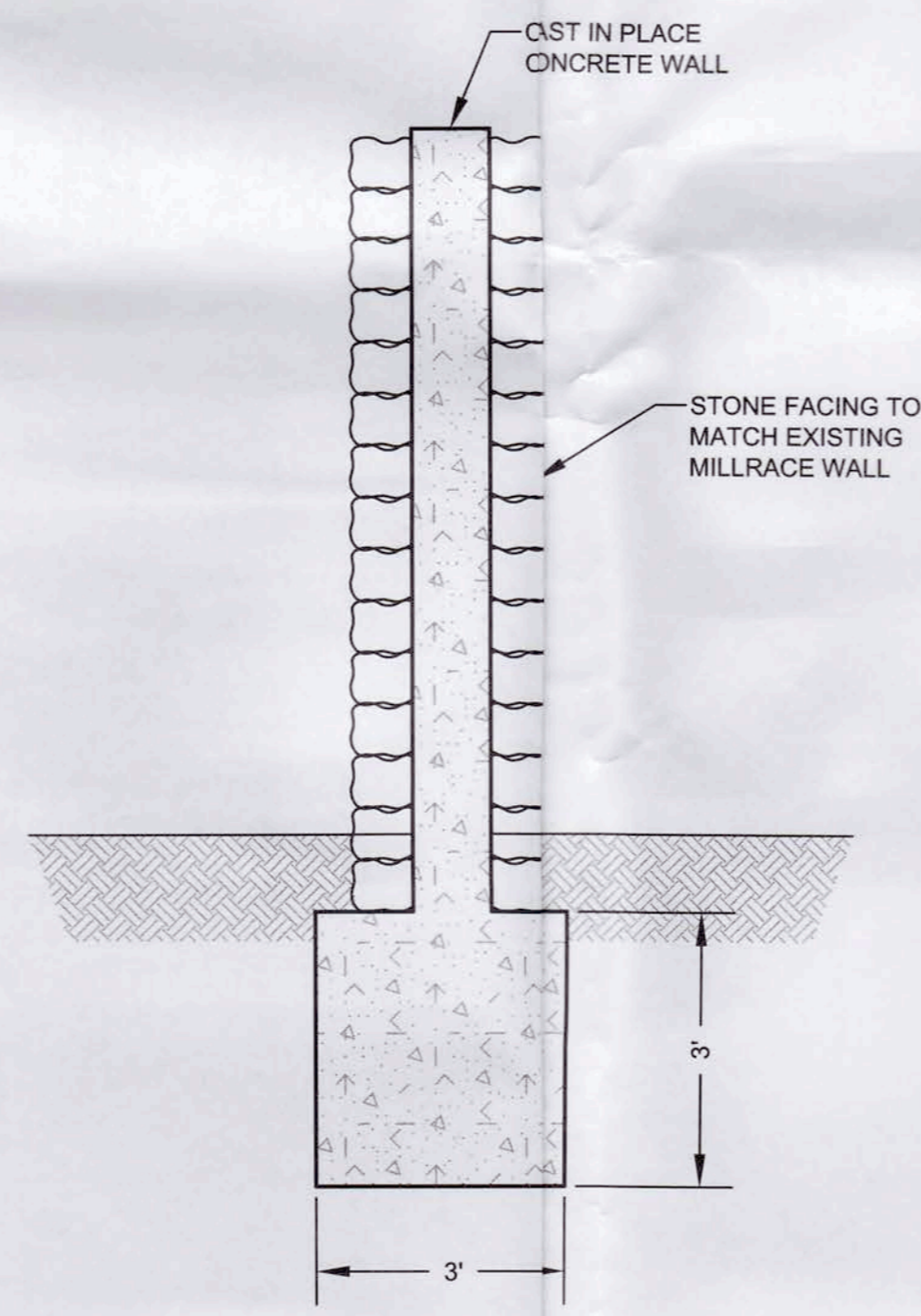
NOTES:
1. FOOTER ROCKS MUST BE PLACED BELOW PROPOSED GRADE.
2. PLACEMENT OF VANE ROCKS MUST BRIDGE SEAMS BETWEEN FOOTER ROCKS.

PROFILE

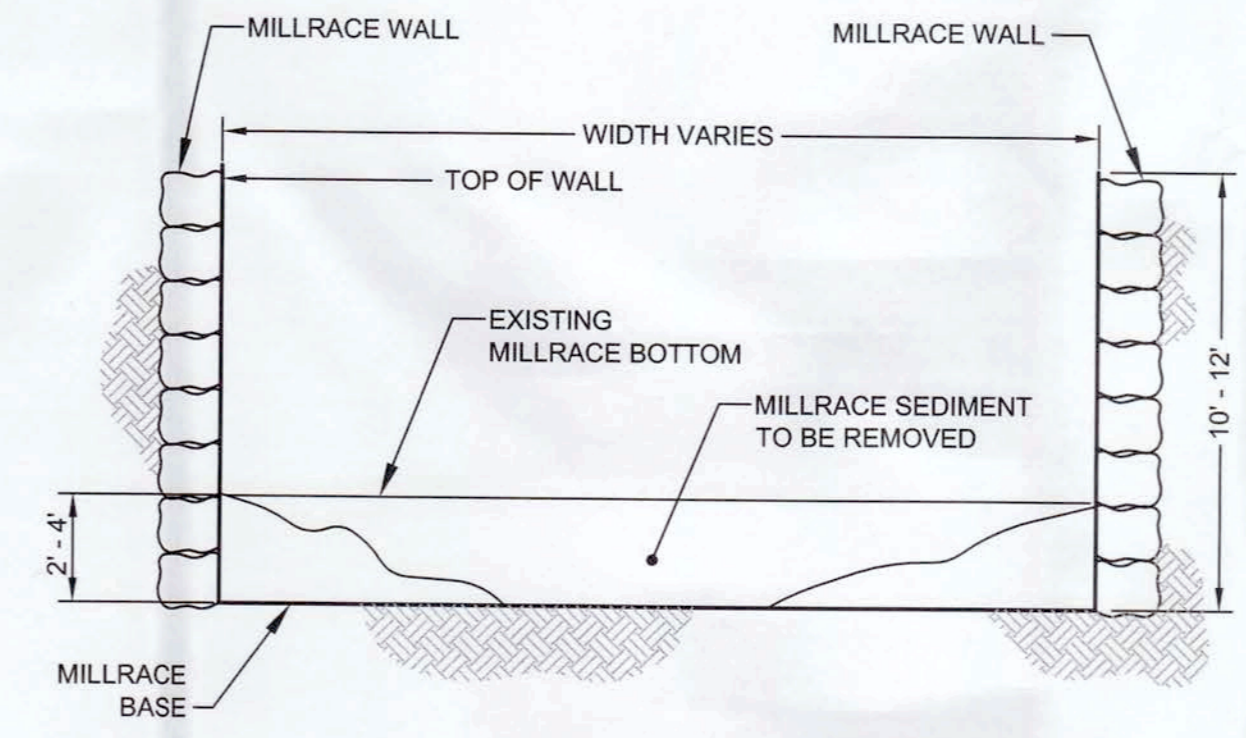


PLAN VIEW

DETAIL: ROCK VANE
SCALE: NOT TO SCALE



SECTION: TYPICAL WILL CROSS-SECTION
SCALE: NOT TO SCALE



SECTION: TYPICAL MILLRACE CROSS-SECTION
SCALE: NOT TO SCALE

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Hagley
MUSEUM AND LIBRARY

MILLRACE RESTORATION DETAILS
HAGLEY MUSEUM & LIBRARY
RESTORATION OF THE ELEUTHERIAN MILLS DAM AND ADJACENT MILLRACE
WILMINGTON-NEW CASTLE COUNTY-DELAWARE

DATE: 19 FEBRUARY 2009
SCALE: AS SHOWN
PROJECT NO. 5980.PD
SHEET: 6 OF 6

ISSUED FOR PERMIT