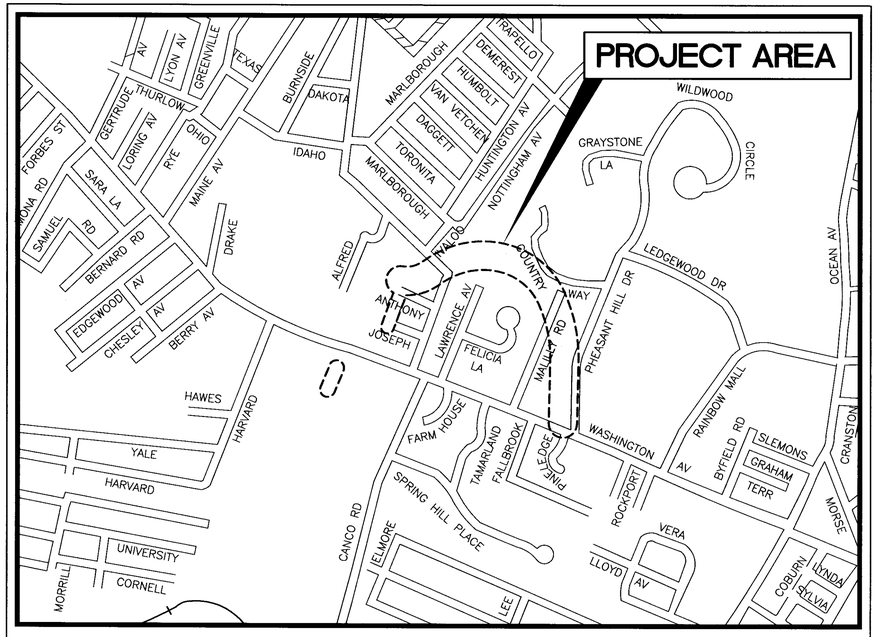
952/8

FALL BROOK CHANNEL IMPROVEMENTS
WASHINGTON AVENUE TO MILLIKEN BROOK

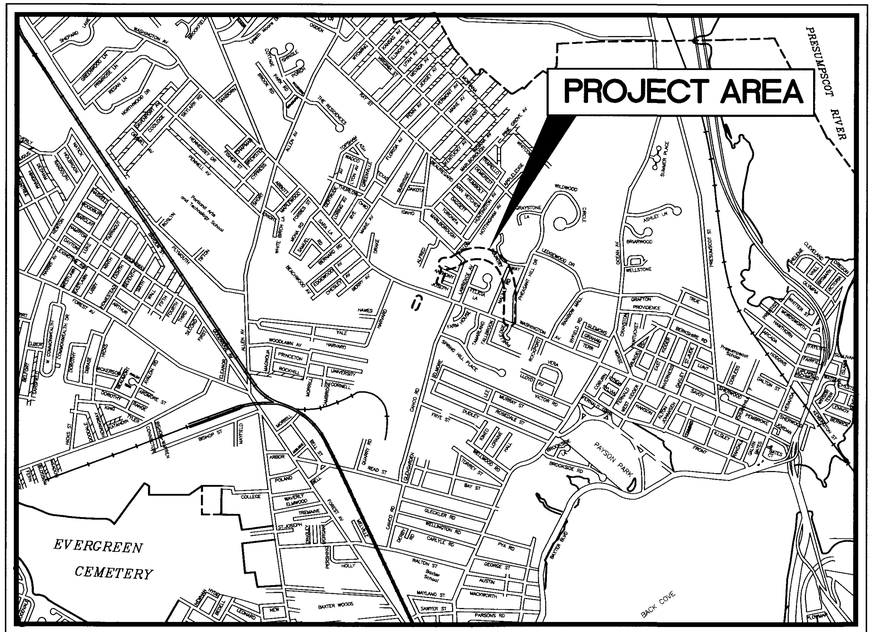
PORTLAND, MAINE
PERMITTING PLANS



LOCATION MAP
1" = 200'

INDEX

1 COVER SHEET
2 GENERAL NOTES AND LEGEND
3A EASEMENT PLAN
3B GEOMETRIC CONTROL PLAN
4 EXISTING CONDITIONS / REMOVALS PLAN AND PROFILE STA. 10+00 TO STA. 16+00
5 EXISTING CONDITIONS / REMOVALS PLAN AND PROFILE STA. 16+00 TO STA. 22+00
6 EXISTING CONDITIONS / REMOVALS PLAN AND PROFILE STA. 22+00 TO STA. 28+00
7 EXISTING CONDITIONS / REMOVALS PLAN AND PROFILE STA. 28+00 TO STA. 34+00
8 EXISTING CONDITIONS / REMOVALS PLAN AND PROFILE STA. 34+00 TO STA. 36+65
9A PROPOSED GRADING PLAN AND PROFILE STA. 10+00 TO STA. 16+00
9B PROPOSED SURFACE STABILIZATION PLAN STA. 10+00 TO STA. 16+00
10A PROPOSED GRADING PLAN AND PROFILE STA. 16+00 TO STA. 22+00
10B PROPOSED SURFACE STABILIZATION PLAN STA. 16+00 TO STA. 22+00
11A PROPOSED GRADING PLAN AND PROFILE STA. 22+00 TO STA. 28+00
11B PROPOSED SURFACE STABILIZATION PLAN STA. 22+00 TO STA. 28+00
12A PROPOSED GRADING PLAN AND PROFILE STA. 28+00 TO STA. 34+00
12B PROPOSED SURFACE STABILIZATION PLAN STA. 28+00 TO STA. 34+00
13A PROPOSED GRADING PLAN AND PROFILE STA. 34+00 TO STA. 36+65
13B PROPOSED SURFACE STABILIZATION PLAN STA. 34+00 TO STA. 36+65
14 CROSS SECTIONS 58 THRU 60
15 CROSS SECTIONS 61 THRU 63
16 CROSS SECTIONS 64 THRU 66
17 CROSS SECTIONS 67 THRU 69
18 CROSS SECTIONS 70 THRU 72
19 CROSS SECTIONS 73 THRU 75
20 CROSS SECTIONS 76 THRU 78
21 CROSS SECTIONS 79 THRU 81
22 CROSS SECTIONS 82 THRU 84
23 CROSS SECTIONS 85 THRU 87
24 CROSS SECTIONS 88 THRU 90
25 CROSS SECTIONS 91 THRU 93
26 CROSS SECTIONS 94 THRU 96
27 CROSS SECTIONS 97 THRU 99
28 CROSS SECTIONS 100 THRU 102
29 CROSS SECTIONS 103 THRU 105
30 EROSION AND SEDIMENTATION CONTROL DETAILS
31 EROSION AND SEDIMENTATION CONTROL DETAILS
32 EXTENSION OF STORMDRAIN TO MILLIKEN BROOK
33 MILLIKEN BROOK STORM DRAIN EXTENSION DETAILS



VICINITY MAP
1" = 500'

PROJECT CONSULTANTS

CIVIL ENGINEER:
DeLuca-Hoffman Associates, Inc.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, MAINE 04106
207.775.1121
CONTACT: STEVE BUSHEY
sbushey@delucahoffman.com

SURVEYOR:
Owen Haskell, Inc.
16 CASCO STREET
PORTLAND, MAINE 04102
207.774.0424
CONTACT: BILL SHIPPEN

WETLAND DELINEATION:
Framatone ANP DE&S, Inc.
500 WASHINGTON AVENUE
PORTLAND, MAINE 04103
207.775.4495
CONTACT: COLEN PETERS

GEOTECHNICAL ENGINEER:
Mark Peterson, P.E.
317 MAIN STREET
YARMOUTH, MAINE 04096
207.846.4220

JANUARY 2003

APPROVED BY CITY ENGINEER

ERIC LABELLE, P.E. — DATE 11/12/03

PROJECT STATEMENT

THE FALL BROOK CHANNEL IMPROVEMENTS FROM WASHINGTON AVENUE TO MILLIKEN BROOK ARE PART OF THE CITY OF PORTLAND'S COMBINED SEWER OVERFLOW ABATEMENT MASTER PLAN. THE IMPROVEMENTS ARE NECESSARY TO IMPROVE CAPACITY AND MINIMIZE IMPACTS TO THE FLOOD ELEVATIONS RESULTING FROM THE REINTRODUCTION OF SEPARATED STORM FLOWS FROM THE CITY'S COMBINED EAST SIDE INTERCEPTOR SEWER. THE SELECTED DESIGN STORM FREQUENCY IS THE 100 YEAR STORM. THE PROJECT GOAL IS TO INCREASE THE CHANNEL CAPACITY BY THE COMPLETION OF OVERBANK AND SIDE SLOPE EXCAVATION WHILE MAINTAINING A NATURAL, VEGETATED DRAINAGE COURSE THAT MINIMIZES IMPACTS TO THE ABUTTING PROPERTIES. PLANS DATED 10/17/03 HVE BEEN UPDATED FOR PERMITTING PURPOSES ONLY AND ARE NOT INTENDED FOR CONSTRUCTION.

I HEREBY ACKNOWLEDGE THAT THESE PLANS AND ACCOMPANYING SPECIFICATIONS WERE PREPARED UNDER MY DIRECT SUPERVISION, AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MAINE AND THAT I AM COMPETENT TO PREPARE THESE DOCUMENTS.

PREPARED FOR:
CITY OF PORTLAND
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION
55 PORTLAND STREET
PORTLAND, ME 04101
PROJECT MANAGER: BRAD ROLAND, P.E.
TEL: 207.874.8801

PREPARED BY:
DELUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME. 04106
TEL. 207.775.1121
FAX. 207.879.0896

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP – NRPA APPLICATION
1	1.03.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE — STEPHEN R. BUSHEY

P.E. STEPHEN R. BUSHEY
LIC. #7429

S:\19001.12\190012-COV.dwg, Model, 11/11/2003 9:41:26 AM, ddavis

952/8

GENERAL NOTES

1. THE EXISTING CONDITIONS SURVEY WAS PERFORMED BY OWEN HASKELL, INC. WITH SUPPLEMENTAL INFORMATION OBTAINED BY FIELD MEASUREMENT AND FROM THE FOLLOWING SOURCES:
   A. CITY OF PORTLAND TAX ASSESSORS' MAPS, MAP NO. 171, 172, & 409.
   B. THE FOLLOWING BENCHMARKS HAVE BEEN ESTABLISHED BY OWEN HASKELL, INC. FOR THIS PROJECT:
      TPM BONNET BOLT HYDRANT BENCH MARK AT ENTRANCE TO BAYVIEW TERRACE
      ELEVATION=28.53
   C. "DEERING NOS. 39, 40 AND 48" WATER DISTRIBUTION MAPS BY PWD, REVISED 4/15/99, 8/27/98 AND 7/6/95, RESPECTIVELY
   D. "STUDY AREA I, INFILTRATION-INFLOW ANALYSIS" BY HUNTER-BALLEW ASSOC., DATED 8/1/88; DRWG. #1-2,3
   E. "FALL BROOK CHANNEL/EAST SIDE INTERCEPTOR LOCATION MAP" BY DeLUCA-HOFFMAN ASSOCIATES, INC., DATED 11/23/98; SHEETS 2 & 3
   F. CHEVERUS ATHLETIC FIELD AREA PLANS PROVIDED BY HARRIMAN ASSOCIATES, OCTOBER 2001
   G. FIELD BORINGS DONE BY PETERSON-RABASCA GEOENGINEERS AND FIELD LOCATED BY OWEN HASKELL, INC. 1998
   H. WETLAND DELINEATION PROVIDED BY DUKE ENGINEERING SERVICES, INC. 1999
   I. FINAL FALL BROOK WATERSHED STUDY - HYDRAULIC MODEL BY DELUCA-HOFFMAN ASSOCIATED, INC. APRIL 1999.
2. PROPERTY LINES ARE APPROXIMATE ONLY AND ARE BASED UPON CITY ASSESSOR RECORDS. EXISTING PROPERTY PINS ENCOUNTERED DURING THE WORK SHALL BE REMOVED AND RESET BY A LICENSED LAND SURVEYOR AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL FIELD INSPECT AND IDENTIFY ALL PROPERTY PINS PRIOR TO THE COMMENCEMENT OF WORK AND REPORT IN WRITING TO THE CITY, FOR ALL OBSERVED PROPERTY CORNERS.
3. THE LOCATIONS OF UNDERGROUND UTILITIES, AS SHOWN ON THE DRAWINGS, ARE APPROXIMATE ONLY AND ARE SHOWN ONLY AS A GUIDE TO THE CONTRACTOR. NO GUARANTEE IS MADE THAT ALL UTILITIES WILL BE ENCOUNTERED WHERE SHOWN OR THAT ALL UNDERGROUND UTILITIES ARE SHOWN. THE CONTRACTOR SHALL VERIFY ALL LOCATIONS IN THE FIELD AND SHALL BE COMPLETELY RESPONSIBLE FOR REPAIR OF ALL UTILITIES DISTURBED DURING CONSTRUCTION AT THE CONTRACTOR'S OWN EXPENSE.
4. TO PROVIDE GUIDANCE AS TO LOCATION OF UTILITIES, THE FOLLOWING UTILITIES AND CONTACTS HAVE BEEN PROVIDED:

UTILITY	OWNER
WATER	PORTLAND WATER DISTRICT ATTN: MR. DAVID COFFIN ENGINEERING SUPERVISOR 225 DOUGLASS STREET PORTLAND, ME 04101 (207) 774-5961, EXT. 3041
SANITARY SEWER AND STORM DRAIN	CITY OF PORTLAND ATTN: MR. TODD MERKLE DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION 55 PORTLAND STREET PORTLAND, ME 04101 (207) 874-8846
POWER	CENTRAL MAINE POWER COMPANY ATTN: MR. TOM ATWOOD 162 CANCO ROAD PORTLAND, ME 04103 (207) 828-2821
TELEPHONE	VERIZON ATTN: MR. TOM MASTERSON / MS. DIANE TRAFTON 13 DAVIS FARM ROAD PORTLAND, ME 04103 (207) 797-1259
GAS	NORTHERN UTILITIES, INC. ATTN: MR. MEL ROAST DISTRIBUTION DEPARTMENT 1075 FOREST AVENUE PORTLAND, ME 04103 (207) 797-8002, EXT. 6242
CABLE TELEVISION	TIME WARNER CABLE ATTN: MR. TOM SMITH 118 JOHNSON ROAD PORTLAND, ME 04102 (207) 775-3431
FIRE ALARM	PORTLAND FIRE DEPARTMENT ATTN: MR. BEN DIAZ 109 MIDDLE STREET PORTLAND, ME 04101 (207) 874-8300
DIG SAFE	1-888-344-7233

5. THE CONTRACTOR SHALL COORDINATE AND COOPERATE WITH THE OWNERS OF ANY UTILITY (UNDERGROUND OR OVERHEAD) IN THEIR REMOVAL, REARRANGEMENT, OR REPAIR.
   AN INTERCEPTOR SANITARY SEWER EXISTS IN THE AREA. THE EAST SIDE INTERCEPTOR IS AN 84" RCP PIPE WHICH FOLLOWS THE FALL BROOK DRAINAGE WAY. THERE ARE NO MODIFICATIONS PROPOSED BY THIS PROJECT TO THE ESI AND THE CONTRACTOR SHALL PROTECT IT THROUGHOUT THE DURATION OF THE PROJECT. MODIFICATIONS TO THE EXISTING MANHOLE ACCESS STRUCTURES ON TOP OF THE INTERCEPTOR MAY BE REQUIRED AND CARE SHALL BE TAKEN TO AVOID IMPACTS TO THE INTERCEPTOR. THERE IS ALSO AN ABANDONED 24" DIAMETER CLAY SEWER PIPE IN THE CHANNEL IMPROVEMENT AREA. REMOVAL OF THE 24" SEWER, WHEN NECESSARY, SHALL BE INCIDENTAL TO THE WORK. THE 24" DIAMETER CLAY SEWER PIPE MAY BE REMOVED IF ENCOUNTERED DURING EXCAVATION FOR THE CHANNEL IMPROVEMENTS.
6. ALL NON-PAVED AREAS DISTURBED DURING CONSTRUCTION NOT MARKED FOR OTHER RESTORATION SHALL BE LOAMED(4"), SEEDED, AND MULCHED UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
7. PRIOR TO BID, THE CONTRACTOR SHOULD VISIT THE SITE TO REVIEW ACCESS TO CONSTRUCTION AREAS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ALL DAMAGES TO ANY ADJACENT WORK AREAS DISTURBED DURING CONSTRUCTION AT NO EXTRA EXPENSE TO THE CITY OR PROPERTY OWNER. THE CITY OF PORTLAND HAS/WILL OBTAIN TEMPORARY/PERMANENT ACCESS RIGHTS FROM PRIVATE LANDOWNERS PRIOR TO THE COMMENCEMENT OF WORK.
8. THE CITY OF PORTLAND, MAINE HAS ADOPTED FOR THIS PROJECT THE "STATE OF MAINE, DEPARTMENT OF TRANSPORTATION, STANDARD SPECIFICATIONS (FOR) HIGHWAYS AND BRIDGES, REVISIONS OF DECEMBER 2002", INCLUDING ALL CURRENT ADDITIONS OR MODIFICATIONS THEREOF. THE CONTRACT AGREEMENT, SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS CONTAINED HEREINAFTER SHALL TAKE PRECEDENCE AND SHALL GOVERN IN ANY CASE OF CONFLICT WITH THE STANDARD SPECIFICATIONS.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FOLLOWING RECORD INFORMATION:
   A. AS-BUILT INFORMATION OF PROPOSED CHANNEL IMPROVEMENTS INCLUDING DIMENSIONS, INVERTS, ELEVATIONS, LENGTH AND SLOPE.
10. TEST PITS REQUIRED FOR THE PROJECT SHALL BE CONDUCTED DURING THE FIRST WEEK OF THE CONTRACT UNLESS OTHERWISE APPROVED BY THE OWNER. THE OWNER ALSO RESERVES THE RIGHT TO REQUEST ADDITIONAL TEST PITS ON THE PROJECT AS NECESSARY.
11. PROPERTY MARKERS AND STREET LINE MONUMENTS SHALL BE PROPERLY PROTECTED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO IDENTIFY AND LOCATE ANY EXISTING PROPERTY MARKERS WITHIN THE LIMITS OF WORK PRIOR TO EXCAVATION ACTIVITIES. IF DAMAGED OR DESTROYED, THEY SHALL BE REPLACED BY A LICENSED SURVEYOR AT THE CONTRACTOR'S EXPENSE. NO REPRESENTATION IS MADE THAT ANY OR ALL EXISTING PROPERTY LINE MARKERS IN THE WORK ZONE AND IDENTIFIED ON THESE PLANS.
12. EXISTING STORM DRAIN OUTFALLS TO FALL BROOK SHALL BE ADJUSTED AND STABILIZED TO MATCH NEW CHANNEL GEOMETRY. THIS WORK SHALL BE CONSIDERED INCIDENTAL TO THE WORK.
13. ALL CATCH BASINS, CULVERTS, AND STORM DRAIN IN THE PROJECT AREA SHALL BE CLEANED AND LEFT IN SATISFACTORY OPERATING CONDITION AFTER CONSTRUCTION HAS BEEN COMPLETED. NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK.
14. ALL LAWN AREAS, WALKWAYS, AND DRIVEWAYS OUTSIDE THE WORK AREA, DAMAGED BY THE CONTRACTOR, SHALL BE REPAIRED BY THE CONTRACTOR AT HIS OWN EXPENSE.
15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PRESERVATION OF ALL TREES AND SHRUBS ON THE PROJECT WHICH ARE NOT MARKED TO BE REMOVED.
16. BASIS OF DESIGN
   DeLuca-Hoffman Assoc., Inc. has been retained by the City of Portland Public Works Department Engineering Division as a consultant to prepare plans and assist with permit applications associated with the proposed channel improvements to the existing Fall Brook Channel. The initial phase improvements are from Washington Avenue to the Milliken Brook confluence. Fall Brook is approximately 2.5 miles in length and flows from Lyman-Moore School to Portland's Back Cove. This project is required to achieve the CSO Abatement Master Plan goal of eliminating wet weather overflows at CSO 007. The goal of the Fall Brook channel improvements is for the improved Fall Brook Channel to be able to handle future flows from continued development within the Fall Brook watershed and the separation of combined sewer flows tributary to the East Side Interceptor Combined Collector Sewer.

   Deluca-Hoffman Associates, Inc did a study. in April 1999 entitled, "Final Fall Brook Watershed Study" which contains the predicted future flows that were determined by a stream modeling software called HEC-1. Based on these predicted future flows the following improvements will be necessary to increase the channel's conveyance capacity:

   -The overbanks of the existing stream must be widened to accommodate future projected flows. The widening will involve extensive excavation of undeveloped land on each side of the channel. The majority of the excavated material shall be removed from the improvement area.
   -Overbanks and upland slopes must be stabilized and vegetated to minimize erosion and depositing of sediments into the flow channel.
   -Portions of the channel will require increased stabilization measures to offset increases in flow volume and velocity resulting from the reintroduction of stormwater runoff in to Fall Brook. These measures may include heavy riprap and/or extensive vegetative plantings.

   The initial channel improvements proposed in the current contract will be completed in the section of Fall Brook that runs from the Milliken Brook confluence (Station 108, River Station 1.314 miles) to the triple box culverts at Washington Avenue (Station 58, River Station 0.803 miles). The proposed modifications of the existing channel will consist of the protection of the existing low flow channel (and existing channel banks from Station 70 to 93, River Station 0.919 miles to 1.149 miles respectively), excavation of proposed overbanks, and excavation of proposed sideslopes ranging from 2:1 to 3:1.

   THE FALL BROOK CHANNEL IMPROVEMENTS DESIGN HAS BEEN BASED ON DESIGN FLOWS PRESENTED IN THE 'FINAL FALL BROOK WATERSHED STUDY, HYDRAULIC AND HYDROLOGIC MODEL' PREPARED BY DeLUCA-HOFFMAN ASSOC., INC., APRIL 1999. THE FOLLOWING FLOWS WERE CALCULATED FOR VARIOUS STORM EVENTS WITH FUTURE FULL SEPARATION OF ALL COMBINED SEWERS IN THE EAST SIDE INTERCEPTOR WATERSHED:

STORM EVENT	DESIGN FLOW, cfs
25 YEAR	501 - 660 cfs (1)
100 YEAR	668 - 886 cfs (1)

   (1) INCREASE OCCURS AT RIVER STATION 1.226 MILES UPSTREAM FROM CONFLUENCE W/ BACK COVE.
17. ALL WORK UNDER THIS CONTRACT SHALL BE IN ACCORDANCE WITH THE CITY OF PORTLAND EXCAVATION WITHIN THE RIGHT OF WAY ORDINANCE WHERE NECESSARY.
18. SCHEDULE OF OPERATIONS
   THE CONTRACTOR SHALL PROVIDE A DETAILED CONSTRUCTION SEQUENCE TO BE REVIEWED AND APPROVED BY THE CITY AND REGULATORY AGENCIES PRIOR TO THE PRECONSTRUCTION CONFERENCE.
19. TEMPORARY ACCESS MEASURES
   A TEMPORARY ACCESS CULVERT STREAM CROSSING OF TWIN 36" PIPE CULVERTS MAY BE TEMPORARILY USED TO PERMIT HEAVY EQUIPMENT ACCESS ACROSS THE CHANNEL. THE CULVERTS SHALL BE PLACED AT A RIGHT ANGLE TO THE EXISTING FALL BROOK CHANNEL. THE FOLLOWING INSTALLATION GUIDELINES SHALL APPLY:

   1. THERE SHALL BE NO SANDS, SILTS, CLAYS OR ORGANIC MATERIALS USED FOR CONSTRUCTION WITHIN THE WATERWAY CHANNEL. WASHED COURSE AGGREGATE (3/4" TO 4") REFERENCED AS AASHTO DESIGNATION NO. 1 SHALL BE THE MINIMUM ACCEPTABLE GRADE SIZE.

   2. THE CULVERTS SHALL BE PLACED IN A MANNER AS TO MINIMIZE EXCAVATION OF THE WATERWAY CHANNEL OR WITHOUT MAJOR APPROACH FILLS. THE CULVERTS SHALL EXTEND ONE FOOT BEYOND THE UPSTREAM AND DOWNSTREAM TOE OF THE AGGREGATE PLACED AROUND THE CULVERTS. GEOTEXTILE FABRIC SHALL BE PLACED ON THE STREAMBED AND STREAMBANKS PRIOR TO THE PLACEMENT OF THE PIPE CULVERTS AND AGGREGATE. THE FILTER FABRIC SHALL COVER THE STREAMBED AND EXTEND A MINIMUM 6 INCHES AND A MAXIMUM ONE FOOT BEYOND THE END OF THE CULVERT AND BEDDING MATERIAL.

   3. THE CULVERTS SHALL BE PLACED AT OR BELOW THE NATURAL STREAMBED. THE CULVERT SHALL BE COVERED WITH A MINIMUM OF ONE FOOT OF AGGREGATE. THE CULVERTS SHALL BE SEPARATED BY AT LEAST 12 INCHES OF COMPACTED AGGREGATE FILL. PERIODIC INSPECTION SHALL BE PERFORMED TO ENSURE CULVERTS, STREAMBED, AND STREAMBANKS ARE NOT DAMAGED AND THAT SEDIMENT IS NOT INFILTRATING THE STREAM.

   4. REMOVAL OF SEDIMENT AND DEBRIS SHALL BE DONE AS NEEDED AND DISPOSED OF OUTSIDE THE WATERWAY FLOOD PLAIN. ALL MATERIALS ASSOCIATED WITH THE TEMPORARY STREAM CROSSING SHALL BE REMOVED WITHIN 14 CALENDAR DAYS AFTER THE CROSSING IS NO LONGER NEEDED. IN ALL CASES THE CULVERT MATERIALS SHALL BE REMOVED WITHIN SIX MONTHS OF INSTALLATION.

   5. THE STREAM CHANNEL AND BANK SHALL BE STABILIZED TO PROTECT FROM EROSION. THE TEMPORARY CULVERT CROSSING SHALL BE REMOVED WITHOUT ANY CONSTRUCTION EQUIPMENT OPERATING IN THE WATERWAY CHANNEL. ALL AREAS DISTURBED DURING THE CULVERT REMOVAL SHALL BE STABILIZED WITHIN 14 CALENDAR DAYS OF THE DISTURBANCE.
20. VEGETATIVE STREAMBANK STABILIZATION
   THE PROJECT'S PRIMARY SURFACE STABILIZATION MEASURES CONSIST OF VEGETATIVE PLANTINGS. THE VEGETATIVE MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH THE MAINE EROSION AND SEDIMENT CONTROL HANDBOOK FOR CONSTRUCTION: BEST MANAGEMENT PRACTICES, BY THE CUMBERLAND COUNTY SWCD DEPARTMENT OF ENVIRONMENTAL PROTECTION, MARCH 1991, NONSTRUCTURAL MEASURES SECTION 11.0 AND PER THE DETAILS CONTAINED IN THE PLAN SET. THE FOLLOWING REQUIREMENTS SHALL APPLY

   1. LIVE DORMANT STAKING CONSISTING OF ½" TO 1½" DIAMETER SHRUB CUTTINGS, 2' TO 3' IN LENGTH SHALL BE USED ON AREAS SLOPED FLATTER THAN 4:1 ADJACENT TO THE EXISTING BROOK CHANNEL.

   2. LIVE MATERIALS MUST HAVE SIDE BRANCHES CLEANLY REMOVED WITH THE BASAL ENDS CUT AT AN ANGLE FOR EASY INSTALLATION. ALL LIVE MATERIALS SHOULD BE INSTALLED THE SAME DAY THEY ARE PREPARED.
   3. TAMP THE LIVE STAKING AT RIGHT ANGLES TO THE SLOPE. THE STAKES SHOULD BE PLACED 2 TO 3 FEET APART USING TRIANGULAR SPACING WITH A DENSITY RANGE OF 2 TO 4 STAKES PER SQUARE YARD. THE BUDS SHOULD BE POSITIONED UP WITH 80% OF THE STAKE INTO THE GROUND.

   4. AN IRON ROD CAN BE USED TO MAKE PILOT HOLES BUT IF ANY STAKES SHOULD SPLIT UPON INSTALLATION, THEY SHOULD BE REMOVED AND REPLACED. THE STAKES SHOULD BE INSTALLED USING A DEAD BLOW HAMMER (HAMMER FILLED WITH SHOT OR SAND).

   5. LIVE DORMANT WATTLES CONSISTING OF CUTTINGS FROM SPECIES OF WILLOW OR SHRUB DOGWOODS WITH BRANCHES RANGING FROM 0.28 TO 1 INCH IN DIAMETER SHALL BE USED ON SLOPES STEEPER THAN 4:1 ADJACENT TO THE PROPOSED OVERBANK AREAS.

   6. THE CUTTINGS SHOULD BE TIED TOGETHER TO FORM LIVE WATTLE BUNDLES VARYING IN LENGTH FROM 5 TO 10 FEET. THE COMPLETED BUNDLES SHOULD BE 6 TO 8 INCHES IN DIAMETER WITH ALL THE GROWING TIPS ORIENTED IN THE SAME DIRECTION.

   7. STAGGER CUTTINGS IN BUNDLES SO THAT TOPS ARE EVENLY DISTRIBUTED THROUGHOUT THE LENGTH OF THE UNIFORMLY SIZE LIVE WATTLE (12 TO 15 CUTTINGS PER BUNDLE).

   8. PREPARE THE CONTOUR JUST LARGE ENOUGH FOR THE LIVE WATTLE. THE TRENCH WILL VARY IN WIDTH, 9 TO 12 INCHES, DEPENDING ON THE SLOPE. PLACE THE LIVE WATTLE IN THE TRENCH WITH A MINIMUM 9" OVERLAP.

   9. DRIVE THE DEAD POST STAKES DIRECTLY THROUGH THE WATTLE EVERY 3 FEET ALONG ITS LENGTH. EXTRA STAKES SHOULD BE USED AT OVERLAPS OF BUNDLES. LEAVE THE STAKE FLUSH WITH THE TOP OF THE INSTALLED BUNDLE WITH A MINIMUM OF 2 PER BUNDLE.

   10. PLACE MOIST SOIL ALONG THE SIDES OF THE LIVE WATTLE WITH THE WATTLE SLIGHTLY VISIBLE. AT INTERVALS ON CONTOUR OR AT AN ANGLE UP THE FACE OF THE SLOPE, REPEAT TO THE TOP OF THE SLOPE. IF POSSIBLE IT IS RECOMMENDED TO GO ONE OR TWO ROWS OVER THE TOP OF THE SLOPE. TURF REINFORCEMENT FABRIC SHALL BE PLACED ON THE SLOPES IN BETWEEN THE LIVE PLANTING ROWS.

   11. MANY LARGE DIAMETER (>12") TREES ARE TO BE SAVED AND PROTECTED ALONG THE EXISTING CHANNEL. THE CONTRACTOR SHALL USE CAUTION TO AVOID EARTH ACTIVITY NO CLOSER THAN THE DRIP LINE OF THE TREES TO BE RETAINED AND IN NO CASE CLOSER THAN 5 FEET TO THE TREE TRUNK. THE CONTRACTOR SHALL PROVIDE THE NECESSARY TREE PROTECTION MEASURES IN ACCORDANCE WITH SECTION 7.0-TREE PROTECTION OF THE MAINE EROSION AND SEDIMENT CONTROL HANDBOOK FOR CONSTRUCTION - BEST MANAGEMENT PRACTICES, MARCH 1991, INCLUDING BUT NOT LIMITED TO, TREE MARKING, FENCING AND REPAIR OF DAMAGES.

   12. ALL AREAS DISTURBED DURING CONSTRUCTION, BUT NOT SUBJECT TO OTHER RESTORATION (LIVE FASCINES, LIVE STAKING, RIPRAP, ETC.) WILL BE LOAMED, LIMED, FERTILIZED, MULCHED AND SEEDED. FABRIC NETTING, ANCHORED WITH STAPLES, SHALL BE PLACED OVER THE MULCH IN AREAS WHERE THE FINISH GRADE SLOPE IS GREATER THAN 10 PERCENT. ALL AREAS WITHIN THE WORK LIMITS SHALL RECEIVE SURFACE PROTECTION WITHIN 14 DAYS. NATIVE TOPSOIL AND HYDRIC SOILS FOR WETLAND RESTORATION AREAS SHALL BE STOCKPILED TEMPORARILY STABILIZED WITH SEED AND MULCH AND REUSED FOR FINAL RESTORATION WHEN IT IS OF SUFFICIENT QUALITY.
21. POSSIBLE CONSTRUCTION SEQUENCE
   THE FOLLOWING GENERAL SEQUENCE OF THE PROJECT'S MAJOR TASKS IS SUGGESTED. SOME TASKS MAY BE PERFORMED CONCURRENTLY. WORK SHALL START AT WASHINGTON AVENUE AND PROCEED UPSTREAM IN 100 FOOT SEGMENTS. EACH WORK SEGMENT SHALL BE PROPERLY STABILIZED PRIOR TO STARTING THE NEXT UPSTREAM SEGMENT. THE CONTRACTOR MUST ADHERE TO THE SEQUENCING OUTLINE IN THESE PLANS, SO THAT THE CHANNEL IS STABILIZED AT ALL TIMES. IN THE EVENT OF A FORCASTED STORM EVENT ALL DISTURBED AREAS OF THE CHANNEL SHALL BE STABILIZED.

   1. PRE CONSTRUCTION WALK THROUGH WITH CITY ARBORIST, CONTRACTOR, CITY REPRESENTATIVES, DEP AGENCY STAFFING, AND CIVIL CONSULTANT TO DETERMINE WHAT TREES WILL BE SAVED

   2. POST TRAFFIC SIGNAGE ALONG PHEASANT HILL DRIVE, WASHINGTON AVENUE, AND RAY STREET

   3. INSTALL TEMPORARY CONSTRUCTION ENTRANCES AT LOCATIONS TO BE COORDINATED WITH THE CITY OF PORTLAND AND CONTRACTOR

   4. INSTALL EROSION CONTROL MEASURES INCLUDING STABILIZED CONSTRUCTION ENTRANCE, SILT FENCE BARRIERS, HAY BALE BARRIERS, ETC.

   5. PERFORM ANY NECESSARY TEST PITS

   6. ESTABLISH LOCATIONS FOR HEAVY EQUIPMENT, STOCK PILES, ETC.

   7. PERFORM PRUNING OF TREES TO BE SAVED, BY TREE COMPANY CHOSEN BY CONTRACTOR

   8. INSTALL TEMPORARY CULVERT CROSSINGS FOR ACCESS TO BOTH SIDES OF EXISTING CHANNEL AS NEEDED

   9. PERFORM GRUBBING, CLEARING, EXCAVATION AND REMOVALS IN 100 FOOT INCREMENTS

   10. PERFORM EXCAVATION AND ANY NECESSARY ROCK REMOVAL TO SUBGRADE IN 100' INCREMENTS, UP TO 200' INCREMENTS MAY BE PERFORMED PROVIDED THERE IS A SEPARATE CREW WORKING TO REESTABLISH VEGETATION AND EROSION CONTROL ON PREVIOUS 100'

   11. INSTALL ANY RIPRAP PROTECTION AND ADJUST TRIBUTARY INLETS AND STRUCTURES IN 100 FOOT INCREMENTS

   12. PERFORM SURFACE RESTORATION INCLUDING LOAM, SEED, MULCH, LIVE STOCK PLANTINGS, TREE PLANTINGS AND EROSION CONTROL BLANKETS IN 100' INCREMENTS

   13. REMOVE BARRELS AND TRAFFIC SIGNAGE

LEGEND

EXISTING	DESCRIPTION	PROPOSED
	CATCH BASIN	
	MANHOLE	
SD	STORM DRAIN	
	DIRECTION OF FLOW	
UP #112	UTILITY POLE	
OHU	OVERHEAD UTILITY LINES	
UGE/T	UNDERGROUND ELEC./TELE.	
GUY	GUY WIRE	
BIT. SIDEWALK	EDGE OF SIDEWALK	
CURB	CURBING (AS LABELED)	
	EDGE OF PAVEMENT	
	BUILDING LINE	
	INDIVIDUAL ALDER/WILLOWS	
	TREE LINE	
RET. WALL	RETAINING WALL	
X X	FENCE LINE (TYPE AS NOTED)	
	SIGN	
	HYDRANT	
	LIGHT POST	
	APPROXIMATE PROPERTY LINE	
	APPROXIMATE RIGHT OF WAY LINE	
P.K.	P.K. NAIL BENCHMARK	
MAP 224 LOT B-17 N/F JOHN E. DOE 555 MAIN ST ANYWHERE, ME 04000	TAX MAP NUMBER AND LOT NUMBER NOW OR FORMERLY OWNER'S NAME AND ADDRESS	
	CONSTRUCTION BASELINE	1+00
30	GRADING CONTOUR LINE	100
25 . 64	SPOT GRADE	100.00
	GUIDE RAIL	
	SILT FENCE	
	RIPRAP SLOPE	
	TEST PIT	
FB-1	SOILS BORING	
	LIMITS OF DISTURBANCE	
84"	SANITARY SEWER	
6"W	WATER MAIN	
	DRAINAGE EASEMENT	
	EDGE OF BROOK	
	WETLAND LIMITS	
	E.S.I. ROW LIMIT	

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP - NRPA APPLICATION
1	1.3.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE
STEPHEN R. BUSHEY
P.E. STEPHEN R. BUSHEY
LIC. #7429

PROJECT: FALL BROOK CHANNEL IMPROVEMENTS

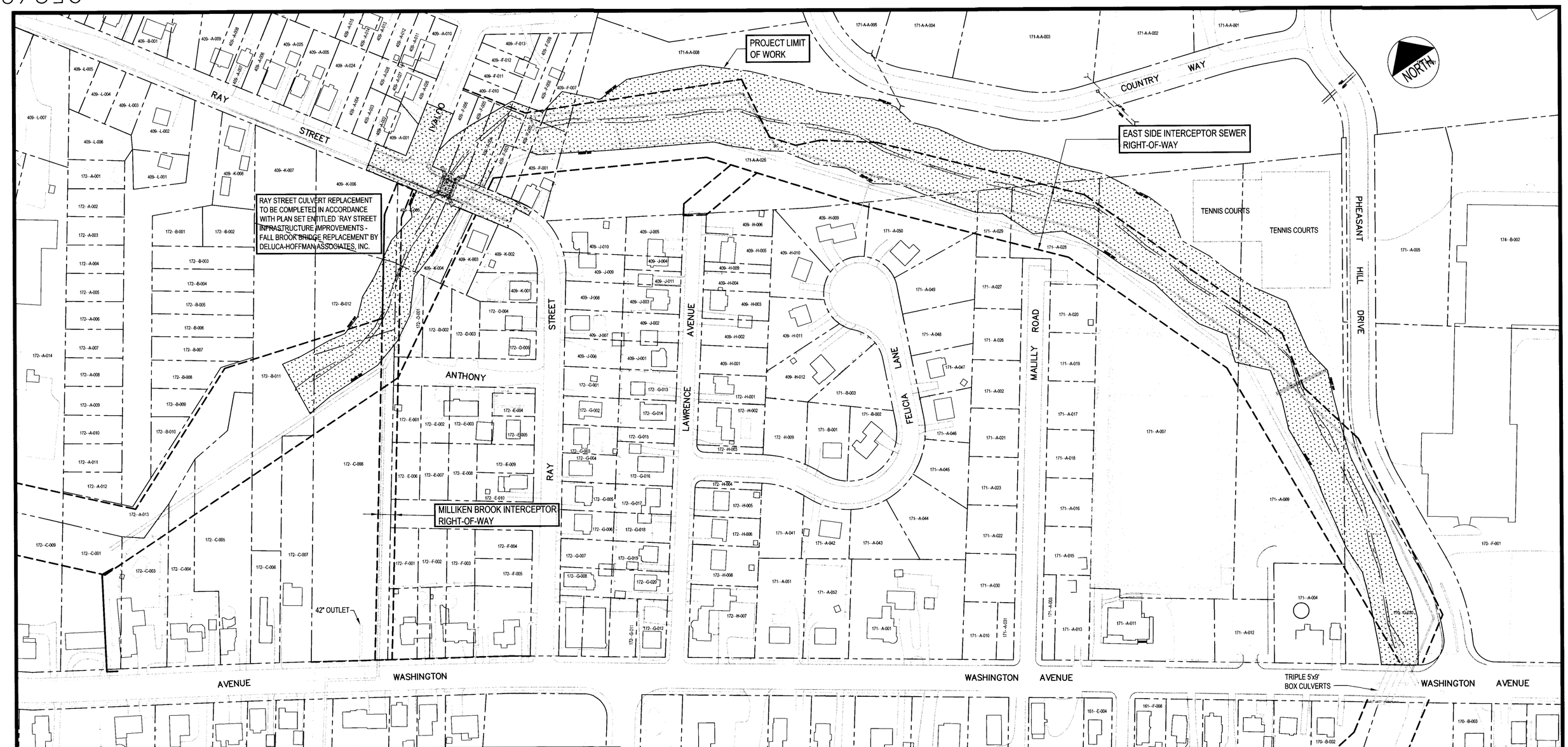
SHEET TITLE: GENERAL NOTES AND LEGEND

CLIENT: CITY OF PORTLAND
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DeLUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME 04106
(207) 775-1121
DHA@MAINE.RR.COM

DRAWN:	DED	DATE:	JULY 2002
DESIGNED:	TDD	SCALE:	NONE
CHECKED:	SRB	JOB NO.	1900.12
FILE NAME: 190012-GEN			
SHEET	2		

S:\1900.12\190012-GEN.dwg, Model, 11/11/2003 9:43:20 AM, ddavis



ABUTTERS WITHIN PROJECT LIMITS

Chart	Block	Lot	Owner/Resident
170	G	30	J.B. Brown & Sons P O Box 207 Portland, ME 04112
171	A	4	Leigh & Donald Roak 937 Washington Avenue Portland, ME 04103
171	A	7	Cheverus High School 267 Ocean Avenue Portland, ME 04103
171	A	9	Cheverus High School 267 Ocean Avenue Portland, ME 04103
171	A	20	Jeffrey Schwartz 49 Malilly Road Portland, ME 04103
171	A	28	Habitat For Humanity Greater Portland Inc. P O Box 10505 Portland, ME 04103
171	A	29	City of Portland 389 Congress Street Portland, ME 04101
171	A	50	Nancy Klukas 65 Felicia Lane Portland, ME 04103
171A	A	26	Pheasant Hill Homeowners Assoc. 50 Graystone Lane Portland, ME 04103
172	B	11	Saint Joseph's Manor 1133 Washington Avenue Portland, ME 04103

Chart	Block	Lot	Owner/Resident
172	B	12	Saint Joseph's Manor 1133 Washington Avenue Portland, ME 04103
172	C	7	Janet R Donovan 1081 Washington Avenue Portland, ME 04103
172	C	8	Saint Joseph's Manor 1133 Washington Avenue Portland, ME 04103
172	D	1	Thomas R D Noonan P O Box 183 Raymond, ME 04071
172	E	1	Catherine A Williams 14 Anthony Avenue Portland, ME 04103
409	H	6	John & Patricia Flaherty 61 Lawrence Avenue Portland, ME 04103
409	H	9	Richard & Martha Waltz 72 Felicia Lane Portland, ME 04103
409	H	10	Odias Bacheider & Laurie Charette 68 Felicia Lane Portland, ME 04103
409	J	5	Gertrude Rines 60 Lawrence Avenue Portland, ME 04103
409	J	10	David & Sally Ann Butland 57 Ray Street Portland, ME 04103

Chart	Block	Lot	Owner/Resident
409	F	1	Marion Bannon & Katherine Rolfe 67 Ray Street Portland, ME 04103
409	F	2	Marion Bannon & Katherine Rolfe 67 Ray Street Portland, ME 04103
409	F	3	Marion Bannon & Katherine Rolfe 67 Ray Street Portland, ME 04103
409	F	4	Jennifer Allee 15 Ivaloo Street Portland, ME 04103
409	F	5	Jennifer Allee 15 Ivaloo Street Portland, ME 04103
409	F	6	Jennifer Allee 15 Ivaloo Street Portland, ME 04103
409	F	7	John McGonagle & Kathleen Hayes 10 Marlborough Road Portland, ME 04103
409	F	8	John McGonagle & Kathleen Hayes 10 Marlborough Road Portland, ME 04103
409	K	3,4, 5	Barbara & Joh F Napoilano JTS 72 Ray Street Portland, ME 04103

NOTE
THIS PLAN HAS BEEN PREPARED BY DELUCA-HOFFMAN ASSOCIATES, INC. BASED ON THE FOLLOWING SOURCES:
1. TAX MAP AND LOT INFORMATION OBTAINED FROM THE CITY OF PORTLAND GIS DEPARTMENT, LAST UPDATED IN 1998
2. ESIS RIGHT OF WAY INFORMATION BASED ON SURVEY DONE BY OWEN HASKELL, INC. OCT 1998
3. CHEVERUS ATHLETIC FIELDS INFORMATION BASED ON CONSTRUCTION PLANS PROVIDED BY HARRIMAN ASSOCIATES, OCT 2001

GRAPHIC SCALE
80 0 40 80 160
(IN FEET)
1 inch = 80 ft.

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP – NRPA APPLICATION
1	1.03.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE
STEPHEN R. BUSHEY
P.E. STEPHEN R. BUSHEY
LIC. #7429

PROJECT
FALL BROOK CHANNEL IMPROVEMENTS

SHEET TITLE
EASEMENT PLAN

CLIENT
CITY OF PORTLAND
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DeLUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME 04106
(207) 775-1121
WWW.DELUCAHOFFMAN.COM

DRAWN:	DED	DATE:	JULY 2002
DESIGNED:	TDD	SCALE:	1"=80'
CHECKED:	SRB	JOB NO.	1900.12
FILE NAME:	FB_BASE		
SHEET	3A		

G:\1900.12\FB_BASE.dwg, EASEMENT PLAN, 11/11/2003 9:49:27 AM, ddavis

PRELIMINARY NOT FOR CONSTRUCTION

GRAPHIC SCALE

50 0 25 50 100

(IN FEET)
1 inch = 50 ft.

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP - NRPA APPLICATION
1	1.03.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE
STEPHEN R. BUSHEY
PROFESSIONAL ENGINEER

P.E. STEPHEN R. BUSHEY
LIC. #7429

PROJECT
FALL BROOK CHANNEL IMPROVEMENTS

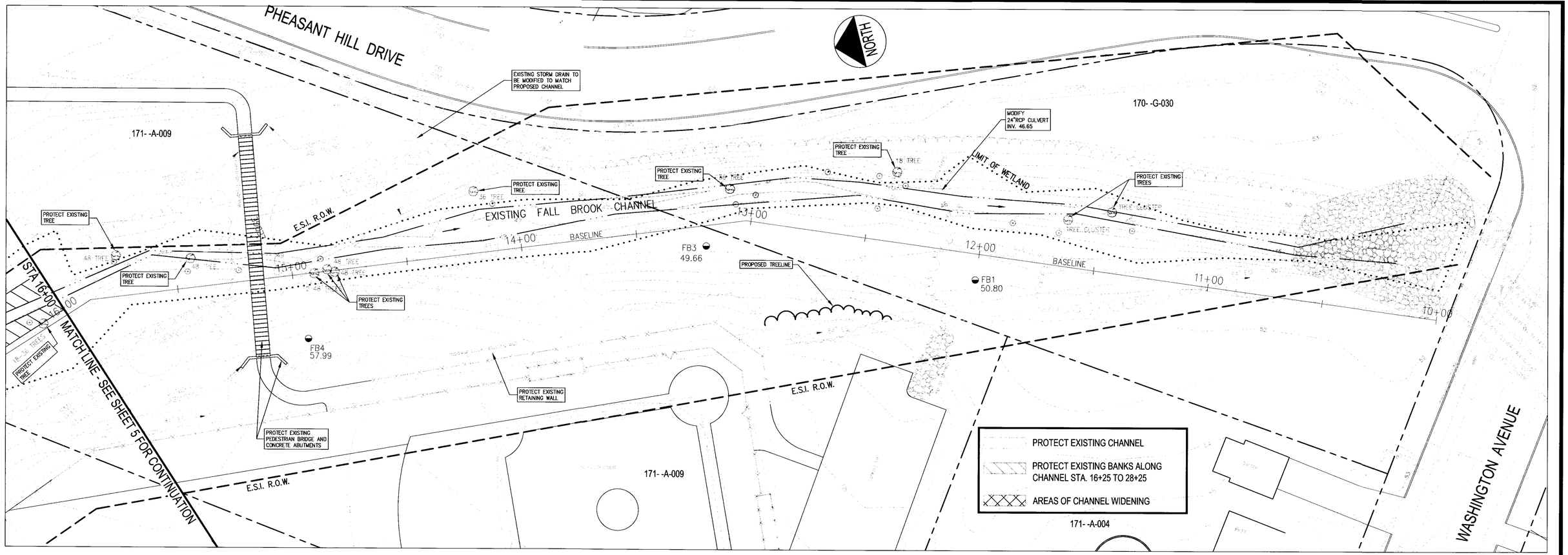
SHEET TITLE
GEOMETRIC CONTROL PLAN

CLIENT
CITY OF PORTLAND
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DeLUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME 04106
(207) 775-1121
WWW.DELUCAHOFFMAN.COM

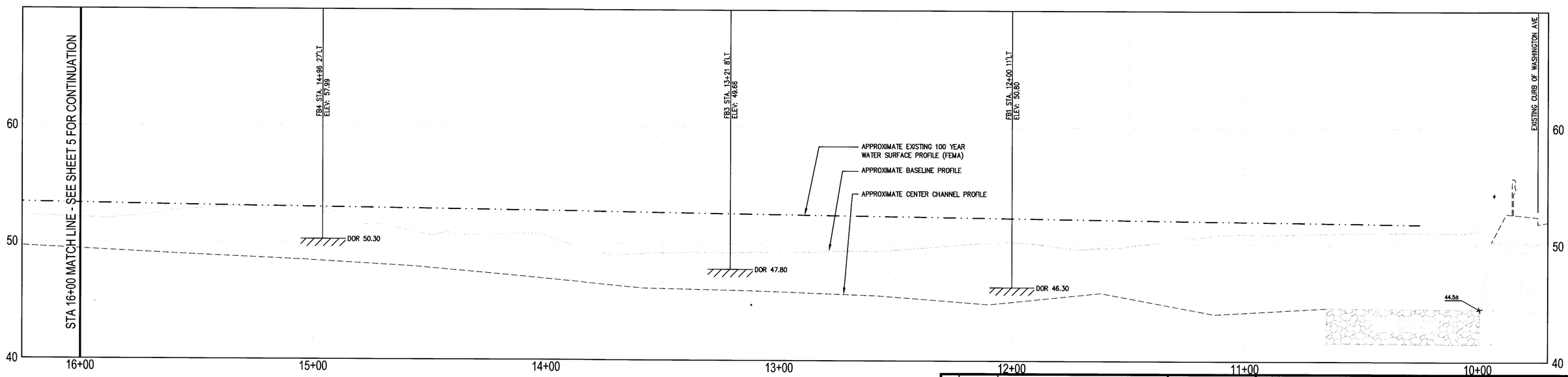
DRAWN:	DED	DATE:	JULY 2002
DESIGNED:	TDD	SCALE:	1"=50'
CHECKED:	SRB	JOB NO.	1900.12
FILE NAME:	FB_BASE		
SHEET	3B		

S:\1900.12\FB_BASE.dwg, CONTROL PLAN, 11/11/2003 9:48:44 AM, ddavis



PLAN VIEW

SCALE: 1" = 20'



PROFILE

SCALE: HORZ. 1" = 20' VERT 1" = 4'

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP – NRPA APPLICATION
1	1.03.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE STEPHEN

P.E. STEPHEN R. BUSHEY
LIC. #7429

PROJECT
FALL BROOK CHANNEL IMPROVEMENTS

SHEET TITLE
EXISTING CONDITIONS / REMOVALS PLAN AND PROFILE STA. 10+00 TO STA. 16+00

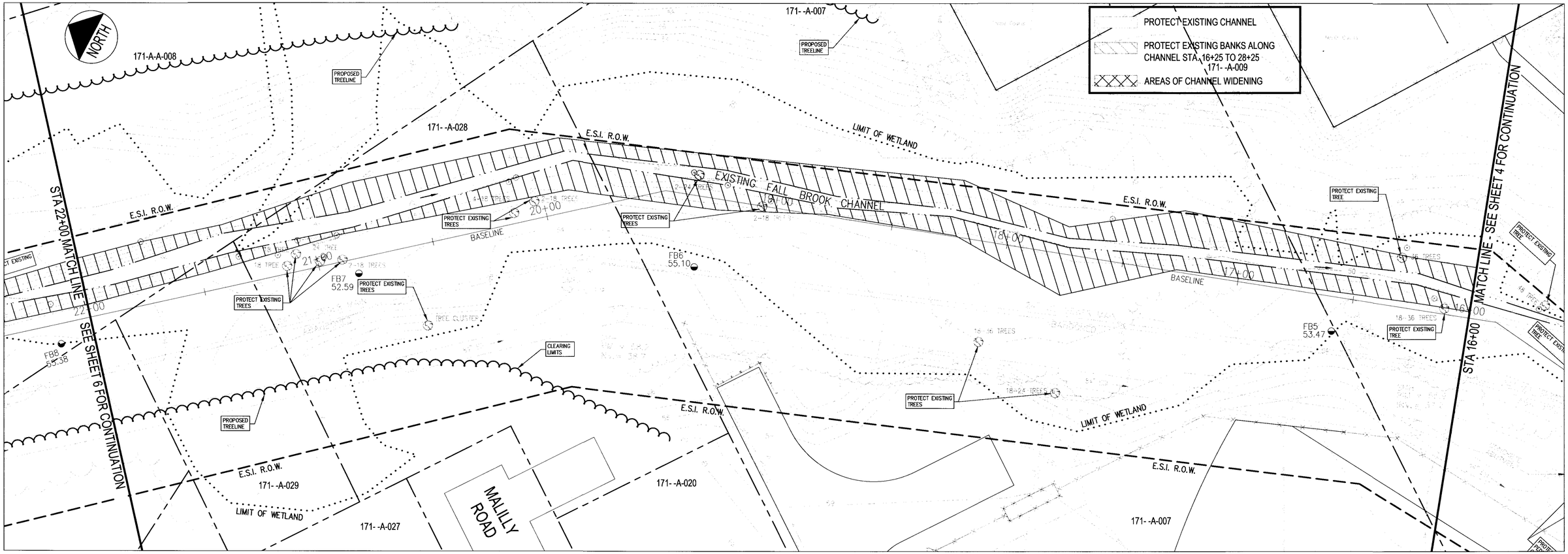
CLIENT
CITY OF PORTLAND
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DeLUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME 04106
(207) 775-1121
WWW.DELUCAHOFFMAN.COM

DRAWN:	DED	DATE:	JULY 2002
DESIGNED:	TDD	SCALE:	AS NOTED
CHECKED:	SRB	JOB NO.	1900.12
FILE NAME:	FB_BASE		
SHEET	4		

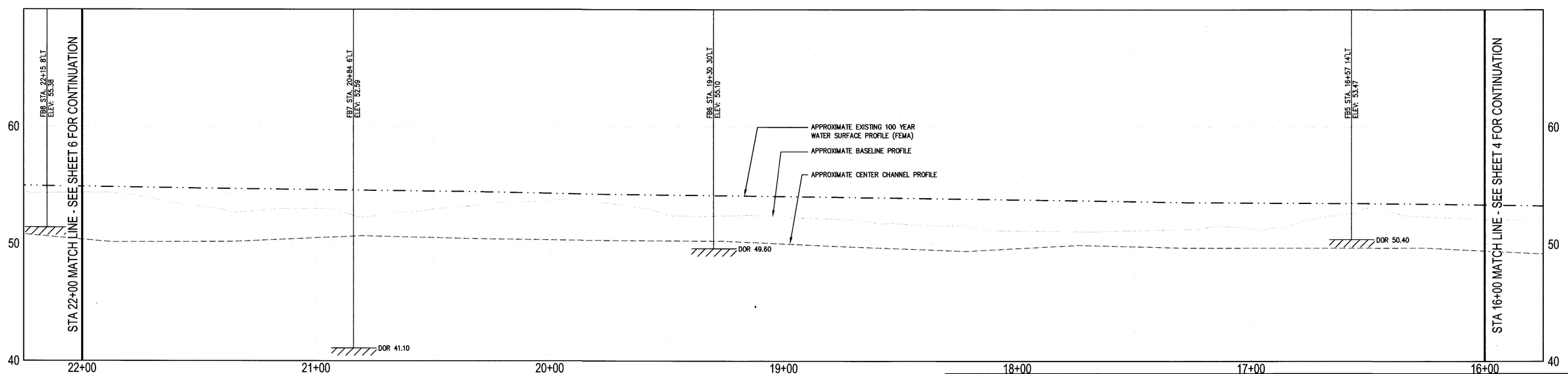
G:\1900.12\FB_BASE.dwg, EXIST 10+00 TO 16+00, 11/11/2003 9:59:23 AM, ddavis

952/8



PLAN VIEW

SCALE: 1" = 20'



PROFILE

SCALE: HORZ. 1" = 20' VERT 1" = 4'

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP – NRPA APPLICATION
1	1.03.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE STEPHEN R. BUSHEY

P.E. STEPHEN R. BUSHEY
LIC. #7429

PROJECT
FALL BROOK CHANNEL IMPROVEMENTS

SHEET TITLE
EXISTING CONDITIONS / REMOVALS PLAN AND PROFILE STA. 16+00 TO STA. 22+00

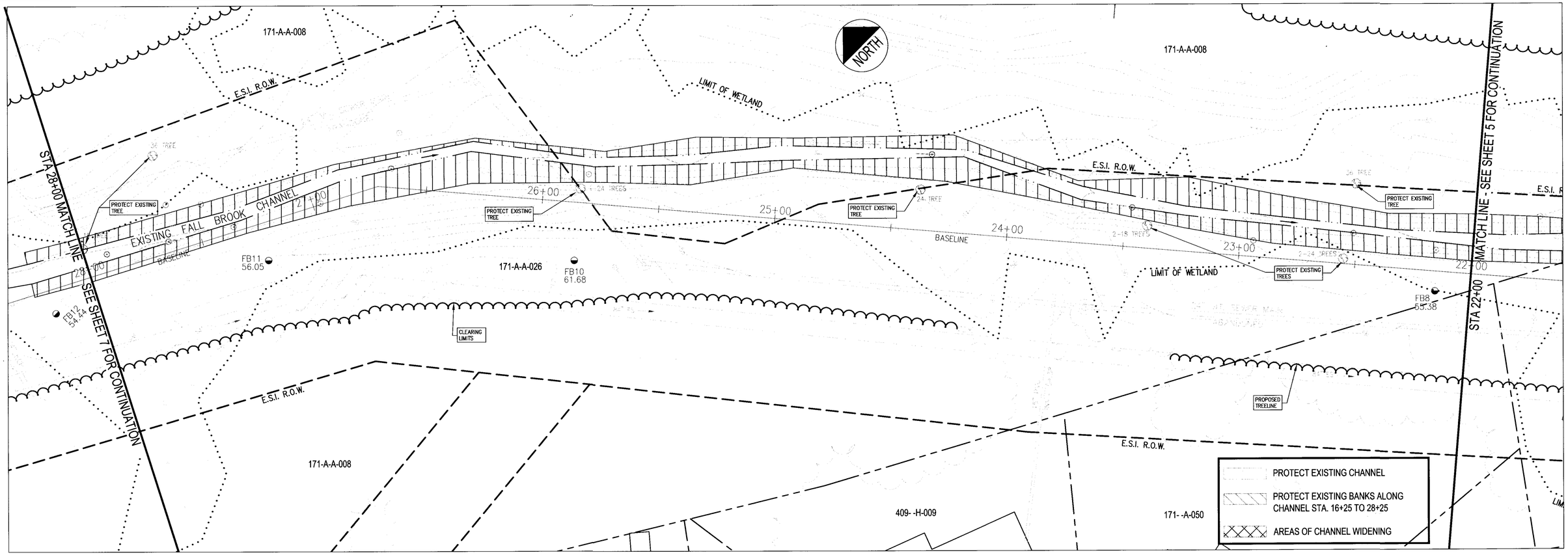
CLIENT
CITY OF PORTLAND
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DeLUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME 04106
(207) 775-1121
WWW.DELUCAHOFFMAN.COM

DRAWN:	DED	DATE:	JULY 2002
DESIGNED:	TDD	SCALE:	AS NOTED
CHECKED:	SRB	JOB NO.	1900.12
FILE NAME:	FB_BASE		
SHEET	5		

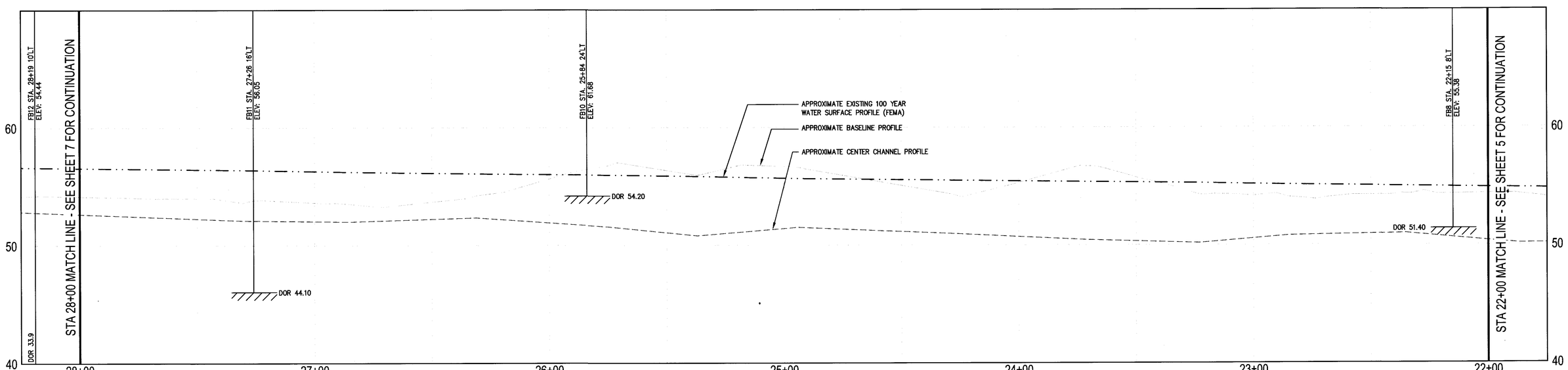
G:\1900.12\FB_BASE.dwg, EXIST 16+00 TO 22+00, 11/11/2003 9:58:26 AM, ddavis

952/8



PLAN VIEW

SCALE: 1" = 20'



PROFILE

SCALE: HORZ. 1" = 20' VERT 1" = 4'

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP – NRPA APPLICATION
1	1.03.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE STEPHEN R. BUSHEY #7429 REGISTERED PROFESSIONAL ENGINEER

P.E. STEPHEN R. BUSHEY
LIC. #7429

PROJECT
FALL BROOK CHANNEL IMPROVEMENTS

SHEET TITLE
EXISTING CONDITIONS / REMOVALS PLAN AND PROFILE STA. 22+00 TO STA. 28+00

CLIENT
CITY OF PORTLAND
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

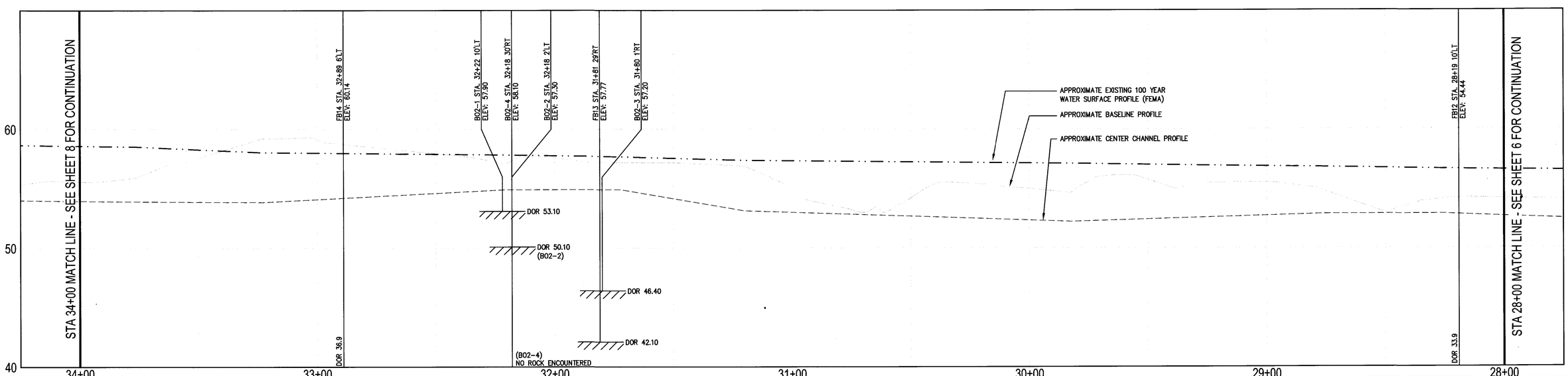
DeLUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME 04106
(207) 775-1121
WWW.DELUCAHOFFMAN.COM

DRAWN:	DED	DATE:	JULY 2002
DESIGNED:	TDD	SCALE:	AS NOTED
CHECKED:	SRB	JOB NO.	1900.12
FILE NAME:	FB_BASE		
SHEET	6		

S:\1900.12\FB_BASE.dwg, EXIST 22+00 TO 28+00, 11/11/2003 9:57:53 AM, ddavis

PLAN VIEW

SCALE: 1" = 20'



PROFILE

SCALE: HORZ. 1" = 20' VERT 1" = 4'

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP – NRPA APPLICATION
1	1.03.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE — STEPHEN R. BUSHEY #7429 — PROFESSIONAL ENGINEER

P.E. STEPHEN R. BUSHEY
LIC. #7429

PROJECT: FALL BROOK CHANNEL IMPROVEMENTS

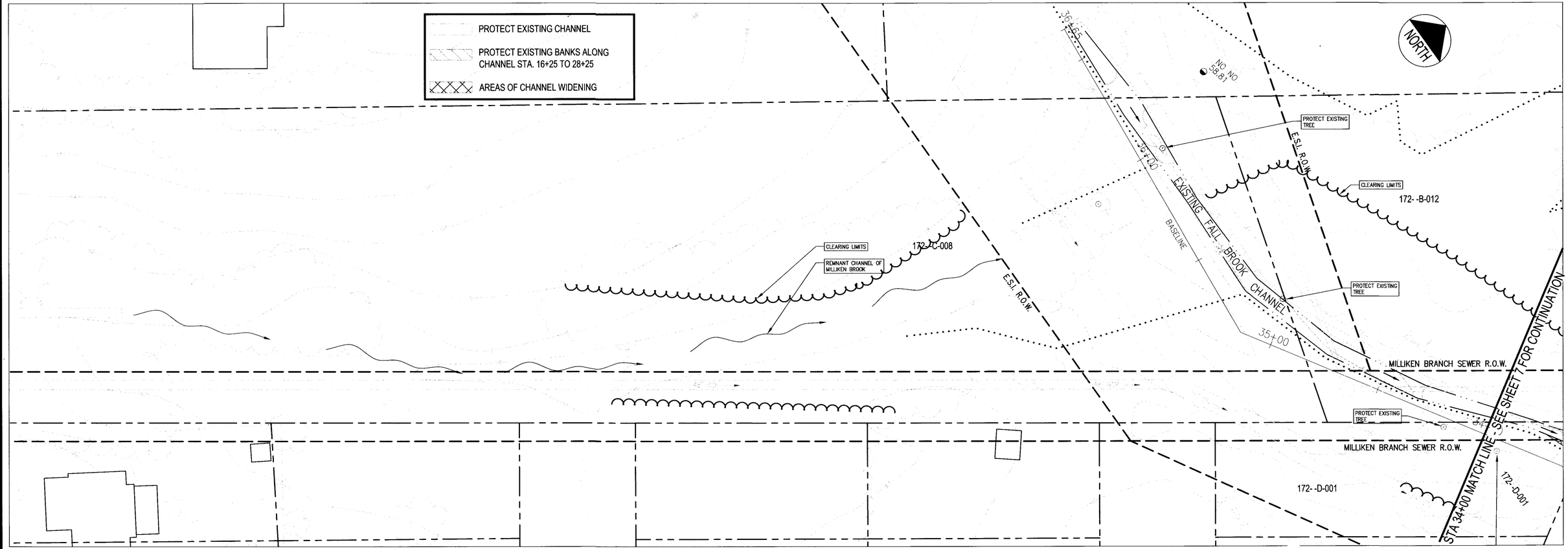
SHEET TITLE: EXISTING CONDITIONS / REMOVALS PLAN AND PROFILE STA. 28+00 TO STA. 34+00

CLIENT: CITY OF PORTLAND DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION

DeLUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME 04106
(207) 775-1121
WWW.DELUCAHOFFMAN.COM

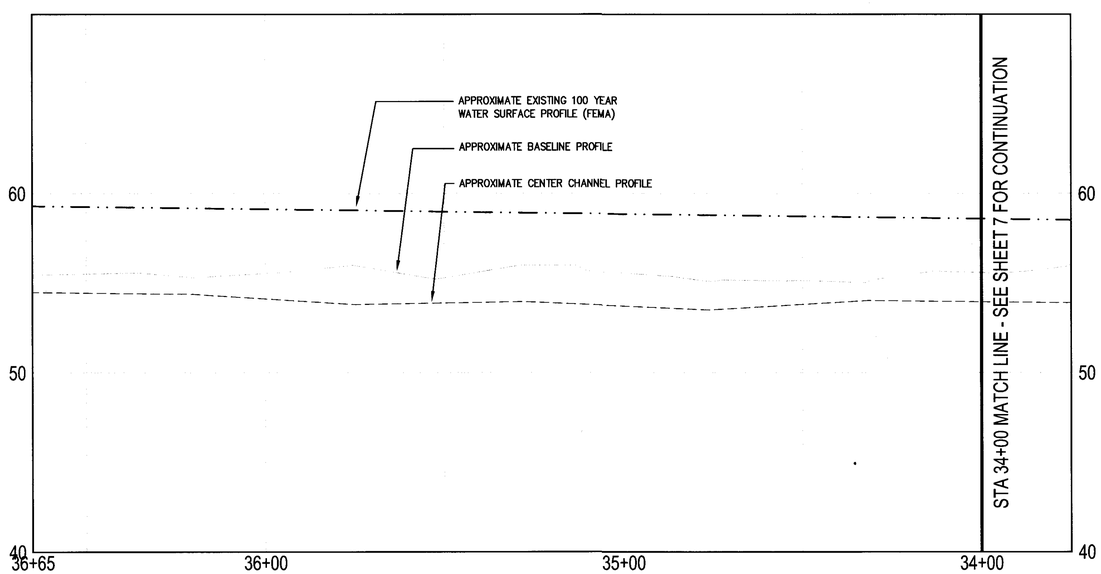
DRAWN:	DED	DATE:	JULY 2002
DESIGNED:	TDD	SCALE:	AS NOTED
CHECKED:	SRB	JOB NO.	1900.12
FILE NAME:	FB_BASE		
SHEET	7		

G:\1900.12\FB_BASE.dwg, EXIST 28+00 TO 34+00, 11/11/2003 9:55:48 AM, ddavis



PLAN VIEW

SCALE: 1" = 20'



PROFILE

SCALE: HORZ. 1" = 20' VERT 1" = 4'

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP – NRPA APPLICATION
1	1.03.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE STEPHEN R. BUSHEY

P.E. STEPHEN R. BUSHEY

LIC. #7429

PROJECT: FALL BROOK CHANNEL IMPROVEMENTS

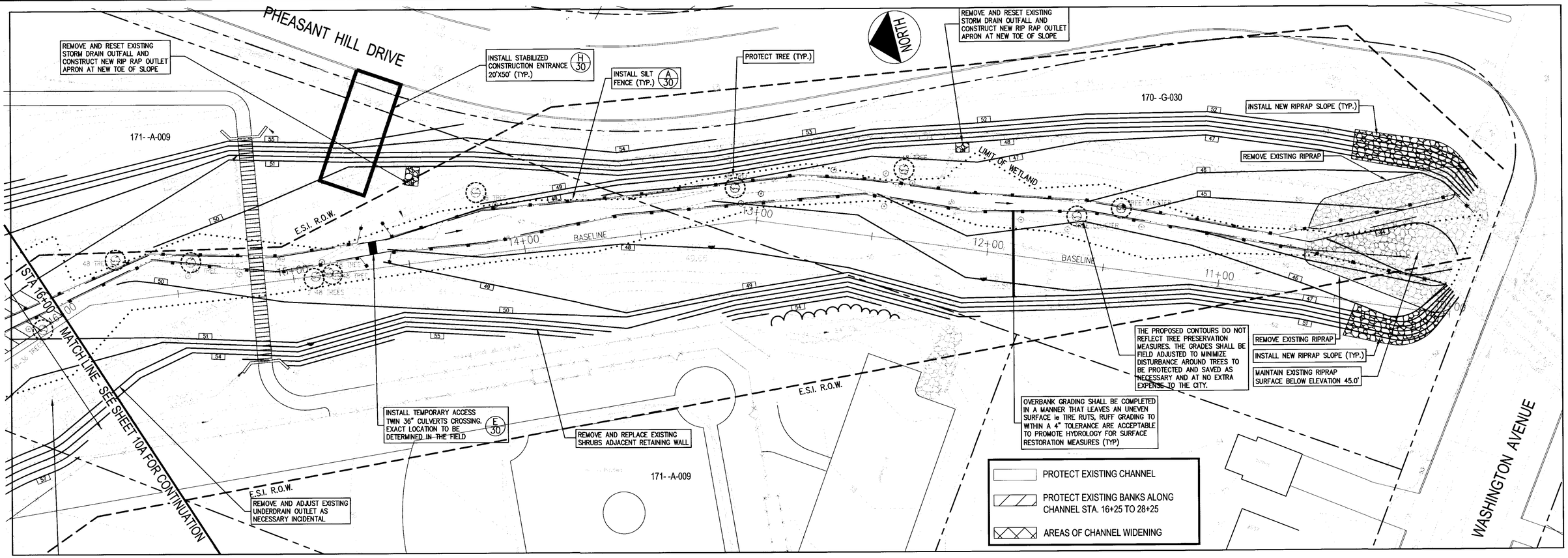
SHEET TITLE: EXISTING CONDITIONS / REMOVALS PLAN AND PROFILE STA. 34+00 TO STA. 36+65

CLIENT: CITY OF PORTLAND DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION

DeLUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME 04106
(207) 775-1121
WWW.DELUCAHOFFMAN.COM

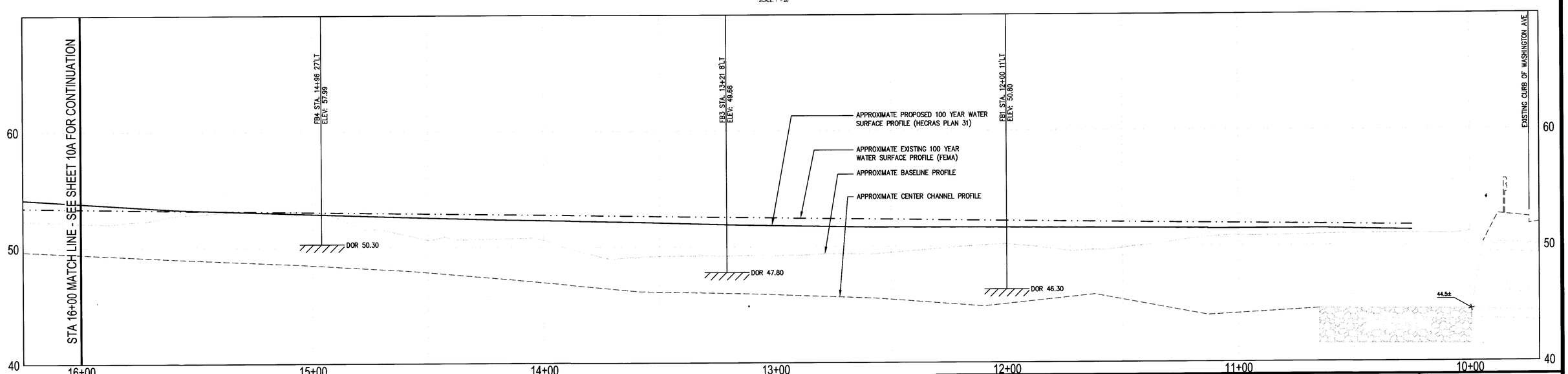
DRAWN:	DED	DATE:	JULY 2002
DESIGNED:	TDD	SCALE:	AS NOTED
CHECKED:	SRB	JOB NO.	1900.12
FILE NAME:	FB_BASE		
SHEET	8		

G:\1900.12\FB_BASE.dwg, EXIST 34+00 TO 36+65, 11/11/2003 9:57:04 AM, ddavis



PLAN VIEW

SCALE: 1" = 20'



PROFILE

SCALE: HORZ 1" = 20' VERT 1" = 4'

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP – NRPA APPLICATION
1	1.03.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE STEPHEN R BUSHEY

P.E. STEPHEN R. BUSHEY
LIC. #7429

PROJECT: FALL BROOK CHANNEL IMPROVEMENTS

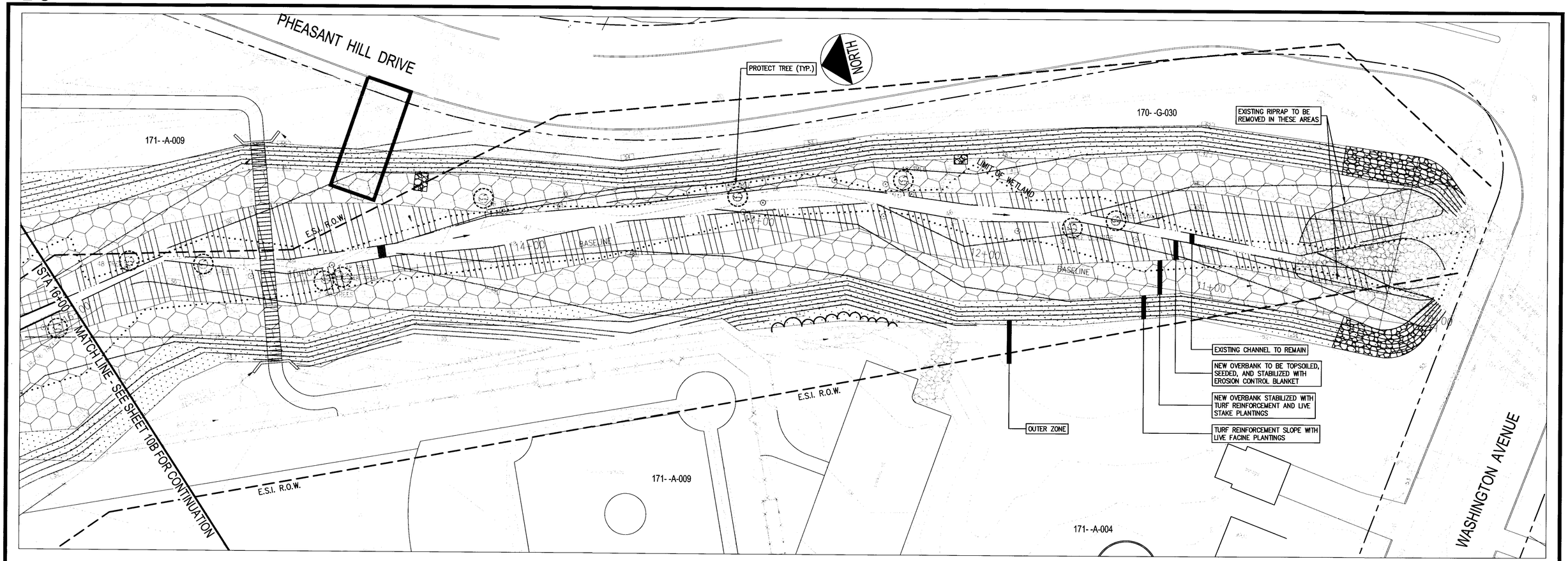
SHEET TITLE: PROPOSED GRADING PLAN AND PROFILE STA. 10+00 TO STA. 16+00

CLIENT: CITY OF PORTLAND DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION

DeLUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME 04106
(207) 775-1121
WWW.DELUCAHOFFMAN.COM

DRAWN:	DED	DATE:	JULY 2002
DESIGNED:	TDD	SCALE:	AS NOTED
CHECKED:	SRB	JOB NO.	1900.12
FILE NAME:	FB_BASE		
SHEET	9A		

S:\1900.12\FB_BASE.dwg, P GRADE 10+00 TO 16+00, 11/11/2003 10:43:26 AM, ddavis



PLAN VIEW

SCALE: 1" = 20'

SOIL BIOENGINEERING MATERIALS NOTES

(1) Locating and selecting plant materials

(i) Commercial sources – Commercially grown plant materials are suitable sources of vegetation for use in bioengineering systems. It shall be the Contractor's responsibility to determine adequate lead times for procurement and delivery. A schedule for the procurement of bioengineering materials shall be reviewed and approved by the Owner prior to construction. Suitable sources include New England Wetland Plants, Inc. tel. 413.548.8000 attn.: David Anderson

(ii) Harvesting indigenous species – Indigenous species harvested from existing stands of living woody vegetation may also be used as a source of bioengineering material, if approved by the MaDEP. The use of indigenous live materials requires careful selection, harvesting, handling, and transporting. They should result in plants that have deep and strong root systems and can be installed quickly.

Live plant materials can be cut from existing native or naturalized stands found near the project site or within practical hauling distance. The source site must contain plant species that will propagate easily from cuttings. Cuttings are normally 1/2 to 2 inches in diameter and range in length from 2 to 6 feet.

Binding and storage – Live cuttings should be bundled together securely at the collection site for easy loading and handling and for protection during transport. Side branches and brushy limbs should be kept intact.

Transporting – The bundles of live cuttings should be placed on the transport vehicles in an orderly fashion to prevent damage and facilitate handling. They should be covered with a tarpaulin during transportation to prevent drying and additional stress.

Handling – Live cuttings should arrive on the job site within 8 hours of harvest and should be installed immediately. This is especially critical when the ambient temperature is 50 degrees F or above.

Live cuttings not installed on the day they arrive should be promptly placed in controlled storage conditions and protected until they can be installed. When in storage, the cuttings must receive continuous shade, must be sheltered from the wind, and must be continuously protected from drying by being heeled into moist soils or stored in uncontaminated water. All live dormant cuttings should be removed from storage and used within 2 days of harvest.

(2) Installing plant materials

(i) Timing – Installation of live cuttings should begin concurrently with earth moving operations. All construction operations should be phased together whenever possible.

(ii) Planting medium – Soil bioengineering projects ideally use onsite stockpiled topsoil and hydric soils as the planting medium of choice. Gravel is not a suitable material for use as fill around live plant materials. Soil bioengineering systems need to be installed in a planting medium that includes fines and organic material and is capable of supporting plant growth. Muddy soils that are otherwise suitable should not be used until they have been dried to a workable moisture content. Heavy clays should be mixed with organic soils to increase porosity. Select soil backfill does not need to be organic topsoil, but it must be able to support plant growth. Stockpiled hydric soils excavated from onsite locations shall be placed back in a layer equivalent in thickness to the existing layer or as determined in the field by the City's wetland scientist. Imported hydric soils will be required and the Contractor shall provide the source and basic soil properties to the overseeing wetland scientist for review and approved prior to delivery to the site at no extra expense to the City.

Soil samples of the onsite materials shall be taken prior to installation of live woody cuttings. Soil samples shall also be taken of all fill materials that are brought to the site prior to use. Nutrient testing by an approved laboratory should include analyses for a full range of nutrients, metal contents, and pH. The laboratory reports should also include recommended fertilizer and lime amendments for woody plant materials. The cost for soil sampling and laboratory testing shall be incidental to the contract.

All fill soil around the live vegetative cuttings should be compacted to densities approximating the surrounding natural soil densities. The soil around plants should be free of voids.

(3) Quality control

Maintaining quality control throughout installation and maintenance operations will ensure a successful soil bioengineering project. The following guidelines shall apply:

(i) Pre-construction

Select plant species for conformance to requirements.
Locate and secure source sites for harvesting live cuttings or commercial procurement.
Define construction work area limits.
Fence off sites requiring special protection.
Complete and inspect the following preparations:
-- Layout
-- Excavation, systems excavation
-- Bench size, shape, angle
-- Preparation of site, i.e., clearing, grading, and shaping
-- Disposal of excess gravel, soil, and debris
-- Depth of excavation
-- Vegetation to be removed/preserved
-- Stockpiling of suitable soil and/or rock

(ii) Construction

Inspect each system component, at every stage, for the following:
-- Angle of placement and orientation of the live cuttings
-- Backfill material/rock and stone material
-- Fertilizer, method and quantity applied
-- Lime, method and quantity applied
-- Preparation of trenches or benches in cut and fill slopes
-- Staking
-- Pruning
-- Stock handling and preparation
-- Soil compaction
-- Watering
Ensure that proper maintenance occurs during and after installation.
Inspect daily for quality control.
-- Check all cuttings; remove unacceptable material and use fresh stock for replacement installations.
-- Continuously check all items in the preconstruction and construction inspection lists.
-- Inspect the plant materials storage area when it is in use.

(4) Establishment period

(i) Interim inspections – Inspections by a qualified wetland scientist retained by the City shall be made after the soil bioengineering measures have been installed. The following schedule shall apply:

Inspect biweekly for the first 2 months. Inspections should note insect infestations, soil moisture, and other conditions that could lead to poor survivability. Immediate action, such as the application of supplemental water, should be taken if conditions warrant.
Inspect monthly for the next six months. Systems not in acceptable growing condition should be noted and, as soon as seasonal conditions permit, should be removed from the site and replaced with materials of the same species and sizes as originally specified.
Needed reestablishment work should be performed every 6 months during the initial 2-year establishment period. This will usually consist of replacing dead material.
Extra inspections should always be made during periods of drought or heavy rains. Damaged sections should always be repaired immediately.

(ii) Final inspection – An inspection should be held 2 years after installation is completed. Healthy growing conditions should exist. Reporting of conditions to the Department shall continue for a period of 5 years.

Healthy growing conditions in all areas refer to overall leaf development and rooted stems defined as follows:
Live stakes --- 70% – 100% growing
Live fascines --- 20% – 50% growing
Brushlayers --- 40% – 70% growing
Growth should be continuous with no open spaces greater than 2 feet in linear systems. Spaces 2 feet or less will fill in without hampering the integrity of the installed living system.

(5) Maintaining the system

After inspection and acceptance of the established system, maintenance requirements should be minor under normal conditions. Maintenance generally consists of light pruning and removal of undesirable vegetation. Heavy pruning may be required to reduce competition for light or stimulate new growth in the project plantings. In many situations, installed soil bioengineering systems become source sites for future harvesting operations. The selective removal of vegetation may be required to eliminate undesirable invading species that shall be cut out every 3 to 7 years.

More intensive maintenance will sometimes be required to repair problem areas created by high intensity storms or other unusual conditions. Site washouts should be repaired immediately. Generally, reestablishment should take place and remain the Contractor's responsibility at no extra expense to the City for at least 2 spring time growing periods (May–June) following construction completion and consist of the following practices:

Replacement of branches in dead unrooted sections
Soil refilling, branchpacking, and compacting in rills and gullies
Insect and disease control
Weed control

Gullies, rills, or damaged sections should be repaired through the use of healthy, live branch cuttings preferably installed during the dormant season. The repair should use the branchpacking system for large breaks and the live gully repair system for breaks up to 2 feet wide and 2 feet deep. If the dormant season has passed, the use of rooted stock may be considered. Maintenance of the surface restoration measures shall revert to the City after the second spring time growing period following initial construction.

SURFACE RESTORATION LEGEND

- EXISTING CHANNEL TO REMAIN
- NEW AREAS OF CHANNEL WIDENING
- EXISTING OVERBANK TO REMAIN
- NEW OVERBANK STABILIZED WITH EROSION CONTROL BLANKET - NORTH AMERICAN GREEN SC150 OR EQUAL
- NEW OVERBANK STABILIZED WITH TURF REINFORCEMENT AND LIVE STAKE PLANTINGS
- TURF REINFORCEMENT SLOPE WITH LIVE FACINE PLANTINGS - NORTH AMERICAN GREEN P300 OR EQUAL
- LOAM, SEED, AND EROSION CONTROL MESH
- NEW RIPRAP STABILIZATION

NOTE:
ALL DISTURBED AREAS NOT SUBJECT TO LIVE DORMANT STAKE OR DORMANT FACINE PLANTINGS OR RIPRAP SHALL BE TOPSOILED, SEEDED, WITH APPROVED WETLAND SEED MIX AND STABILIZED WITH EROSION CONTROL BLANKET OR MESH (NORTH AMERICAN GREEN SC150 OR EQUAL)

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP – NRPA APPLICATION
1	1.03.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE
STEPHEN R. BUSHEY
#7429

P.E. STEPHEN R. BUSHEY
LIC. #7429

PROJECT
FALL BROOK CHANNEL IMPROVEMENTS

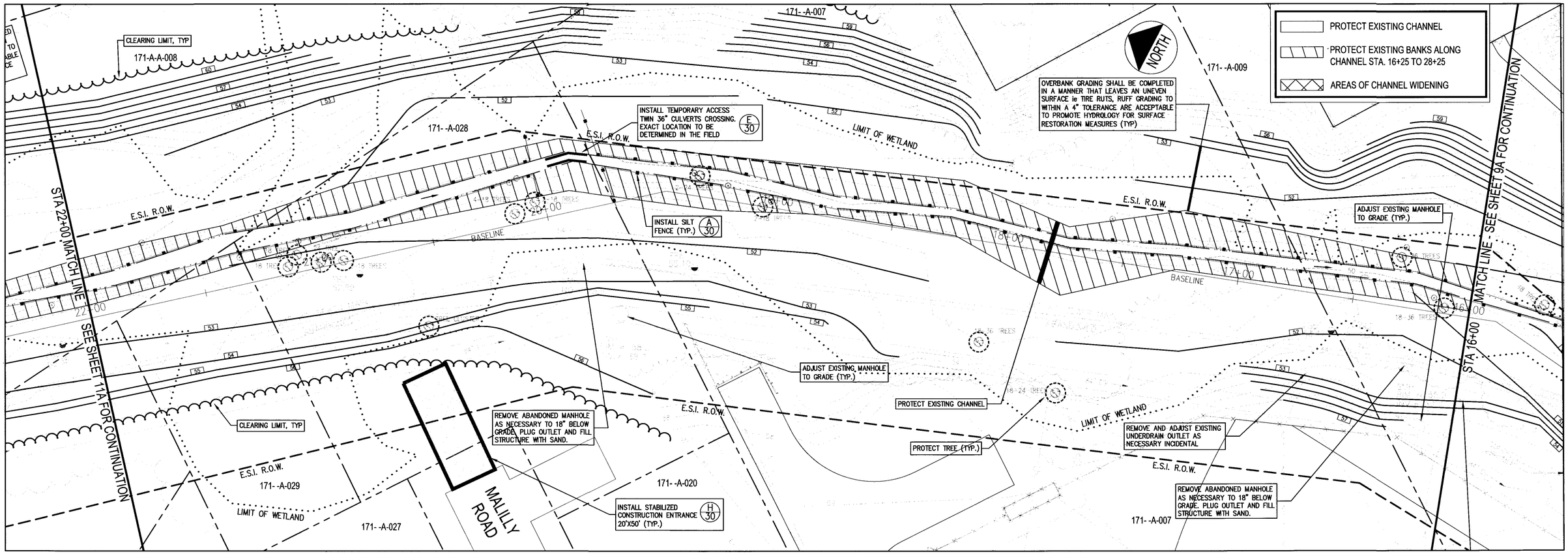
SHEET TITLE
PROPOSED SURFACE STABILIZATION PLAN
STA. 10+00 TO STA. 16+00

CLIENT
CITY OF PORTLAND
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DeLUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME 04106
(207) 775-1121
WWW.DELUCAHOFFMAN.COM

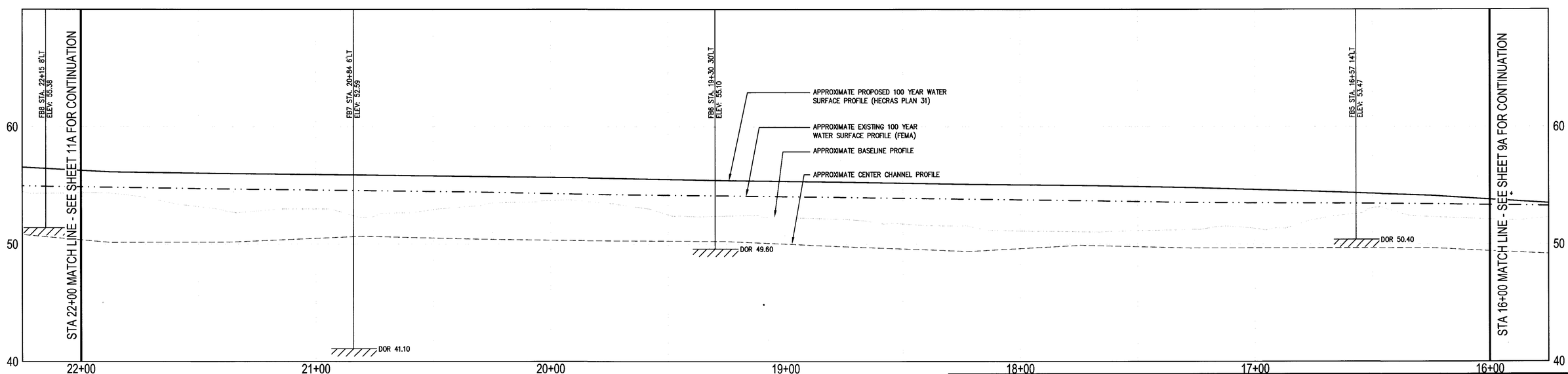
DRAWN:	DED	DATE:	JULY 2002
DESIGNED:	TDD	SCALE:	AS NOTED
CHECKED:	SRB	JOB NO.	1900.12
FILE NAME:	FB_BASE		
SHEET	9B		

S:\1900.12\FB_BASE.dwg, P-SURFACE 10+00 TO 16+00, 11/11/2003 10:48:11 AM, ddavis



PLAN VIEW

SCALE: 1" = 20'



PROFILE

SCALE: HORZ 1" = 20' VERT 1" = 4'

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP – NRPA APPLICATION
1	1.03.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE STEPHEN R. BUSHEY

P.E. STEPHEN R. BUSHEY
LIC. #7429

PROJECT
FALL BROOK CHANNEL IMPROVEMENTS

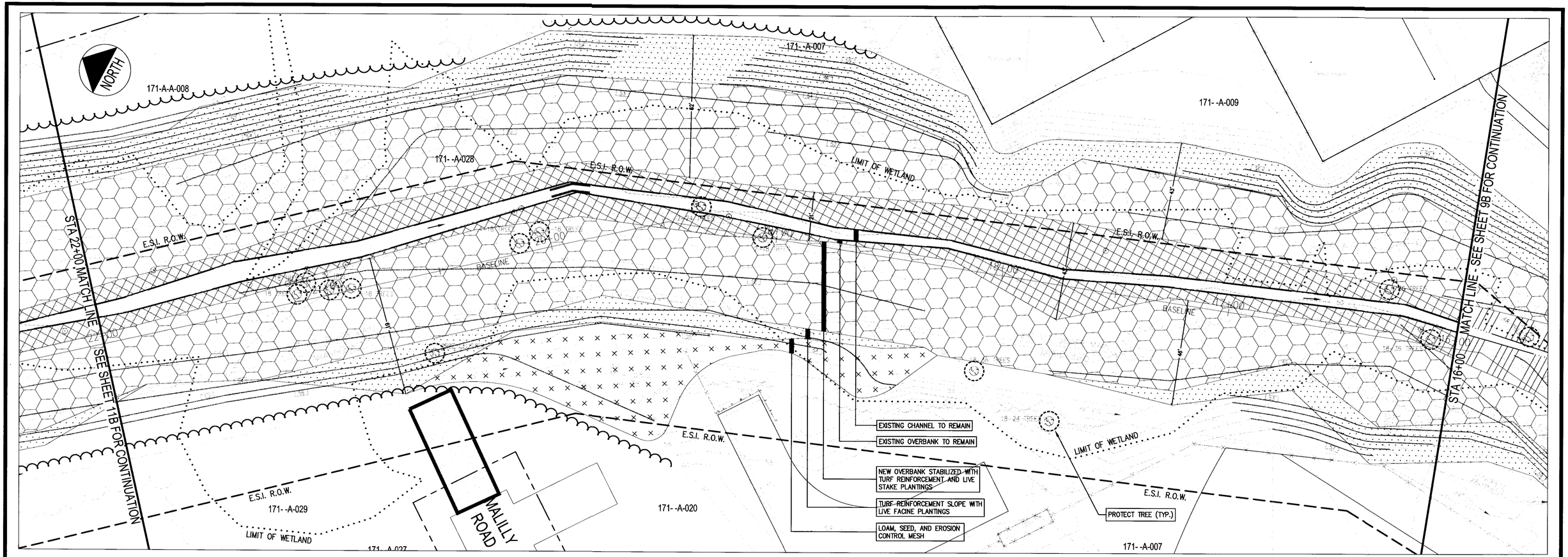
SHEET TITLE
PROPOSED GRADING PLAN AND PROFILE
STA. 16+00 TO STA. 22+00

CLIENT
CITY OF PORTLAND
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DeLUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME 04106
(207) 775-1121
WWW.DELUCAHOFFMAN.COM

DRAWN:	DED	DATE:	JULY 2002
DESIGNED:	TDD	SCALE:	AS NOTED
CHECKED:	SRB	JOB NO.	1900.12
FILE NAME:	FB_BASE		
SHEET	10A		

S:\1900.12\FB_BASE.dwg, P GRADE 16+00 TO 22+00, 11/11/2003 10:44:21 AM, ddavis



PLAN VIEW

SCALE: 1" = 20'

SOIL BIOENGINEERING MATERIALS NOTES

(1) Locating and selecting plant materials
(i) Commercial sources – Commercially grown plant materials are suitable sources of vegetation for use in bioengineering systems. It shall be the Contractor's responsibility to determine adequate lead times for procurement and delivery. A schedule for the procurement of bioengineering materials shall be reviewed and approved by the Owner prior to construction. Suitable sources include New England Wetland Plants, Inc. tel. 413.548.8000 attn.: David Anderson

(ii) Harvesting indigenous species – Indigenous species harvested from existing stands of living woody vegetation may also be used as a source of bioengineering material, if approved by the MeDEP. The use of indigenous live materials requires careful selection, harvesting, handling, and transporting. They should result in plants that have deep and strong root systems and can be installed quickly.

Live plant materials can be cut from existing native or naturalized stands found near the project site or within practical hauling distance. The source site must contain plant species that will propagate easily from cuttings. Cuttings are normally 1/2 to 2 inches in diameter and range in length from 2 to 6 feet.

Binding and storage – Live cuttings should be bundled together securely at the collection site for easy loading and handling and for protection during transport. Side branches and brushy limbs should be kept intact.

Transporting – The bundles of live cuttings should be placed on the transport vehicles in an orderly fashion to prevent damage and facilitate handling. They should be covered with a tarpaulin during transportation to prevent drying and additional stress.

Handling – Live cuttings should arrive on the job site within 8 hours of harvest and should be installed immediately. This is especially critical when the ambient temperature is 50 degrees F or above.

Live cuttings not installed on the day they arrive should be promptly placed in controlled storage conditions and protected until they can be installed. When in storage, the cuttings must receive continuous shade, must be sheltered from the wind, and must be continuously protected from drying by being heeled into moist soils or stored in uncontaminated water. All live dormant cuttings should be removed from storage and used within 2 days of harvest.

(2) Installing plant materials
(i) Timing – Installation of live cuttings should begin concurrently with earth moving operations. All construction operations should be phased together whenever possible.

(ii) Planting medium – Soil bioengineering projects ideally use onsite stockpiled topsoil and hydric soils as the planting medium of choice. Gravel is not a suitable material for use as fill around live plant materials. Soil bioengineering systems need to be installed in a planting medium that includes fines and organic material and is capable of supporting plant growth. Muddy soils that are otherwise suitable should not be used until they have been dried to a workable moisture content. Heavy clays should be mixed with organic soils to increase porosity. Select soil backfill does not need to be organic topsoil, but it must be able to support plant growth. Stockpiled hydric soils excavated from onsite locations shall be placed back in a layer equivalent in thickness to the existing layer or as determined in the field by the City's wetland scientist. Imported hydric soils will be required and the Contractor shall provide the source and basic soil properties to the overseeing wetland scientist for review and approved prior to delivery to the site at no extra expense to the City.

Soil samples of the onsite materials shall be taken prior to installation of live woody cuttings. Soil samples shall also be taken of all fill materials that are brought to the site prior to use. Nutrient testing by an approved laboratory should include analyses for a full range of nutrients, metal contents, and pH. The laboratory reports should also include recommended fertilizer and lime amendments for woody plant materials. The cost for soil sampling and laboratory testing shall be incidental to the contract.

All fill soil around the live vegetative cuttings should be compacted to densities approximating the surrounding natural soil densities. The soil around plants should be free of voids.

(3) Quality control
Maintaining quality control throughout installation and maintenance operations will ensure a successful soil bioengineering project. The following guidelines shall apply:

(i) Pre-construction
Select plant species for conformance to requirements.
Locate and secure source sites for harvesting live cuttings or commercial procurement.
Define construction work area limits.
Fence off sites requiring special protection.
Complete and inspect the following preparations:
-- Layout
-- Excavation, systems excavation
-- Bench size, shape, angle
-- Preparation of site, i.e., clearing, grading, and shaping
-- Disposal of excess gravel, soil, and debris
-- Depth of excavation
-- Vegetation to be removed/preserved
-- Stockpiling of suitable soil and/or rock

(ii) Construction
Inspect each system component, at every stage, for the following:
-- Angle of placement and orientation of the live cuttings
-- Backfill material/rock and stone material
-- Fertilizer, method and quantity applied
-- Lime, method and quantity applied
-- Preparations of trenches or benches in cut and fill slopes
-- Staking
-- Pruning
-- Stock handling and preparation
-- Soil compaction
-- Watering
Ensure that proper maintenance occurs during and after installation.
Inspect daily for quality control.
-- Check all cuttings; remove unacceptable material and use fresh stock for replacement installations.
-- Continuously check all items in the preconstruction and construction inspection lists.
-- Inspect the plant materials storage area when it is in use.

(4) Establishment period
(i) Interim inspections – Inspections by a qualified wetland scientist retained by the City shall be made after the soil bioengineering measures have been installed. The following schedule shall apply:

Inspect biweekly for the first 2 months. Inspections should note insect infestations, soil moisture, and other conditions that could lead to poor survivability. Immediate action, such as the application of supplemental water, should be taken if conditions warrant.
Inspect monthly for the next six months. Systems not in acceptable growing condition should be noted and, as soon as seasonal conditions permit, should be removed from the site and replaced with materials of the same species and sizes as originally specified.
Needed reestablishment work should be performed every 6 months during the initial 2-year establishment period. This will usually consist of replacing dead material.
Extra inspections should always be made during periods of drought or heavy rains. Damaged sections should always be repaired immediately.

(ii) Final inspection – An inspection should be held 2 years after installation is completed. Healthy growing conditions should exist. Reporting of conditions to the Department shall continue for a period of 5 years.

Healthy growing conditions in all areas refer to overall leaf development and rooted stems defined as follows:
Live stakes --- 70% – 100% growing
Live fascines --- 20% – 50% growing
Brushlayers --- 40% – 70% growing
Growth should be continuous with no open spaces greater than 2 feet in linear systems. Spaces 2 feet or less will fill in without hampering the integrity of the installed living system.

(5) Maintaining the system
After inspection and acceptance of the established system, maintenance requirements should be minor under normal conditions. Maintenance generally consists of light pruning and removal of undesirable vegetation. Heavy pruning may be required to reduce competition for light or stimulate new growth in the project plantings. In many situations, installed soil bioengineering systems become source sites for future harvesting operations. The selective removal of vegetation may be required to eliminate undesirable invading species that shall be cut out every 3 to 7 years.

More intensive maintenance will sometimes be required to repair problem areas created by high intensity storms or other unusual conditions. Site washouts should be repaired immediately. Generally, reestablishment should take place and remain the Contractor's responsibility at no extra expense to the City for at least 2 spring time growing periods (May–June) following construction completion and consist of the following practices:

Replacement of branches in dead unrooted sections
Soil refilling, branchpacking, and compacting in rills and gullies
Insect and disease control
Weed control

Gullies, rills, or damaged sections should be repaired through the use of healthy, live branch cuttings preferably installed during the dormant season. The repair should use the branchpacking system for large breaks and the live gully repair system for breaks up to 2 feet wide and 2 feet deep. If the dormant season has passed, the use of rooted stock may be considered. Maintenance of the surface restoration measures shall revert to the City after the second spring time growing period following initial construction.

SURFACE RESTORATION LEGEND

- EXISTING CHANNEL TO REMAIN
- NEW AREAS OF CHANNEL WIDENING
- EXISTING OVERBANK TO REMAIN
- NEW OVERBANK STABILIZED WITH EROSION CONTROL BLANKET - NORTH AMERICAN GREEN SC150 OR EQUAL
- NEW OVERBANK STABILIZED WITH TURF REINFORCEMENT AND LIVE STAKE PLANTINGS
- TURF REINFORCEMENT SLOPE WITH LIVE FACINE PLANTINGS - NORTH AMERICAN GREEN P300 OR EQUAL
- LOAM, SEED, AND EROSION CONTROL MESH
- NEW RIPRAP STABILIZATION

NOTE:
ALL DISTURBED AREAS NOT SUBJECT TO LIVE STAKE OR FACINE PLANTINGS OR RIPRAP SHALL BE TOPSOILED, SEEDED, WITH APPROVED WETLAND SEED MIX AND STABILIZED WITH EROSION CONTROL BLANKET OR MESH (NORTH AMERICAN GREEN SC150 OR EQUAL)

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP – NRPA APPLICATION
1	1.03.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE STEPHEN R. BUSHEY #7429 LICENSED PROFESSIONAL ENGINEER

P.E. STEPHEN R. BUSHEY
LIC. #7429

PROJECT
FALL BROOK CHANNEL IMPROVEMENTS

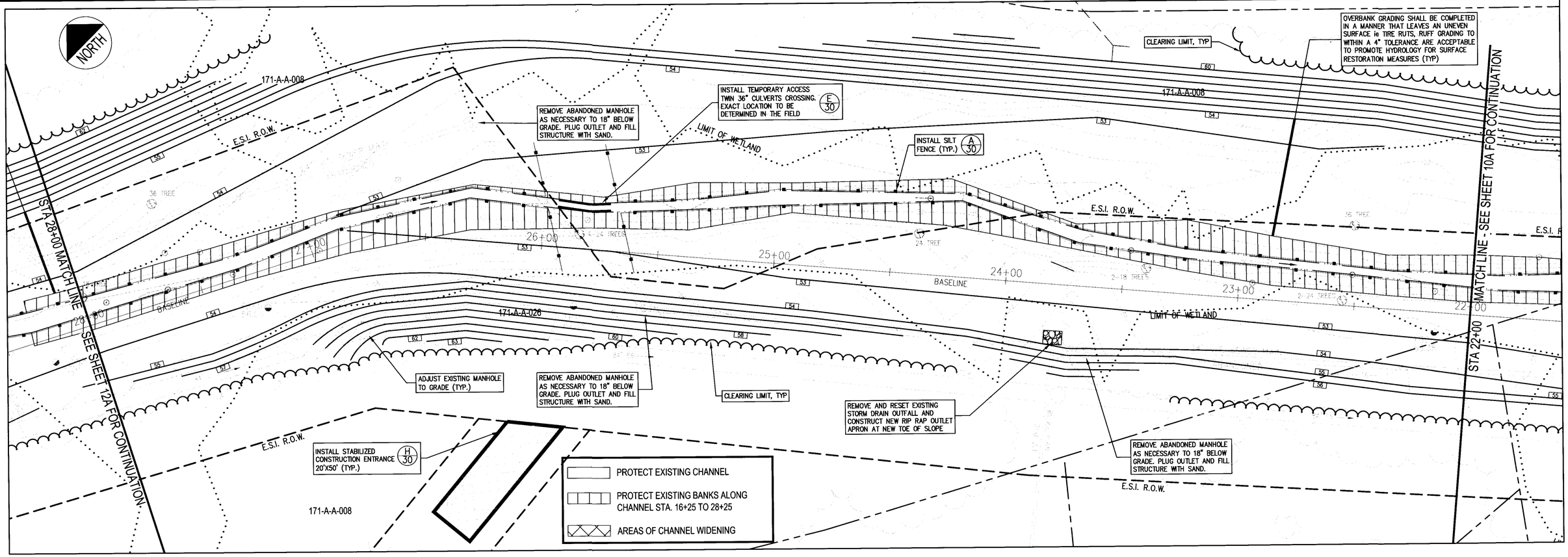
SHEET TITLE
PROPOSED SURFACE STABILIZATION PLAN STA. 16+00 TO STA. 22+00

CLIENT
CITY OF PORTLAND
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DeLUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME 04106
(207) 775-1121
WWW.DELUCAHOFFMAN.COM

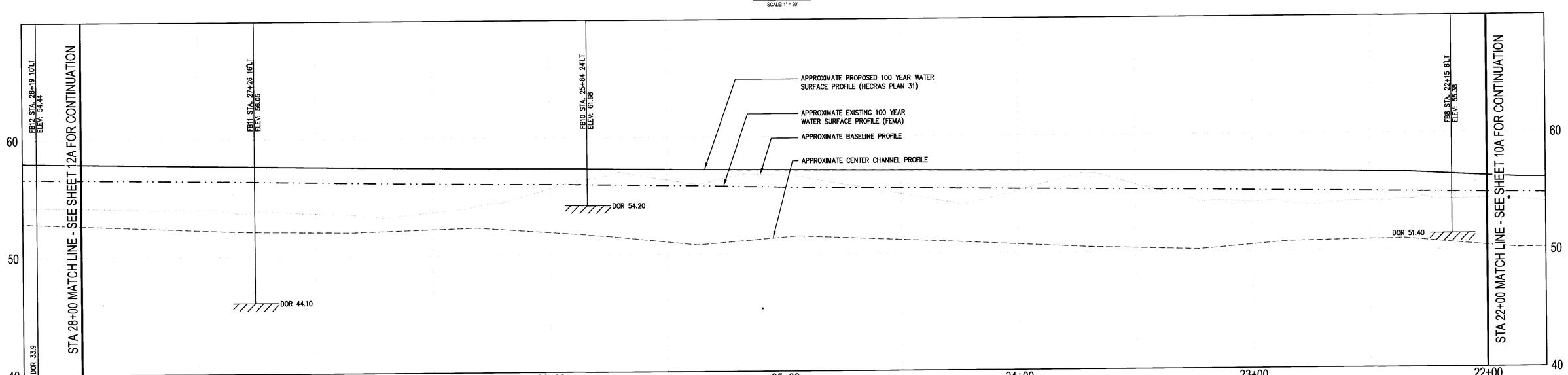
DRAWN:	DED	DATE:	JULY 2002
DESIGNED:	TDD	SCALE:	AS NOTED
CHECKED:	SRB	JOB NO.	1900.12
FILE NAME:	FB_BASE		
SHEET	10B		

S:\1900.12\FB_BASE.dwg, P SURFACE 16+00 TO 22+00, 11/11/2003 10:49:00 AM, ddavis



PLAN VIEW

SCALE: 1" = 20'



PROFILE

SCALE: HORZ. 1" = 20' VERT 1" = 4'

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP – NRPA APPLICATION
1	1.03.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE
STEPHEN R. BUSHEY #7429
PROFESSIONAL ENGINEER

P.E. STEPHEN R. BUSHEY
LIC. #7429

PROJECT
FALL BROOK CHANNEL IMPROVEMENTS

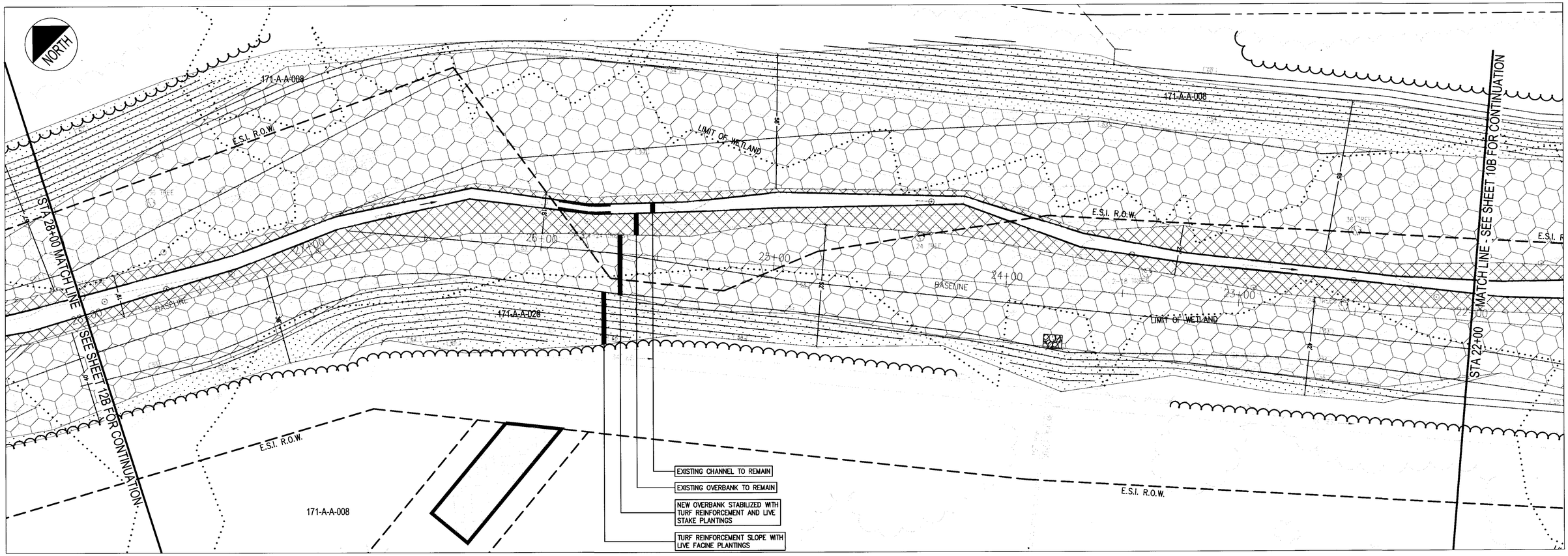
SHEET TITLE
PROPOSED GRADING PLAN AND PROFILE
STA. 22+00 TO STA. 28+00

CLIENT
CITY OF PORTLAND
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DeLUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME 04106
(207) 775-1121
WWW.DELUCAHOFFMAN.COM

DRAWN:	DED	DATE:	JULY 2002
DESIGNED:	TDD	SCALE:	AS NOTED
CHECKED:	SRB	JOB NO.	1900.12
FILE NAME:	FB_BASE		
SHEET	11A		

G:\1900.12\FB_BASE.dwg, P GRADE 22+00 TO 28+00, 11/11/2003 10:45:05 AM, ddavis



PLAN VIEW

SCALE: 1" = 20'

SOIL BIOENGINEERING MATERIALS NOTES

(1) Locating and selecting plant materials
(i) Commercial sources – Commercially grown plant materials are suitable sources of vegetation for use in bioengineering systems. It shall be the Contractor's responsibility to determine adequate lead times for procurement and delivery. A schedule for the procurement of bioengineering materials shall be reviewed and approved by the Owner prior to construction. Suitable sources include New England Wetland Plants, Inc. tel. 413.548.8000 attn.: David Anderson

(ii) Harvesting indigenous species – Indigenous species harvested from existing stands of living woody vegetation may also be used as a source of bioengineering material, if approved by the MeDEP. The use of indigenous live materials requires careful selection, harvesting, handling, and transporting. They should result in plants that have deep and strong root systems and can be installed quickly.

Live plant materials can be cut from existing native or naturalized stands found near the project site or within practical hauling distance. The source site must contain plant species that will propagate easily from cuttings. Cuttings are normally 1/2 to 2 inches in diameter and range in length from 2 to 6 feet.

Binding and storage – Live cuttings should be bundled together securely at the collection site for easy loading and handling and for protection during transport. Side branches and brushy limbs should be kept intact.

Transporting – The bundles of live cuttings should be placed on the transport vehicles in an orderly fashion to prevent damage and facilitate handling. They should be covered with a tarpaulin during transportation to prevent drying and additional stress.

Handling – Live cuttings should arrive on the job site within 8 hours of harvest and should be installed immediately. This is especially critical when the ambient temperature is 50 degrees F or above.

Live cuttings not installed on the day they arrive should be promptly placed in controlled storage conditions and protected until they can be installed. When in storage, the cuttings must receive continuous shade, must be sheltered from the wind, and must be continuously protected from drying by being heeled into moist soils or stored in uncontaminated water. All live dormant cuttings should be removed from storage and used within 2 days of harvest.

(2) Installing plant materials
(i) Timing – Installation of live cuttings should begin concurrently with earth moving operations. All construction operations should be phased together whenever possible.

(ii) Planting medium – Soil bioengineering projects ideally use onsite stockpiled topsoil and hydric soils as the planting medium of choice. Gravel is not a suitable material for use as fill around live plant materials. Soil bioengineering systems need to be installed in a planting medium that includes fines and organic material and is capable of supporting plant growth. Muddy soils that are otherwise suitable should not be used until they have been dried to a workable moisture content. Heavy clays should be mixed with organic soils to increase porosity. Select soil backfill does not need to be organic topsoil, but it must be able to support plant growth. Stockpiled hydric soils excavated from onsite locations shall be placed back in a layer equivalent in thickness to the existing layer or as determined in the field by the City's wetland scientist. Imported hydric soils will be required and the Contractor shall provide the source and basic soil properties to the overseeing wetland scientist for review and approved prior to delivery to the site at no extra expense to the City.

Soil samples of the onsite materials shall be taken prior to installation of live woody cuttings. Soil samples shall also be taken of all fill materials that are brought to the site prior to use. Nutrient testing by an approved laboratory should include analyses for a full range of nutrients, metal contents, and pH. The laboratory reports should also include recommended fertilizer and lime amendments for woody plant materials. The cost for soil sampling and laboratory testing shall be incidental to the contract.

All fill soil around the live vegetative cuttings should be compacted to densities approximating the surrounding natural soil densities. The soil around plants should be free of voids.

(3) Quality control
Maintaining quality control throughout installation and maintenance operations will ensure a successful soil bioengineering project. The following guidelines shall apply:

(i) Pre–construction
Select plant species for conformance to requirements.
Locate and secure source sites for harvesting live cuttings or commercial procurement.
Define construction work area limits.
Fence off sites requiring special protection.
Complete and inspect the following preparations:
-- Layout
-- Excavation, systems excavation
-- Bench size, shape, angle
-- Preparation of site, i.e., clearing, grading, and shaping
-- Disposal of excess gravel, soil, and debris
-- Depth of excavation
-- Vegetation to be removed/preserved
-- Stockpiling of suitable soil and/or rock

(ii) Construction
Inspect each system component, at every stage, for the following:
-- Angle of placement and orientation of the live cuttings
-- Backfill material/rock and stone material
-- Fertilizer, method and quantity applied
-- Lime, method and quantity applied
-- Preparation of trenches or benches in cut and fill slopes
-- Staking
-- Pruning
-- Stock handling and preparation
-- Soil compaction
-- Watering
Ensure that proper maintenance occurs during and after installation.
Inspect daily for quality control.
-- Check all cuttings; remove unacceptable material and use fresh stock for replacement installations.
-- Continuously check all items in the preconstruction and construction inspection lists.
-- Inspect the plant materials storage area when it is in use.

(4) Establishment period
(i) Interim inspections – Inspections by a qualified wetland scientist retained by the City shall be made after the soil bioengineering measures have been installed. The following schedule shall apply:

Inspect biweekly for the first 2 months. Inspections should note insect infestations, soil moisture, and other conditions that could lead to poor survivability. Immediate action, such as the application of supplemental water, should be taken if conditions warrant.
Inspect monthly for the next six months. Systems not in acceptable growing condition should be noted and, as soon as seasonal conditions permit, should be removed from the site and replaced with materials of the same species and sizes as originally specified.
Needed reestablishment work should be performed every 6 months during the initial 2–year establishment period. This will usually consist of replacing dead material.
Extra inspections should always be made during periods of drought or heavy rains. Damaged sections should always be repaired immediately.

(ii) Final inspection – An inspection should be held 2 years after installation is completed. Healthy growing conditions should exist. Reporting of conditions to the Department shall continue for a period of 5 years.

Healthy growing conditions in all areas refer to overall leaf development and rooted stems defined as follows:
Live stakes --- 70% – 100% growing
Live fascines --- 20% – 50% growing
Brushlayers --- 40% – 70% growing
Growth should be continuous with no open spaces greater than 2 feet in linear systems. Spaces 2 feet or less will fill in without hampering the integrity of the installed living system.

(5) Maintaining the system
After inspection and acceptance of the established system, maintenance requirements should be minor under normal conditions. Maintenance generally consists of light pruning and removal of undesirable vegetation. Heavy pruning may be required to reduce competition for light or stimulate new growth in the project plantings. In many situations, installed soil bioengineering systems become source sites for future harvesting operations. The selective removal of vegetation may be required to eliminate undesirable invading species that shall be cut out every 3 to 7 years.

More intensive maintenance will sometimes be required to repair problem areas created by high intensity storms or other unusual conditions. Site washouts should be repaired immediately. Generally, reestablishment should take place and remain the Contractor's responsibility at no extra expense to the City for at least 2 spring time growing periods (May–June) following construction completion and consist of the following practices:

Replacement of branches in dead unrooted sections
Soil refilling, branchpacking, and compacting in rills and gullies
Insect and disease control
Weed control

Gullies, rills, or damaged sections should be repaired through the use of healthy, live branch cuttings preferably installed during the dormant season. The repair should use the branchpacking system for large breaks and the live gully repair system for breaks up to 2 feet wide and 2 feet deep. If the dormant season has passed, the use of rooted stock may be considered. Maintenance of the surface restoration measures shall revert to the City after the second spring time growing period following initial construction.

SURFACE RESTORATION LEGEND

- EXISTING CHANNEL TO REMAIN
- NEW AREAS OF CHANNEL WIDENING
- EXISTING OVERBANK TO REMAIN
- NEW OVERBANK STABILIZED WITH EROSION CONTROL BLANKET - NORTH AMERICAN GREEN SC150 OR EQUAL
- NEW OVERBANK STABILIZED WITH TURF REINFORCEMENT AND LIVE STAKE PLANTINGS
- TURF REINFORCEMENT SLOPE WITH LIVE FACINE PLANTINGS - NORTH AMERICAN GREEN P300 OR EQUAL
- LOAM, SEED, AND EROSION CONTROL MESH
- NEW RIPRAP STABILIZATION

NOTE:
ALL DISTURBED AREAS NOT SUBJECT TO LIVE STAKE OR FACINE PLANTINGS OR RIPRAP SHALL BE TOPSOILED, SEEDED, WITH APPROVED WETLAND SEED MIX AND STABILIZED WITH EROSION CONTROL BLANKET OR MESH (NORTH AMERICAN GREEN SC150 OR EQUAL).

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP – NRPA APPLICATION
1	1.03.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE STEPHEN R. BUSHEY
P.E. STEPHEN R. BUSHEY
LIC. #7429

PROJECT
FALL BROOK CHANNEL IMPROVEMENTS

SHEET TITLE
PROPOSED SURFACE STABILIZATION PLAN
STA. 22+00 TO STA. 28+00

CLIENT
CITY OF PORTLAND
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DeLUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME 04106
(207) 775–1121
WWW.DELUCAHOFFMAN.COM

DRAWN:	DED	DATE:	JULY 2002
DESIGNED:	TDD	SCALE:	AS NOTED
CHECKED:	SRB	JOB NO.	1900.12
FILE NAME:	FB_BASE		
SHEET	11B		

G:\1900.12\FB_BASE.dwg, P SURFACE 22+00 TO 28+00, 11/11/2003 10:49:40 AM, ddavis

PROTECT EXISTING CHANNEL

PROTECT EXISTING BANKS ALONG CHANNEL STA. 16+25 TO 28+25

AREAS OF CHANNEL WIDENING

NORTH

THE RAY STREET CROSSING IMPROVEMENTS ARE DERICTED SEPARATELY ON A DRAWING SET TITLED 'RAY STREET INFRASTRUCTURE IMPROVEMENTS - FALL BROOK BRIDGE REPLACEMENT' WHICH MAY BE CONSTRUCTED SEPARATELY OR CONCURRENTLY WITH THE FALL BROOK CHANNEL IMPROVEMENTS PROJECT

INSTALL STABILIZED CONSTRUCTION ENTRANCE 20'X50' (TYP.) (H/30)

INSTALL TEMPORARY ACCESS TWIN 36" CULVERTS CROSSING. EXACT LOCATION TO BE DETERMINED IN THE FIELD (E/30)

INSTALL SILT FENCE (TYP.) (A/30)

ADJUST EXISTING MANHOLE AS NECESSARY TO 18" BELOW PROPOSED GRADE AND INSTALL NEW WATERTIGHT FRAME AND COVER

OVERBANK GRADING SHALL BE COMPLETED IN A MANNER THAT LEAVES AN UNEVEN SURFACE ie TIRE RUTS, RUFF GRADING TO WITHIN A 4" TOLERANCE ARE ACCEPTABLE TO PROMOTE HYDROLOGY FOR SURFACE RESTORATION MEASURES (TYP)

INSTALL SILT FENCE (TYP.) (A/30)

CLEARING LIMIT, TYP

GRADING LINE DEPICTS WORK TO BE COMPLETED UNDER RAY STREET INFRASTRUCTURE IMPROVEMENT PROJECT

ADJUST EXISTING MANHOLE TO GRADE (TYP.)

CLEARING LIMIT, TYP

STA 34+00 MATCH LINE - SEE SHEET 13A FOR CONTINUATION

STA 28+00 MATCH LINE - SEE SHEET 11A FOR CONTINUATION

IVALOO

RAY STREET

MILLIKEN BRANCH SEWER R.O.W.

E.S.I. R.O.W.

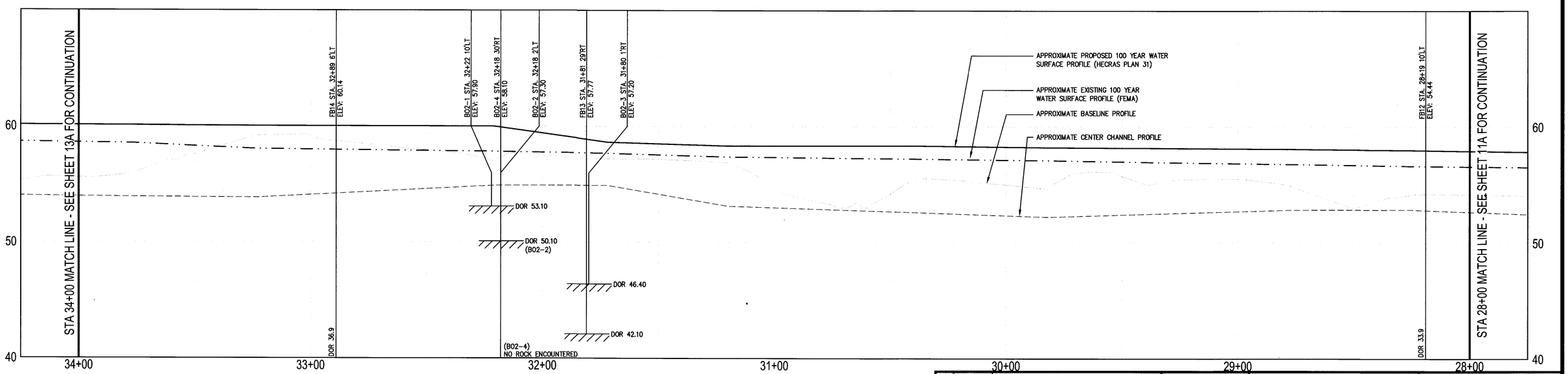
LIMIT OF WETLAND

BASELINE

409- -K-006 · 409- -K-005 · 409- -K-004 · 409- -K-003 · 409- -K-002 · 409- -F-006 · 409- -F-005 · 409- -F-004 · 409- -F-003 · 409- -F-002 · 409- -F-001 · 409- -F-011 · 409- -F-010 · 409- -F-009 · 409- -F-008 · 409- -F-007 · 172- -B-012 · 172- -D-001 · 172- -D-002 · 171-A-A-008 · #10 · #67 · #72

PLAN VIEW

SCALE: 1" = 20'



PROFILE

SCALE: HORZ. 1" = 20' VERT 1" = 4'

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP – NRPA APPLICATION
1	1.03.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE · STEPHEN R. BUSHEY · REGISTERED PROFESSIONAL ENGINEER

P.E. STEPHEN R. BUSHEY

LIC. #7429

PROJECT: FALL BROOK CHANNEL IMPROVEMENTS

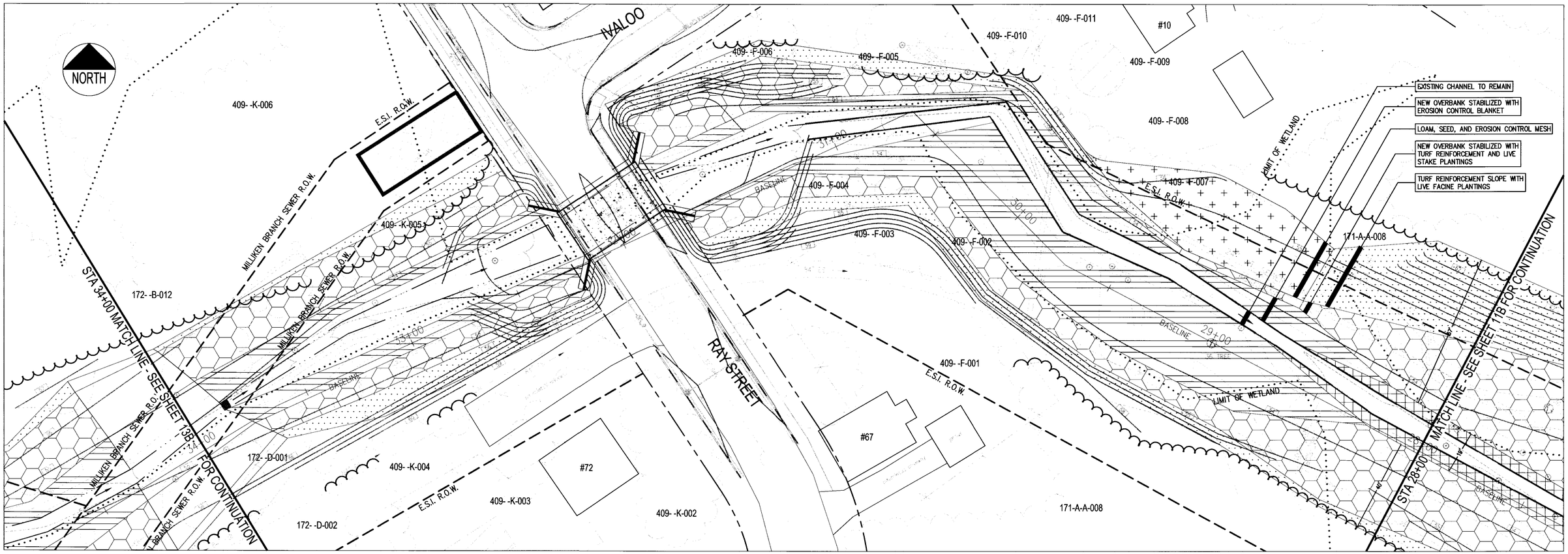
SHEET TITLE: PROPOSED GRADING PLAN AND PROFILE STA. 28+00 TO STA. 34+00

CLIENT: CITY OF PORTLAND DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION

DeLUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME 04106
(207) 775-1121
WWW.DELUCAHOFFMAN.COM

DRAWN:	DED	DATE:	JULY 2002
DESIGNED:	TDD	SCALE:	AS NOTED
CHECKED:	SRB	JOB NO.	1900.12
FILE NAME:	FB_BASE		
SHEET	12A		

G:\1900.12\FB_BASE.dwg, P GRADE 28+00 TO 34+00, 11/11/2003 10:45:38 AM, ddavis



PLAN VIEW

SCALE: 1" = 20'

SOIL BIOENGINEERING MATERIALS NOTES

(1) Locating and selecting plant materials

(i) Commercial sources – Commercially grown plant materials are suitable sources of vegetation for use in bioengineering systems. It shall be the Contractor's responsibility to determine adequate lead times for procurement and delivery. A schedule for the procurement of bioengineering materials shall be reviewed and approved by the Owner prior to construction. Suitable sources include New England Wetland Plants, Inc. tel. 413.548.8000 attn.: David Anderson

(ii) Harvesting indigenous species – Indigenous species harvested from existing stands of living woody vegetation may also be used as a source of bioengineering material, if approved by the MeDEP. The use of indigenous live materials requires careful selection, harvesting, handling, and transporting. They should result in plants that have deep and strong root systems and can be installed quickly.

Live plant materials can be cut from existing native or naturalized stands found near the project site or within practical hauling distance. The source site must contain plant species that will propagate easily from cuttings. Cuttings are normally 1/2 to 2 inches in diameter and range in length from 2 to 6 feet.

Binding and storage – Live cuttings should be bundled together securely at the collection site for easy loading and handling and for protection during transport. Side branches and brushy limbs should be kept intact.

Transporting – The bundles of live cuttings should be placed on the transport vehicles in an orderly fashion to prevent damage and facilitate handling. They should be covered with a tarpaulin during transportation to prevent drying and additional stress.

Handling – Live cuttings should arrive on the job site within 8 hours of harvest and should be installed immediately. This is especially critical when the ambient temperature is 50 degrees F or above.

Live cuttings not installed on the day they arrive should be promptly placed in controlled storage conditions and protected until they can be installed. When in storage, the cuttings must receive continuous shade, must be sheltered from the wind, and must be continuously protected from drying by being heeled into moist soils or stored in uncontaminated water. All live dormant cuttings should be removed from storage and used within 2 days of harvest.

(2) Installing plant materials

(i) Timing – Installation of live cuttings should begin concurrently with earth moving operations. All construction operations should be phased together whenever possible.

(ii) Planting medium – Soil bioengineering projects ideally use onsite stockpiled topsoil and hydric soils as the planting medium of choice. Gravel is not a suitable material for use as fill around live plant materials. Soil bioengineering systems need to be installed in a planting medium that includes fines and organic material and is capable of supporting plant growth. Muddy soils that are otherwise suitable should not be used until they have been dried to a workable moisture content. Heavy clays should be mixed with organic soils to increase porosity. Select soil backfill does not need to be organic topsoil, but it must be able to support plant growth. Stockpiled hydric soils excavated from onsite locations shall be placed back in a layer equivalent in thickness to the existing layer or as determined in the field by the City's wetland scientist. Imported hydric soils will be required and the Contractor shall provide the source and basic soil properties to the overseeing wetland scientist for review and approved prior to delivery to the site at no extra expense to the City.

Soil samples of the onsite materials shall be taken prior to installation of live woody cuttings. Soil samples shall also be taken of all fill materials that are brought to the site prior to use. Nutrient testing by an approved laboratory should include analyses for a full range of nutrients, metal contents, and pH. The laboratory reports should also include recommended fertilizer and lime amendments for woody plant materials. The cost for soil sampling and laboratory testing shall be incidental to the contract.

All fill soil around the live vegetative cuttings should be compacted to densities approximating the surrounding natural soil densities. The soil around plants should be free of voids.

(3) Quality control

Maintaining quality control throughout installation and maintenance operations will ensure a successful soil bioengineering project. The following guidelines shall apply:

(i) Pre-construction

Select plant species for conformance to requirements.
Locate and secure source sites for harvesting live cuttings or commercial procurement.
Define construction work area limits.
Fence off sites requiring special protection.
Complete and inspect the following preparations:
-- Layout
-- Excavation, systems excavation
-- Bench size, shape, angle
-- Preparation of site, i.e., clearing, grading, and shaping
-- Disposal of excess gravel, soil, and debris
-- Depth of excavation
-- Vegetation to be removed/preserved
-- Stockpiling of suitable soil and/or rock

(ii) Construction

Inspect each system component, at every stage, for the following:
-- Angle of placement and orientation of the live cuttings
-- Backfill material/rock and stone material
-- Fertilizer, method and quantity applied
-- Lime, method and quantity applied
-- Preparation of trenches or benches in cut and fill slopes
-- Staking
-- Pruning
-- Stock handling and preparation
-- Soil compaction
-- Watering
Ensure that proper maintenance occurs during and after installation.
Inspect daily for quality control.
-- Check all cuttings; remove unacceptable material and use fresh stock for replacement installations.
-- Continuously check all items in the preconstruction and construction inspection lists.
-- Inspect the plant materials storage area when it is in use.

(4) Establishment period

(i) Interim inspections – Inspections by a qualified wetland scientist retained by the City shall be made after the soil bioengineering measures have been installed. The following schedule shall apply:

Inspect biweekly for the first 2 months. Inspections should note insect infestations, soil moisture, and other conditions that could lead to poor survivability. Immediate action, such as the application of supplemental water, should be taken if conditions warrant.
Inspect monthly for the next six months. Systems not in acceptable growing condition should be noted and, as soon as seasonal conditions permit, should be removed from the site and replaced with materials of the same species and sizes as originally specified.
Needed reestablishment work should be performed every 6 months during the initial 2-year establishment period. This will usually consist of replacing dead material.
Extra inspections should always be made during periods of drought or heavy rains. Damaged sections should always be repaired immediately.

(ii) Final inspection – An inspection should be held 2 years after installation is completed. Healthy growing conditions should exist. Reporting of conditions to the Department shall continue for a period of 5 years.

Healthy growing conditions in all areas refer to overall leaf development and rooted stems defined as follows:
Live stakes --- 70% – 100% growing
Live fascines --- 20% – 50% growing
Brushlayers --- 40% – 70% growing
Growth should be continuous with no open spaces greater than 2 feet in linear systems. Spaces 2 feet or less will fill in without hampering the integrity of the installed living system.

(5) Maintaining the system

After inspection and acceptance of the established system, maintenance requirements should be minor under normal conditions. Maintenance generally consists of light pruning and removal of undesirable vegetation. Heavy pruning may be required to reduce competition for light or stimulate new growth in the project plantings. In many situations, installed soil bioengineering systems become source sites for future harvesting operations. The selective removal of vegetation may be required to eliminate undesirable invading species that shall be cut out every 3 to 7 years.

More intensive maintenance will sometimes be required to repair problem areas created by high intensity storms or other unusual conditions. Site washouts should be repaired immediately. Generally, reestablishment should take place and remain the Contractor's responsibility at no extra expense to the City for at least 2 spring time growing periods (May–June) following construction completion and consist of the following practices:

Replacement of branches in dead unrooted sections
Soil refilling, branchpacking, and compacting in rills and gullies
Insect and disease control
Weed control

Gullies, rills, or damaged sections should be repaired through the use of healthy, live branch cuttings preferably installed during the dormant season. The repair should use the branchpacking system for large breaks and the live gully repair system for breaks up to 2 feet wide and 2 feet deep. If the dormant season has passed, the use of rooted stock may be considered. Maintenance of the surface restoration measures shall revert to the City after the second spring time growing period following initial construction.

SURFACE RESTORATION LEGEND

- EXISTING CHANNEL TO REMAIN
- NEW AREAS OF CHANNEL WIDENING
- EXISTING OVERBANK TO REMAIN
- NEW OVERBANK STABILIZED WITH EROSION CONTROL BLANKET - NORTH AMERICAN GREEN SC150 OR EQUAL
- NEW OVERBANK STABILIZED WITH TURF REINFORCEMENT AND LIVE STAKE PLANTINGS
- TURF REINFORCEMENT SLOPE WITH LIVE FACINE PLANTINGS - NORTH AMERICAN GREEN P300 OR EQUAL
- LOAM, SEED, AND EROSION CONTROL MESH
- NEW RIPRAP STABILIZATION

NOTE:
ALL DISTURBED AREAS NOT SUBJECT TO LIVE STAKE OR FACINE PLANTINGS OR RIPRAP SHALL BE TOPSOILED, SEEDED, WITH APPROVED WETLAND SEED MIX AND STABILIZED WITH EROSION CONTROL BLANKET OR MESH (NORTH AMERICAN GREEN SC150 OR EQUAL)

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP – NRPA APPLICATION
1	1.03.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE STEPHEN R. BUSHEY #7429 REGISTERED PROFESSIONAL ENGINEER

P.E. STEPHEN R. BUSHEY
LIC. #7429

PROJECT
FALL BROOK CHANNEL IMPROVEMENTS

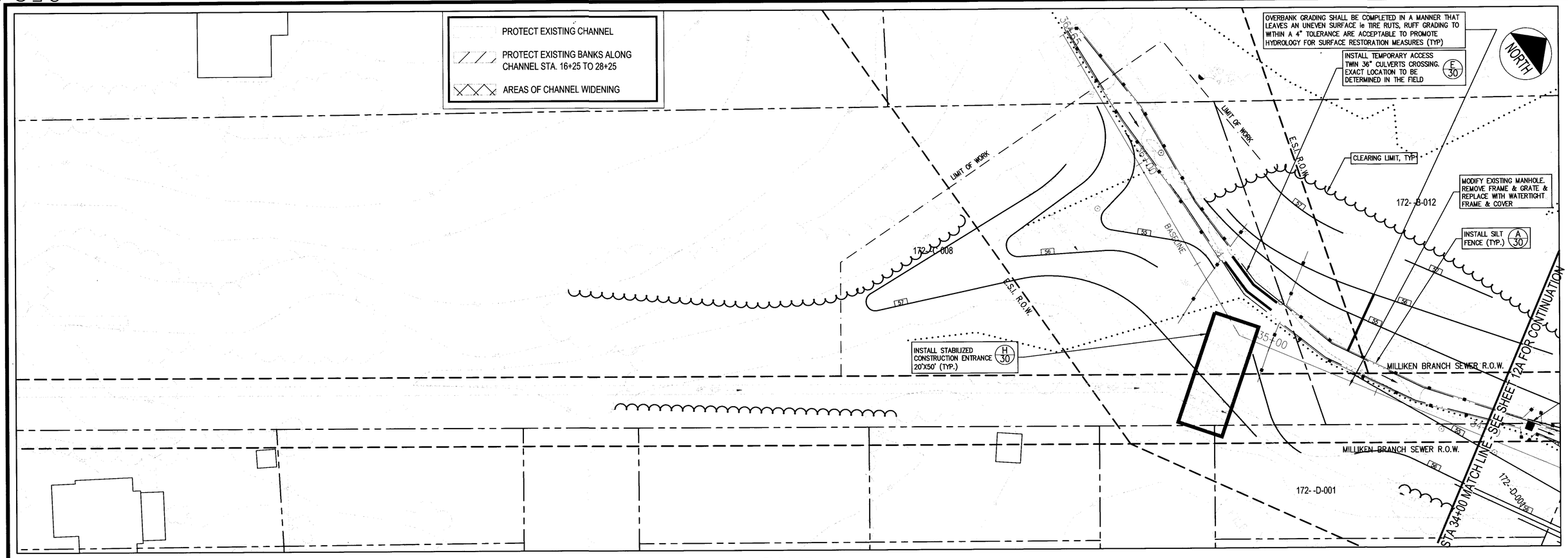
SHEET TITLE
PROPOSED SURFACE STABILIZATION PLAN
STA. 28+00 TO STA. 34+00

CLIENT
CITY OF PORTLAND
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DeLUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME 04106
(207) 775-1121
WWW.DELUCAHOFFMAN.COM

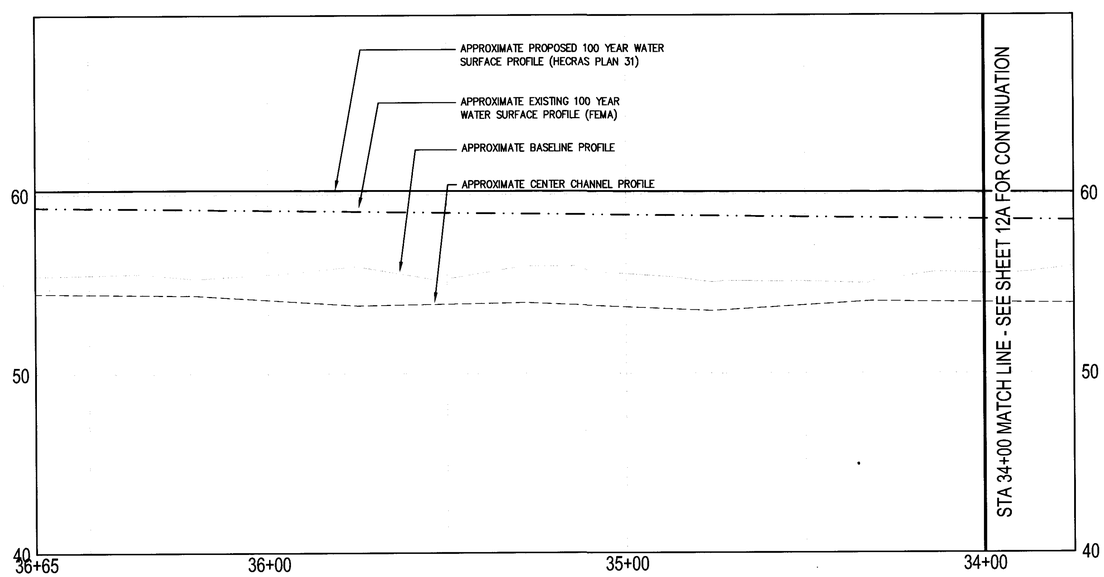
DRAWN:	DED	DATE:	JULY 2002
DESIGNED:	TDD	SCALE:	AS NOTED
CHECKED:	SRB	JOB NO.	1900.12
FILE NAME:	FB_BASE		
SHEET	12B		

S:\1900.12\FB_BASE.dwg, P SURFACE 28+00 TO 34+00, 11/11/2003 10:50:26 AM, ddavis



PLAN VIEW

SCALE: 1" = 20'



PROFILE

SCALE: HORZ. 1" = 20' VERT 1" = 4'

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP – NRPA APPLICATION
1	1.03.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE STEPHEN R. BUSHEY 7429 LICENSED PROFESSIONAL ENGINEER

P.E. STEPHEN R. BUSHEY
LIC. #7429

PROJECT: FALL BROOK CHANNEL IMPROVEMENTS

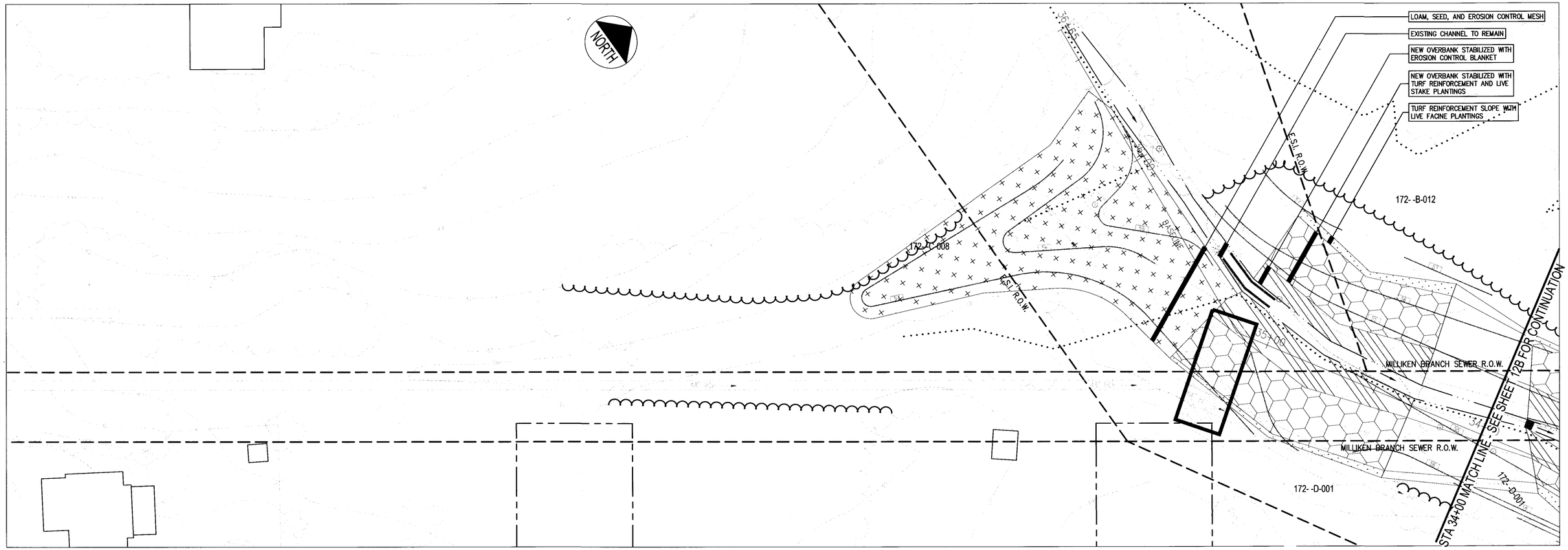
SHEET TITLE: PROPOSED GRADING PLAN AND PROFILE STA. 34+00 TO STA. 36+65

CLIENT: CITY OF PORTLAND DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION

DeLUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME 04106
(207) 775-1121
WWW.DELUCAHOFFMAN.COM

DRAWN:	DED	DATE:	JULY 2002
DESIGNED:	TDD	SCALE:	AS NOTED
CHECKED:	SRB	JOB NO.	1900.12
FILE NAME:	FB_BASE		
SHEET	13A		

S:\1900.12\FB_BASE.dwg, P GRADE 34+00 TO 36+65, 11/11/2003 10:46:46 AM, ddavis



PLAN VIEW

SCALE: 1" = 20'

SOIL BIOENGINEERING MATERIALS NOTES

(1) Locating and selecting plant materials

(i) Commercial sources – Commercially grown plant materials are suitable sources of vegetation for use in bioengineering systems. It shall be the Contractor's responsibility to determine adequate lead times for procurement and delivery. A schedule for the procurement of bioengineering materials shall be reviewed and approved by the Owner prior to construction. Suitable sources include New England Wetland Plants, Inc. tel. 413.548.8000 attn.: David Anderson

(ii) Harvesting indigenous species – Indigenous species harvested from existing stands of living woody vegetation may also be used as a source of bioengineering material, if approved by the MeDEP. The use of indigenous live materials requires careful selection, harvesting, handling, and transporting. They should result in plants that have deep and strong root systems and can be installed quickly.

Live plant materials can be cut from existing native or naturalized stands found near the project site or within practical hauling distance. The source site must contain plant species that will propagate easily from cuttings. Cuttings are normally 1/2 to 2 inches in diameter and range in length from 2 to 6 feet.

Binding and storage – Live cuttings should be bundled together securely at the collection site for easy loading and handling and for protection during transport. Side branches and brushy limbs should be kept intact.

Transporting – The bundles of live cuttings should be placed on the transport vehicles in an orderly fashion to prevent damage and facilitate handling. They should be covered with a tarpaulin during transportation to prevent drying and additional stress.

Handling – Live cuttings should arrive on the job site within 8 hours of harvest and should be installed immediately. This is especially critical when the ambient temperature is 50 degrees F or above.

Live cuttings not installed on the day they arrive should be promptly placed in controlled storage conditions and protected until they can be installed. When in storage, the cuttings must receive continuous shade, must be sheltered from the wind, and must be continuously protected from drying by being heeled into moist soils or stored in uncontaminated water. All live dormant cuttings should be removed from storage and used within 2 days of harvest.

(2) Installing plant materials

(i) Timing – Installation of live cuttings should begin concurrently with earth moving operations. All construction operations should be phased together whenever possible.

(ii) Planting medium – Soil bioengineering projects ideally use onsite stockpiled topsoil and hydric soils as the planting medium of choice. Gravel is not a suitable material for use as fill around live plant materials. Soil bioengineering systems need to be installed in a planting medium that includes fines and organic material and is capable of supporting plant growth. Muddy soils that are otherwise suitable should not be used until they have been dried to a workable moisture content. Heavy clays should be mixed with organic soils to increase porosity. Select soil backfill does not need to be organic topsoil, but it must be able to support plant growth. Stockpiled hydric soils excavated from onsite locations shall be placed back in a layer equivalent in thickness to the existing layer or as determined in the field by the City's wetland scientist. Imported hydric soils will be required and the Contractor shall provide the source and basic soil properties to the overseeing wetland scientist for review and approved prior to delivery to the site at no extra expense to the City.

Soil samples of the onsite materials shall be taken prior to installation of live woody cuttings. Soil samples shall also be taken of all fill materials that are brought to the site prior to use. Nutrient testing by an approved laboratory should include analyses for a full range of nutrients, metal contents, and pH. The laboratory reports should also include recommended fertilizer and lime amendments for woody plant materials. The cost for soil sampling and laboratory testing shall be incidental to the contract.

All fill soil around the live vegetative cuttings should be compacted to densities approximating the surrounding natural soil densities. The soil around plants should be free of voids.

(3) Quality control

Maintaining quality control throughout installation and maintenance operations will ensure a successful soil bioengineering project. The following guidelines shall apply:

(i) Pre–construction

Select plant species for conformance to requirements.
Locate and secure source sites for harvesting live cuttings or commercial procurement.
Define construction work area limits.
Fence off sites requiring special protection.
Complete and inspect the following preparations:
-- Layout
-- Excavation, systems excavation
-- Bench size, shape, angle
-- Preparation of site, i.e., clearing, grading, and shaping
-- Disposal of excess gravel, soil, and debris
-- Depth of excavation
-- Vegetation to be removed/preserved
-- Stockpiling of suitable soil and/or rock

(ii) Construction

Inspect each system component, at every stage, for the following:
-- Angle of placement and orientation of the live cuttings
-- Backfill material/rock and stone material
-- Fertilizer, method and quantity applied
-- Lime, method and quantity applied
-- Preparation of trenches or benches in cut and fill slopes
-- Staking
-- Pruning
-- Stock handling and preparation
-- Soil compaction
-- Watering

Ensure that proper maintenance occurs during and after installation.
Inspect daily for quality control.
-- Check all cuttings; remove unacceptable material and use fresh stock for replacement installations.
-- Continuously check all items in the preconstruction and construction inspection lists.
-- Inspect the plant materials storage area when it is in use.

(4) Establishment period

(i) Interim inspections – Inspections by a qualified wetland scientist retained by the City shall be made after the soil bioengineering measures have been installed. The following schedule shall apply:

Inspect biweekly for the first 2 months. Inspections should note insect infestations, soil moisture, and other conditions that could lead to poor survivability. Immediate action, such as the application of supplemental water, should be taken if conditions warrant.
Inspect monthly for the next six months. Systems not in acceptable growing condition should be noted and, as soon as seasonal conditions permit, should be removed from the site and replaced with materials of the same species and sizes as originally specified.
Needed reestablishment work should be performed every 6 months during the initial 2–year establishment period. This will usually consist of replacing dead material.
Extra inspections should always be made during periods of drought or heavy rains. Damaged sections should always be repaired immediately.

(ii) Final inspection – An inspection should be held 2 years after installation is completed. Healthy growing conditions should exist. Reporting of conditions to the Department shall continue for a period of 5 years.

Healthy growing conditions in all areas refer to overall leaf development and rooted stems defined as follows:
Live stakes --- 70% – 100% growing
Live fascines --- 20% – 50% growing
Brushlayers --- 40% – 70% growing
Growth should be continuous with no open spaces greater than 2 feet in linear systems. Spaces 2 feet or less will fill in without hampering the integrity of the installed living system.

(5) Maintaining the system

After inspection and acceptance of the established system, maintenance requirements should be minor under normal conditions. Maintenance generally consists of light pruning and removal of undesirable vegetation. Heavy pruning may be required to reduce competition for light or stimulate new growth in the project plantings. In many situations, installed soil bioengineering systems become source sites for future harvesting operations. The selective removal of vegetation may be required to eliminate undesirable invading species that shall be cut out every 3 to 7 years.

More intensive maintenance will sometimes be required to repair problem areas created by high intensity storms or other unusual conditions. Site washouts should be repaired immediately. Generally, reestablishment should take place and remain the Contractor's responsibility at no extra expense to the City for at least 2 spring time growing periods (May–June) following construction completion and consist of the following practices:

Replacement of branches in dead unrooted sections
Soil refilling, branchpacking, and compacting in rills and gullies
Insect and disease control
Weed control

Gullies, rills, or damaged sections should be repaired through the use of healthy, live branch cuttings preferably installed during the dormant season. The repair should use the branchpacking system for large breaks and the live gully repair system for breaks up to 2 feet wide and 2 feet deep. If the dormant season has passed, the use of rooted stock may be considered. Maintenance of the surface restoration measures shall revert to the City after the second spring time growing period following initial construction.

SURFACE RESTORATION LEGEND

- EXISTING CHANNEL TO REMAIN
- NEW AREAS OF CHANNEL WIDENING
- EXISTING OVERBANK TO REMAIN
- NEW OVERBANK STABILIZED WITH EROSION CONTROL BLANKET - NORTH AMERICAN GREEN SC150 OR EQUAL
- NEW OVERBANK STABILIZED WITH TURF REINFORCEMENT AND LIVE STAKE PLANTINGS
- TURF REINFORCEMENT SLOPE WITH LIVE FACINE PLANTINGS - NORTH AMERICAN GREEN P300 OR EQUAL
- LOAM, SEED, AND EROSION CONTROL MESH
- NEW RIPRAP STABILIZATION

NOTE:
ALL DISTURBED AREAS NOT SUBJECT TO LIVE STAKE OR FACINE PLANTINGS OR RIPRAP SHALL BE TOPSOILED, SEEDED, WITH APPROVED WETLAND SEED MIX AND STABILIZED WITH EROSION CONTROL BLANKET OR MESH (NORTH AMERICAN GREEN SC150 OR EQUAL)

REV	DATE	DESCRIPTION
3	11.16.03	RELEASED FOR BIDDING
2	10.17.03	REVISED SUBMISSION TO DEP – NRPA APPLICATION
1	1.03.03	NRPA SUBMISSION TO DEP

REVISIONS

STATE OF MAINE
STEPHEN R. BUSHEY
7429
LICENSED
PROFESSIONAL ENGINEER

P.E. STEPHEN R. BUSHEY
LIC. #7429

PROJECT
FALL BROOK CHANNEL IMPROVEMENTS

SHEET TITLE
PROPOSED SURFACE STABILIZATION PLAN
STA. 34+00 TO STA. 36+65

CLIENT
CITY OF PORTLAND
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DeLUCA-HOFFMAN ASSOCIATES, INC.
778 MAIN STREET, SUITE 8
SOUTH PORTLAND, ME 04106
(207) 775-1121
WWW.DELUCAHOFFMAN.COM

DRAWN:	DED	DATE:	JULY 2002
DESIGNED:	TDD	SCALE:	AS NOTED
CHECKED:	SRB	JOB NO.	1900.12
FILE NAME:	FB_BASE		
SHEET	13B		

S:\1900.12\FB_BASE.dwg, P SURFACE 34+00 TO 36+65, 11/11/2003 10:51:10 AM, ddavis