

1. THIS PLAN IS COMPILED FROM DIGITAL INFORMATION TAKEN FROM TWO "GRADING AND DRAINAGE AS-BUILT PLANS" PREPARED BY COLER & COLANTONIO ENGINEERS, DATED NOVEMBER 15, 1994; FROM PLANS SUPPLIED TO DAYLOR FROM THE OWNER; TOWN AND UTILITY COMPANY RESEARCH; AND FROM A LIMITED TOPOGRAPHY SURVEY BY DAYLOR CONSULTING GROUP. WETLAND FLAGGING WAS PERFORMED BY DAYLOR CONSULTING GROUP.

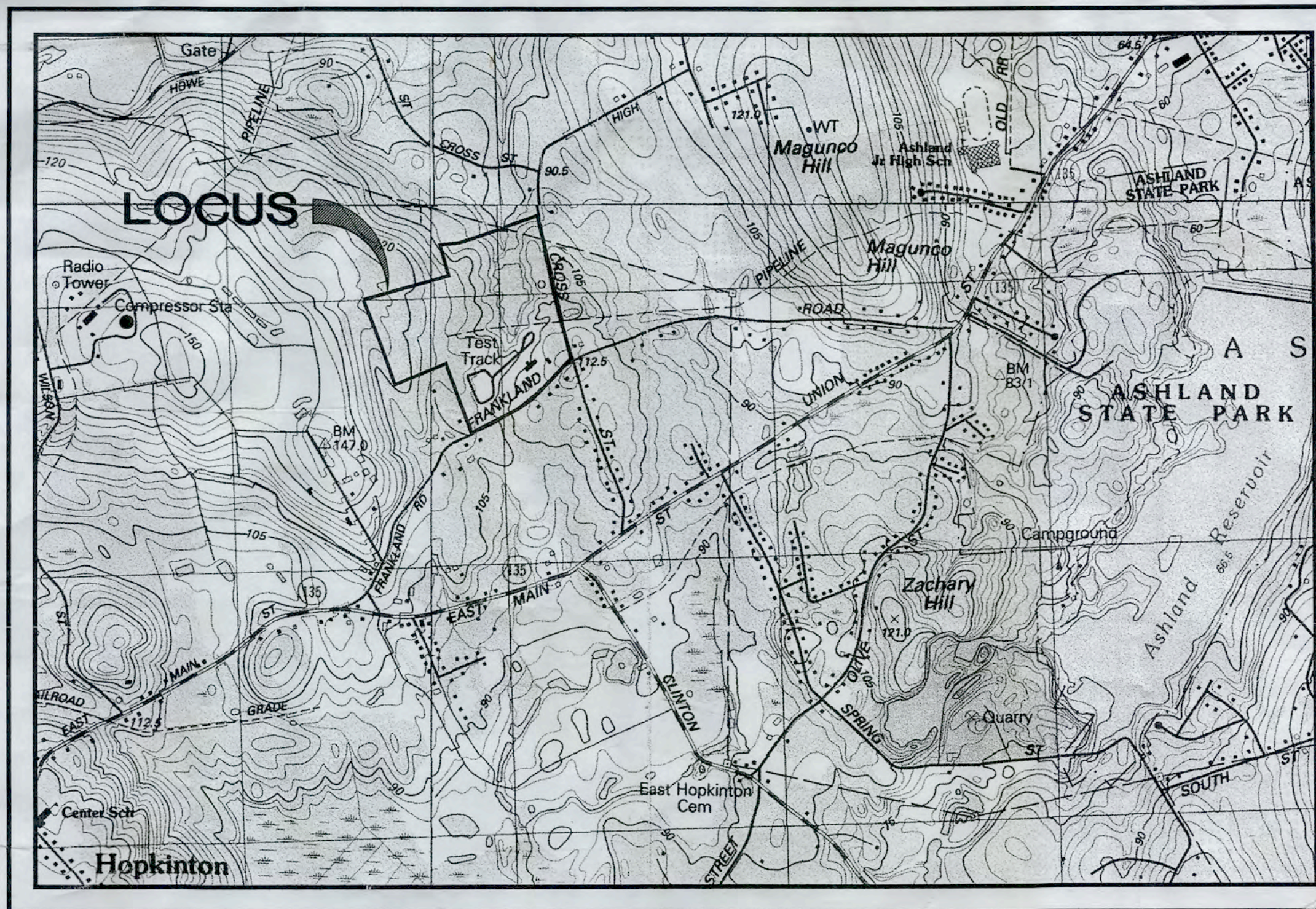
2. LOCUS OWNER: LOT R9-4, R9-5 & U7-7, LIBERTY MUTUAL
DEED BOOK 8040, PAGE 589.
3. ASSESSORS REFERENCE: SHEET R9 & U7.
4. MIDDLESEX COUNTY REGISTRY OF DEEDS.

1. PLAN OF LAND IN HOPKINTON & ASHLAND, MA, PREPARED BY SCOTCHFIELD BROTHERS, INC. DATED JUNE 13, 1973, SCALE 1"=100'.
2. EXISTING CONDITIONS PLAN 1, PREPARED BY COLER & COLANTONIO, INC., DATED FEBRUARY 5, 1993, SCALE 1"=20'.
3. GRADING AND DRAINAGE AS-BUILT PLAN, PREPARED BY COLER & COLANTONIO, DATED NOVEMBER 15, 1994, SCALE 1"=40'.
4. NORTHEASTERN GAS TRANSMISSION COMPANY, FRAMINGHAM DELIVERY LINE ROUTE IN TOWNS OF HOPKINTON AND ASHLAND, REVISED DATE JUNE 12, 1951, SCALE 1"=500'.

THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA. THE SURVEYOR HAS NOT ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED. ALTHOUGH THE DOES CERTIFY THAT THE ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE, THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

BEEFEE DESIGN AND CONSTRUCTION CALL DIG-SAFE SYSTEMS, INC. AT 1-888-344-7233.

EXISTING		PROPOSED
● REROQ	IRON ROD	
CB	CONCRETE BOUND	
SB	STONE BOUND	
● DH	DRILL HOLE	
☆ LP	LIGHT POLE	
☆ LP	UTILITY POLE	●
◇	WATER VALVE	◇
— D —	DRAIN LINE	— D —
S	SEWER LINE	S
E / I / C / F	ELECTRIC / TELEPHONE / CABLE	T / C / FA
G	GAS LINE	
E	ELECTRIC	
T	TELEPHONE	
W	WATER LINE	W
OHW	OVERHEAD WIRES	
98	CONTOUR	98
	CHAINLINK FENCE	
■ CBN	CATCH BASIN	■
■ DCB	DOUBLE CATCH BASIN	
▷	FLARED END OUTLET	▷
● DMH	DRAIN MANHOLE	● DMH
● SMH	SEWER MANHOLE	● SMH
● DMH	ELECTRIC MANHOLE	
● TMH	TELEPHONE MANHOLE	
↑	HYDRANT	↑
● GCG	GAS GATE	
BCC	BITUMINOUS CONCRETE CURB	
CCB	CAPE COD BERM	CCB
VGC	VERTICAL GRANITE CURB	
SGC	SLOPED GRANITE CURB	
CC	CONCRETE CURB	
●	MONITORING WELL	
H2O	WATER ELEVATION IN CBN	
S=	SUMP ELEVATION IN CBN	
TP	TEST PIT LOCATION	



SITE CONSTRUCTION PLANS FOR

Liberty Mutual Research Center

71 Frankland Road
Hopkinton, Massachusetts

Date: February 6, 2002

Rev. March 29, 2002



ZONED: P (PROFESSIONAL OFFICE)

<u>Item</u>	<u>Required</u>	<u>Provided</u>
Total Property Area	—	3,765,880 sf (86.47 Acres)
Minimum Development Site Area	5 Acres	23.16 Acres
Minimum Open Land Within Development Site Area	40%	40%
Minimum Lot Frontage (Frankland Road)	50 ft.	1,521 ft.
Minimum Lot Width	100 ft.	1,433 ft.
Minimum Front Yard Setback From a Street	60 ft.	65.8' From Cross Street
Maximum Building Size (% of GFA to total Development Site Area)	60%	9.3% (4.2% Existing)
Maximum Building Height	35 ft. (or three stories)	<35 ft. (two stories)
Minimum Parking Spaces (3 per 1000 s.f. GFA) (excluding garage)	91,907 s.f. GFA x 3/1000=276 (92 Existing Spaces)	212 To Be Constructed (64 Reserved For Future)

SHEET 1	COVER SHEET
SHEET 2	EXISTING CONDITIONS PLAN
SHEET 3	DEMOLITION PLAN
SHEET 4	CONSTRUCTION PHASING & UTILIZATION PLAN
SHEET 5	SITE LAYOUT PLAN
SHEET 6	GRADING & DRAINAGE PLAN
SHEET 7	UTILITY PLAN
SHEET 8	EROSION CONTROL PLAN
SHEET 9	LIGHTING PLAN
SHEET 10	PLANTING PLAN
SHEET 11	DETAIL SHEET
SHEET 12	DETAIL SHEET
SHEET 13	DETAIL SHEET
SHEET 14	DETAIL SHEET
SHEET 15	DETAIL SHEET
SHEET 16	DETAIL SHEET
SHEET 17	SANITARY SEWER DISPOSAL SYSTEM PLAN
SHEET 18	SANITARY SEWER DETAIL SHEET
SHEET 19	SANITARY SEWER DETAIL SHEET
SHEET 20	SANITARY SEWER DETAIL SHEET

**Daylor
Consulting
Group
Inc.**



3/29/0

Drawing No.
1
of 20



Revisions	
3/11/02	CONSTRUCTION REVISIONS
3/19/02	TREE PROTECTION/ TRANSPLANT PLAN CREATED
3/29/02	GENERAL CONSTRUCTION COORDINATION REVISIONS

Project Title

**SITE
CONSTRUCTION PLANS
For
Liberty Mutual
Research Center
Hopkinton
MA**

Prepared For

LIBERTY MUTUAL GROUP
175 Berkeley Street
Boston, MA
02116

**Daylor
Consulting
Group
Inc.**

Ten Forbes Road
Braintree, MA 02184
781-849-7070
FAX 781-849-0096

Drawing Title

**DEMOLITION
PLAN**

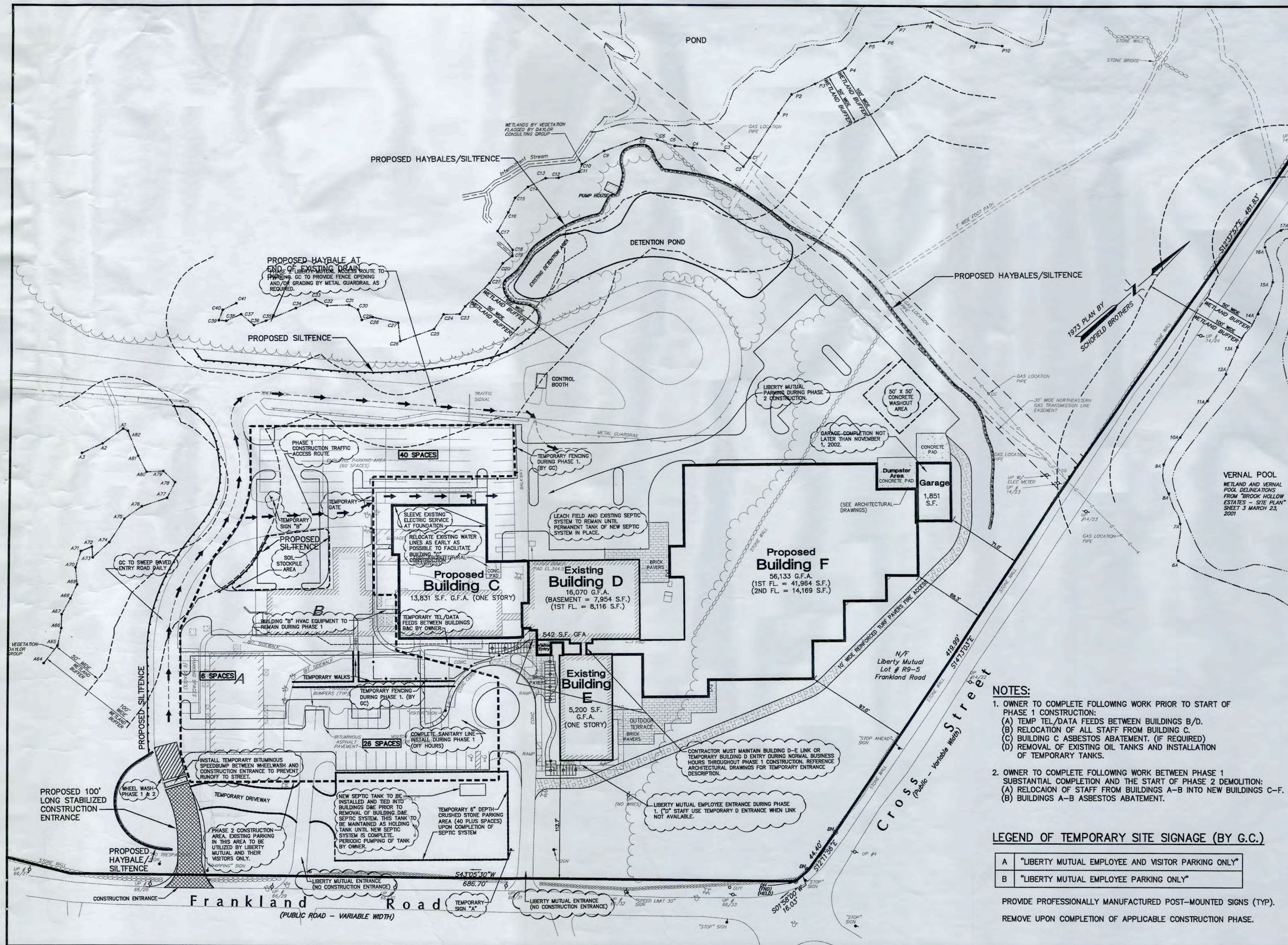
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Date FEB. 6, 2002	Drawing No.
Proj. Mgr. G.K.D.	
Design G.K.D.	
Check	
Drawn J.V.B.	
Job No. 1.1987.00	
Last Rev. 3/29/02	of 20

NOTES:

1. CONTRACTOR SHALL FILL THE BASEMENT OF EXISTING BUILDINGS A, B AND C WITH APPROVED FILL MATERIAL AND FOLLOW AN APPROVED METHOD OF COMPACTION.
2. WHEN PROPOSED GRADES & EXISTING UTILITY DEPTHS PERMIT, CONTRACTOR MAY FILL EXISTING SANITARY SEWER PIPING AND STORM DRAIN PIPING WITH FLOWABLE FILL AS AN ALTERNATIVE TO REMOVING THE PIPING WHERE SCHEDULED FOR DEMOLITION.
3. ALL SANITARY SEWER AND STORM SEWER STRUCTURES SCHEDULED FOR DEMOLITION SHALL BE REMOVED AND DISPOSED OF OFF SITE BY THE CONTRACTOR OR FILLED WITH FLOWABLE FILL.



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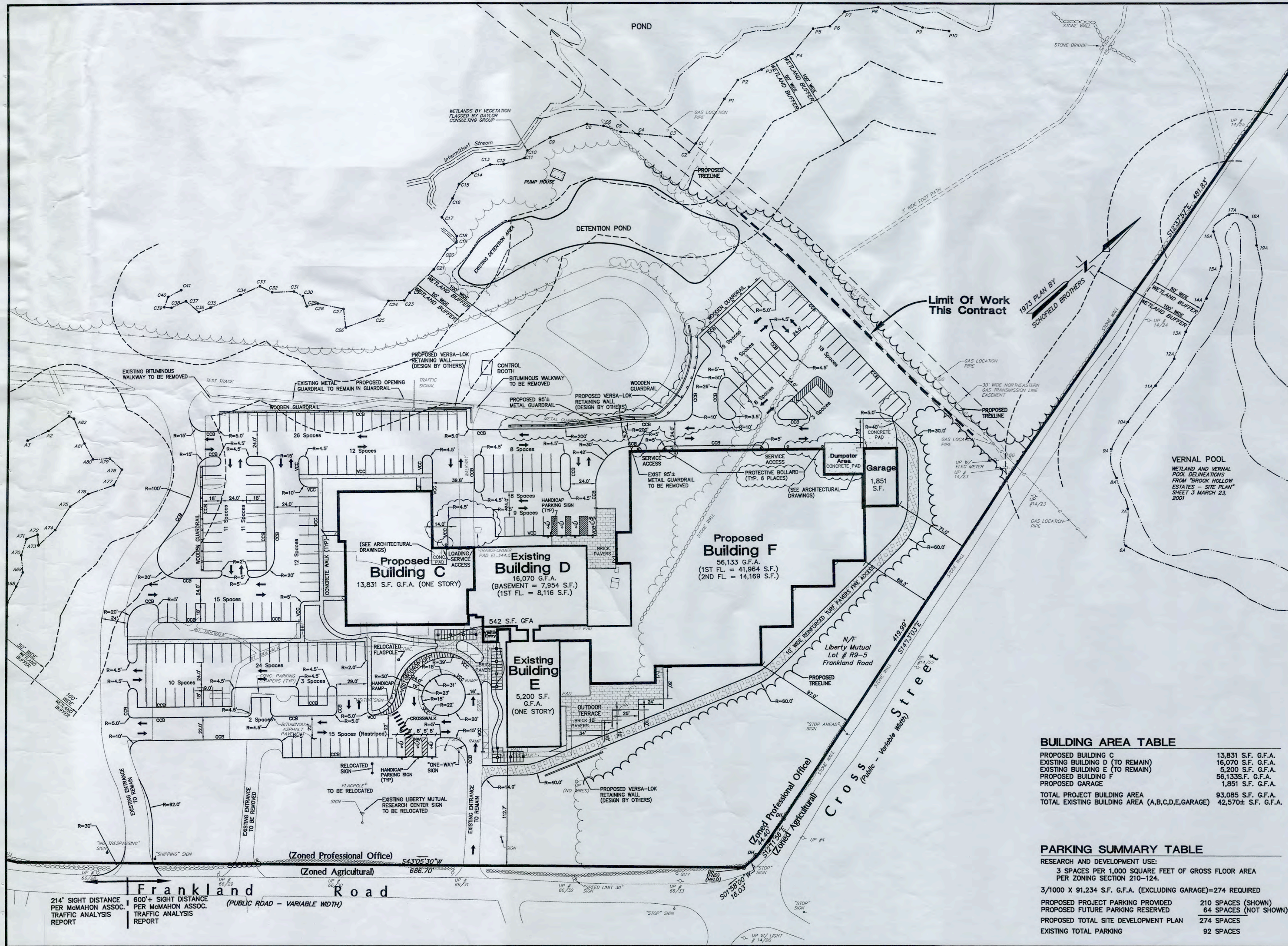
Ten Forbes Road
 Braintree, MA 02184
 781-849-7070
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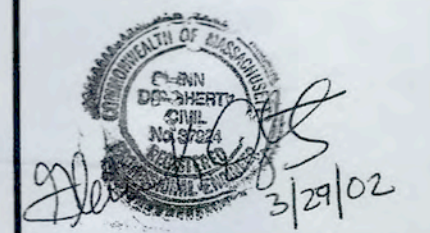
**CONSTRUCTION
 PHASING
 AND
 UTILIZATION
 PLAN**

Scale: 1"=40'	
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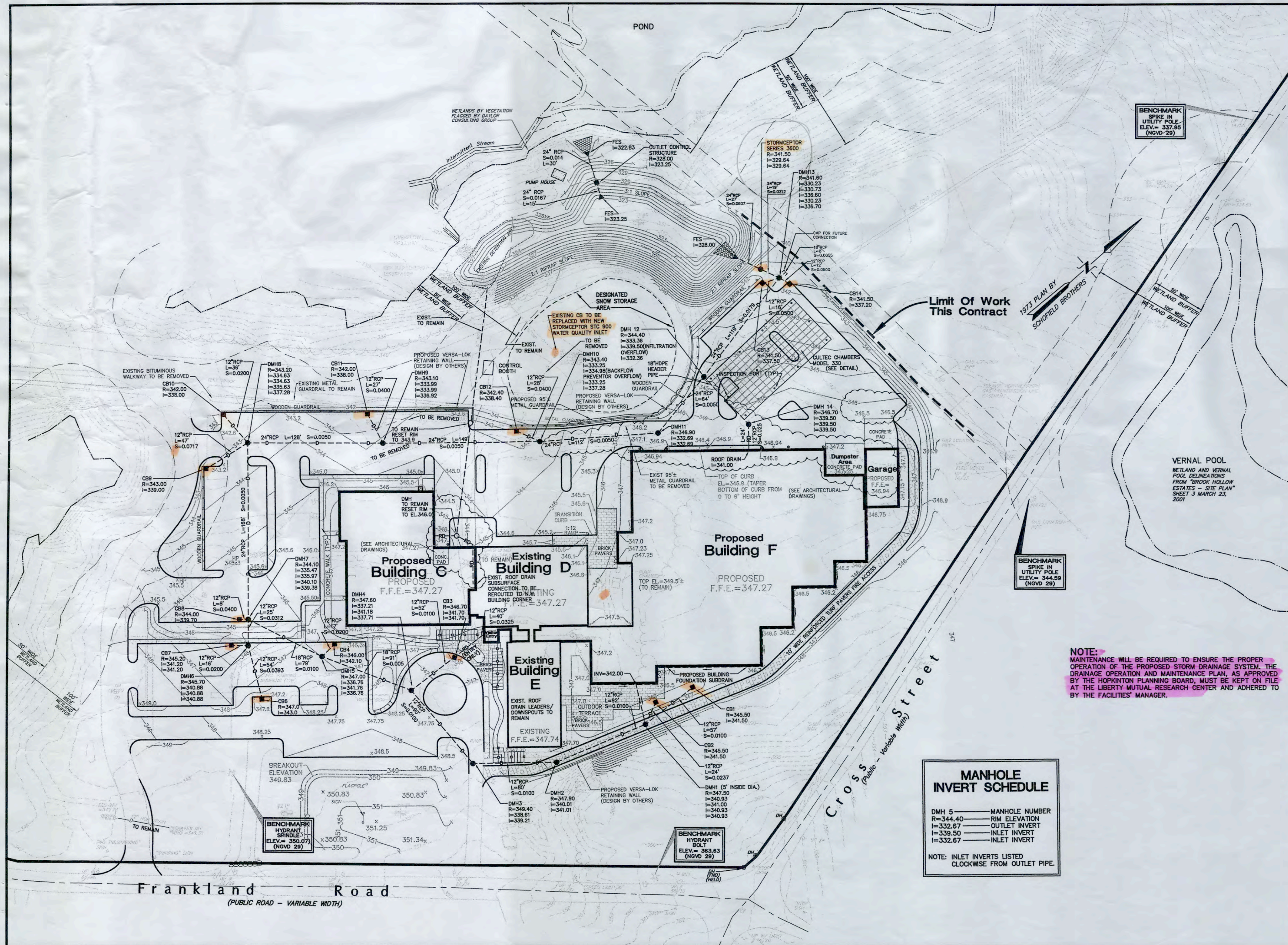
**LAYOUT
 PLAN**

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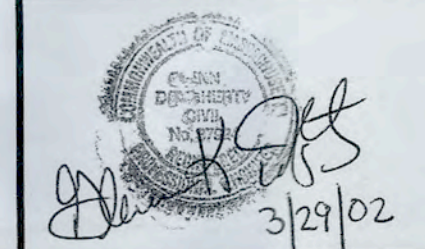
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BUILDING AREA TABLE	
PROPOSED BUILDING C	13,831 S.F. G.F.A.
EXISTING BUILDING D (TO REMAIN)	16,070 S.F. G.F.A.
EXISTING BUILDING E (TO REMAIN)	5,200 S.F. G.F.A.
PROPOSED BUILDING F	56,133 S.F. G.F.A.
PROPOSED GARAGE	1,851 S.F. G.F.A.
TOTAL PROJECT BUILDING AREA	93,085 S.F. G.F.A.
TOTAL EXISTING BUILDING AREA (A,B,C,D,E,GARAGE)	42,570± S.F. G.F.A.

PARKING SUMMARY TABLE	
RESEARCH AND DEVELOPMENT USE:	
3 SPACES PER 1,000 SQUARE FEET OF GROSS FLOOR AREA PER ZONING SECTION 210-124.	
3/1000 X 91,234 S.F. G.F.A. (EXCLUDING GARAGE)=274 REQUIRED	
PROPOSED PROJECT PARKING PROVIDED	210 SPACES (SHOWN)
PROPOSED FUTURE PARKING RESERVED	64 SPACES (NOT SHOWN)
PROPOSED TOTAL SITE DEVELOPMENT PLAN	274 SPACES
EXISTING TOTAL PARKING	92 SPACES



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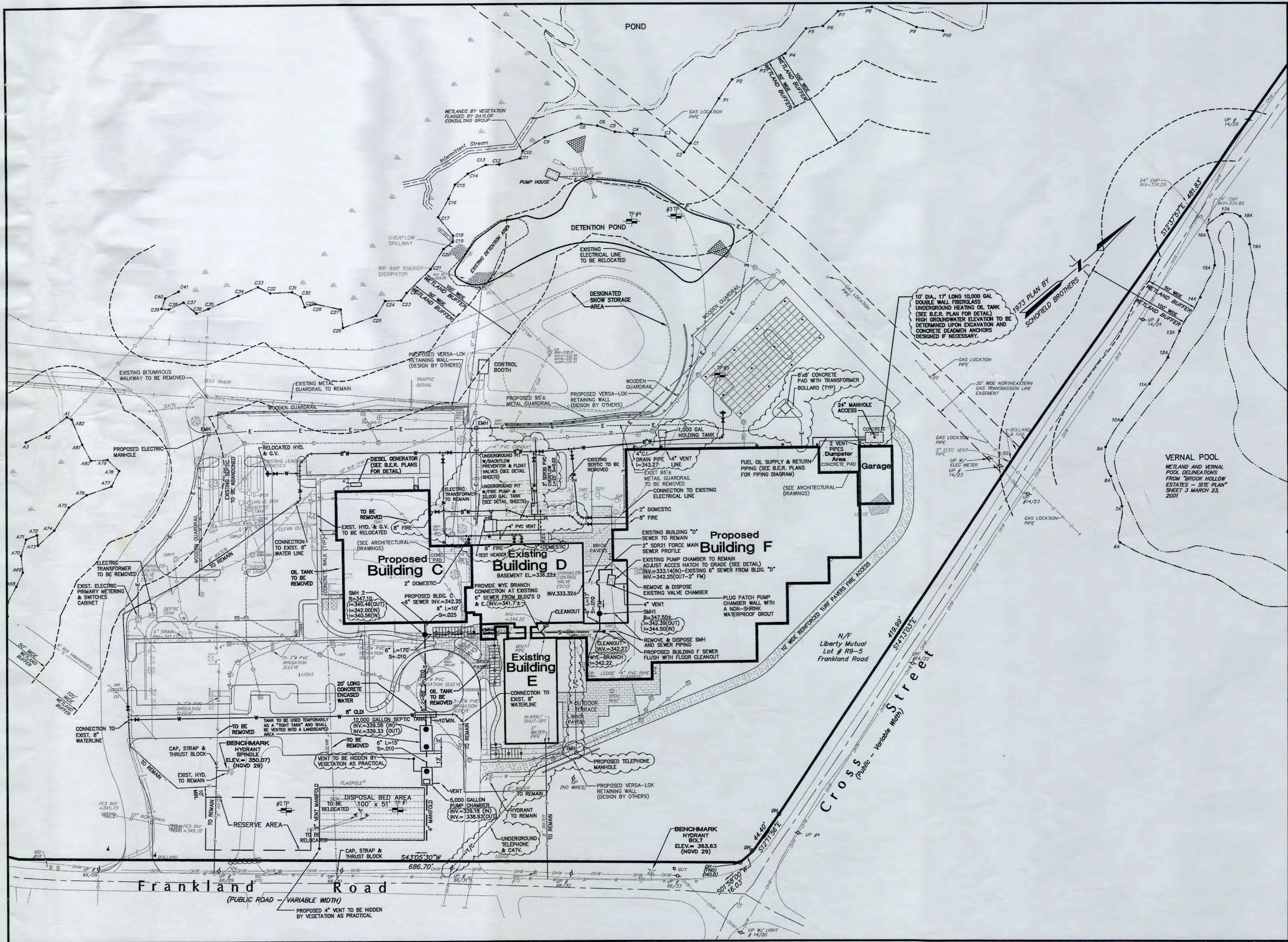
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GRADING AND DRAINAGE PLAN

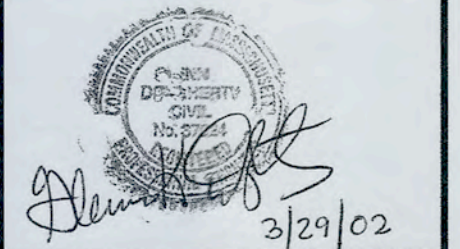
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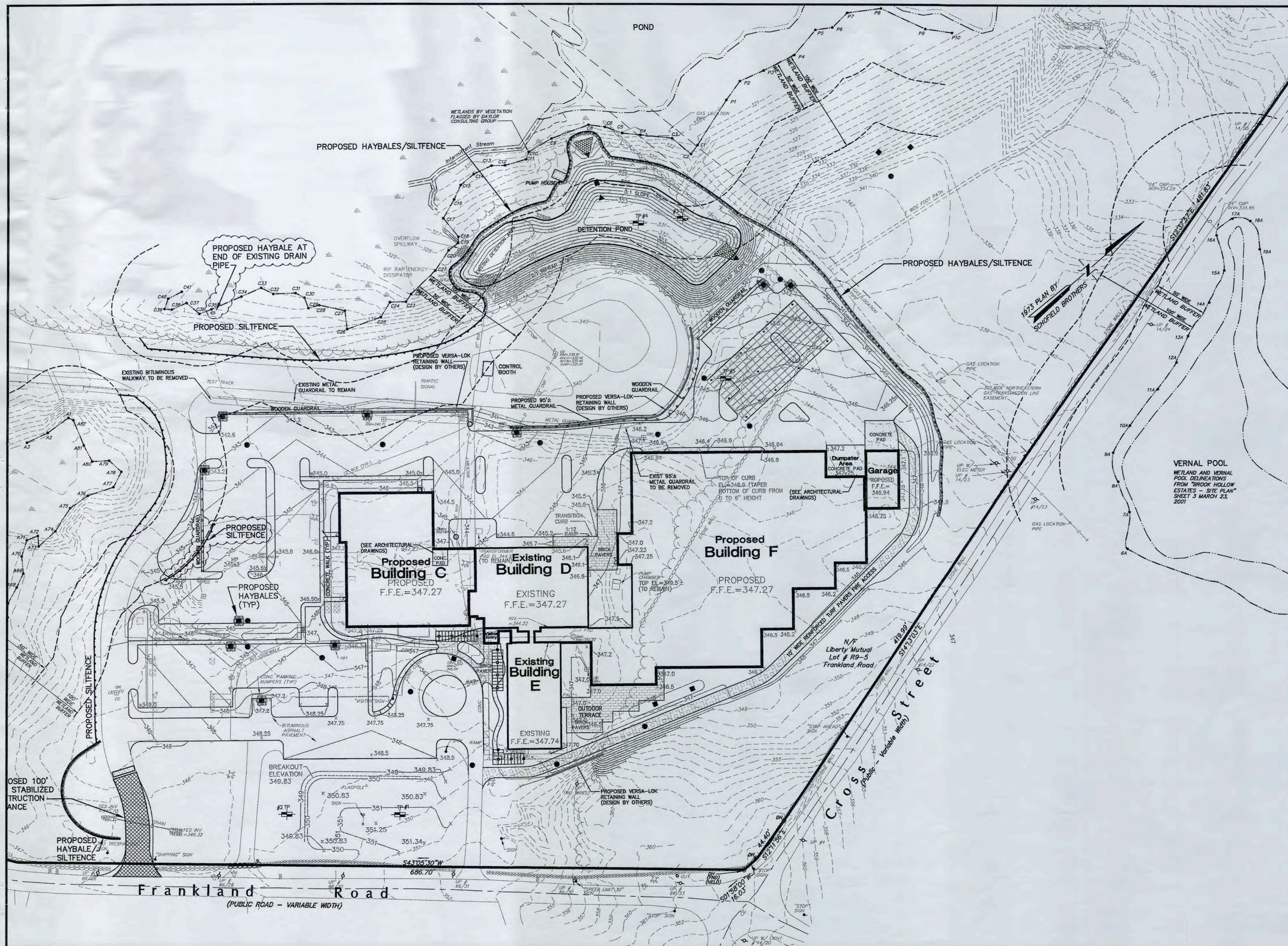
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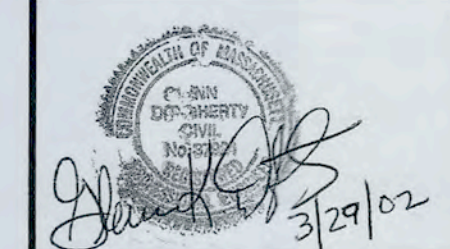
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**UTILITY
PLAN**

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Date FEB. 6, 2002	Drawing No.
Proj. Mgr. G.K.D.	7
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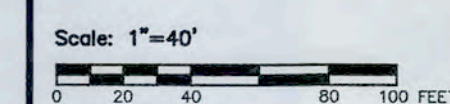
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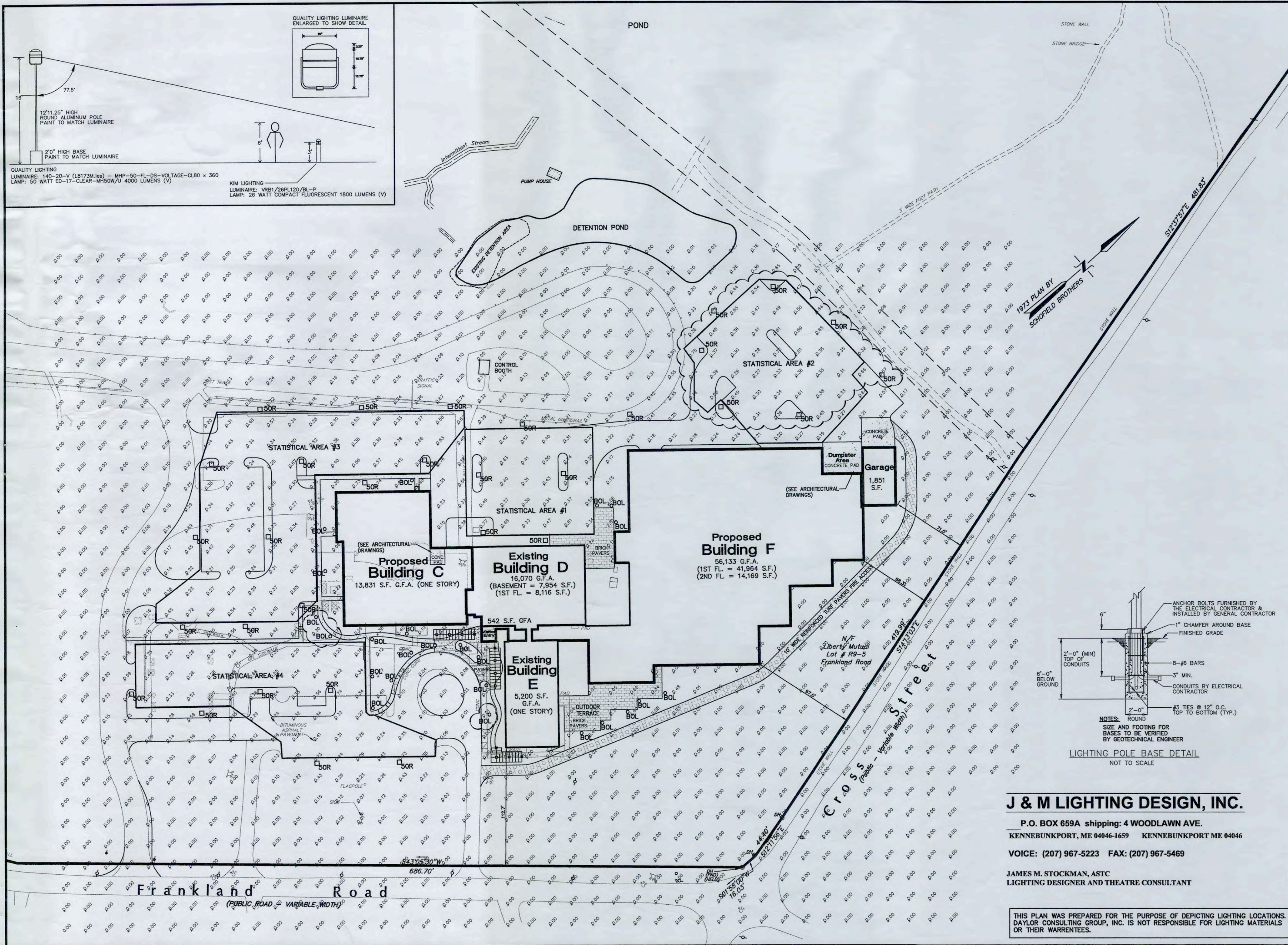
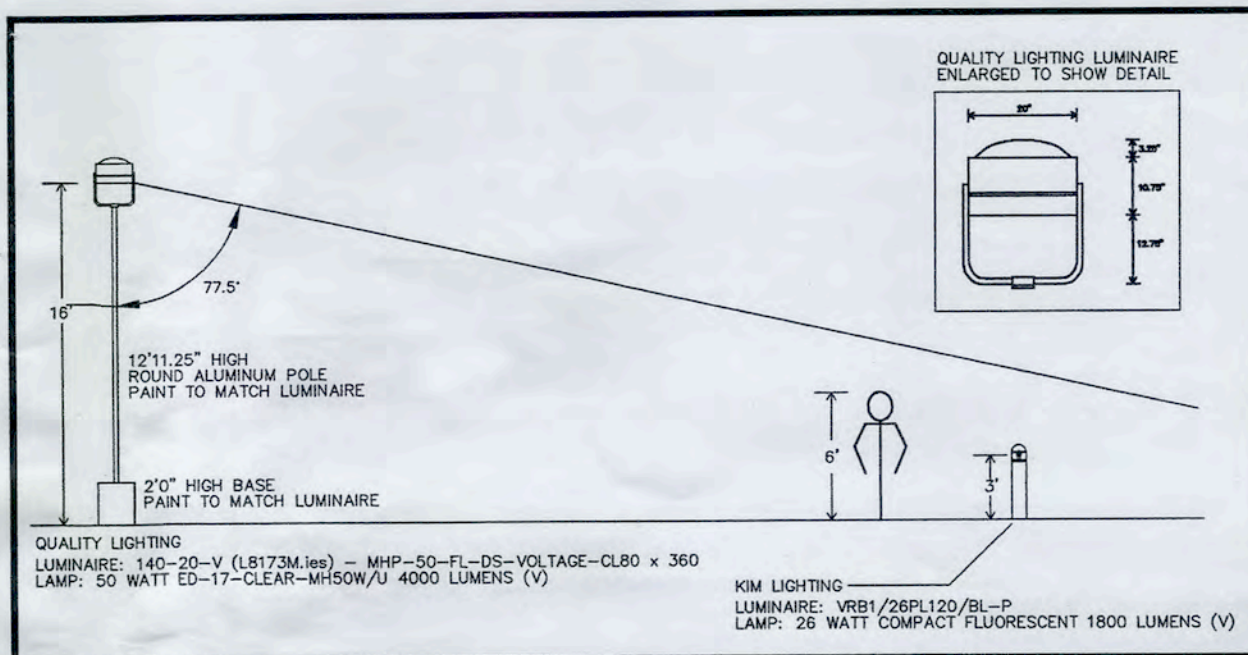
Drawing Title

**EROSION
CONTROL
PLAN**



Date FEB. 6, 2002	Drawing No.
Proj. Mgr. G.K.D.	8 of 20
Design G.K.D.	
Check	
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Job. No. 1.1987.00	
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LIGHTING PLAN

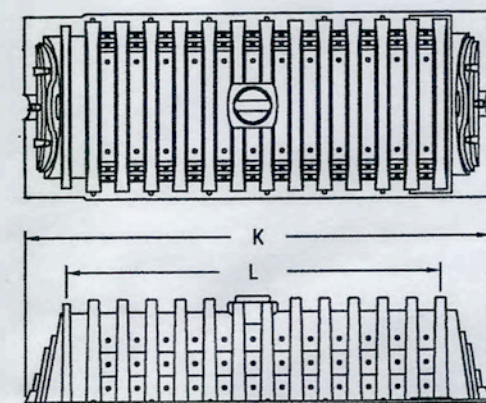
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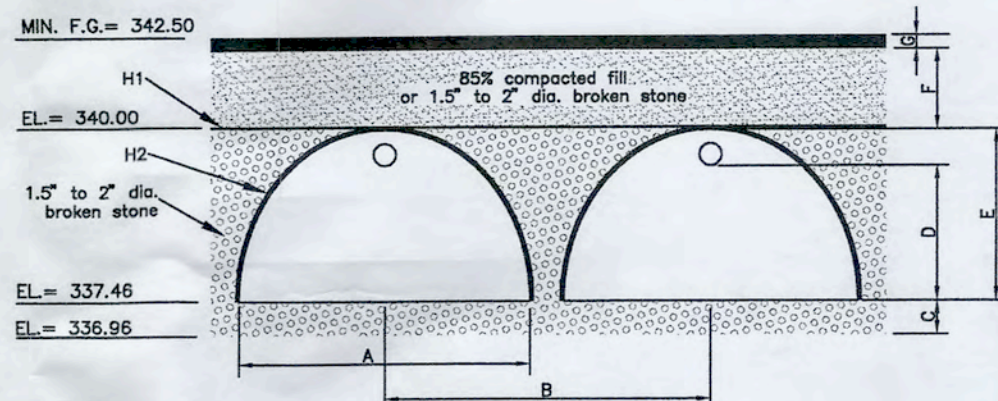
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Design	G.K.D.		
Check			
Drawn	J.V.B.		
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THIS PLAN WAS PREPARED FOR THE PURPOSE OF DEPICTING LIGHTING LOCATIONS. DAYLOR CONSULTING GROUP, INC. IS NOT RESPONSIBLE FOR LIGHTING MATERIALS OR THEIR WARRANTIES.

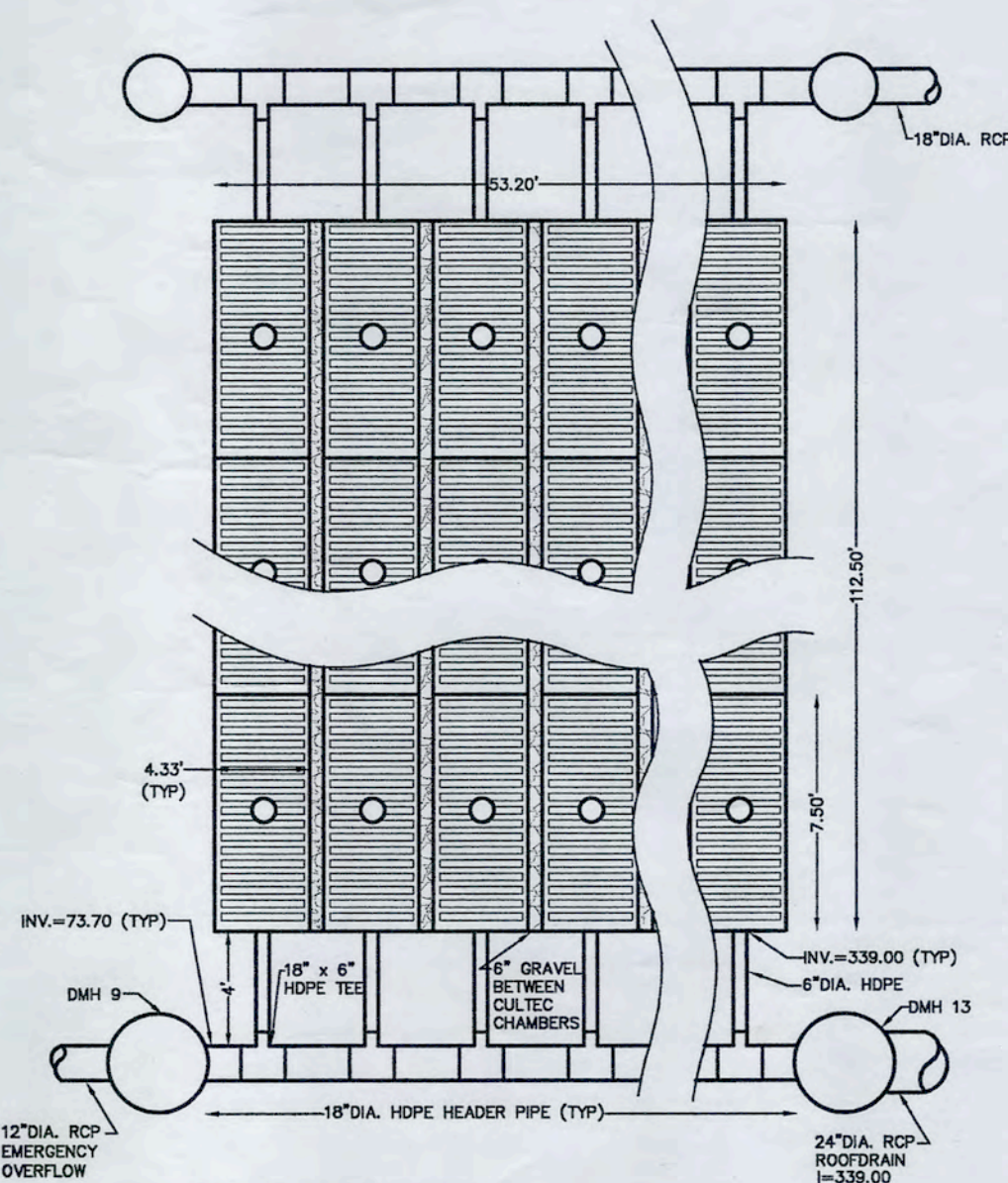


A = Width of chamber
B = Width on center
C = Stone base
D = Inlet height
E = Height of chamber
F = Compacted fill
G = Finished grade
H = Culter #410 Filter Fabric
I = CF/LF Design
J = Length
K = Lay Up Length

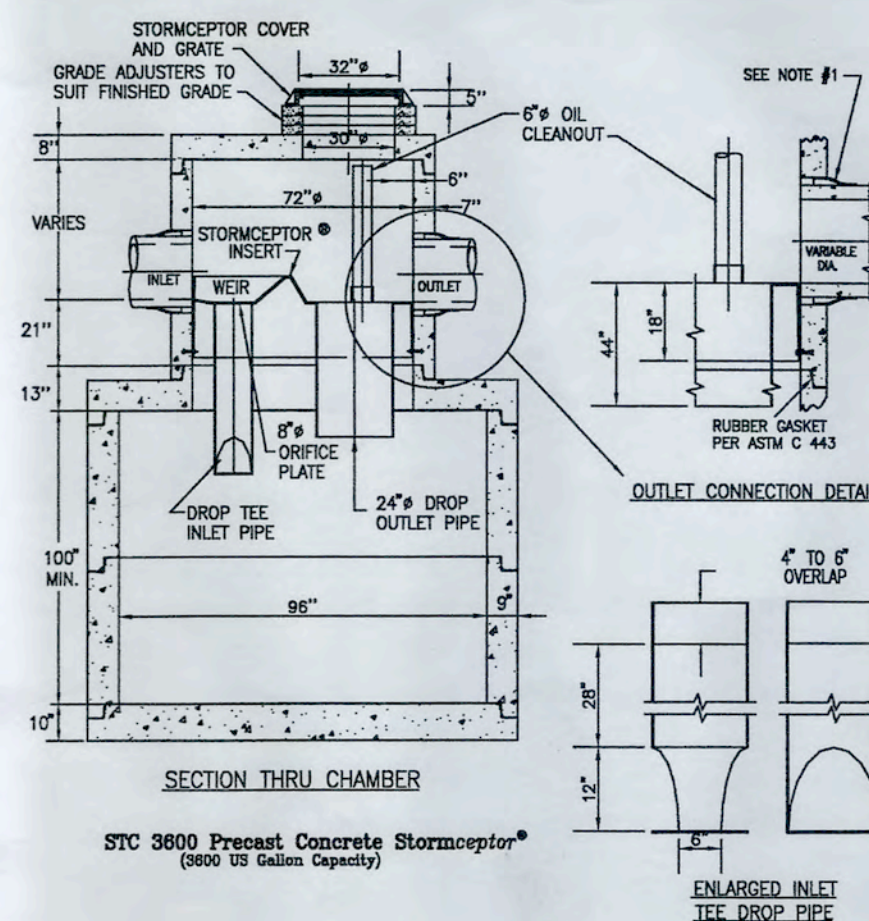


Recharger	A	B	C	D	E	F	G	H1	H2	J	K	L
330	52"	58"	6"	18.5"	30.5"	16"	2.5"	Required	Recommended	10.4	7.5'	6.25'
H-20 Paved												

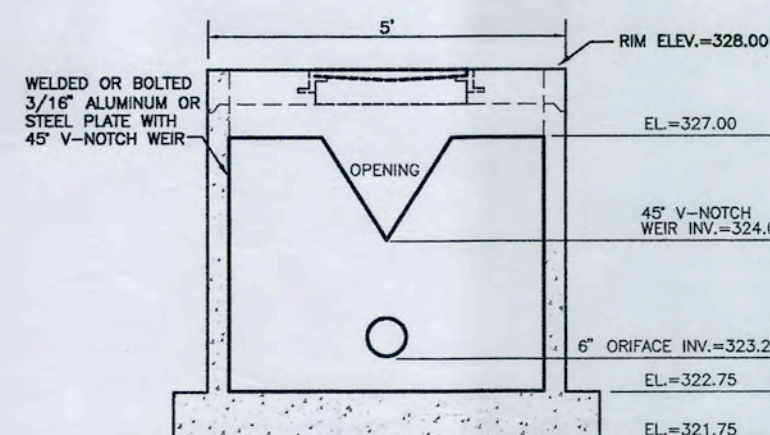
Recommended Single-Level
Installation of Cultec Recharger
for Storm Water Management



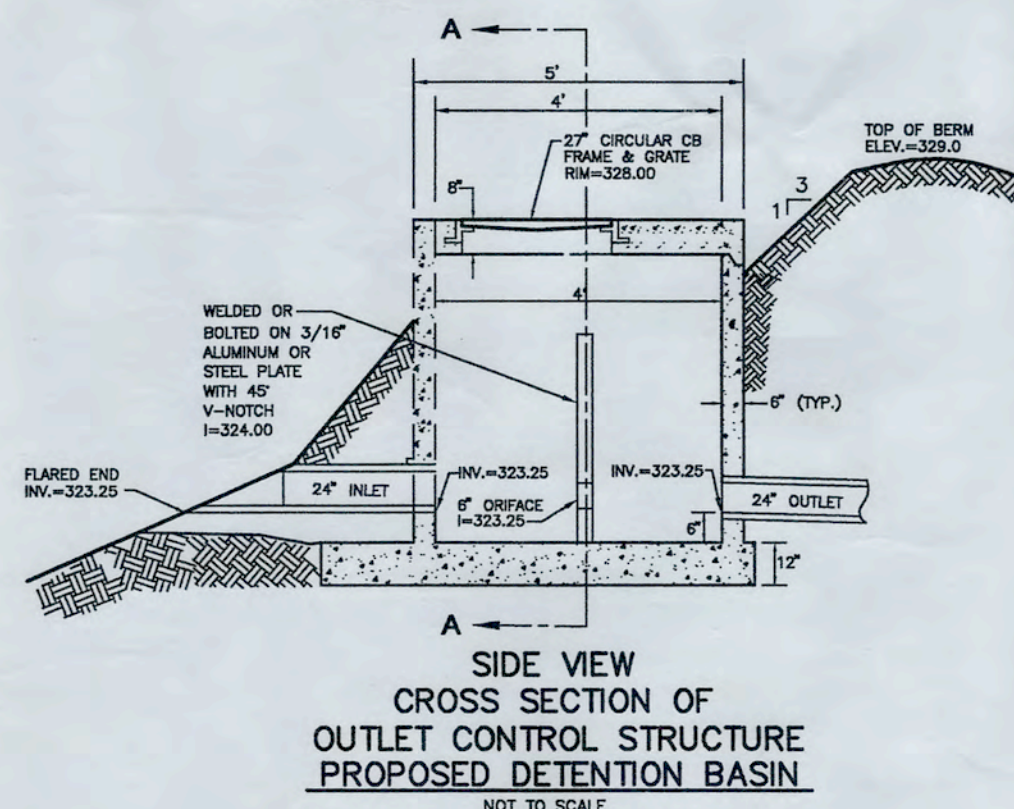
CULTEC RECHARGER 330
RECHARGE SYSTEM - PLAN VIEW
- NOT TO SCALE -



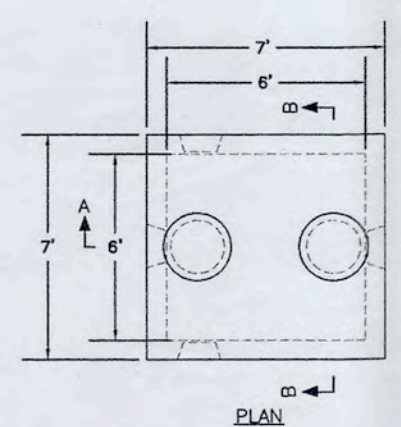
STC 3600 Precast Concrete Stormceptor®
(3600 US Gallon Capacity)



SECTION A-A
OUTLET CONTROL STRUCTURE
NOT TO SCALE

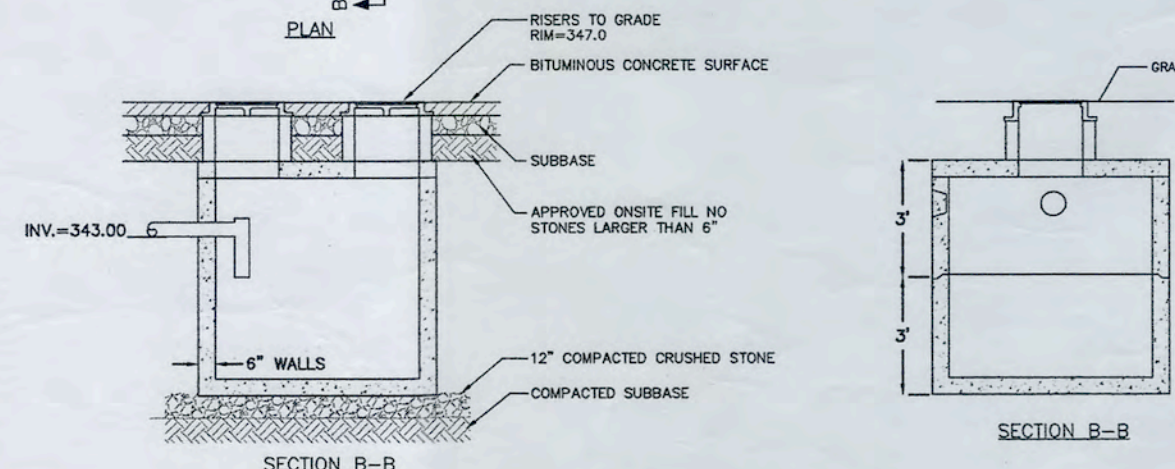


SIDE VIEW
CROSS SECTION OF
OUTLET CONTROL STRUCTURE
PROPOSED DETENTION BASIN
NOT TO SCALE

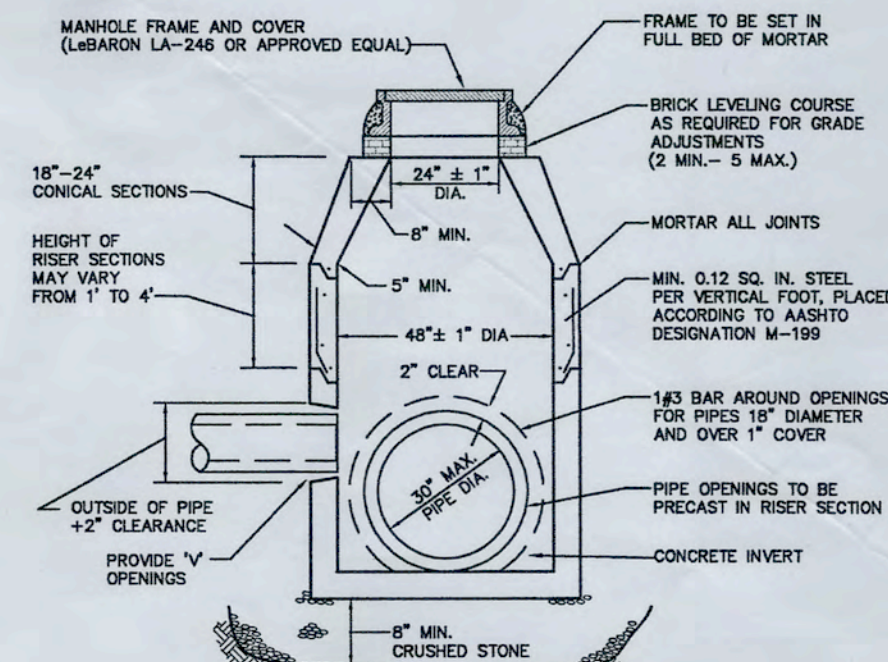


NOTES:

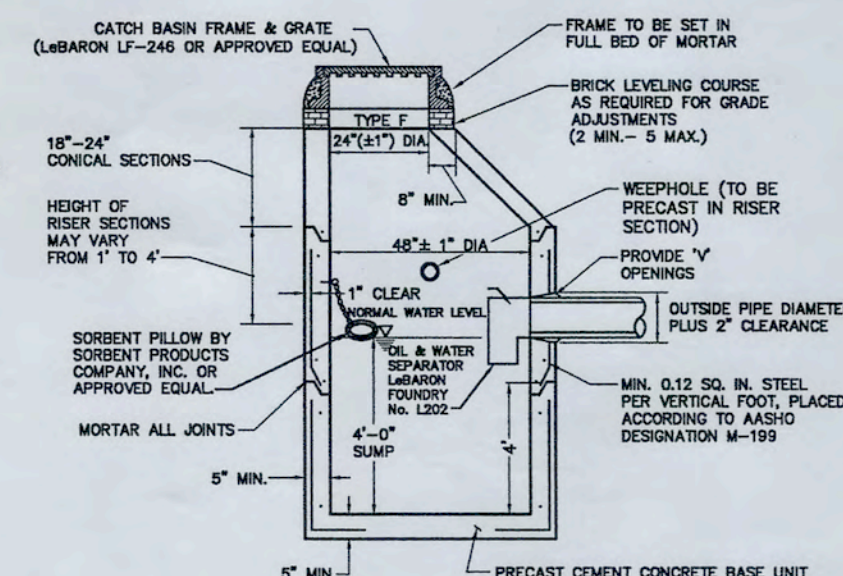
1. TANK SHALL BE WATER TIGHT ST 616-1 MANUFACTURED BY ROTONDO & SONS OR APPROVED EQUAL.
2. CONCRETE - 5,000 P.S.I. MINIMUM STRENGTH @ 28 DAYS
3. COVER TO STEEL - 1" MINIMUM
4. TANKS ARE DESIGNED TO MEET ASTM C858 AND ACI 318 WITH AASHTO HS-20 LOADING
5. EARTH COVER 0 TO 4 FEET
6. CONSTRUCTION JOINT - SEALED WITH 1" DIA. BUTYL RUBBER EQUIVALENT
7. STEEL REINFORCEMENT - ASTM A-615, GRADE 60



1000 GAL. INLINE PARTICLE SEPARATOR
NOT TO SCALE

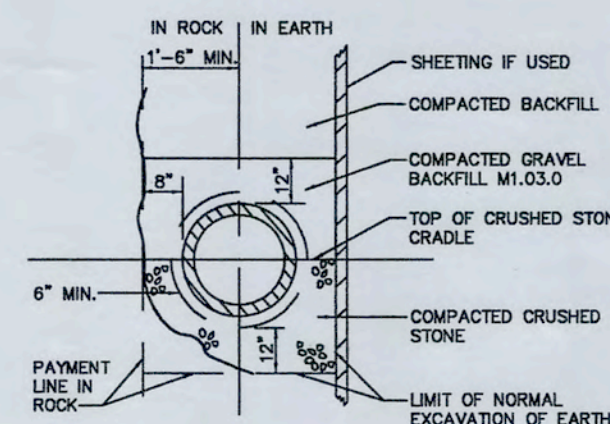


PRECAST CONCRETE DRAIN MANHOLE
NOT TO SCALE

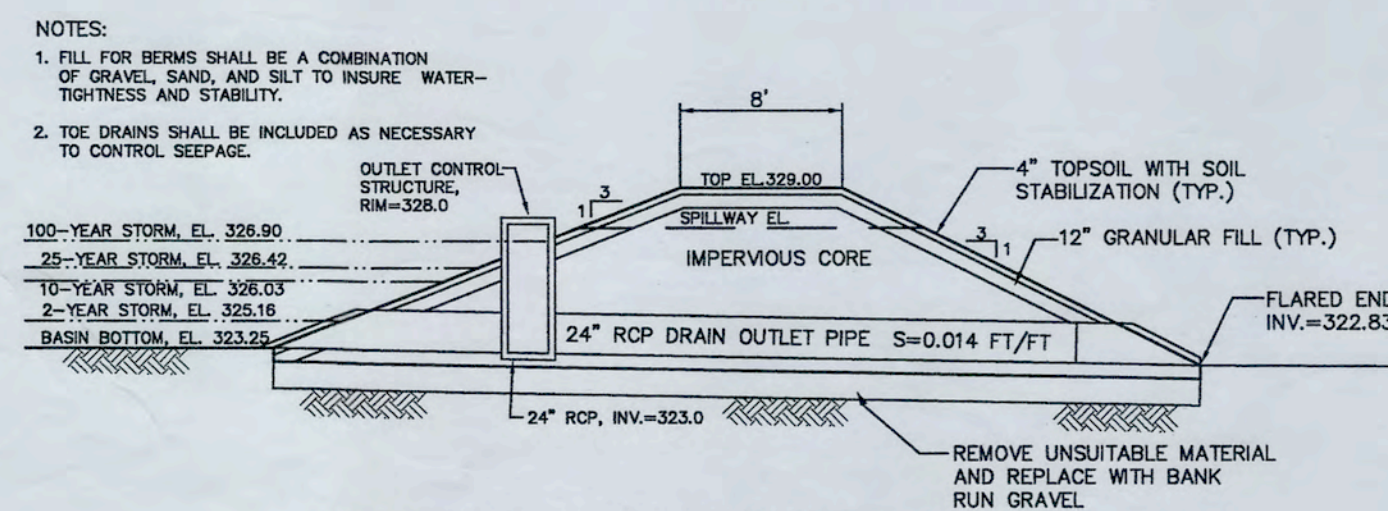


- NOTES:
1. FACE OF PIPE TO BE FLUSH OR NOT TO PROJECT MORE THAN 4" FROM FACE OF WALL ALONG CENTERLINE OF PIPE.
 2. WHEN A CURB INLET IS INSTALLED, OPENING TO BE 24" ± 1" x 27" ± 1"

PRECAST CONCRETE CATCH BASIN
NOT TO SCALE



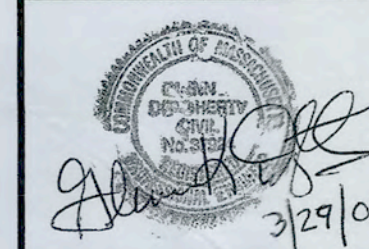
STORM DRAIN TRENCH SECTION - ONE PIPE
NOT TO SCALE



STORMWATER MANAGEMENT AREA
BERM SECTION DETAIL
NOT TO SCALE

Revisions

3/11/02 CONSTRUCTION DETAILS
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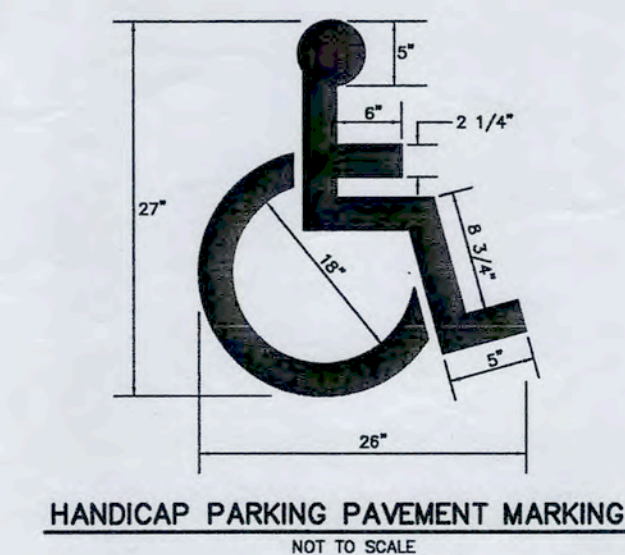
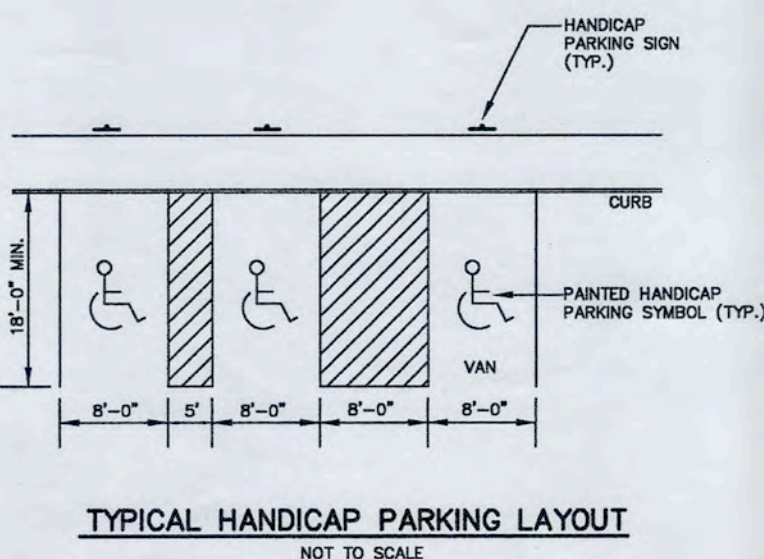
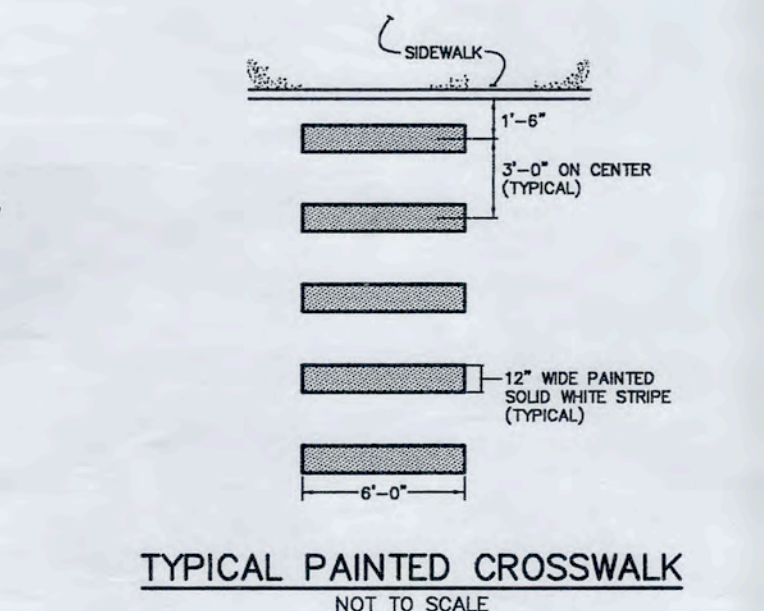
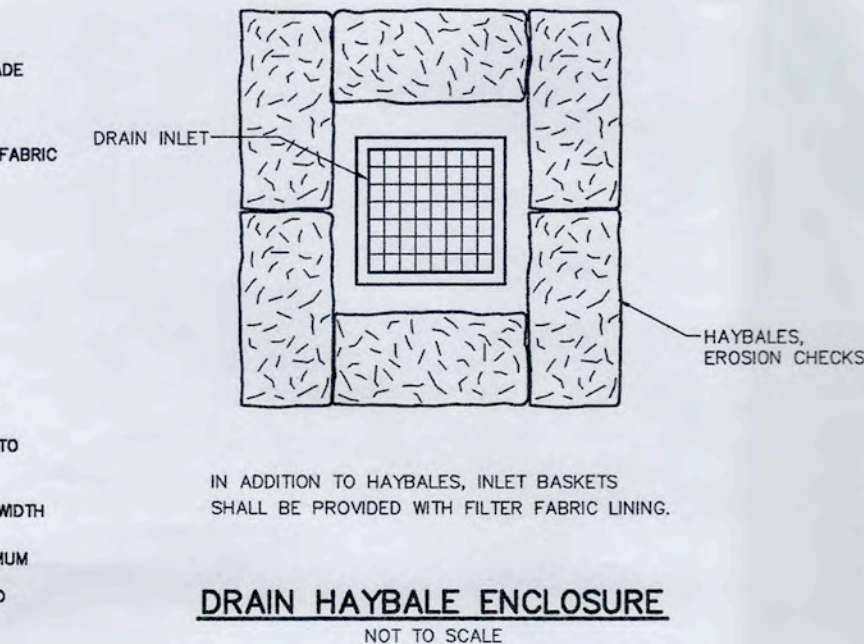
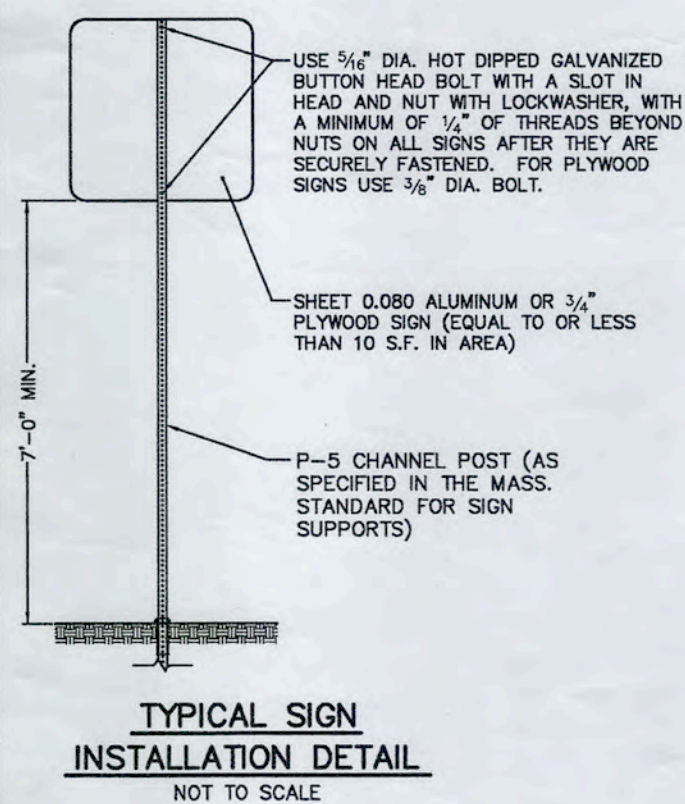
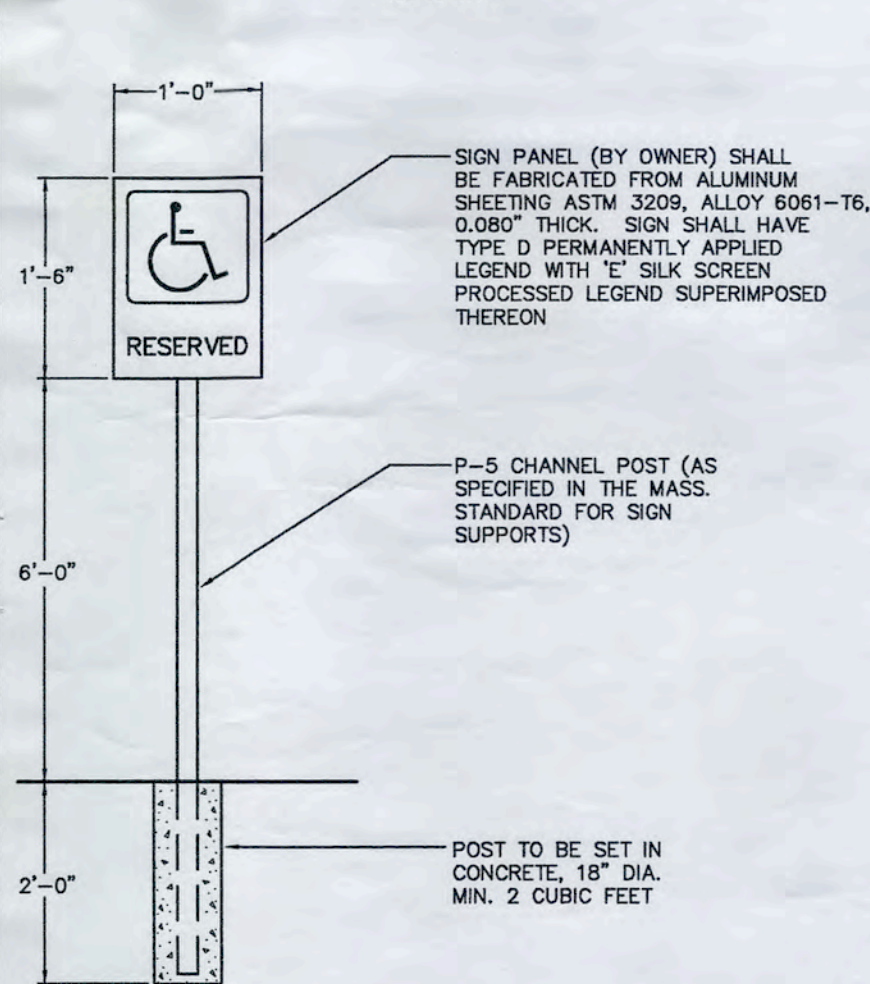
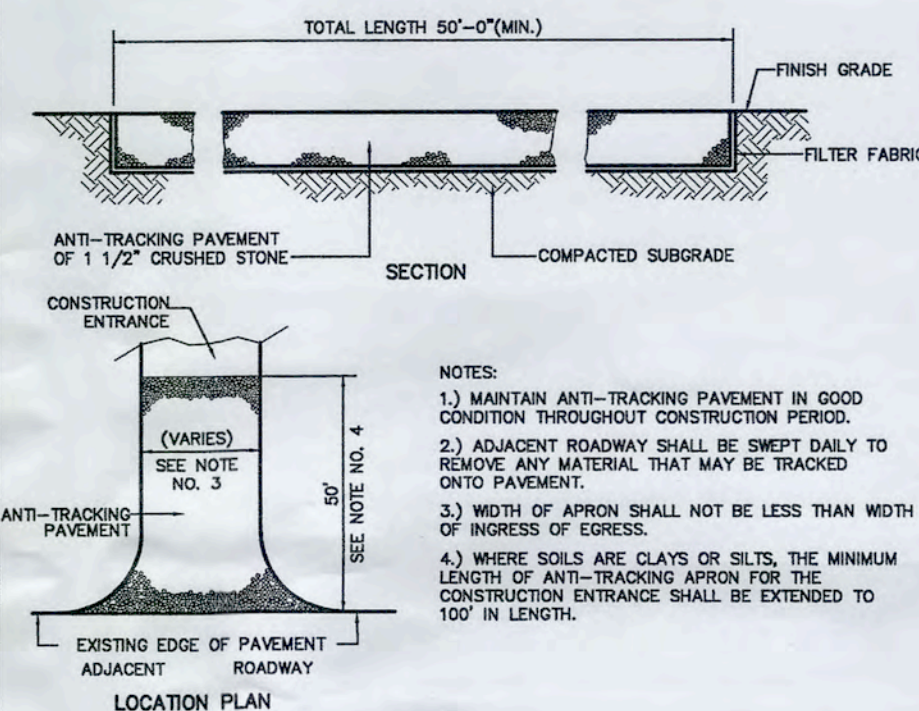
DETAIL
SHEET

Date FEB. 6, 2002
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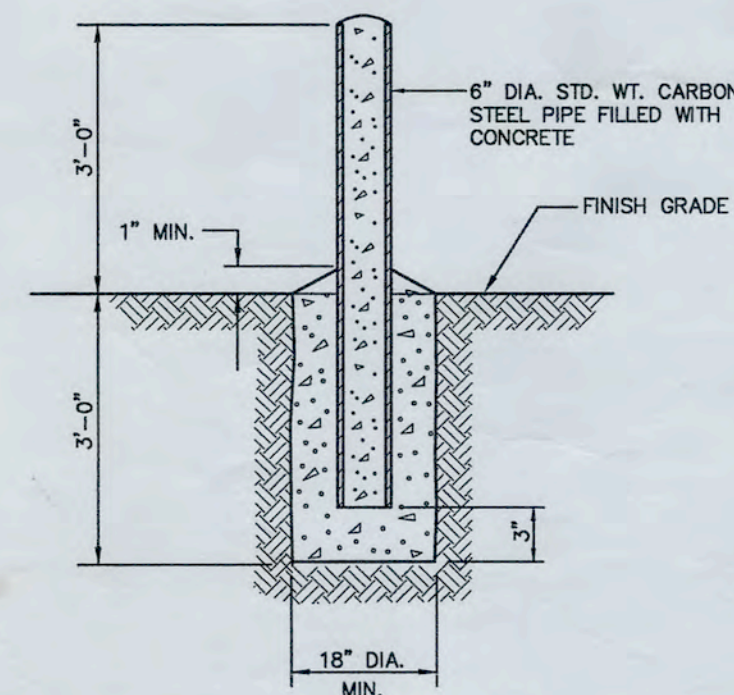
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1987 CONST. DETAILS.DWG



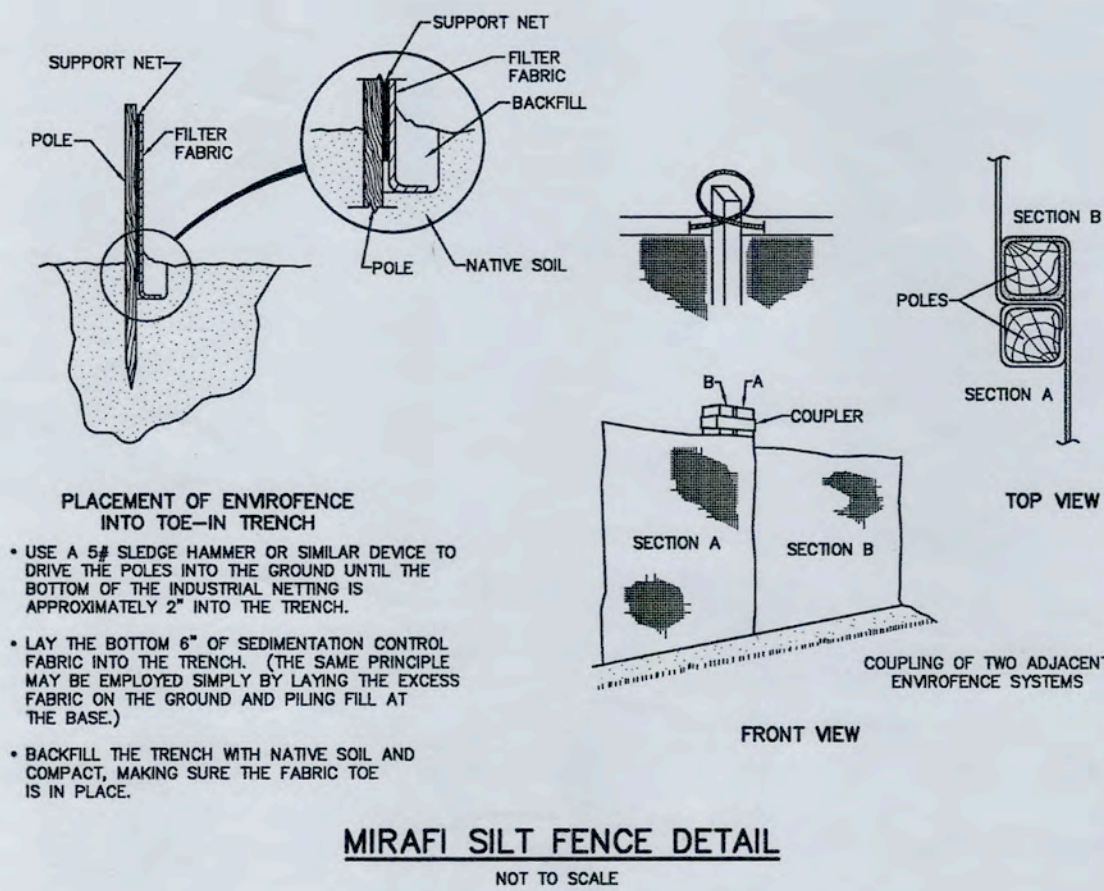
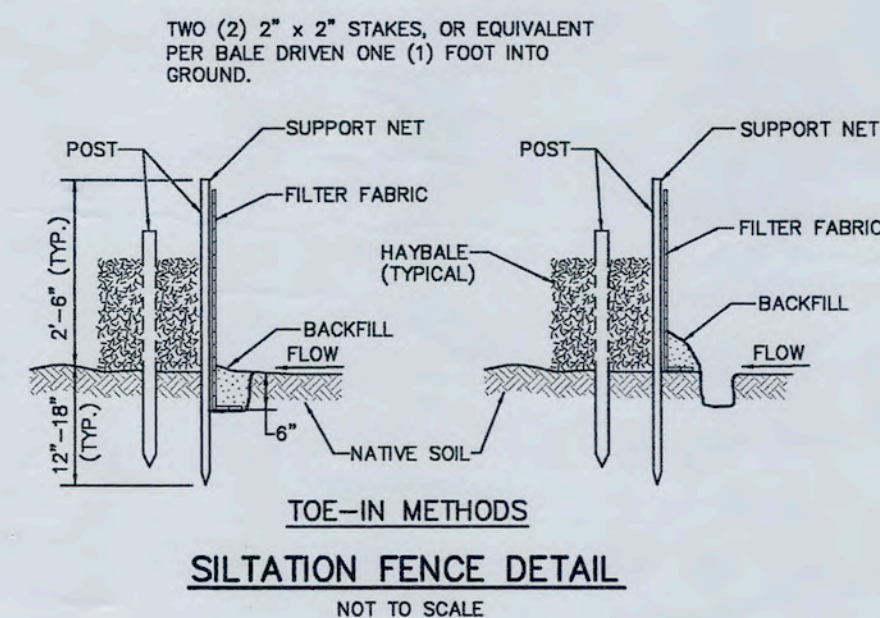
GENERAL NOTES:

- THIS SET OF PLANS HAS BEEN PREPARED FOR PURPOSES OF MUNICIPAL AGENCY REVIEW AND APPROVAL. THIS SET OF PLANS SHALL NOT BE UTILIZED AS CONSTRUCTION DOCUMENTS UNTIL ALL CONDITIONS OF APPROVAL HAVE BEEN SATISFIED ON THE DRAWINGS AND EACH DRAWING HAS BEEN REVISED TO INDICATE "ISSUED FOR CONSTRUCTION."
- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE TOWN OF HOPKINTON "RULES AND REGULATIONS RELATING TO THE SUBDIVISION OF LAND" IN HOPKINTON, MASSACHUSETTS, UNLESS OTHERWISE NOTED.
- THE MATERIAL OF PARKING PAVEMENT CONSTRUCTION AND CONSTRUCTION METHODOLOGIES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TOWN OF HOPKINTON PLANNING BOARD AS STIPULATED IN THE RULES AND REGULATIONS RELATING TO THE SUBDIVISION OF LAND.
- THE SEQUENCE OF ALL EXCAVATION OPERATIONS SHALL BE SUCH AS TO INSURE THE MOST EFFICIENT UTILIZATION OF EXISTING LEDGE EMBANKMENTS AND THE USE OF A MINIMUM AMOUNT OF BORROW. PRIOR TO ANY LEDGE REMOVAL, THE LEDGE AREA SHALL BE PARTIALLY OR COMPLETELY STRIPPED OF OVERBURDEN AS DIRECTED BY THE ENGINEER.
- TO REDUCE THE AMOUNT OF OFF GRADING REQUIRED IN EMBANKMENT AREAS, IF FIELD CONDITIONS PROVE TO BE FAVORABLE, THE CONTRACTOR MAY REQUEST IN WRITING FOR APPROVAL TO PROVIDE ALTERNATE STRUCTURES (RETAINING WALLS, RIP-RAP, EMBANKMENT, ETC.) TO PRESERVE EXISTING NATURAL FEATURES. SAID WRITTEN REQUEST SHALL BE ACCOMPANIED BY THE PERTINENT PLANS AND SUPPORTING CALCULATIONS PREPARED BY A PROFESSIONAL ENGINEER. THIS INFORMATION SHALL BE SUBMITTED TO THE DAYLOR CONSULTING GROUP, INC. THE HOPKINTON PLANNING DEPARTMENT AND THE HOPKINTON CONSERVATION COMMISSION PRIOR TO CONSTRUCTION.
- ALL SLOPES ADJACENT TO WETLAND RESOURCE AREAS OR BELOW THE PERIMETER DRIVE AND PARKING AREAS HAVING SLOPES WHICH ARE 3 FT HORIZONTAL TO 1 FT VERTICAL OR LATER MAY BE GRASSED SLOPES. ALL SLOPES STEEPER THAN 3 FT HORIZONTAL TO 1 FT VERTICAL SHALL RECEIVE A RIP RAP TREATMENT UNLESS OTHERWISE NOTED ON THE GRADING PLANS. (SEE DETAIL)
- THE UTILITY COMPANIES MUST BE NOTIFIED BY THE CONTRACTOR AT LEAST 48 HOURS PRIOR TO CONSTRUCTION.
- LOCATIONS OF EXISTING UTILITIES ARE APPROXIMATE ONLY AND ARE TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR AT THE TIME OF CONSTRUCTION. ALL UNDERGROUND UTILITIES SHOWN WERE COMPILED ACCORDING TO AVAILABLE RECORD PLANS FROM THE VARIOUS UTILITY COMPANIES AND PUBLIC AGENCIES AND AREA APPROXIMATE ONLY. THE OWNER ASSUMES NO RESPONSIBILITY FOR DAMAGE INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN.
- WHILE WORKING IN THE VICINITY OF AN EXISTING UTILITY, REFER TO THE FOLLOWING: ALL UNDERGROUND UTILITIES SHOWN WERE COMPILED ACCORDING TO AVAILABLE RECORD PLANS FROM THE VARIOUS UTILITY COMPANIES AND PUBLIC AGENCIES AND AREA APPROXIMATE ONLY. SEE CHAPTER 370, ACTS OF 1963, MASSACHUSETTS GENERAL LAWS. WE ASSUME NO RESPONSIBILITY FOR DAMAGE INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN. BEFORE PLANNING FUTURE CONNECTIONS, THE APPROPRIATE PUBLIC ENGINEERING DEPARTMENT SHALL BE CONTACTED AND THE PROPOSED UTILITY WORK SHALL BE COORDINATED. DIG SAFE NUMBER: 1-888-344-7233.
- ELECTRIC, TELEPHONE AND OTHER UTILITY SIZES, AND APPURTENANCES SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF THE TOWN OF HOPKINTON PLANNING BOARD, AND REVIEWED AND APPROVED BY APPROPRIATE UTILITY COMPANIES.
- FIRE ALARM SYSTEMS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE HOPKINTON FIRE DEPARTMENT.
- THE CONTRACTOR SHALL COORDINATE WORK WITH RESPECTIVE UTILITY COMPANIES ALLOWING AMPLE TIME FOR OTHERS TO INSTALL THEIR PROPOSED WORK AND PROTECT ALL UTILITIES DURING THE COURSE OF CONSTRUCTION. SEVENTY-TWO (72) HOURS PRIOR TO MAKING ANY EXCAVATION, THE CONTRACTOR SHALL NOTIFY DIG SAFE 1-888-344-7233 AND ALL PUBLIC UTILITIES THAT HE IS MAKING AN ENTRY, IN ACCORDANCE WITH CHAPTER 370, ACTS OF 1963.
- THE CONTRACTOR SHALL GIVE TWENTY-FOUR (24) HOUR NOTICE TO PERTINENT TOWN DEPARTMENTS BEFORE COMMENCING ANY WORK.
- ALL AREAS DISTURBED BY THE CONTRACTOR SHALL BE RESTORED TO EQUAL OR BETTER CONDITION. (SEE PLANTING AND EROSION CONTROL PLANS)
- ALL FINISHED SURFACES SHALL BE GRADED SMOOTHLY AND EVENLY.
- AT THE COMPLETION OF THE CONTRACTOR'S OPERATION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING ALL DRAINAGE STRUCTURES (NEW AND/OR EXISTING) OF DEBRIS.
- DO NOT SCALE PLANS. DUE TO REPROGRAPHIC STRETCH, PRINTS MAY NOT SCALE ACCURATELY. NUMERIC DIMENSIONING IS CORRECT.
- FILL CONTAINING HAZARDOUS MATERIALS SHALL NOT BE USED.
- LIMITS OF WORK SHALL BE MARKED IN THE FIELD PRIOR TO THE START OF CONSTRUCTION OR SITE CLEARING.
- CATCH BASIN SUMPS AND STORMWATER BASINS SHALL BE CLEANED FOLLOWING CONSTRUCTION AND ANNUALLY THEREAFTER.
- ALL CONSTRUCTION WHICH INCLUDES HAULING OF EARTH TO OR FROM THE SITE SHALL BE RESTRICTED BETWEEN THE HOURS OF 7:00 AM AND 6:00 PM ON WEEKDAYS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ADEQUATE RECORDS OF LOCATION AND ELEVATION OF ALL WORK INSTALLED.
- WATER PRESSURE REQUIREMENTS AND THE ACTUAL WATER PRESSURE TO BE PROVIDED AT THE BUILDING SHALL BE DETERMINED BY OTHERS.
- ALL ELEVATIONS REFER TO N.G.V.D. DATUM (MEAN SEA LEVEL DATUM OF 1929).
- IT IS THE CONTRACTORS RESPONSIBILITY TO OBTAIN THE ELECTRONIC FILE FROM DAYLOR CONSULTING GROUP FOR PROPER COORDINATION OF SURVEY LAYOUT.
- PRESERVATION OF ON SITE VEGETATION SHALL BE REVIEWED AND APPROVED BY OWNERS REPRESENTATIVE PRIOR TO THE START OF CONSTRUCTION.



EROSION AND SEDIMENT CONTROL NOTES:

- EROSION AND SEDIMENT CONTROL MEASURES WILL BE INSTALLED PRIOR TO START OF CONSTRUCTION OF PROJECT. STABILIZATION OF ALL REGRADED AND SOIL STOCKPILE AREAS WILL BE INITIATED AND MAINTAINED DURING ALL PHASES OF CONSTRUCTION.
- DURING THE CONSTRUCTION OF THE DRAINAGE SYSTEM, DISTURBANCE TO THE SITE SHALL BE MINIMIZED. CONSTRUCTION EQUIPMENT AND TRUCKS MUST STAY WITHIN THE AREAS OF PROPOSED WORK.
- ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE CONSTRUCTED IN ACCORDANCE WITH STANDARDS AND SPECIFICATIONS OF THE "GUIDELINES FOR SOIL & WATER CONSERVATION IN URBANIZING AREAS OF MASSACHUSETTS" DATED 1977. ALL EROSION CONTROL MEASURES ARE TO BE MAINTAINED AND UPGRADED AS REQUIRED TO ACHIEVE PROPER SEDIMENT CONTROL DURING CONSTRUCTION.
- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL ADDITIONAL CONTROL MEASURES DURING CONSTRUCTION AS REQUIRED (TO PROTECT ANY ADJACENT UNDISTURBED AREAS).
- SEDIMENT REMOVED FROM EROSION CONTROL STRUCTURES WILL BE DISPOSED OF IN A MANNER WHICH IS CONSISTENT WITH THE INTENT OF THIS PLAN. ALL HAYBALES OR SILT FENCE RETAINING SEDIMENT OVER 1/2 THEIR HEIGHT SHALL HAVE THE SEDIMENT REMOVED AND ALL DAMAGED EROSION CONTROLS REMOVED AND REPLACED.
- THE CONTRACTOR SHALL BE ASSIGNED THE RESPONSIBILITY FOR IMPLEMENTING THIS EROSION AND SEDIMENT CONTROL PLAN. THIS RESPONSIBILITY INCLUDES THE INSTALLATION AND MAINTENANCE OF CONTROL MEASURES, INFORMING ALL PARTIES ENGAGED ON THE CONSTRUCTION SITE OF THE REQUIREMENTS AND OBJECTIVES OF THE PLAN, AND NOTIFYING THE PROPER TOWN AGENCY OF ANY TRANSFER OF THIS RESPONSIBILITY. THE OWNER SHALL BE RESPONSIBLE FOR CONVEYING A COPY OF THE EROSION AND SEDIMENT CONTROL PLAN IF THE TITLE TO THE LAND IS TRANSFERRED.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTROLLING DUST AND WIND EROSION THROUGHOUT THE LIFE OF HIS CONTRACT. DUST CONTROL SHALL INCLUDE, BUT IS NOT LIMITED TO, SPRINKLING OF WATER ON EXPOSED SOILS AND HAUL ROADS. CONTRACTOR SHALL CONTROL DUST TO PREVENT A HAZARD TO TRAFFIC ON ADJACENT ROADWAYS.
- IF FINAL GRADING IS TO BE DELAYED FOR MORE THAN THIRTY (30) DAYS AFTER LAND DISTURBANCES CEASE, TEMPORARY VEGETATION OR MULCH SHALL BE USED TO STABILIZE SOILS.
- HAYBALES SHALL BE USED AS A TEMPORARY MEASURE. WHERE CONTROL MEASURES WILL BE REQUIRED FOR LONGER THAN SIXTY (60) DAYS, FILTER FABRIC SHALL BE USED.
- IF A DISTURBED AREA WILL BE EXPOSED FOR GREATER THAN ONE YEAR, PERMANENT GRASSES OR OTHER APPROVED COVER MUST BE INSTALLED.
- IN DISTURBED AREAS, IF THE SURFACE MATERIAL IS NOT SUITABLE FOR THE GROWING OF SEED, A MINIMUM OF 4 INCHES OF LOAN WILL BE REQUIRED.
- SEE PLANTING PLAN AND EROSION CONTROL DETAILS INCLUDED WITH THESE PLANS.



Revisions	
3/11/02	CONSTRUCTION DETAILS
3/29/02	GENERAL CONSTRUCTION COORDINATION REVISIONS

Project Title
SITE
CONSTRUCTION PLANS
For
Liberty Mutual
Research Center
Hopkinton
MA

Prepared For
LIBERTY MUTUAL GROUP
175 Berkeley Street
Boston, MA
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Drawing Title

DETAIL
SHEET

Date FEB. 6, 2002	Drawing No.
Proj. Mgr. G.K.D.	13
Design G.K.D.	
Check	
Drawn J.V.B.	
Job. No. 2.1987.00	of 20
Last Rev. 3/29/02	

1987 CONST. DETAILS.DWG

SHRUB TABLE

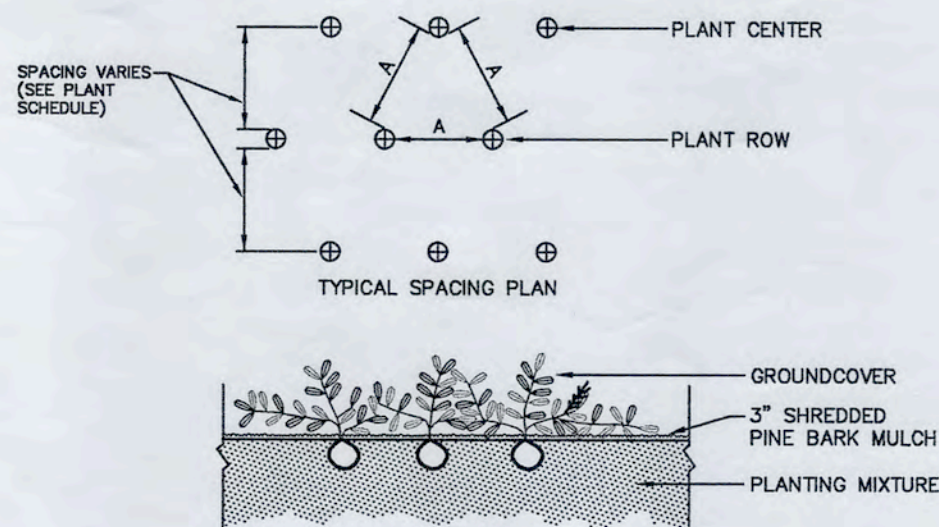
SYMBOL	SCIENTIFIC NAME	COMMON NAME	SIZE	REMARKS	QUANTITY
AZD	AZALEA 'DELAWARE VALLEY'	DELAWARE VALLEY WHITE AZALEA	18" - 24" HT.	3 GAL. - 3.5' O.G.	77
AZM	AZALEA 'HINO-CRIMSON'	HINO-CRIMSON AZALEA	18" - 24" HT.	3 GAL. - 3.5' O.G.	14
AZS	AZALEA 'STEWARTSTONIAN'	STEWARTSTONIAN AZALEA	18" - 24" HT.	3 GAL. - 3.5' O.G.	15
HMB	HYDRANGEA MACROPHYLLA 'SUMMER BEAUTY'	SUMMER BEAUTY HYDRANGEA	18" - 24" HT.	3 GAL. - 4' O.G.	18
IOF	ILEX OPACA 'FEMALE'	AMERICAN HOLLY 'FEMALE'	5'-6" HT.	B + B. - 10' O.G.	3
IOH	ILEX OPACA 'MALE'	AMERICAN HOLLY 'MALE'	5'-6" HT.	B + B. - 10' O.G.	1
JB5	JUNIPERUS SARGENTI GLAUCA	BLUE SARGENT JUNIPER	18" - 24" SPK.	3 GAL. - 4' O.G.	12
FJ	PIERIS JAPONICA 'DOROTHY WYCKOFF'	WHITE FLOWERING ANDROMEDA	24" - 30" HT.	B + B. - 4' O.G.	3
RB	RHODODENDRON 'BOULE DE NEIGE'	BOULE DE NEIGE RHODODENDRON	24" - 30" HT.	B + B. - 4' O.G.	7
RCH	RHODODENDRON CHIONODES	CHIONODES RHODODENDRON	18" - 24" HT.	3 GAL. - 4' O.G.	9
FJM	RHODODENDRON 'PJM'	PJM RHODODENDRON	24" - 30" HT.	B + B. - 4' O.G.	23
SBA	SPYRAEA X BUNALDI 'ANTHONY WATERER'	ANTHONY WATERER'S SPIREA	18" - 24" HT.	3 GAL. - 4' O.G.	0
TD	TAXUS DENSIFORMIS	DENSE YEW	2' - 3' HT.	B+B - 4' O.G.	35
VG	VEURUM CARLESII	MAYFLOWER VEURNUM	24" - 30" HT.	3 GAL. - 5' O.G.	32
VCG	VEURUM CARLESII 'COMPACTUM'	COMPACT MAYFLOWER VEURNUM	18" - 24" HT.	3 GAL. - 5' O.G.	10

TREE TABLE

SYMBOL	SCIENTIFIC NAME	COMMON NAME	SIZE	REMARKS	QUANTITY
ARO	ACER RUBRUM 'OCTOBER GLORY'	OCTOBER GLORY RED MAPLE	2.5"-3" CAL.	B + B	8
BJ	BETULA JACQUEMONTII	HIMALAYAN WHITE BIRCH	2.5"-3" CAL.	B + B	14
GAG	GEDRUS ATLANTICA GLAUCA	BLUE ATLAS CEDAR	7' - 8' HT.	B + B	8
CK	CORNUS KOUSA	KOUSA DOGWOOD	8' - 10' HT.	B + B	7
MS	MAGNOLIA STELLATA	STAR MAGNOLIA	2"-2.5" CAL.	12" O.G.	4
PA	PLATANUS ACERIFOLIA 'BLOODGOOD'	LONDON PLANETREE	3"-3.5" CAL.	B + B 10' O.G.	14
PN	PRUNUS NIGRA	AUSTRIAN PINE	7' - 8' HT.	B + B	13
PR	PRUNUS RESINOSA	RED PINE	7' - 8' HT.	B + B	10
PS	PRUNUS SYLVESTRIS	SCOTCH PINE	7' - 8' HT.	B + B	14
QR	QUERCUS ROBUR 'FASTIGIATA'	COLUMNAR ENGLISH OAK	2.5"-3" CAL.	B + B	8
TC	TSUGA CANADENSIS	CANADIAN HEMLOCK	7' - 8' HT.	B + B	4
ZS	ZELKOVA SERRATA 'GREEN VASE'	GREENVASE ZELKOVA	2.5"-3" CAL.	B + B	4

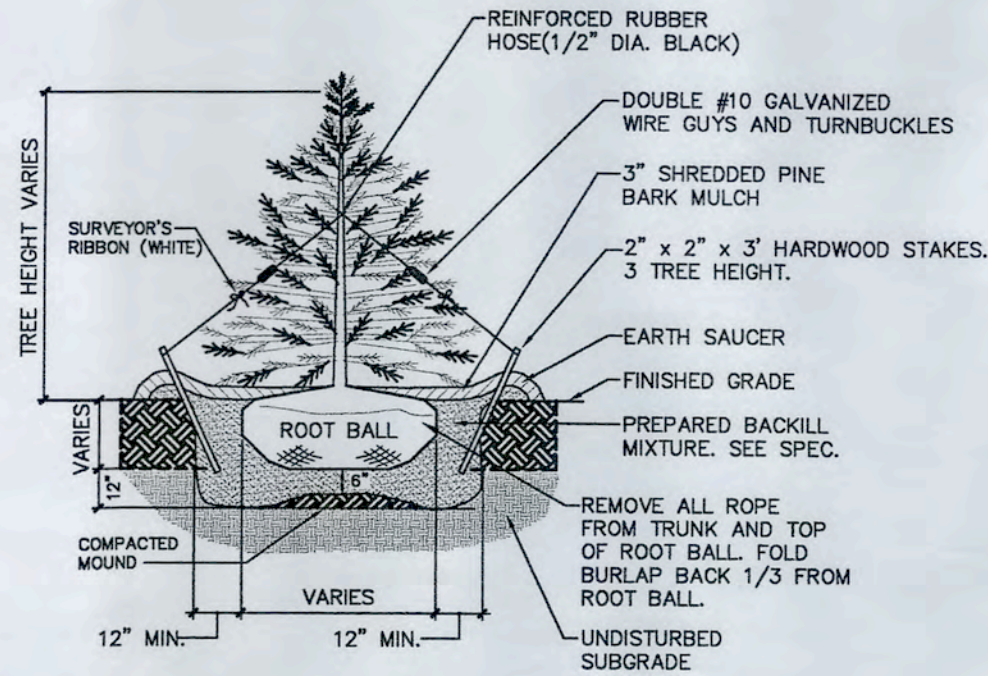
GRASSES, BULBS, PERENNIALS & GROUNDCOVERS TABLE

SYMBOL	SCIENTIFIC NAME	COMMON NAME	SIZE	REMARKS	QUANTITY
HES	HEMEROCALLIS STELLA D'ORO	EVERFLOWING YELLOW DAYLILY	1 GAL.	18" O.G.	274
PAH	PERNETSETUM ALOPECUROIDES HAMELIN	DWARF FOUNTAIN GRASS	1 GAL.	24" O.G.	20
PT	PACHYSANDRA TERMINALIS	PACHYSANDRA	ROOTED CUTTINGS FROM PLANTS	6" O.G.	120



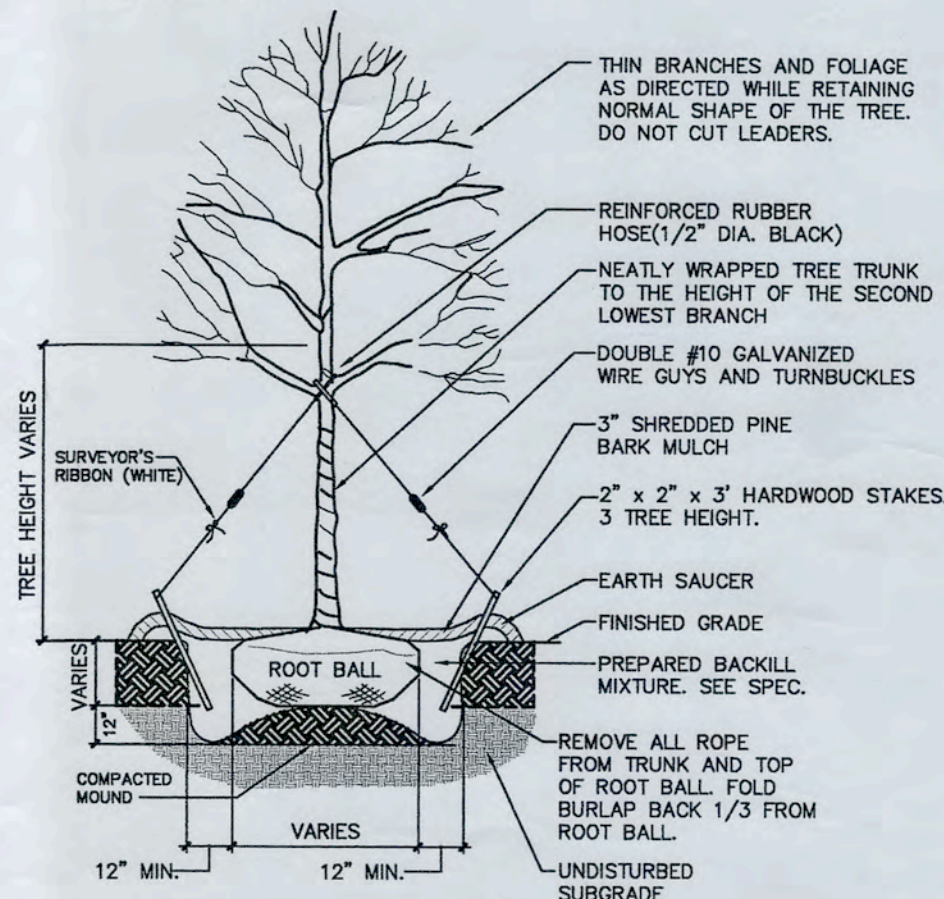
GROUNDCOVER PLANTING
NOT TO SCALE

- NOTES:
1. NO SOIL OR MULCH SHALL BE PLACED AGAINST ROOT COLLAR OF PLANT.
2. PLANTING DEPTH SHALL BE THE SAME OR HIGHER AS GROWN IN NURSERY.



EVERGREEN TREE PLANTING DETAIL
FOR 8' AND ABOVE HEIGHT
NOT TO SCALE

- NOTES:
1. NO SOIL OR MULCH SHALL BE PLACED AGAINST ROOT COLLAR OF PLANT.
2. PLANTING DEPTH SHALL BE THE SAME OR HIGHER AS GROWN IN NURSERY.



DECIDUOUS TREE PLANTING DETAIL
FOR 2.5" CAL. AND ABOVE
NOT TO SCALE

WETLAND SEED MIXTURE

COMMON NAME	SCIENTIFIC NAME	NW	COMMENTS
Lurid sedge	Carex lurida	OBL	A low ground cover that tolerates varying hydrology, prolific seeder in second growing season.
Fowl meadow grass	Glyceria canadensis	OBL	Prolific seed producer & valuable wildlife seed source
Fringed sedge	Carex crinita	OBL	Medium to large sedge that tolerates saturated areas, good seed producer.
Joe-Pye-Weed	Eupatorium maculatum	FACW	Flowering plant that is valuable for wildlife cover. Grows to 4 feet.
Broom sedge	Carex spp., Ovales group	FACW+, OBL	Tolerates wide range of hydrologic conditions.
Soft rush	Juncus effusus	FACW+	Tolerates a variety of hydrologic conditions. Good wildlife cover.
Woolgrass	Scirpus cyperinus	FACW+	Tolerates fluctuating hydrology.
Boneset	Eupatorium perfoliatum	FACW+	Flowering plant that is valuable for wildlife cover, grows to 3 feet.
Tussock sedge	Carex stricta	OBL	Creates elevated hummocks on wet sites, may remain level on drier sites.
Blue vervain	Verbena hastata	FACW+	A native plant that bears attractive blue flowers.

SLOPE STABILIZATION MIX

3/4 lb/1000 s.f.
New England Roadside Matrix Mix
Species
Grasses
Meadow fescue (Festuca pratensis), Switch Grass (Panicum virgatum), Deertongue (Panicum clandestinum), Big Bluestem (Andropogon gerardii), Indian Grass (Sorghastrum nutans), and Little Bluestem (Andropogon scoparius).
Wildflowers
Black-eyed Susan (Rudbeckia hirta), Lance-leaved Coreopsis (Coreopsis lanceolata), Oxeye Daisy (Chrysanthemum leucanthemum), Partridge Pea (Chamaecrista fasciculata), and Showy Tick-trefoil (Desmodium canadense).

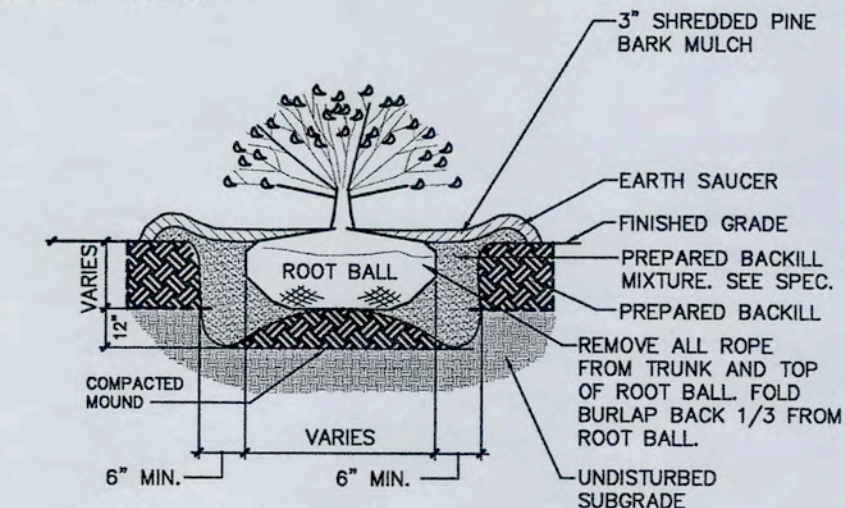
GENERAL PLANTING NOTES

- ALL PLANT MATERIAL SHALL CONFORM TO THE STANDARDS OF THE AMERICAN ASSOCIATION OF NURSERYMEN OR THE PLANT MATERIAL WILL BE UNACCEPTABLE. ALL PLANT MATERIAL SHALL BE TRUE TO SPECIES, VARIETY, SIZE AND BE CERTIFIED DISEASE AND INSECT FREE. THE OWNER AND/OR THE LANDSCAPE ARCHITECT RESERVES THE RIGHT TO APPROVE ALL PLANT MATERIAL ON SITE PRIOR TO INSTALLATION.
- ALL PLANT MATERIAL SHALL BE PROPERLY GUYED, STAKED, WRAPPED AND PLANTED IN CONFORMANCE WITH THE TYPICAL PLANTING DETAILS. GUY WIRES SHALL BE ATTACHED TO THE TREE AT A HEIGHT OF TWO-THIRDS THE HEIGHT OF THE TREE AND SHOULD BE LOCATED AT POINTS SO AS NOT TO SPLIT THE TRUNKS OF MULTI-STEMMED TREES. PROVIDE THREE STAKES PER TREE UNLESS NOTED OTHERWISE. INSTALL ALL PLANT MATERIAL ON UNDISTURBED GRADE. PROVIDE BURLAP WRAPPING WITH A 50% OVERLAP. CUT AND REMOVE BURLAP FROM TOP ONE-THIRD OF THE ROOT BALL.
- PROVIDE PLANTING PITS AS INDICATED ON PLANTING DETAILS. BACKFILL PLANTING PITS WITH ONE PART EACH OF TOPSOIL, PEAT MOSS AND PARENT MATERIAL. IF WET SOIL CONDITIONS EXIST THEN PLANTING PITS SHALL BE EXCAVATED AN ADDITIONAL 12" AND FILLED WITH SAND.
- NEWLY INSTALLED PLANT MATERIAL SHALL BE WATERED AT THE TIME OF INSTALLATION. REGULAR WATERING SHALL BE PROVIDED TO ENSURE THE ESTABLISHMENT, GROWTH AND SURVIVAL OF ALL PLANTS.
- ALL PLANT MATERIAL SHALL BE GUARANTEED FOR ONE YEAR AFTER THE DATE OF FINAL ACCEPTANCE. ANY PLANT MATERIAL THAT DIES WITHIN THAT TIME PERIOD SHALL BE REMOVED, INCLUDING THE STUMP, AND REPLACED BY A TREE OF SIMILAR SIZE AND SPECIES AT THE EXPENSE OF THE DEVELOPER.
- THE LANDSCAPE CONTRACTOR SHALL PROVIDE A MINIMUM 6" LAYER OF TOPSOIL IN ALL LAWN AREAS AND A MINIMUM OF 12" OF TOPSOIL IN ALL PLANTING AREAS. A FULL SOIL ANALYSIS SHALL BE CONDUCTED AFTER CONSTRUCTION AND PRIOR TO PLANTING TO DETERMINE THE EXTENT OF SOIL AMENDMENT REQUIRED.
- ALL DISTURBED LAWN AREAS SHALL BE STABILIZED WITH EITHER SOD OR SEED AS INDICATED ON THE LANDSCAPE PLANS. SEED SHALL CONSIST OF THE MIXTURE LISTED IN THE GENERAL SEEDING NOTES. ALL DISTURBED LAWN AREAS SHALL BE TOPSOILED, LIMED, FERTILIZED AND FINE GRADED PRIOR TO LAWN INSTALLATION.
- ALL PLANTING BEDS SHALL RECEIVE 3" OF SHREDDED PINE BARK MULCH.
- ALL SHRUB MASSES SHALL BE PLANTED IN CONTINUOUS MULCHED BEDS.

GENERAL SEEDING NOTES

- PERMANENT SEEDING SHALL CONSIST OF THE FOLLOWING MIXTURE OR APPROVED EQUAL - OPTIMUM SEEDING DATES ARE BETWEEN APRIL 1 AND MAY 31 AND AUGUST 16 AND OCTOBER 15.
SUMMER STRESS MIXTURE (LOFTS SEED INC.)
90% REBEL II OR TRIBUTE TALL FESCUE
10% NASSAU OR BARON KENTUCKY BLUEGRASS
SEEDING RATE: 5# PER 1,000 SQ. FT. OR 200# PER ACRE.
- PERMANENT SEEDING TO BE APPLIED BY RAKING OR DRILLING INTO THE SOILS AT A RATE OF 150# PER ACRE. SLOPED AREA TO BE COVERED WITH MULCH AS INDICATED IN NOTE 4.
- FERTILIZER FOR THE ESTABLISHMENT OF TEMPORARY AND PERMANENT VEGETATIVE COVER SHALL BE 10-10-10 APPLIED AT A RATE OF 15# PER 1,000 SQ. FT. OR AS DETERMINED BY SOIL TESTS. LIMESTONE FOR TEMPORARY SEEDING SHALL BE APPLIED AT A RATE OF 90# PER 1,000 SQ. FT. LIMESTONE FOR PERMANENT SEEDING SHALL BE APPLIED AT A RATE OF 135# PER 1,000 SQ. FT.
- MULCH TO CONSIST OF SMALL GRAIN STRAW OR SALT HAY ANCHORED WITH A WOOD AND FIBER MULCH BINDER OR AN APPROVED EQUAL. MULCH WILL BE SPREAD AT RATES OF 90 TO 115 LBS. PER 1,000 SQ. FT. AND ANCHORED WITH A MULCH ANCHORING TOOL OR LIQUID MULCH BINDER AND SHALL BE PROVIDED ON ALL SEEDINGS. HYDROMULCH SHALL ONLY BE USED DURING OPTIMUM GROWING SEASONS.

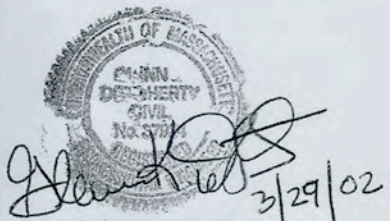
- NOTES:
1. NO SOIL OR MULCH SHALL BE PLACED AGAINST ROOT COLLAR OF PLANT.
2. PLANTING DEPTH SHALL BE THE SAME OR HIGHER AS GROWN IN NURSERY.



SHRUB PLANTING DETAIL
NOT TO SCALE

Revisions

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3/29/02	GENERAL CONSTRUCTION COORDINATION REVISIONS



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CONSTRUCTION PLANS**
For
**Liberty Mutual
Research Center**
Hopkinton
MA

Prepared For

LIBERTY MUTUAL GROUP
175 Berkeley Street
Boston, MA
02116

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Consulting
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Drawing Title

**DETAIL
SHEET**

Date FEB. 6, 2002	Drawing No.
Proj. Mgr. G.K.D.	
Design G.K.D.	
Check	
Drawn J.V.B.	
Job No. 2.1987.00	
Last Rev. 3/29/02	of 20

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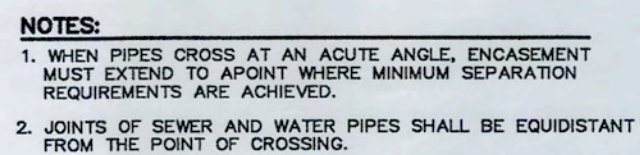
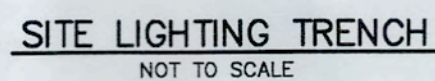
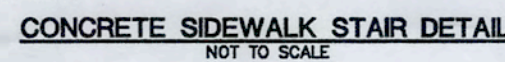
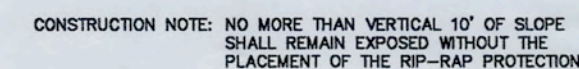
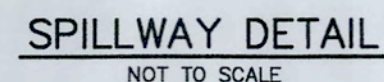
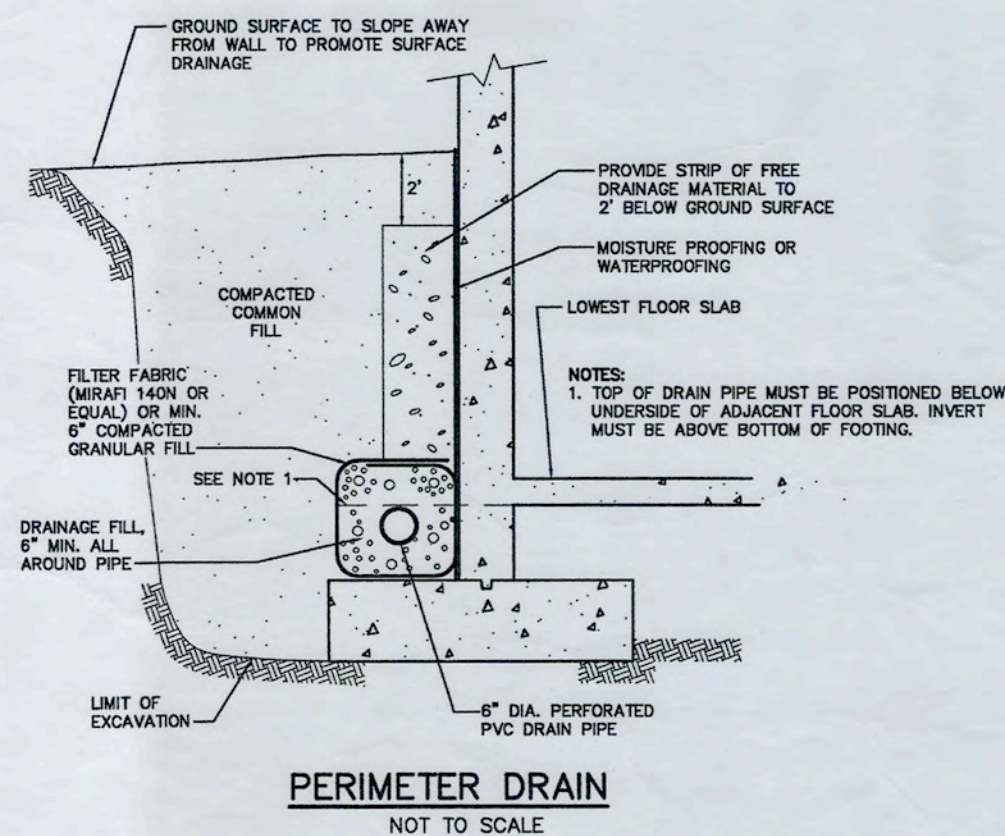
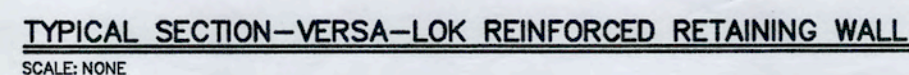
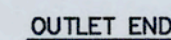
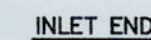


Figure 1 is a cross-sectional diagram of a concrete specimen. It is a square with a side length of 6 inches. A circular hole is located in the upper-left quadrant. The hole has a nominal diameter of 3 inches. The hole is filled with 3000# concrete. The hole is positioned 1 inch from the top and left edges and 5 inches from the bottom and right edges. The surrounding concrete is labeled '3000# CONCRETE'. The hole is labeled 'NOMINAL DIAMETER'.

CONCRETE ENCASEMENT DETAIL
Not To Scale



PLACED STONE RIP-RAP SLOPE
NOT TO SCALE



DIA.	W	A	B	C	D	E	BD	K	L	P	DIA. 13"	R ₁	R ₂	S	G	SLO.
12"	2"	4"	2'-0"	4'-0 $\frac{1}{2}$ "	6'-1 $\frac{1}{2}$ "	2'-0"	20"	4'-6 $\frac{1}{2}$ "	6'-6 $\frac{1}{2}$ "	19' $\frac{1}{2}$ "	13"	10' $\frac{1}{2}$ "	9"	4"	2' $\frac{1}{2}$ "	3:
15"	2 $\frac{1}{2}$ "	6"	2'-3"	3'-10"	6'-1 $\frac{1}{2}$ "	2'-6"	24"	4'-3 $\frac{1}{2}$ "	6'-0 $\frac{1}{2}$ "	24 $\frac{1}{2}$ "	16"	12' $\frac{1}{2}$ "	11"	4"	2' $\frac{1}{2}$ "	3:
18"	2 $\frac{1}{2}$ "	9"	2'-3"	3'-10"	6'-1"	3'-0"	28"	3'-5 $\frac{1}{2}$ "	6'-8"	28 $\frac{1}{2}$ "	15"	15' $\frac{1}{2}$ "	12"	4"	2 $\frac{1}{2}$ "	3:
24"	3"	9 $\frac{1}{2}$ "	3'-7 $\frac{1}{2}$ "	2'-6"	6'-1"	3'-0"	36"	3'-5 $\frac{1}{2}$ "	6'-8"	33 $\frac{1}{2}$ "	25"	16' $\frac{1}{2}$ "	14"	4"	3"	3:

FLARED END SECTION
NOT TO SCALE

3/29/07

SITE
CONSTRUCTION PLANS
For
**Liberty Mutual
Research Center**
•
Hopkinton
MA

Prepared For

LIBERTY MUTUAL GROUP

175 Berkeley Street
Boston, MA
02116

**Daylor
Consulting
Group
Inc.**

Ten Forbes Road
Braintree, MA 02184
781-849-7070
FAX 781-849-0096

Drawing Title

DETAIL SHEET

Date FEB. 6, 2002	Drawing No. 15 of 20
Proj. Mgr. G.K.D.	
Design G.K.D.	
Check	
Drawn J.V.B.	
Job. No. 2.1987.00	
Last Rev. 3/29/02	

1987 CONST. DETAILS S.D.W.

Revisions
3/11/02 CONSTRUCTION DETAILS
3/29/02 GENERAL CONSTRUCTION COORDINATION REVISIONS

Project Title
SITE
CONSTRUCTION PLANS
For
Liberty Mutual
Research Center
Hopkinton
MA

Prepared For
LIBERTY MUTUAL GROUP
175 Berkeley Street
Boston, MA
02116

Daylor
Consulting
Group
Inc.

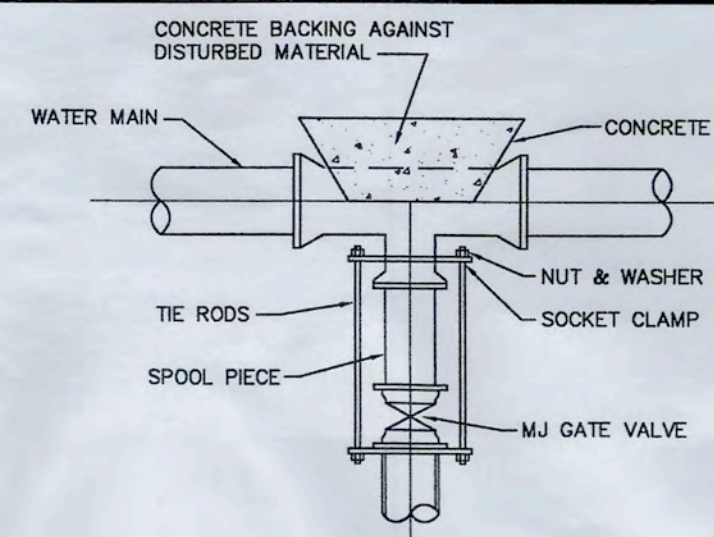
Ten Forbes Road
Braintree, MA 02184
781-849-7070
FAX 781-849-0096

Drawing Title

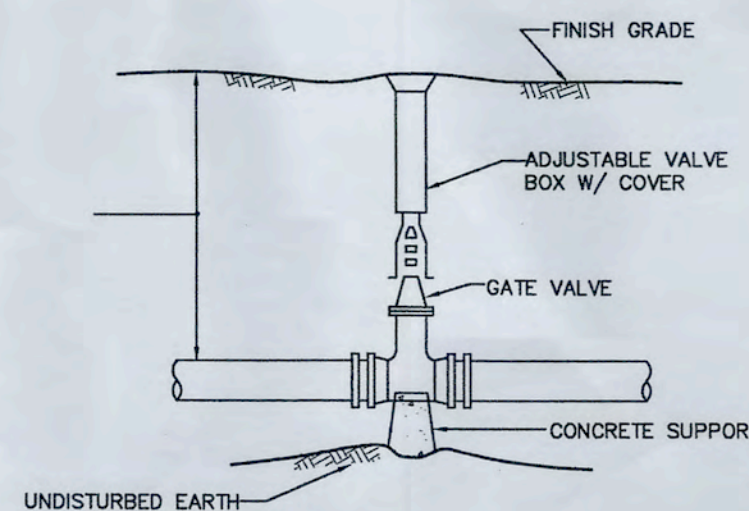
DETAIL
SHEET

Date FEB. 6, 2002
Proj. Mgr. G.K.D.
Design G.K.D.
Check
Drawn J.V.B.
Job. No. 2.1987.00
Last Rev. 3/29/02

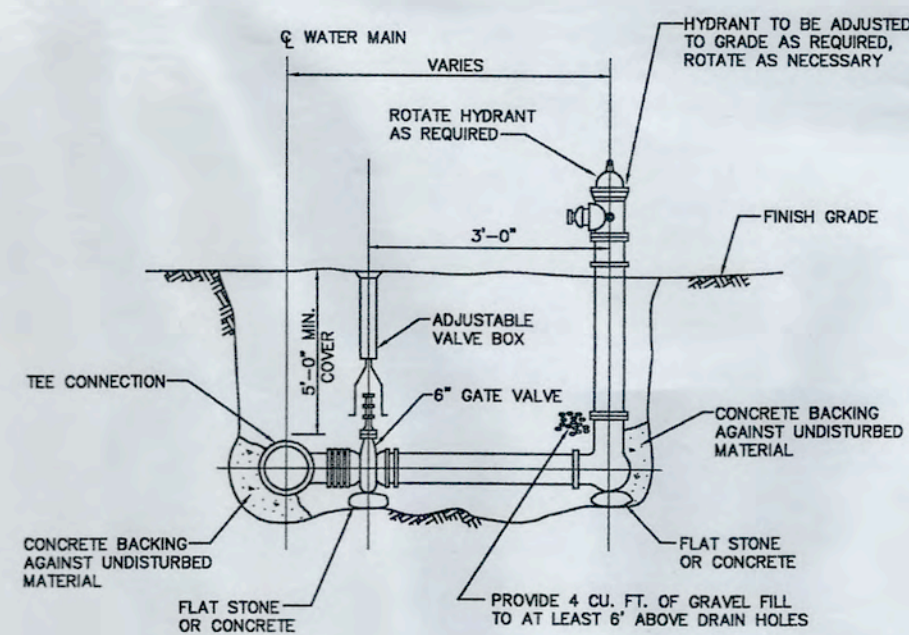
Drawing No.
16
of 20
1997 CONST. DETAILS.DWG



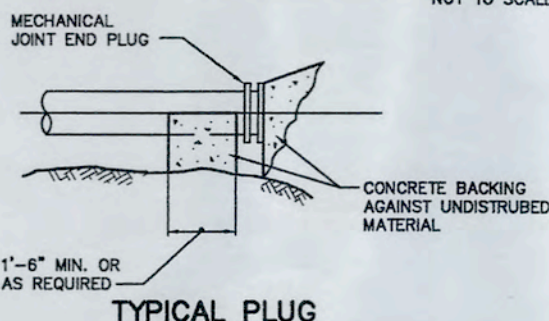
TYPICAL VALVE CONNECTION
RESTRAINED JOINT TEE
NOT TO SCALE



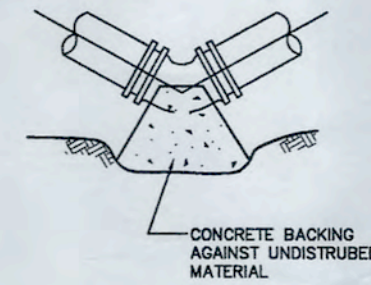
TYPICAL GATE VALVE
NOT TO SCALE



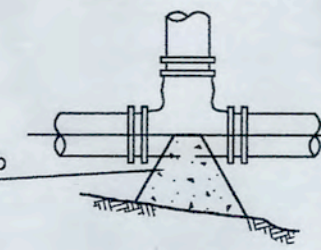
TYPICAL HYDRANT AND VALVE DETAIL
NOT TO SCALE



TYPICAL PLUG



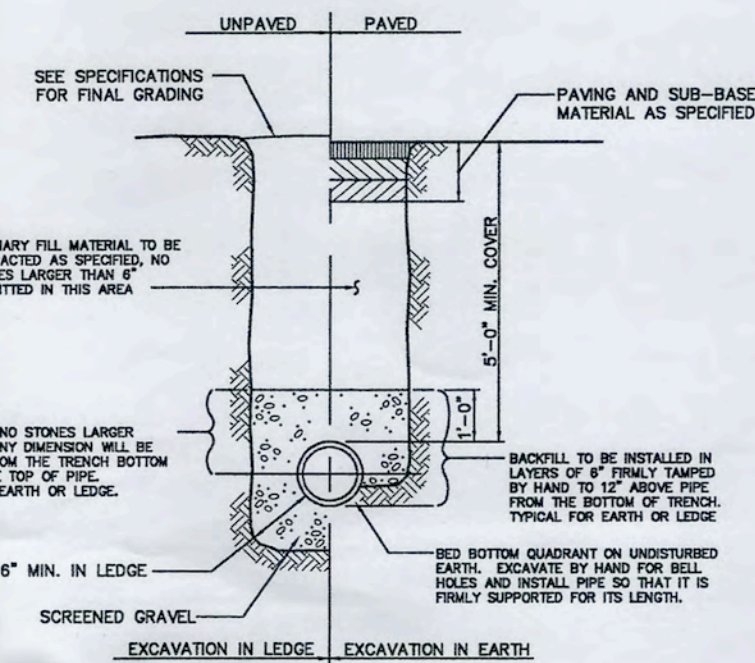
TYPICAL BEND



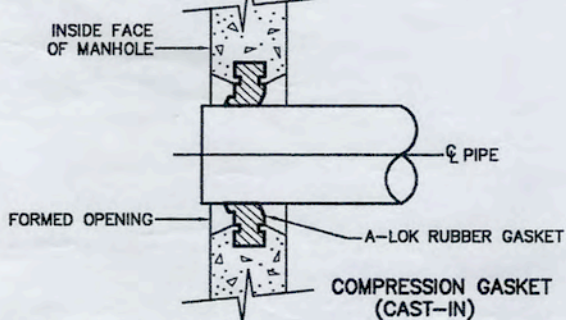
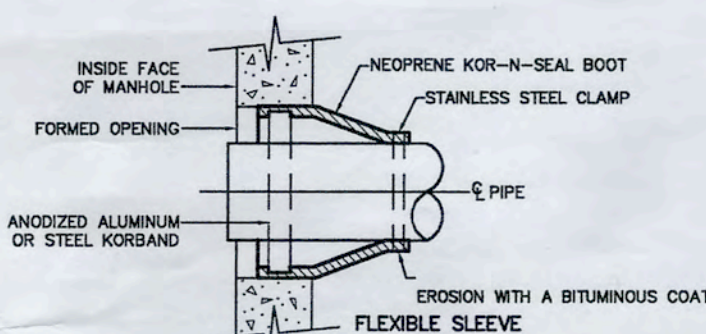
TYPICAL TEE

TABLE OF BEARING AREAS IN SQUARE FEET AGAINST UNDISTURBED MATERIAL FOR WATER MAIN FITTINGS			
SIZE OF MAIN (IN.)	45°	TEES & BENDS	22 1/2° BEND
8" & LESS	8	10	8
10" & 12"	22	16	13

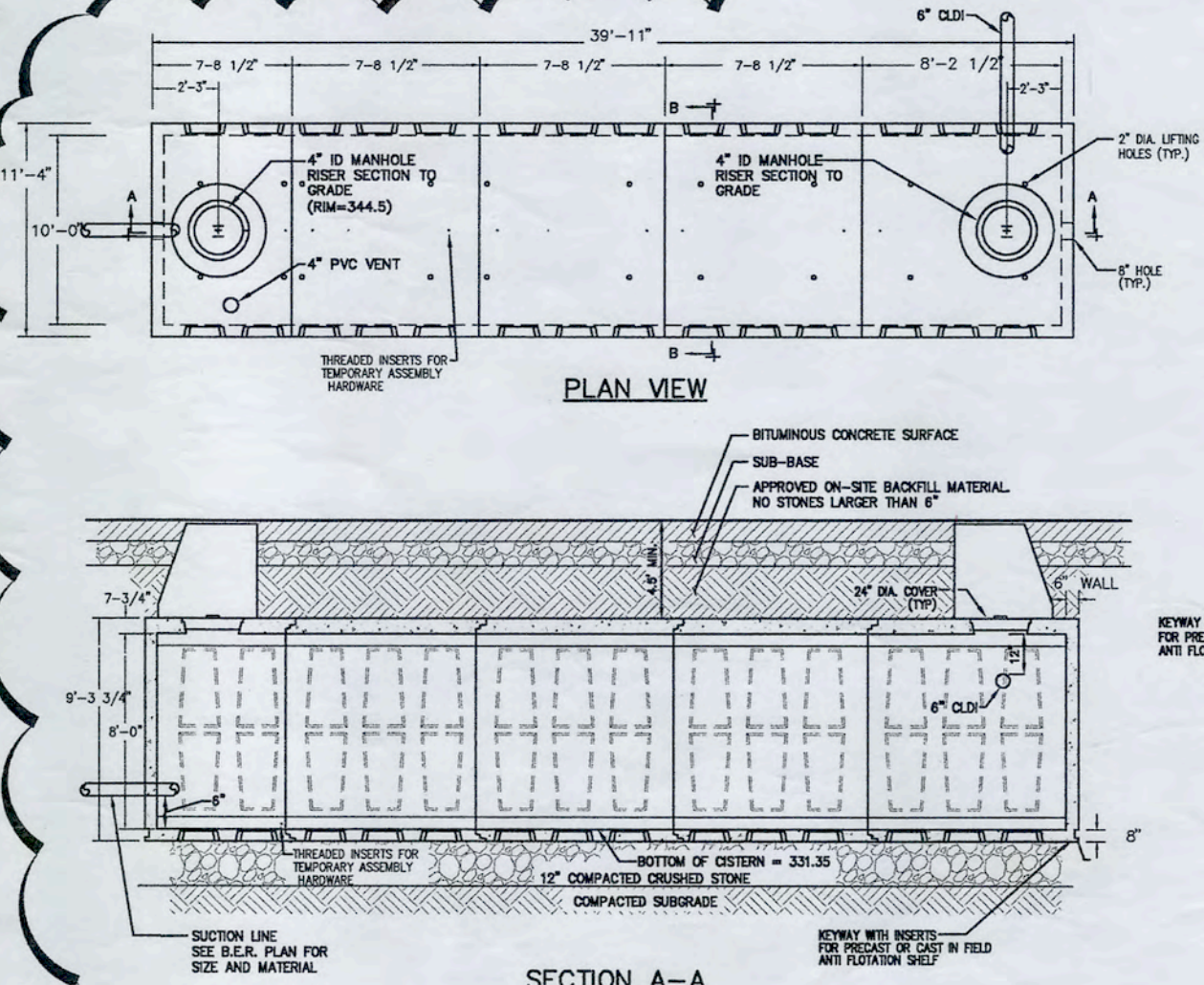
THRUST BLOCK DETAIL
NOT TO SCALE



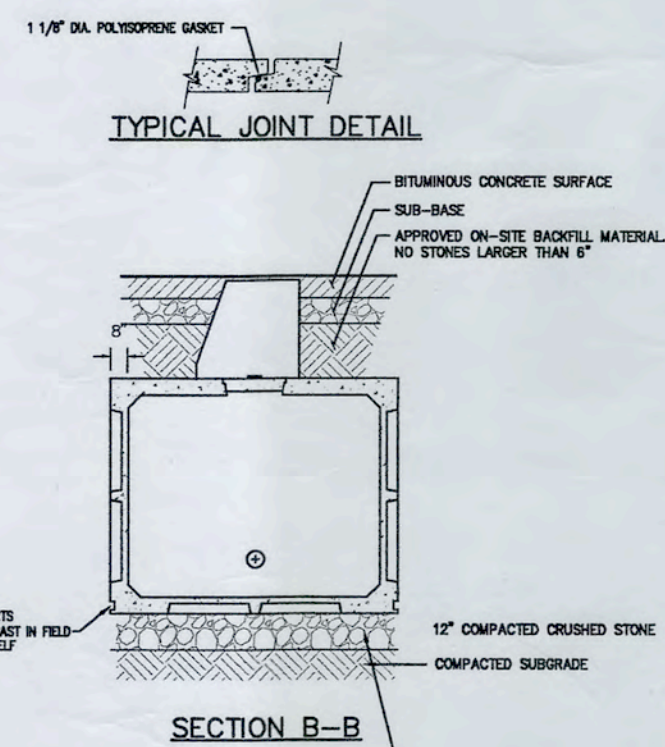
TYPICAL TRENCH DETAIL
CEMENT LINED DUCTILE IRON (CLDI) PIPE
NOT TO SCALE



PIPE TO MANHOLE CONNECTIONS
NOT TO SCALE



20,000 GALLON FIRE CISTERN
NOT TO SCALE

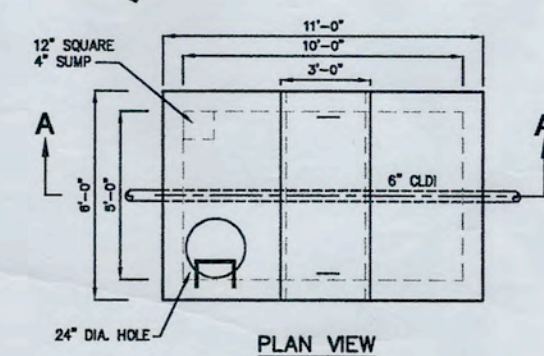


SECTION B-B

NOTES:
CONTRACTOR SHALL DO A TEST PIT TO VERIFY SEASONAL HIGH GROUNDWATER ELEVATION IN THE PRESENCE OF THE ENGINEER.

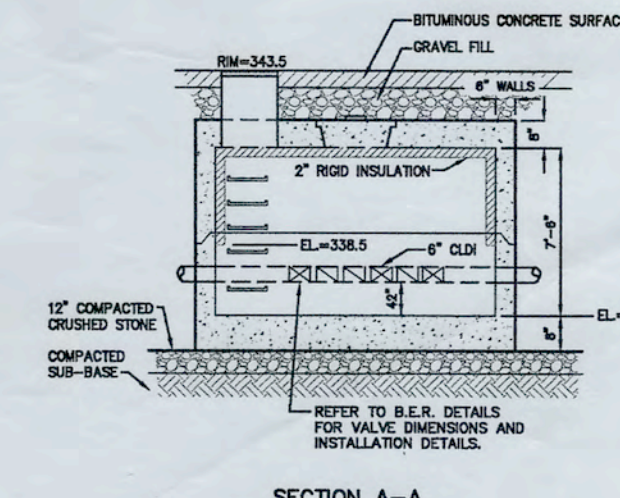
TANK SHALL BE WATERTIGHT LWT 8x10-20 AS MANUFACTURED BY ROTONDO & SONS OR APPROVED EQUAL.

- NOTES:
1. CONCRETE - 5,000 P.S.I. MINIMUM STRENGTH @ 28 DAYS
 2. STEEL REINFORCEMENT - ASTM A-615, GRADE 60
 3. COVER TO STEEL - 1" MINIMUM
 4. TANKS ARE DESIGNED TO MEET ASTM C858 AND ACI 318 WITH AASHTO HS-20 LOADING
 5. EARTH COVER 0-8 FEET
 6. CONSTRUCTION JOINT - SEALED WITH 1" DIA. POLYISOPRENE O-RING



PLAN VIEW

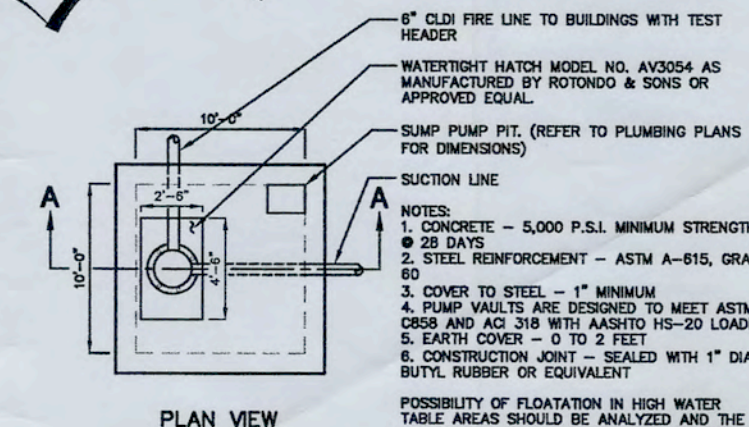
TANK SHALL BE WATERTIGHT MP8X10-B AS MANUFACTURED BY ROTONDO & SONS OR APPROVED EQUAL.



SECTION A-A

- NOTES:
1. CONCRETE - 5,000 P.S.I. MINIMUM STRENGTH @ 28 DAYS
 2. STEEL REINFORCEMENT - ASTM A-615, GRADE 60
 3. COVER TO STEEL - 1" MINIMUM
 4. VAULTS ARE DESIGNED TO MEET ASTM C857 AND ACI 318 WITH AASHTO HS-20 LOADING
 5. CONSTRUCTION JOINT - SEALED WITH BUTYL RUBBER RESIN OR EQUIVALENT

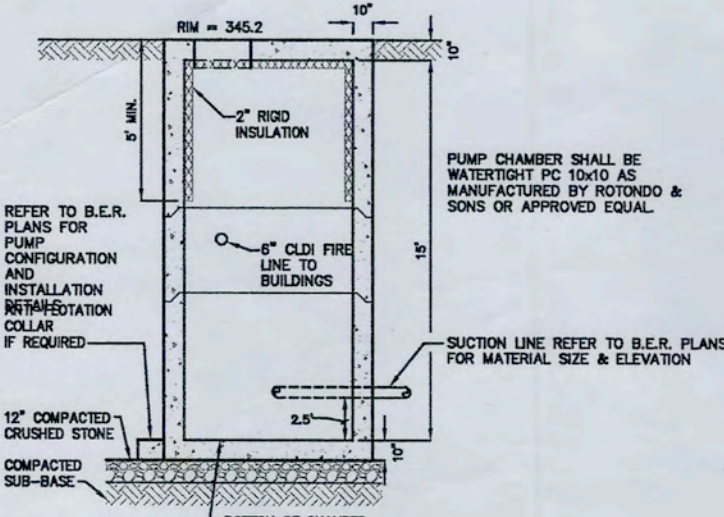
BACKFLOW PREVENTOR & FLOAT VALVE PIT DETAIL
NOT TO SCALE



PLAN VIEW

- NOTES:
1. CONCRETE - 5,000 P.S.I. MINIMUM STRENGTH @ 28 DAYS
 2. STEEL REINFORCEMENT - ASTM A-615, GRADE 60
 3. COVER TO STEEL - 1" MINIMUM
 4. PUMP VAULTS ARE DESIGNED TO MEET ASTM C858 AND ACI 318 WITH AASHTO HS-20 LOADING
 5. EARTH COVER 0 TO 2 FEET
 6. CONSTRUCTION JOINT - SEALED WITH 1" DIA. BUTYL RUBBER OR EQUIVALENT

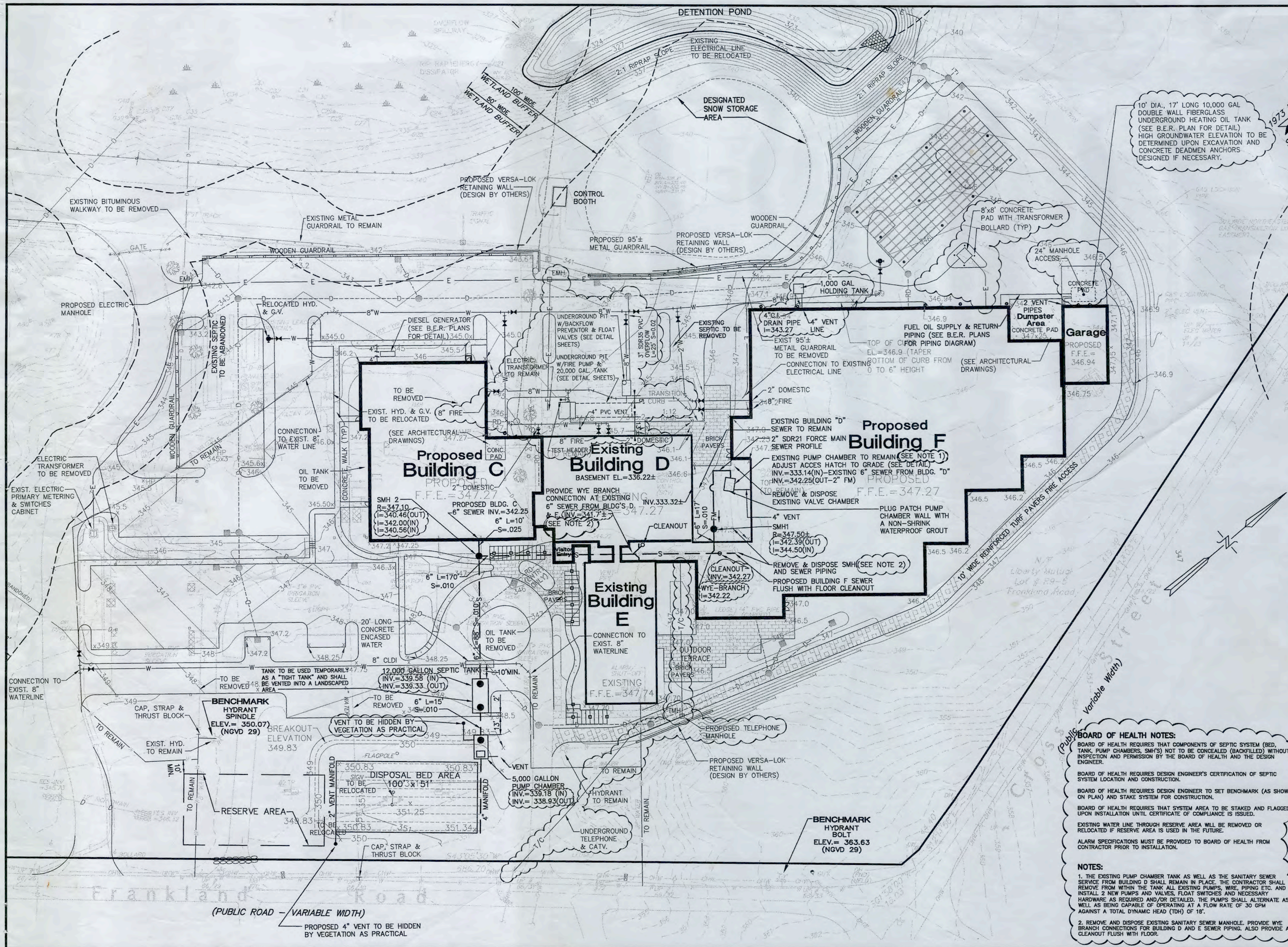
POSSIBILITY OF FLOATION IN HIGH WATER TABLE AREAS SHOULD BE ANALYZED AND THE APPROPRIATE ANTI-FLOATION COLLARS ADDED IF REQUIRED.



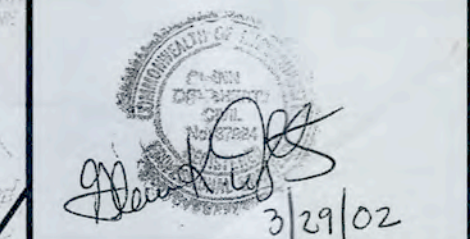
FIRE PUMP CHAMBER DETAIL
NOT TO SCALE

PUMP CHAMBER SHALL BE WATERTIGHT PC 10x10 AS MANUFACTURED BY ROTONDO & SONS OR APPROVED EQUAL.

SUCTION LINE REFER TO B.E.R. PLANS FOR MATERIAL SIZE & ELEVATION



Revisions	
3/11/02	CONSTRUCTION REVISIONS
3/18/02	TREE PROTECTION/ TRANSPLANT PLAN CREATED
3/29/02	GENERAL CONSTRUCTION COORDINATION REVISIONS



Project Title
**SITE
CONSTRUCTION PLANS
For
Liberty Mutual
Research Center
Hopkinton
MA**

Prepared For
**LIBERTY MUTUAL GROUP
175 Berkeley Street
Boston, MA
02116**

**Daylor
Consulting
Group
Inc.**

Ten Forbes Road
Braintree, MA 02184
781-849-7070
FAX 781-849-0096

Drawing Title
**SANITARY
SEWER
DISPOSAL
SYSTEM
PLAN**

Scale: 1"=30'
0 15 30 60 75 FEET

Date FEB. 6, 2002	Drawing No.
Proj. Mgr. G.K.D.	17 of 20
Design R.D.L.	
Check J.V.B.	
Drawn J.V.B.	
Job No. 1.1987.00	
Last Rev. 3/29/02	

BOARD OF HEALTH NOTES:
BOARD OF HEALTH REQUIRES THAT COMPONENTS OF SEPTIC SYSTEM (BED, TANK, PUMP CHAMBERS, SM'S) NOT BE CONCEALED (BACKFILLED) WITHOUT INSPECTION AND PERMISSION BY THE BOARD OF HEALTH AND THE DESIGN ENGINEER.
BOARD OF HEALTH REQUIRES DESIGN ENGINEER'S CERTIFICATION OF SEPTIC SYSTEM LOCATION AND CONSTRUCTION.
BOARD OF HEALTH REQUIRES DESIGN ENGINEER TO SET BENCHMARK (AS SHOWN ON PLAN) AND STAKE SYSTEM FOR CONSTRUCTION.
BOARD OF HEALTH REQUIRES THAT SYSTEM AREA TO BE STAKED AND FLAGGED UPON INSTALLATION UNTIL CERTIFICATE OF COMPLIANCE IS ISSUED.
EXISTING WATER LINE THROUGH RESERVE AREA WILL BE REMOVED OR RELOCATED IF RESERVE AREA IS USED IN THE FUTURE.
ALARM SPECIFICATIONS MUST BE PROVIDED TO BOARD OF HEALTH FROM CONTRACTOR PRIOR TO INSTALLATION.

NOTES:
1. THE EXISTING PUMP CHAMBER TANK AS WELL AS THE SANITARY SEWER SERVICE FROM BUILDING D SHALL REMAIN IN PLACE. THE CONTRACTOR SHALL REMOVE FROM WITHIN THE TANK ALL EXISTING PUMPS, WIRE, PIPING ETC. AND INSTALL 2 NEW PUMPS AND VALVES, FLOAT SWITCHES AND NECESSARY HARDWARE AS REQUIRED AND/OR DETAILED. THE PUMPS SHALL ALTERNATE AS WELL AS BEING CAPABLE OF OPERATING AT A FLOW RATE OF 30 GPM AGAINST A TOTAL DYNAMIC HEAD (TDH) OF 18'.
2. REMOVE AND DISPOSE EXISTING SANITARY SEWER MANHOLE. PROVIDE WYE BRANCH CONNECTIONS FOR BUILDING D AND E SEWER PIPING. ALSO PROVIDE A CLEANOUT FLUSH WITH FLOOR.

TEST PIT #1 GRD. EL. 349.75 TEST BY: DAYLOR CONSULTING GROUP
GW. EL. 339.75 WITNESSED BY: BETH A. KOCH, HOPKINTON, BOH
DATE: 7/24/01 MOTTILING EL. NONE CERTIFIED BY: GLENN K. DOUGHERTY, P.E.

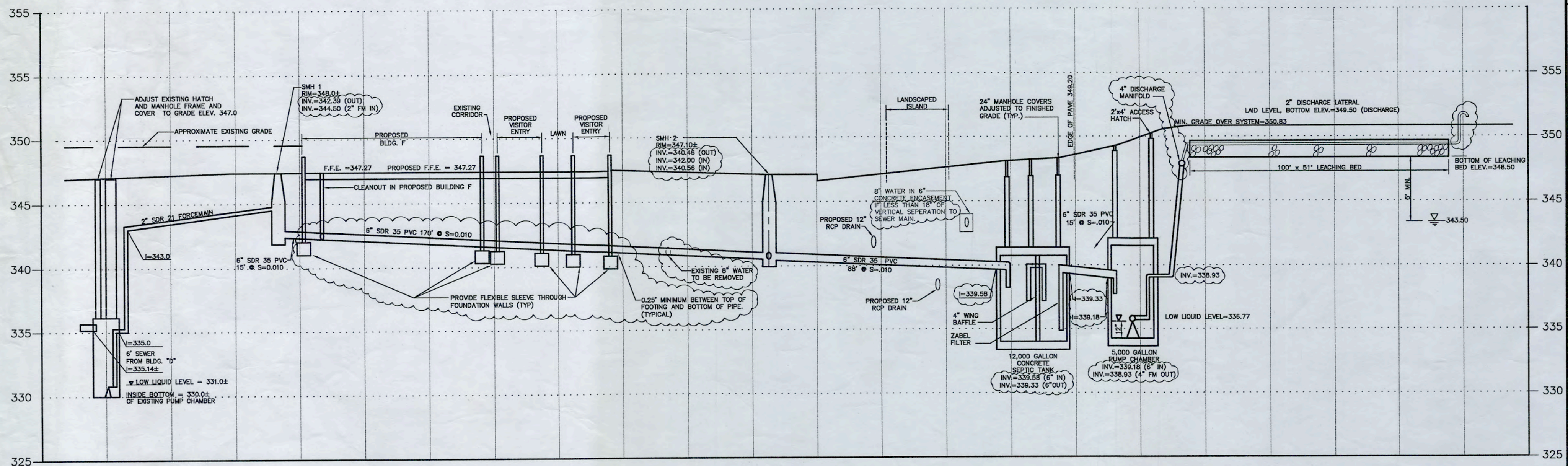
ELEV.	SURFACE	SOIL	SOIL	SOIL	
349.75	DEPTH	HORIZON	TEXTURE	MOTTLING	OTHER
348.75	0"-12"	A	SANDY LOAM	NO	
347.75	12"-24"	B	SANDY LOAM	NO	
344.75	24"-60"	C1	LOAMY SAND	NO	SINGLE GRAIN MANY STONES BOULDERS
339.75	60"-120"	C2	FIRM LOAMY SAND	NO	SINGLE GRAIN MANY STONES BOULDERS 25% GRAVEL

BOTTOM
 WATER OBSERVED @
 NONE
 TOP PERC HOLE
 345.75
 PERC RATE:
 2 MIN./INCH

TEST PIT #2 GRD. EL. 348.50 TEST BY: DAYLOR CONSULTING GROUP
GW. EL. 343.50 WITNESSED BY: BETH A. KOCH, HOPKINTON, BO
DATE: 7/24/01 MOTTUNG EL. 343.50 CERTIFIED BY: GLENN K. DOUGHERTY, P.E.

ELEV.	SURFACE DEPTH	SOIL HORIZON	SOIL TEXTURE	SOIL MOTTLING	OTHER
348.50	0"-24"		FILL	NO	
345.50	24"-36"	A	SANDY LOAM	NO	FRIABLE
343.50	36"-60"	B	SANDY LOAM	60"	FRIABLE COBBLES
341.00	60"-90"	C1	FINE SAND		SINGLE GRAIN MANY COBBLES
337.83	90"-128"	C2	MED.-COARSE SAND		SINGLE GRAIN COBBLES, 10% GRAVEL

BOTTOM
 WATER OBSERVED @
60" (34.3)
 TOP PERC HOLE
 PERC RATE:
<2 MIN./INCH



Horizontal Scale: 1" = 20'
Vertical Scale: 1" = 4'

Revisions	
3/11/02	CONSTRUCTION DETAILS
3/29/02	GENERAL CONSTRUCTION COORDINATION REVISIONS

329/02

Project Title

SITE
CONSTRUCTION PLANS
For
Liberty Mutual
Research Center
•
Hopkinton
MA

Prepared For

LIBERTY MUTUAL GROUP
175 Berkeley Street
Boston, MA
02116

**Daylor
Consulting
Group
Inc.**

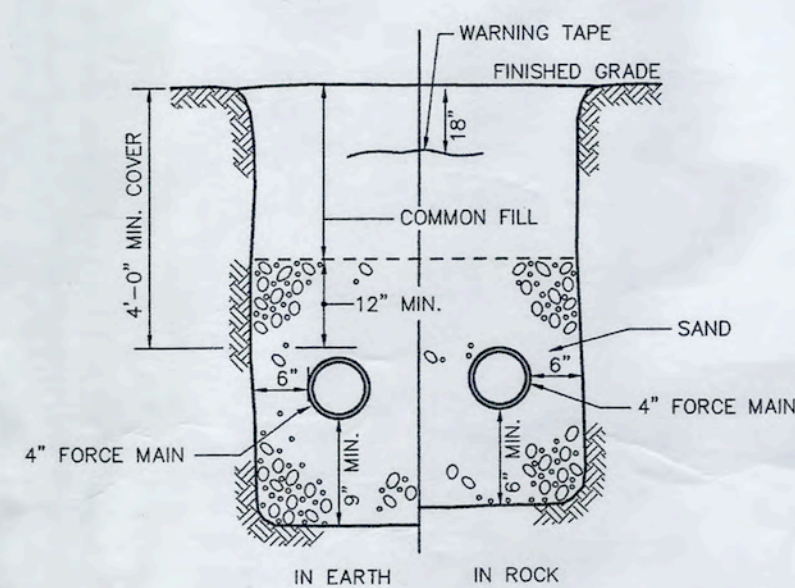
Ten Forbes Road
Braintree, MA 02184
781-849-7070
FAX 781-849-0096

Drawing Title

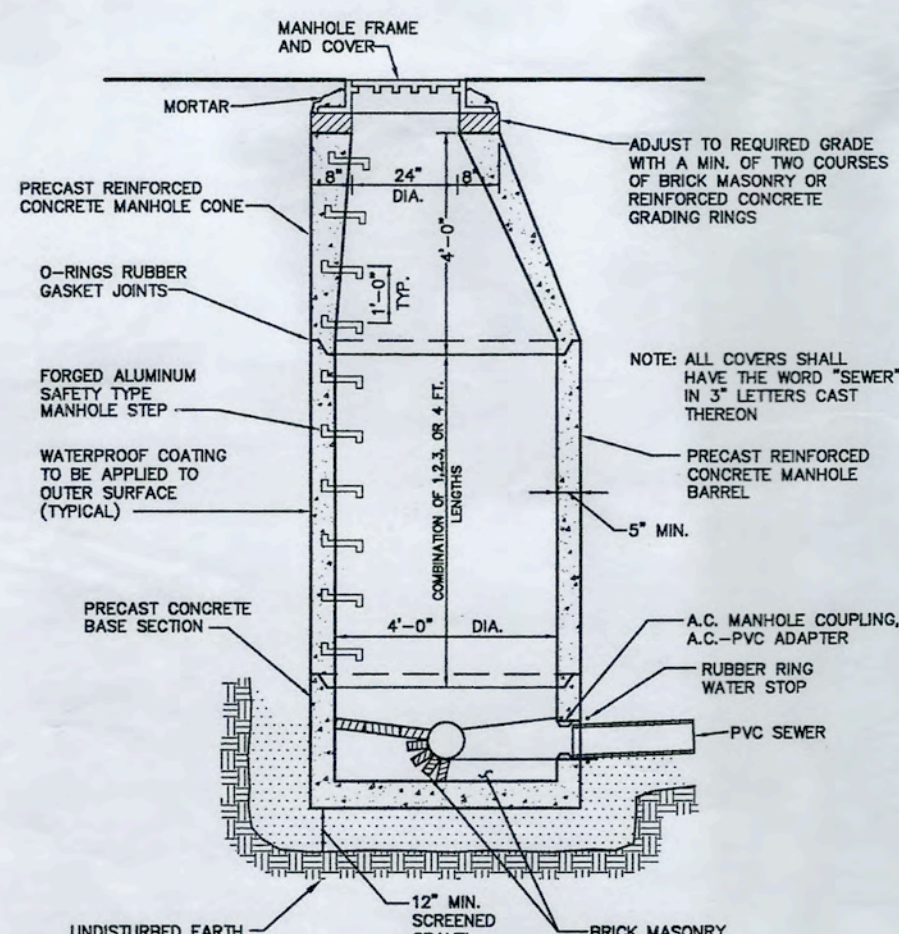
**SANITARY
SEWER
DISPOSAL
SYSTEM
DETAIL
SHEET**

Date FEB. 6, 2002	Drawing No. 18 of 20
Proj. Mgr. G.K.D.	
Design R.D.L.	
Check	
Drawn J.V.B.	
Job. No. 1.1987.00	
Last Rev. 3/29/02	

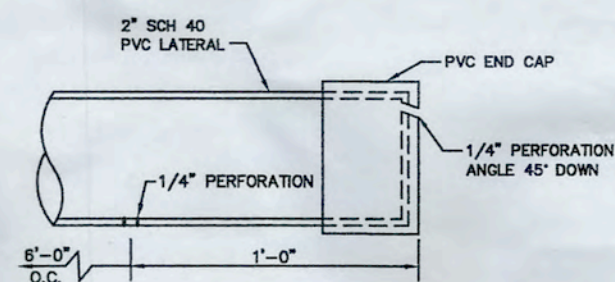
1987 CONST. DETAILS.DWG



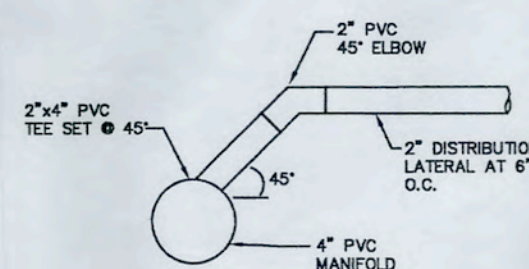
FORCE MAIN TRENCH DETAIL
NOT TO SCALE



STANDARD SEWER MANHOLE SECTION
NOT TO SCALE



CAP DETAIL AT DISTAL END OF DISTRIBUTION LATERALS
NOT TO SCALE



SECTION B - B
NOT TO SCALE

WITHIN AREA SHOWN, ALL UNSUITABLE MATERIAL (A & B HORIZONS) TO BE REMOVED AND REPLACED WITH SOIL CONSISTING OF CLEAN GRANULAR SAND, FREE FROM ORGANIC MATTER AND DELETERIOUS SUBSTANCES. MIXTURES AND LAYERS OF DIFFERENT CLASSES OF SOIL SHALL NOT BE USED. THE FILL SHALL NOT CONTAIN ANY MATERIAL LARGER THAN 2 INCHES. A SIEVE ANALYSIS, USING A #4 SIEVE, SHALL BE PERFORMED ON A REPRESENTATIVE SAMPLE OF THE FILL UP TO 45% BY WEIGHT OF THE FILL SAMPLE MAY BE RETAINED ON THE #4 SIEVE. SIEVE ANALYSES ALSO SHALL BE PERFORMED ON THE FRACTION OF THE FILL SAMPLE PASSING THE #4 SIEVE, SUCH ANALYSES MUST DEMONSTRATE THAT THE MATERIAL MEETS EACH OF THE FOLLOWING SPECIFICATIONS:

SIEVE SIZE	EFFECTIVE PARTICLE SIZE	% THAT MUST PASS SIEVE
# 4	4.75 MM	100%
# 50	0.30 MM	100%
# 100	0.15 MM	100%
# 200	0.075 MM	5%

SEPTIC SYSTEM DESIGN

FLOW
RESEARCH CENTER = 15 GPD/EMPLOYEE
FLOW = 250 EMPLOYEES(15 GPD/1,000 S.F.) = 3,750 GPD
DESIGNED FOR 3,750 GPD

SEPTIC TANK

FIRST DETENTION TIME 48 HOURS
FIRST VOLUME = (3,750 gpd x 2 days) = 7,500 gal
SECOND DETENTION TIME 24 HOURS
SECOND VOLUME = (3,750 gpd x 1 day) = 3,750 gal
USE ROTONDO LWT 8X10-12 (12,000 gal)

PUMP CHAMBER

USE ROTONDO ST 8X10-5,000 GAL.

SOIL ABSORPTION SYSTEM

PERC RATE 2 min/in
SOIL TYPE CLASS 1 - SAND, LOAMY SAND
LTAR - EFFLUENT LOADING RATE 0.74 gpd/sq.ft.
REQUIRED LEACHING AREA=(3,750 gpd)/(0.74 gpd/sq.ft.)=5,070 sq.ft.

USE LEACHING BED

BED DIMENSIONS
WIDTH 51'-0"
LENGTH 100'-0"
DEPTH 1'-0"

PROVIDED LEACHING AREA

USE BED AREA 100' LONG X 51' WIDE
BOTTOM AREA = 5100

5,100 SF > 5,070 S.F. O.K.

DOING

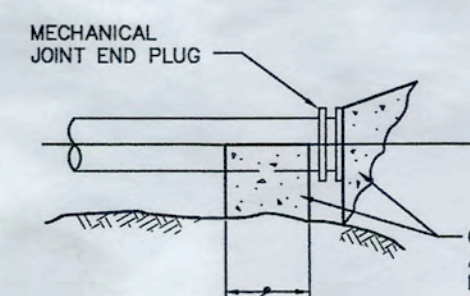
USE PRESSURE DOING

SAND, SANDY LOAM = DOSE 4 TIMES / DAY

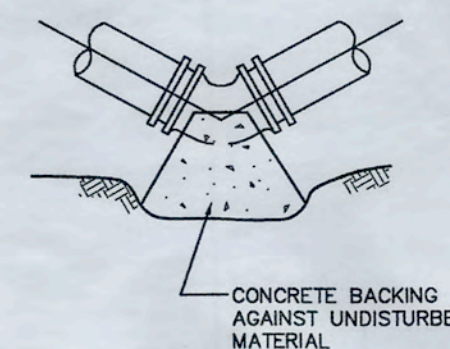
DOSE VOLUME = 3,750 gpd / (4 DOSES/DAY/1 BED = 940 gal/DOSE/BED

DOING NETWORK

USE 4" PVC FORCE MAIN
USE 4" PVC MANIFOLD
USE 2" PVC LATERALS
USE 0.25" PERFORATIONS SPACED 5'-0" ON CENTER

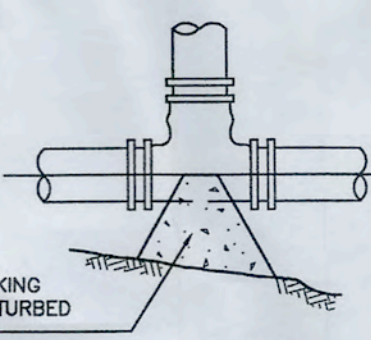


TYPICAL PLUG



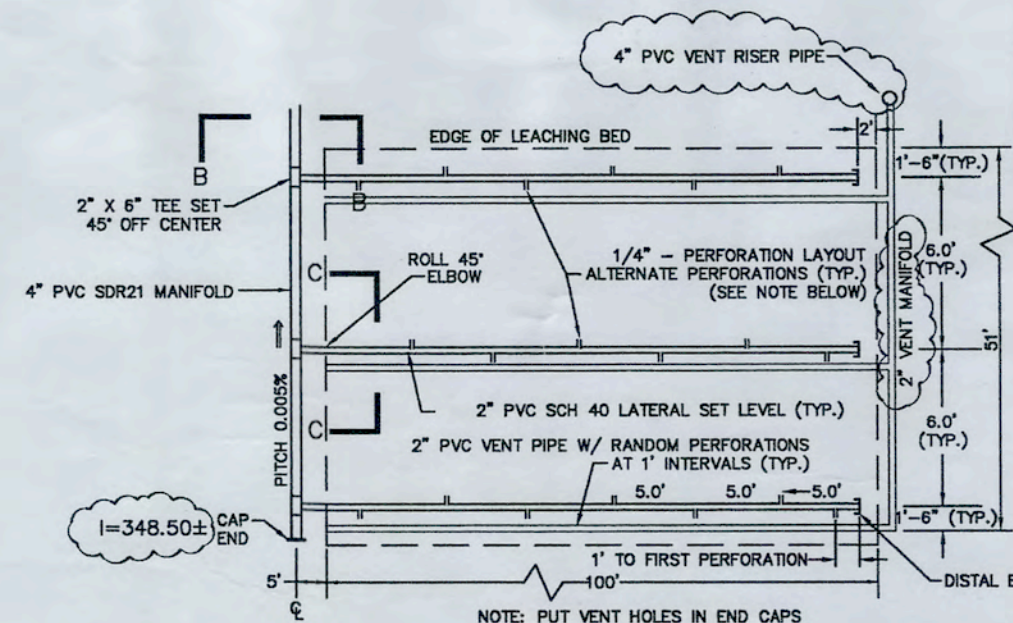
TYPICAL BEND

SIZE OF MAIN (IN.)	45° BEND	TEES & PLUGS	22 1/2° BEND	90° BEND
2"	.5	.6	.5	.8
4"	2	3	2	4



TYPICAL TEE

THRUST BLOCK DETAIL
NOT TO SCALE



LEACHING BED PLAN VIEW - SYSTEM LAYOUT (TYP.)

NOT TO SCALE
2" LATERALS SHALL BE PERFORATED WITH 1/4" HOLES ALTERNATING 30" OFF BOTTOM CENTER. THE FIRST PERFORATIONS SHALL BE 1' FROM THE DISTAL END AND THE REMAINING SHALL BE SPACED AT 5' ON CENTER INTERVALS-20 PERFORATIONS PER LATERAL.

INVERT ELEVATIONS

6" INVERT AT BUILDING "C"	342.25	4" INVERT AT ENDS OF MANIFOLD	348.50 ±
6" INVERT AT BUILDING "D" (EXISTING)	333.32 ±	INVERTS AT LEACHING FACILITY:	
2" INVERT AT SMH 1 IN	344.50	2" INVERT AT BEGINNING OF LEACHING BED	349.50
6" INVERT AT SMH 1 OUT	342.39	2" INVERT AT END OF LEACHING BED	349.50
6" INVERT AT SMH 2 IN	340.56	ELEVATION AT BOTTOM OF LEACHING BED	348.50
6" INVERT AT SMH 2 OUT	340.46	GROUND WATER ELEVATION	343.5 (MOTTILING TP 2)
6" INVERT AT 12,000 GAL SEPTIC TANK (IN)	339.58		
6" INVERT AT 12,000 GAL SEPTIC TANK (OUT)	339.33		
6" INVERT AT 5,000 GAL. PUMP CHAMBER (IN)	339.18		
4" FM INVERT AT 5,000 GAL. PUMP CHAMBER (OUT)	338.93		

Revisions

3/11/02 CONSTRUCTION DETAILS
3/29/02 GENERAL CONSTRUCTION COORDINATION REVISIONS

Project Title
SITE CONSTRUCTION PLANS
For
Liberty Mutual Research Center
Hopkinton MA

Project Title

SITE CONSTRUCTION PLANS
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Hopkinton MA

Prepared For

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175 Berkeley Street
Boston, MA 02116

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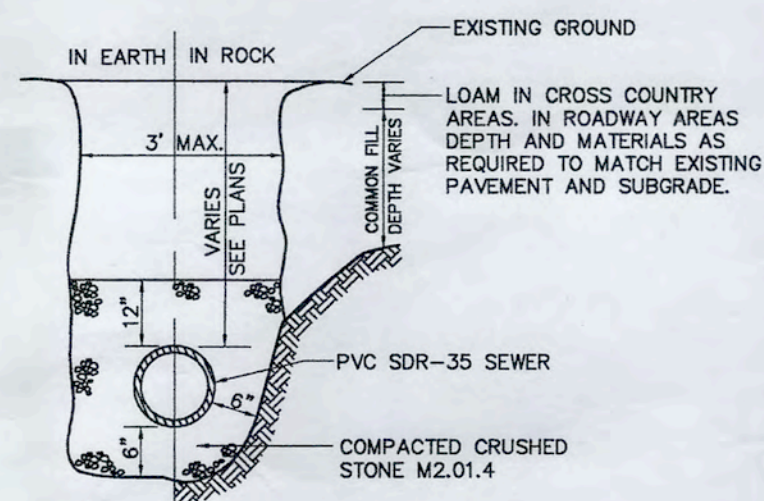
Ten Forbes Road
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781-849-7070
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Drawing Title

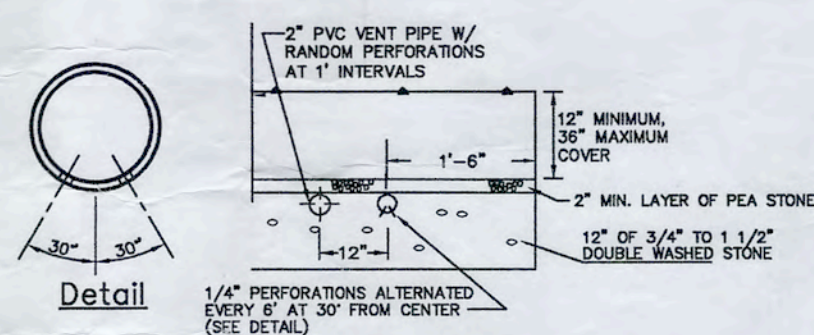
SANITARY SEWER DISPOSAL SYSTEM DETAIL SHEET

Date FEB. 6, 2002
Proj. Mgr. G.K.D.
Design R.D.L.
Check
Drawn J.V.B.
Job No. 1.1987.00
Last Rev. 3/29/02
Drawing No. 19
of 20

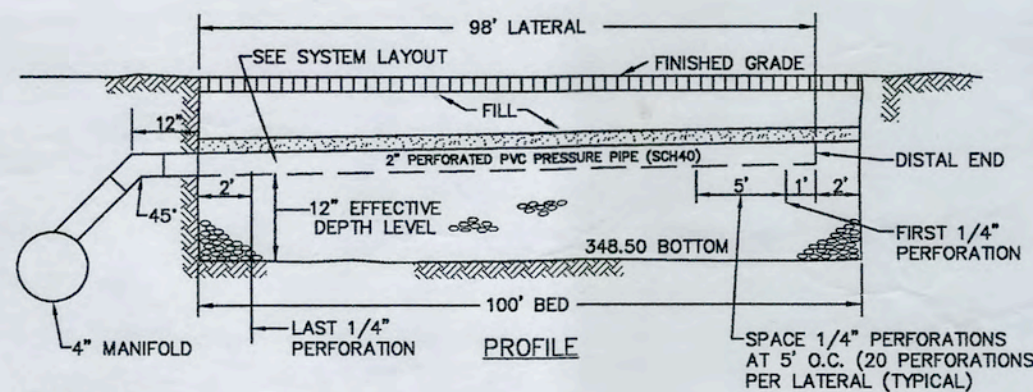
1987 CONST. DETAILS.DWG



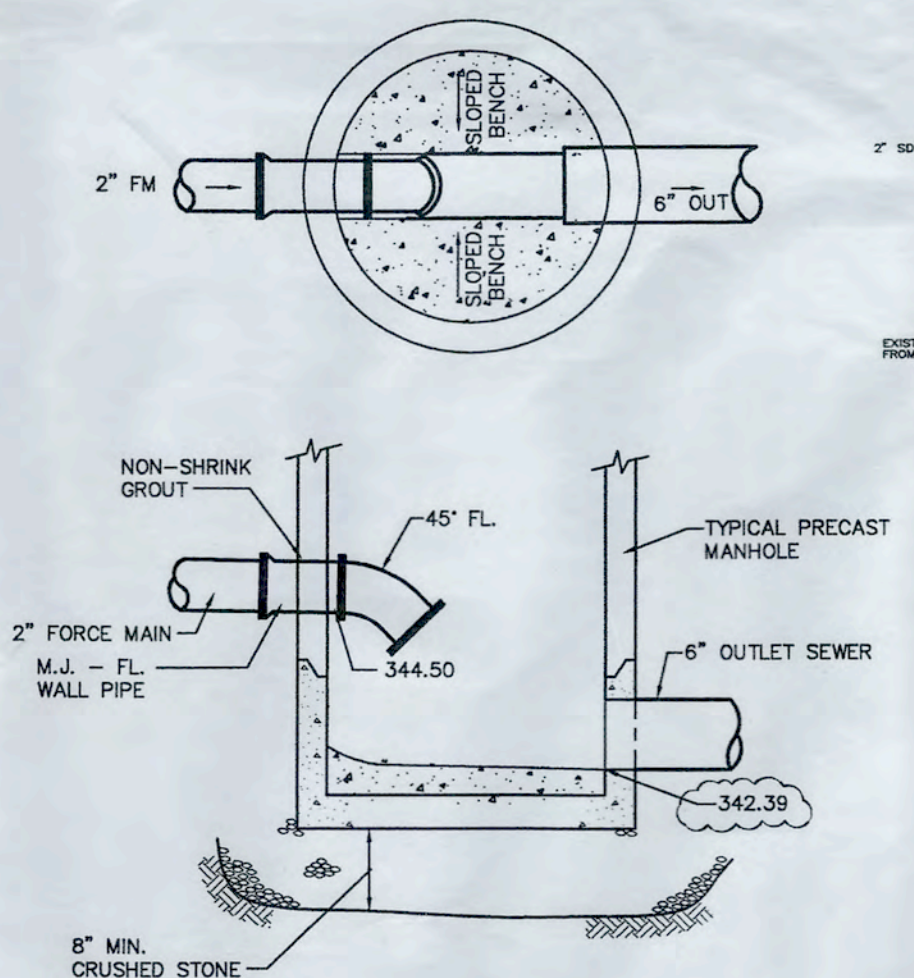
SEWER TRENCH SECTION
NOT TO SCALE



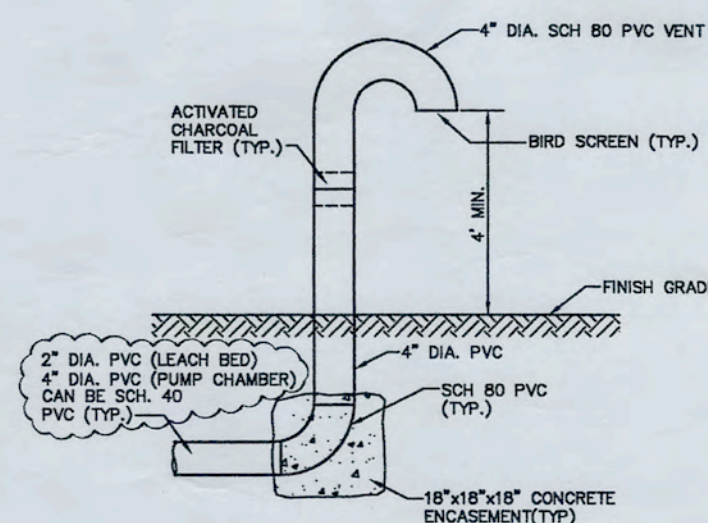
SECTION C - C
NOT TO SCALE



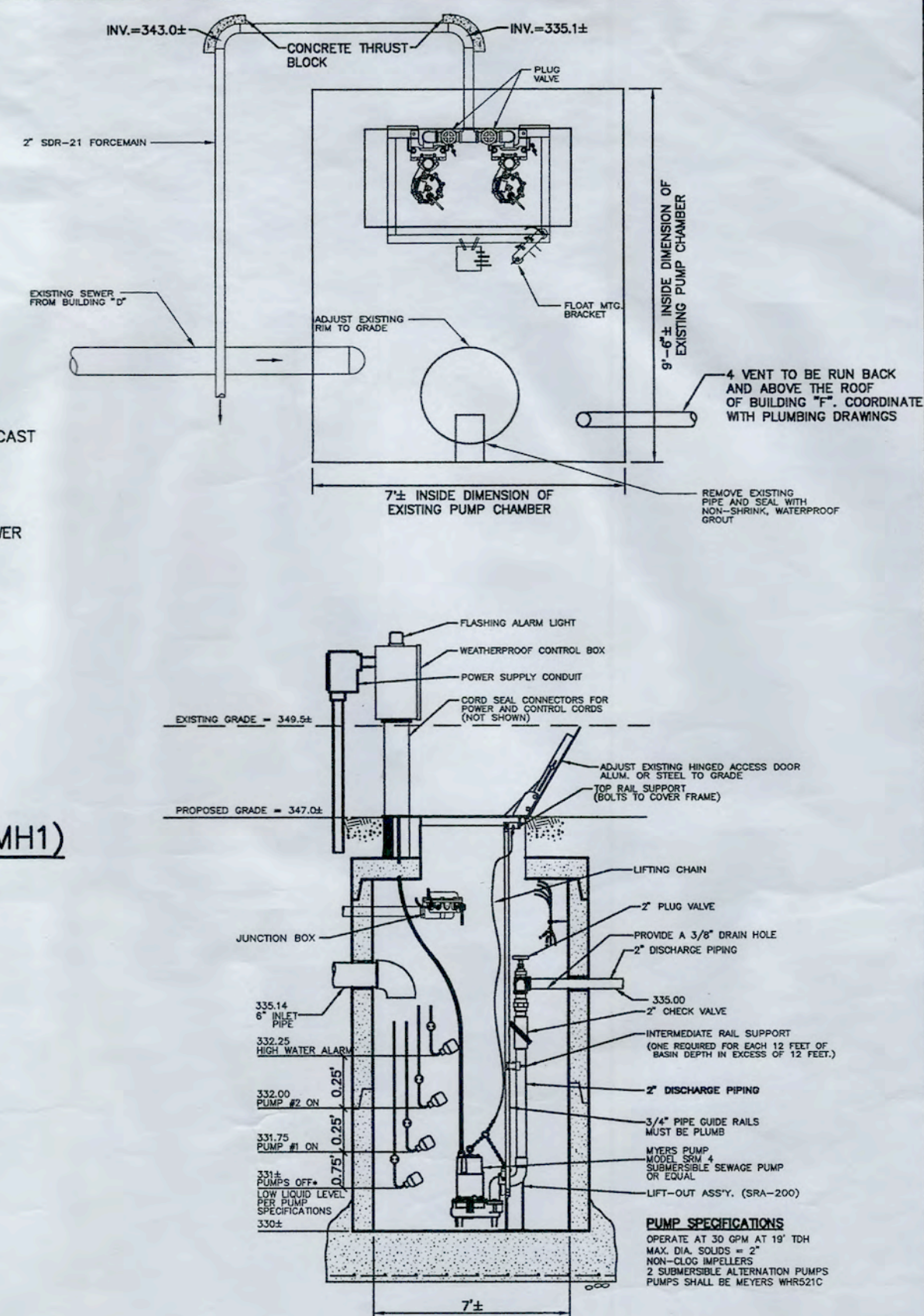
LEACHING BED
NOT TO SCALE



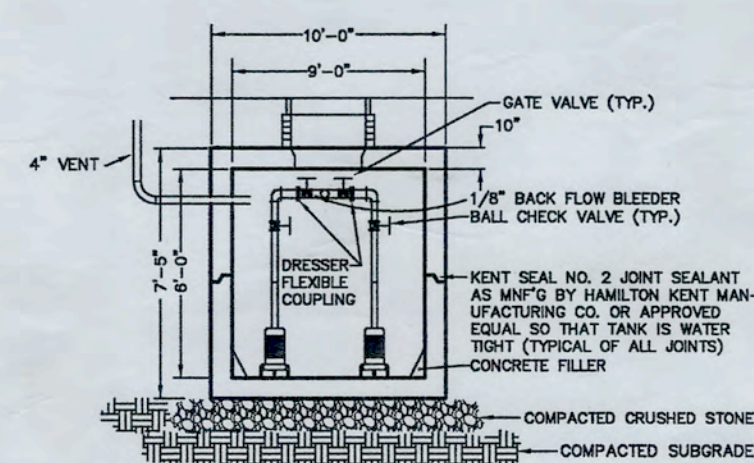
FORCE MAIN MANHOLE CONNECTION (SMH1)
NOT TO SCALE



TYPICAL VENT DETAIL
NOT TO SCALE



EXISTING SEWAGE PUMP CHAMBER 1
NOT TO SCALE

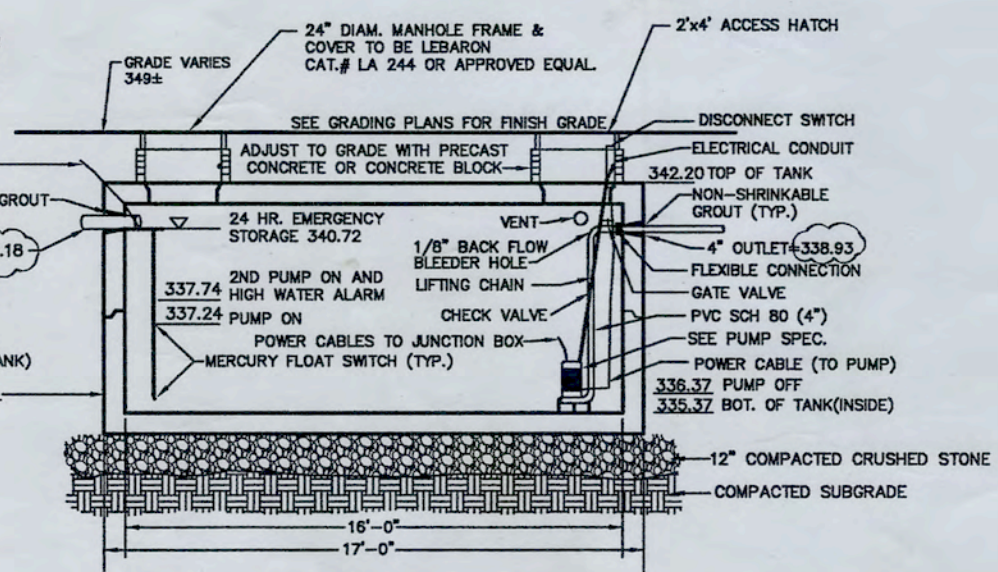


- NOTES:**
1. INSTALL PUMP AND CONTROLS AS PER MANUFACTURERS SPECIFICATIONS.
 2. CONTROL PANEL, ALARM AND SWITCH BOX TO BE LOCATED WITHIN THE BUILDING.
 3. FORCE MAIN TO BE PRESSURE TESTED WITH AIR TO 20 PSI.
 4. ONE DAYS FLOW FOR EMERGENCY STORAGE PROVIDED IN PUMP STA.
 5. PUMPS TO ALTERNATE IN OPERATION.
 6. PUMP CHAMBER IS TO BE VENTED.
 7. ALL PUMPS MUST BE ON A SEPARATE CIRCUIT FROM THE ALARM SYSTEM.

PUMP SPECIFICATIONS
OPERATE AT 216 GPM AT 25' TDH
MAX. DIAM. SOLIDS = 3"
DISCHARGE 4"
NON CLOG IMPELLERS
2 SUBMERSIBLE ALTERNATING PUMPS
PUMPS SHALL BE METERS WYV30M421

EMERGENCY STORAGE
24 HOUR DAILY FLOW=3750 GALLONS
(340.72-337.24)(9'-0")(16.00)(7.50) = 3,758 GAL > 3,750 GAL. OK.
DOSING: 940 GAL/DAY = 3,750 GPD

5,000 GALLON SEWAGE PUMP CHAMBER DETAIL
NOT TO SCALE



NOTE:
THE CONTRACTOR SHALL SUBMIT TO THE DESIGN ENGINEER, FOR HIS REVIEW AND APPROVAL, THE MANUFACTURERS SPECIFICATIONS FOR THE PUMP AND ACCESSORIES (MERCURY SWITCHES, ETC.) PRIOR TO THE CONSTRUCTION OF THE SYSTEM.

Revisions
3/11/02 CONSTRUCTION DETAILS
3/29/02 GENERAL CONSTRUCTION COORDINATION REVISIONS

Project Title
SITE
CONSTRUCTION PLANS
For
Liberty Mutual Research Center
Hopkinton MA

Prepared For
LIBERTY MUTUAL GROUP
175 Berkeley Street
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Drawing Title
SANITARY SEWER DISPOSAL SYSTEM DETAIL SHEET

Date FEB. 6, 2002
Proj. Mgr. G.K.D.
Design R.D.L.
Check
Drawn J.V.B.
Job. No. 1.1987.00
Last Rev. 3/29/02 of 20

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1987 CONST. DETAILS.DWG