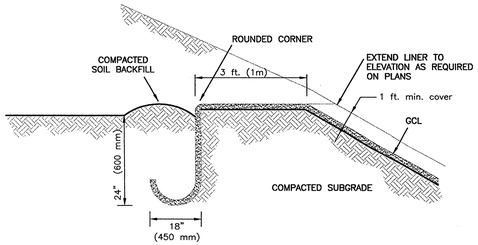
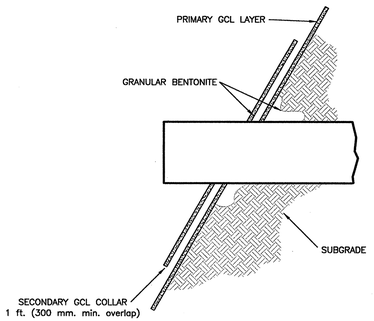
BACKFILL NOTES:

1) MINIMUM COVER OVER LINER IS 1 FT INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
2) BACK FILL MATERIAL BELOW STATIC WATER SURFACE ELEVATION TO BE SAND OR BANK RUN MATERIAL (SEE MANUFACTURER'S SPECIFICATIONS).
3) BACK FILL MATERIAL ABOVE STATIC WATER SURFACE ELEVATION TO BE SUITABLE ON-SITE MATERIAL AND TOPSOIL (SEE MANUFACTURER'S SPECIFICATIONS).



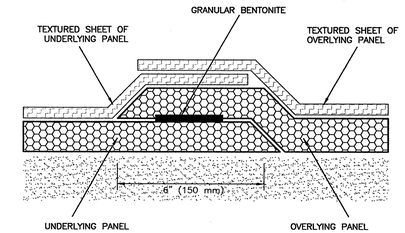
TYPICAL ANCHOR TRENCH DESIGN

N.T.S.



CROSS-SECTION OF A HORIZONTAL PIPE PENETRATION

N.T.S.



BENTOMAT CLT OVERLAPPED SEAM

N.T.S.

LINER INSTALLATION GUIDELINES

General Notes:

1) Bentomat GCL to be installed per all manufacturers specifications and installation guidelines.

2) Ground water to be tested prior to construction or ordering. Results are to be provided to the manufacturer to insure suitability of product for intended use.

3) Use Bentomat CLT for wet pond applications.

Installation:

1) Prepare the subgrade in accordance with manufacturers specifications. The surface shall be smooth, firm and unyielding, and free any water, vegetation, debris, sharp rocks or any other foreign matter. Subgrade soils should possess a particle distribution such that a least 80 percent of the soil is finer than a #60 sieve (0.250 mm). Immediately prior to GCL placement, the subgrade shall be final graded to fill in all voids or cracks and then smooth rolled to provide the best pratical surface for the GCL. At completion of this activity, no wheel ruts, footprints or other irregularities shall exist in the subgrade. Furthermore, all protrusions extending more the one-half inch (12 mm) from the surface shall either be removed, crushed or pushed into the surface with a smooth drum compactor.

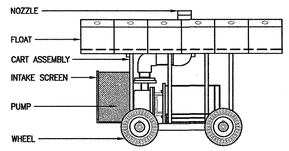
2) Install sump pits or approved alternate for dewatering prior to GCL placement. Locations and depths to be determined in the field by the soils engineer and contractor. (See details)

3) Estimated installation time is two (2) days. Install GCL along basin slopes first then install along basin bottom towards sump pit(s). Remove sump pit(s) just prior to GCL installation in immediate area. The adjacent GCL must be covered prior to removing the sump pits(s). Only as much GCL shall be installed as can be covered by the end of the working day. The GCL shall not be left uncovered over night.

AQUAMASTER FOUNTAINS AND AERATORS
16024 CTH X
KIEL, WI 53024
1-800-693-3144
PHONE: (920) 693-3121
FAX: (920) 693-3634
www.aquamasterfountains.com

DESCRIPTION:

AQUA MASTER'S NEW CELESTIAL FOUNTAINS FEATURE FOUR SPRAY PATTERNS – AQUARIUS, PISCES, LIBRA AND GEMINI – TO HELP CREATE AN IMPRESSION THAT'S BACKED BY A TWO YEAR WARRANTY THAT DEMONSTRATES OUR ONGOING COMMITMENT TO EXCELLENCE IN SUPERIOR AQUATIC MANAGEMENT SYSTEMS. THIS HIGH EFFICIENCY FOUNTAIN DESIGN WITH MINIMAL HEAD LOSS RESULTS IN MAXIMUM FOUNTAIN PERFORMANCE. SOME SPECIAL FEATURES INCLUDE: OVERSIZED FLOATATION TYPE TIRES FOR EASE OF LAUNCHING, SIMPLE INTERCHANGEABLE NOZZLES, UNDERWATER CABLE DISCONNECT AND INDIVIDUAL HIGH DENSITY POLYETHYLENE FLOATS ARE IN-WATER ADJUSTABLE.



NOTES:
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
2. DO NOT SCALE DRAWINGS.
3. CONTRACTORS NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT www.CADdetails.com/info REFERENCE NUMBER 011-005A.

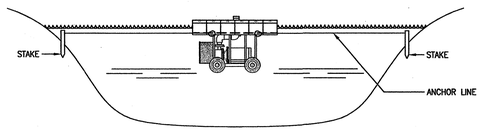
CELESTIAL FOUNTAIN

DETAIL

AQUAMASTER FOUNTAINS AND AERATORS
16024 CTH X
KIEL, WI 53024
1-800-693-3144
PHONE: (920) 693-3121
FAX: (920) 693-3634
www.aquamasterfountains.com

MOST APPLICABLE FOR A SMALLER POND, OR ONE THAT IS EASILY ACCESSIBLE FROM TWO SIDES.

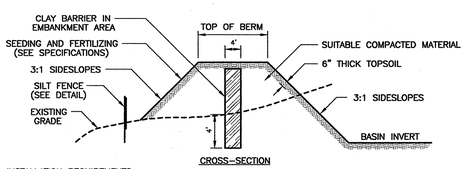
1. YOU WILL NEED TWO (2) ANCHOR LINES (1/4 INCH NYLON OR EQUIVALENT) AND TWO (2) STAKES (WOOD STAKE OR METAL ROD THAT CAN BE DRIVEN SECURELY INTO POND'S EDGE).
2. WITH YOUR AERATOR FULLY ASSEMBLED AND STILL ON SHORE, ATTACH ANCHOR LINES TO THE S-HOOKS ON THE FLOAT. NEXT, CAREFULLY LOWER AERATOR INTO THE POND. BE SURE NOT TO TANGLE ANCHOR LINES AND ELECTRICAL CABLE(S).
3. ONCE AERATOR IS FLOATING FREELY HOLD OR SECURE ONE ANCHOR LINE. WITH SECOND LINE, WALK SLOWLY AWAY FROM FIRST STAKE TO OPPOSITE SIDE OF POND, PULLING AERATOR WITH YOU. CONTINUE UNTIL AERATOR IS IN DESIRED LOCATION.
4. SECURE BOTH LINES, KEEPING TENSION ON BOTH. MAKE SURE ELECTRICAL CABLE(S) IS UNTANGLED AND HAS SOME SLACK FROM AERATOR TO SHORE.



NOTES:
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
2. DO NOT SCALE DRAWINGS.
3. CONTRACTORS NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT www.CADdetails.com/info REFERENCE NUMBER 011-005B.

CELESTIAL FOUNTAIN ANCHORING INSTRUCTIONS

DETAIL



CROSS-SECTION

INSTALLATION REQUIREMENTS

SITE PREPARATION

TIMBER, LOGS, BRUSH, RUBBISH, ROCKS, STUMPS AND VEGETABLE MATTER UNDER THE EMBANKMENT AND ANY STRUCTURAL WORK SHALL BE CLEARED, GRUBED, DISPOSED OF. IN ORDER TO FACILITATE CLEANOUT AND RESTORATION, THE POOL AREA WILL BE CLEARED OF ALL BRUSH AND EXCESS TREES.

CLAY BARRIER

A CLAY BARRIER SHALL BE EXCAVATED ALONG THE CENTERLINE OF EARTH FILL EMBANKMENTS TO A MINIMUM DEPTH OF 4 FEET BELOW EXISTING GRADE. THE CLAY BARRIER SHALL EXTEND UP BOTH ABUTMENTS TO THE RISER CREST ELEVATION. THE MINIMUM BOTTOM WIDTH SHALL BE WIDE ENOUGH TO PERMIT OPERATION OF COMPACTION EQUIPMENT. THE TRENCH SHALL BE KEPT FREE FROM STANDING WATER DURING THE BACKFILLING OPERATIONS.

EMBANKMENT

THE FILL MATERIAL SHALL BE TAKEN FROM APPROVED DESIGNATED BORROW AREAS. IT SHALL BE FREE OF ROOTS, WOODY VEGETATION, STONES OVER 6 INCHES, OR OTHER OBJECTIONAL MATERIAL. AREAS ON WHICH FILL IS TO BE PLACED SHALL SCARIFIED PRIOR TO PLACEMENT OF FILL. THE FILL MATERIAL SHOULD CONTAIN SUFFICIENT MOISTURE FOR PROPER COMPACTION.

ALL FILLS SHALL BE COMPACTED SUFFFICIENTLY FOR THEIR INTENDED PURPOSE.

SEEDING

ALL DISTURBED AREAS ABOVE THE CREST OF THE PRINCIPAL SPILLWAY SHALL BE SEEDED OR SODDED. SEEDING, FERTILIZING AND MULCHING SHALL CONFORM TO THE APPROPRIATE STANDARD.

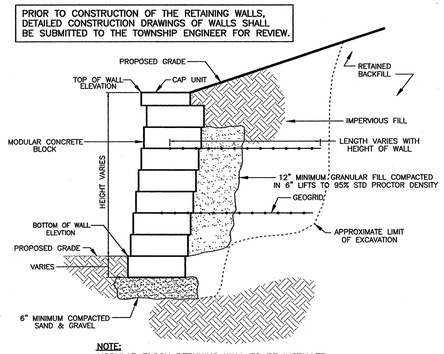
TREES

TREES TO BE RETAINED SHALL BE PROTECTED.

DETENTION BASIN CLAY BARRIER DETAIL

N.T.S.

PRIOR TO CONSTRUCTION OF THE RETAINING WALLS, DETAILED CONSTRUCTION DRAWINGS OF WALLS SHALL BE SUBMITTED TO THE TOWNSHIP ENGINEER FOR REVIEW.



NOTE:
MODULAR BLOCK RETAINING WALL TO BE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS.

WET POND RETAINING WALL DETAIL

N.T.S.

VEGETATIVE FILTERS AND SWALE MAINTENANCE:

Description
Effective vegetated filter strip and swale performance requires regular and effective maintenance. Maintenance involves routine periodic inspection of the vegetation, the removal of accumulated sediment and debris, and the correction of any structural or erosion problems.

Schedule I – four times annually and after every storm exceeding 1 inch of rainfall
Schedule IA – once a month during the growing season
Schedule II – bi-annually, during the growing season and the non-growing season
Schedule III – annually

1) Maintenance: General
a) The Contractor shall inspect all areas to verify that all work is being performed properly and as scheduled, locate potential problems, and correct unacceptable conditions. A brief verbal report is to be submitted to the Owner. Problems requiring immediate attention shall be reported to the Owner.

2) Maintenance: Schedule I
a) All vegetated filter strips and swale components expected to receive and/or trap debris and sediment must be inspected for clogging and excessive debris and sediment accumulation at least four times annually and after every storm exceeding 1 inch of rainfall. Such components include vegetated areas and stone cutoffs and, in particular, the upstream edge of the filter strip where coarse sediment and/or debris accumulation could cause inflow to concentrate. Sediment removal should take place when the filter strip is thoroughly dry.
b) All areas of the filter strip should be inspected for excess ponding. Corrective measures should be taken when excessive ponding occurs.

3) Maintenance: Schedule IA (monthly during growing season)
a) Vegetated Areas : Mowing and/or trimming of vegetation must be performed on a regular schedule based on specific site conditions. Grass should be mowed at least once a month during the growing season.

4) Maintenance: Schedule II (bi- annually)
a) Once established, inspections of vegetation health, density, and diversity should be performed during both the growing and non-growing season at least twice annually.
b) The vegetative cover should be maintained at 85 percent. If vegetation has greater than 50 percent damage, the area should be reestablished in accordance with the original specifications (see seeding specification) and the inspection requirements presented above. All use of fertilizers, mechanical treatments, pesticides and other means to assure optimum vegetation health must not compromise the intended purpose of the vegetative filter. All vegetation deficiencies should be addressed without the use of fertilizers and pesticides whenever possible.

5) Maintenance: Schedule III (annually)
a) Vegetated areas must be inspected annually for erosion and scour. Vegetated areas must be inspected for unwanted growth, which must be removed with minimum disruption to the planting soil bed and remaining vegetation.
b) When establishing or restoring vegetation, biweekly inspections of vegetation health must be performed during the first growing season or until the vegetation is established.

6) Performance Criteria
a) The filter strip and or swales should completely drain within 24 hours of the end of the rainfall event. Actual drying time for the subsoils soils is dependent upon the specific field conditions and weather conditions.
b) If significant increases or decreases in the normal drain time are observed or if the 72 hour maximum is exceeded, the filter strip's planting soil bed, vegetation, and groundwater levels must be evaluated and appropriate measures taken to comply with the maximum drain time requirements and maintain the proper functioning of the filter strip.

7) Prevention of Water Pollution
a) The contractor's activities shall be performed by methods that will prevent entrance or accidental spillage of solid matter, contaminates, debris or other pollutants and wastes into the downstream conveyance system. Such pollutants and wastes include, but are not restricted to, refuse, garbage, cement, collected silt and sediment, etc. Disposal of debris and trash should be done only at suitable disposal / recycling sites and must comply with all applicable local, state, and federal waste regulations.

BASIN MAINTENANCE COST ESTIMATE:

MOWING: 6 times/year x $200/acre/mow x 0.50 acres = $600
LANDSCAPING: 1 time/year Trees: $100 x 13 trees = $1300
Shrubs: $10 x 125 shrubs = $1250
FERTILIZER/LIME/PEST & DISEASE CONTROL: 1 time/year $1750/acre x 0.50 = $875
OVERSEED/AERATION: 1 time/year $2800/acre x 0.50 = $1400
AERATOR:
ELECTRIC USAGE: 0.6 Kwh x $0.10/Kwh x 720 hrs/month x 8 months = $346
MAINTENANCE: Maintenance kit: 1 time/year x $100 = $100
Labor: 2 times/year x $200 = $400
VORTECHNICS CHAMBER: 1 time/year pollutant removal x $600 = $600

TOTAL MAINTENANCE COST: $6,871/year

WET BASIN MAINTENANCE:

Description
Effective wet pond performance requires regular and effective maintenance. Maintenance involves routine periodic inspection of the basin and vegetation, the removal of accumulated sediment and debris, and the correction of any structural or erosion problems.

Schedule I – four times annually and after every storm exceeding 1 inch of rainfall
Schedule IA – once a month during the growing season
Schedule II – bi-annually, during the growing season and the non-growing season
Schedule III – annually

1) Maintenance: General
a) The Contractor shall inspect all areas to verify that all work is being performed properly and as scheduled, locate potential problems, and correct unacceptable conditions. A brief verbal report is to be submitted to the Owner. Problems requiring immediate attention shall be reported to the Owner.

2) Maintenance: Schedule I
a) Basin Outlet Works: Inspect for and clear debris from the trashrack and exit ports of the basin outlet structures. This is to prevent clogging of the outlets and subsequent backup of detained water.
b) Inspect receiving waters for damage, obstructions and unsightly debris. All obstructions shall be removed immediately and any damage repaired.
c) Inspect for and clear excessive debris from the pipe inlets and aprons.
d) Inspect for any erosion of banks or other hazards. Any erosion shall be immediately repaired and stabilized accordingly. Maintain seeded areas until they are established.
e) Any problems or defects shall be reported to the Owner.

3) Maintenance: Schedule IA (monthly during growing season)
a) Vegetated Areas : Mowing and/or trimming of vegetation must be performed on a regular schedule based on specific site conditions. Grass should be mowed at least once a month during the growing season.

4) Maintenance: Schedule II (bi-annually)
a) Once established, inspections of vegetation health, density, and diversity should be performed during both the growing and non-growing season at least twice annually.
b) The vegetative cover should be maintained at 85 percent. If vegetation has greater than 50 percent damage, the area should be reestablished in accordance with the original specifications (see seeding specification) and the inspection requirements presented above. All use of fertilizers, mechanical treatments, pesticides and other means to assure optimum vegetation health must not compromise the intended purpose of the vegetative filter. All vegetation deficiencies should be addressed without the use of fertilizers and pesticides whenever possible.

5) Maintenance: Schedule III (annually)
a) Vegetated areas must be inspected annually for erosion and scour. Vegetated areas must be inspected for unwanted growth, which must be removed with minimum disruption to the planting soil bed and remaining vegetation.
b) When establishing or restoring vegetation, biweekly inspections of vegetation health must be performed during the first growing season or until the vegetation is established.
c) Sediment levels are to be determined in the wet pond at least once a year. The sediment shall be removed when the pool volume is reduced by 25% over the initial design. The average cleanout cycle is 10 years but will vary with field conditions.

6) Basin Performance Criteria
a) If significant increases or decreases in the normal drain time are observed, or if the 72 hour maximum drain time is exceeded, the basin's outlet structure, and both groundwater and tailwater levels must be evaluated and appropriate measures taken to comply with the maximum drain time requirements and maintain the proper functioning of the basin.

7) Prevention of Water Pollution
a) The contractor's activities shall be performed by methods that will prevent entrance or accidental spillage of solid matter, contaminates, debris or other pollutants and wastes into the downstream conveyance system. Such pollutants and wastes include, but are not restricted to, refuse, garbage, cement, collected silt and sediment, etc. Disposal of debris and trash should be done only at suitable disposal / recycling sites and must comply with all applicable local, state, and federal waste regulations.

STORMWATER MANAGEMENT MAINTENANCE:

On site Stormwater Management Maintenance will be performed by:
Briar Cliffe Homeowners Association

MAINTENANCE RESPONSIBILITIES:

1. The above referenced party shall maintain a detailed log of all preventative and corrective maintenance for the stormwater management measures shown on the plans, including a record of all inspections and copies of all maintenance related work orders.
2. The person responsible for maintenance identified above shall evaluate the effectiveness of the maintenance plan at least once a year and adjust the plan as needed.
3. The person responsible for maintenance identified above shall retain and make available upon request by any public entity with administrative, health, environmental or safety authority over the site, the maintenance plan and the documentation required above.
4. Following is a list of specific areas requiring maintenance. For detailed information and schedules refer to the specific subsection for each item.

a. Stormwater Collection System Maintenance
b. Vegetative Filters and Swale Maintenance
c. Infiltration Basin Maintenance
d. Lawn & Landscaped Area Maintenance

LAWN AND LANDSCAPED AREA MAINTENANCE:

Description
Maintenance involves routine periodic inspection of the vegetation, fertilization, and the correction of erosion problems.

Schedule III – annually or as noted

Shrubs & Trees:	Between March 1 and April 15
Mowing:	As specified per BMP
Fertilize:	Fall – Between September 1 and October 15
Liming:	Between September 1 and October 15
Soil Testing:	Between September 1 and October 15
Pest & Disease Control:	As required
Overseeding:	Between September 1 and October 15 (As required)
Aeration:	Between September 1 and October 15 (As required)

1) Maintenance: General
a) The Contractor shall inspect all areas to verify that all work is being performed properly and as scheduled, locate potential problems, and correct unacceptable conditions. A brief verbal report is to be submitted to the Owner. Problems requiring immediate attention shall be reported to the Owner.

2) Shrubs & Trees:
a) These plants shall be maintained in a natural setting. No shearing is allowed, shrubs and trees will be hand-pruned to remove dead or diseased branches. Dead plant material shall be replaced in kind unless cultural requirements necessitate change. When planting within compacted slopes, excavate larger holes and backfill with a suitable planting medium.

3) Mowing:
a) All clippings are to be raked, bagged and disposed off-site to prevent clogging of the outlet structure.

4) Fertilize:
a) Fall: Fertilizer analyses and rates are to be based on soil test results. Standard fertilizer blends rather than custom blends are assumed.

5) Liming:
a) One application in the fall as required by a soil test. Minimum requirements – Lime with pulverized dolomite limestone at a rate of 100 lbs./1,000 s.f.

6) Soil Testing:
a) The Contractor shall take soil samples from grassed areas for the following analysis: ph, available Mg, P, K, C, recommended nitrogen application. Copies of the analyses for each area are to be furnished to the Owner. Samples shall be taken before liming and fertilization as noted on the schedule.

7) Turf disease and pest control:
a) As required. Submit to the Owner the following information before sprayng:
i) –Targeted pests or diseases.
ii) –Materials and methods used.

8) Overseeding:
a) Overseeding is scheduled, as required per field inspection; or a minimum of once every four (4) years. A variseeder or equal equipment should be used to overseed designated lawn areas. Seed type and rate per the following schedule.

b) Seed type and rates for infiltration basin: (See landscape plans for locations)
Lofts Reclaim Conservation Mix-Dry Formula
(At a rate of 5 lbs./1,000 s.f.)
–40% Tall Fescue
–20% Weeping Lovegrass
–10% Hard Fescue
–10% Chewings Fescue
–10% Perennial Ryegrass
–25% Poa Trivalis
– 5% White Clover
– 5% Switchgrass

c) Seed type and rates for lawn areas: (See landscape plans for locations)
SCS Seed Mix 16
–(3.5 lbs./1,000 s.f) Tall Fescue
–(0.4 lbs./1,000 s.f) Kentucky Bluegrass (blend)
–(0.4 lbs./1,000 s.f) Perennial Ryegrass (blend)

d) Seed type and rates for low maintenance areas: (See landscape plans for locations)
Lofts Reclaim Native Shortgrass Mixture
(At a rate of 60lbs/acre)
–40% Little Bluegrass
–30% Sheep Fescue
–15% Side Oats Grama
–10% Blue Grama

9) Aeration:
a) A coring with 3" minimum hollow tines should be used to aerate lawn areas, followed by a steel drag mat to disperse cores. Coring should be timed for adequate soil moisture to insure proper penetration and plug removal. Coring should be done in conjunction with fertilization and/or liming and overseeding in the fall, once a year.

STORMWATER COLLECTION SYSTEM MAINTENANCE:

Schedule I – four times annually and after every storm exceeding 1 inch of rainfall
Schedule III – annually

Description
Stormwater collection system maintenance involves routine periodic inspection of the storm collection system, the removal of accumulated sediment and debris, and the correction of any structural problems.

1) Inspection : General
a) The Contractor shall inspect all areas to verify that all work is being performed properly and as scheduled, locate potential problems, and correct unacceptable conditions. A brief verbal report is to be submitted to the Owner. Problems requiring immediate attention shall be reported to the Owner.

2) Inspection : Schedule I
a) Inlets, conduit, outfalls and other conveyance elements: Inspect for and clear debris from the gratings, inlets and pipes. This is to prevent clogging of the inlets and subsequent backup of stormwater runoff. Any problems or defects shall be reported to the Owner.

3) Inspection : Schedule III (annually)
a) Visual inspection of all components of the onsite stormwater collection system. Inspect for and remove silt and sediment, litter and other debris from all inlets, gratings and drainage pipes. All inlets and manhole are to be vacuumed. (Frequency of vacuuming may be adjusted if maintenance records indicate that sediment and debris accumulation is insignificant.) In the event that the accumulated material exceeds 10% of the pipe diameter, it must be flushed / vacuumed out of the system.

4) Prevention of Water Pollution
a) The contractor's activities shall be performed by methods that will prevent entrance or accidental spillage of solid matter, contaminates, debris or other pollutants and wastes into the downstream conveyance system. Such pollutants and wastes include, but are not restricted to, refuse, garbage, cement, collected silt and sediment, etc. Disposal of debris and trash should be done only at suitable disposal / recycling sites and must comply with all applicable local, state, and federal waste regulations.

1.)	SCS/TWSP COMMENTS	11/05/04
2.)	TWSP COMMENTS	11/22/04
3.)	TWSP COMMENTS	12/14/04
4.)	MAINTENANCE	03/08/05
5.)	TWSP COMMENTS	05/17/05
6.)	FINAL SUBMISSION	05/30/12
7.)	ELSA COMMENTS	07/20/12
8.)	SHEET NO.	11/20/12

THIS DRAWING IS FOR PERMIT PURPOSES ONLY - NOT FOR CONSTRUCTION UNTIL THIS BOX HAS BEEN CHECKED AND DATED.
CHKD BY: ____ DATE: ____

THIS WORK PREPARED UNDER MY IMMEDIATE SUPERVISION...

RONALD R. COCO
PROFESSIONAL ENGINEER/
LAND SURVEYOR
NJ PE&LS#26264

MENLO ENGINEERING ASSOCIATES, INC.
CIVIL ENGINEERS, LAND SURVEYORS AND PROFESSIONAL PLANNERS
261 CLEVELAND AVENUE HIGHLAND PARK, NEW JERSEY 08904
PHONE: (732) 846-8585 FAX: (732) 846-9439
CERTIFICATE OF AUTHORIZATION: 24GA27951900

BRIAR CLIFFE

TOWNSHIP OF HOPEWELL, MERCER COUNTY, NEW JERSEY
PRELIMINARY MAJOR SUBDIVISION

DETAILS/MAINTENANCE PLAN

BLOCK 78.01 LOT 15, BLOCK 78.02 LOTS 6-9, BLOCK 78.03 LOTS 2-7 & BLOCK 78.05 LOT 1 TAX MAP SHEET No. 20 13.69 ACRES±

DRWN. BY	JAC	DATE OF ISSUE	SCALE: AS NOTED
DSGN BY	WAL	SEPTEMBER 17, 2004	CAD # 2000048MP1
CHKD. BY	ARC	REV. 8.) NOVEMBER 20, 2012	JOB # 2000.048
APPRD. BY	ARC		DWG # MP-1

ZIP FILE = 2000048MP1.dwg C:\dwg\2000048\2000048MP1.dwg