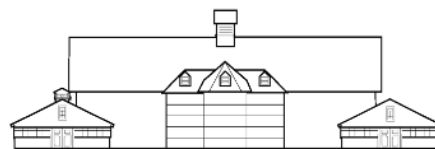




Vassar Barns Green Infrastructure Master Plan/Pilot Projects



The Environmental Cooperative
at the Vassar Barns

Funded in part through NY State Department of Environmental Conservation's Hudson River Estuary Program



ACKNOWLEDGEMENTS

This project has been funded in part by a grant from the New York State Environmental Protection Fund through the Hudson River Estuary Program of the New York State Department of Environmental Conservation. Additional funding from: The Leona M. and Harry B. Helmsley Charitable Trust, The Environmental Cooperative at the Vassar Barns and the Vassar Sustainability Office.

Collaborators on this project include:

- Susan G. Blickstein, AICP/PP, Ph.D., Principal, Susan G. Blickstein, LLC
- Ken Casamento, CPESC, LRC Engineering and Surveying;
- Bryan Corrigan, Project Manager, Vassar College;
- Mary Ann Cunningham, Ph.D. Earth Science and Geography, Vassar College;
- Alistair Hall, Sustainability Coordinator, Vassar College;
- Jennifer Rubbo, Manager, The Environmental Cooperative; and,
- Bryan Quinn, Principal, One Nature Inc.

Special thanks to Vassar student interns, Elise Chessman '18 and Anna Abrams '18.

DESIGN PROCESS & NARRATIVE

The design team collaborated in a series of internal workshops, including several site visits/field walks, to develop the green stormwater Master Plan using the following overarching criteria to guide development of pilot projects for the Vassar Barns site:

- Complement and expand on the improvements to the visitor experience created by the architectural restoration of the barn.
- Promote ties to/synergy with educational programming mission of Vassar Barns.
- Ensure ease of permitting/shovel-ready potential.
- Minimize future disruption/extend life of pilot projects based on potential future improvements around the Barns.
- Maximize ability to replicate pilot measures elsewhere on campus, including affordability of implementation and maintenance.
- Provide opportunities for Vassar Facilities and others to learn from implementation successes and challenges.
- Maximize ecosystem services/benefits, in accordance with Casperkill Assessment Report.
- Fit contextually with the cultural heritage of the land.

The Master Plan described below and shown on subsequent pages would be a dramatic improvement to the Vassar Farm and Ecological Reserve. Imagine a lush wetland complex as a light foreground to the restored Cow Barn and Corn Crib. Faculty hold meetings and classes outdoors within the native and edible landscape. Student naturalists hone their plant identification skills by pulling weeds and planting new native species. Environmental Cooperative staff pause during summer thunderstorms to watch the wetlands fill with water and slowly infiltrate into the soils. The backdrop to this scene is the entirety of Vassar Farm and all it has to offer.

The project's design intent is to integrate the Environmental Cooperative into a regenerative landscape and make a catalyst to the overall improvement of the Vassar Farm and Ecological Reserve.

RAIN GARDENS & CREATED WETLANDS: The design envisions a series of interconnected rain gardens and created wetlands with lateral culvert connections, like those seen on a traditional farm. The pitch between the various depressions would be minimal and high flows of water would equalize as needed. In each rain garden shrub material would be installed as well. During extreme storm events, the lowest elevation wetland would fill to its brim and sheet flow across the gravel access road.

VEHICLE & EMERGENCY ACCESS: A circular access driveway is located between the restored barn and the Corn Crib to allow for deliveries and building construction. This road would be loosely covered in stone and have a turning radius large enough for emergency access vehicles. The road would be allowed to become moderately overgrown with grass and clover. The drive would have a locked gate that could be opened upon approval or during emergencies. A seasonal road between the Cow Barn and the Casperkill would continue to exist within a "let-it-grow" meadow approach.

PEDESTRIAN ACCESS: An ADA accessible route would be preserved to the main entrance of the Cow Barns. Paving is proposed as large bluestone slabs dry laid on an appropriate sub-base material. An outdoor gathering space located on the west side of the Cow Barns will extend into one of the constructed wetlands to create an immersive experience. The interior courtyard of the Cow Barns would be formalized and improved for large events.

PLANTINGS: All plants will be BOTH native and edible. Many of the plants, while technically edible, are not necessary things that people will be likely to eat (such as shrub roots). All planting areas will be densely planted with herbaceous plugs, shrubs, and small trees. Species arrangement and diversity will be correlated to water and sunlight requirements. Large boulders will be placed at key points within the vehicle driveway to ensure beds are protected from tires and snow plows.

PARKING: A limited amount of regrading in the middle of the existing lot would be required to achieve pitch across redesigned and painted parking spaces for water flow into newly constructed rain gardens. Parking spaces would be delineated by locally harvested, rough cut white oak 6" x 6" x 8' wheel stops.

LAWN FORMALIZATION: Entry to the lawn area within the barn complex would be framed by rain gardens and large bluestone slabs. In addition, the lawn should be over-seeded with white clover and rye to decompact soils and increase infiltration levels.

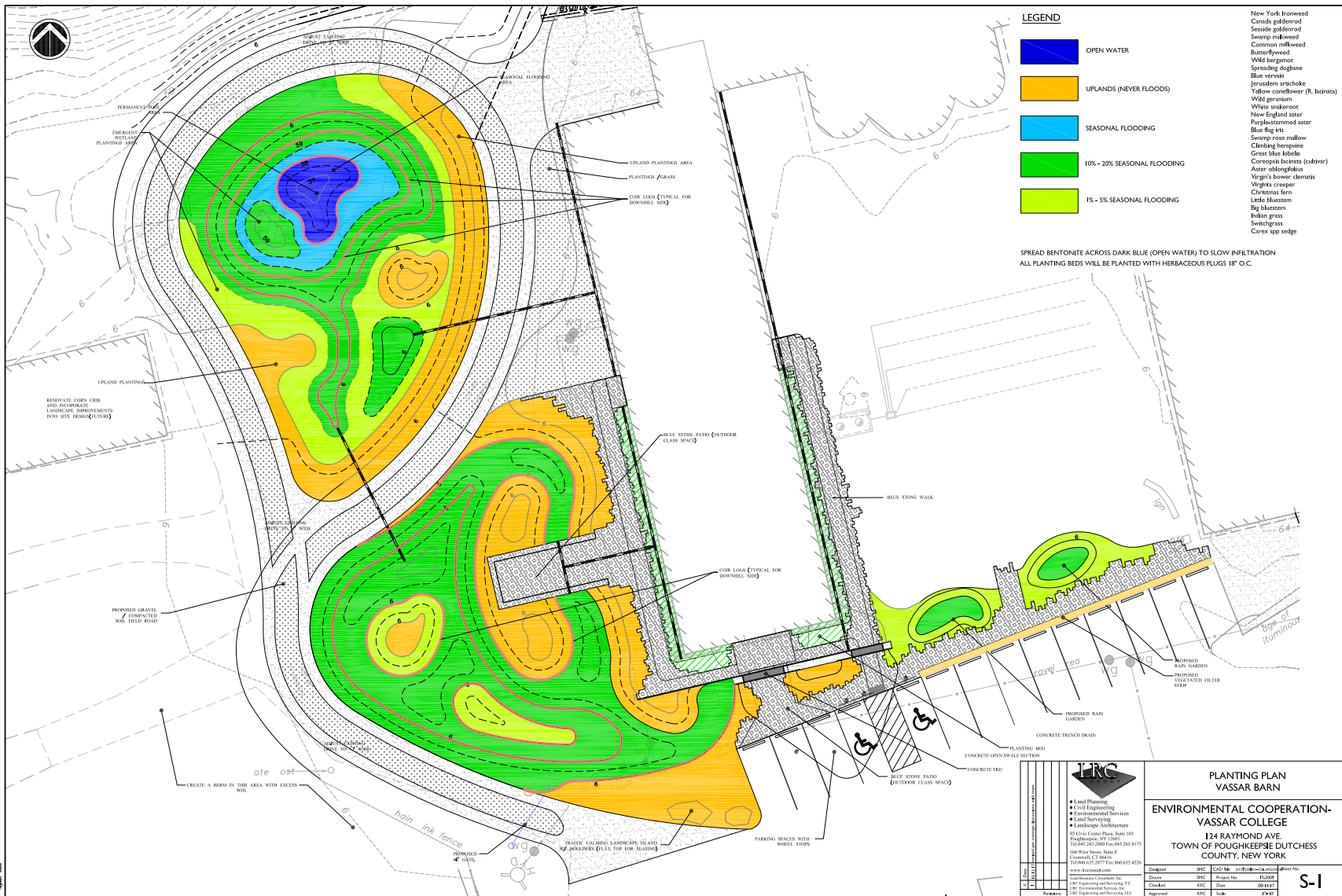
The design achieves the criteria developed for pilot projects and the following objectives:

- Enhances and builds on the barn restoration while allowing for the future restoration of the remaining barn, Cow Barn structure and the adjacent Corn Crib;
- Incorporates site specific green infrastructure and low impact development (L.I.D.) techniques;
- Addresses traffic calming needs while allowing for future alterations to overall farm circulation;
- Increases overall ecological function in measurable ways;
- Considers lower cost options which do not require extensive re-engineering of soils or intensive paving methods; and,
- Provides for additional outdoor spaces for barn-oriented functions.

The green stormwater Master Plan for the Barns is illustrated in the following concept drawing and has been advanced via engineering and development of cost estimates. Depending on the timing and availability of funding sources, the design components may be constructed as a single phase or as a series of smaller projects.



GREEN INFRASTRUCTURE MASTER PLAN
THE ENVIRONMENTAL COOPERATIVE AT VASSAR BARNES



EDUCATIONAL PROGRAMMING OPPORTUNITIES

The Environmental Cooperative at the Vassar Barns is working to engage Vassar students and the community in local conservation efforts through education and outreach. Focusing on education and awareness about healthy watersheds and waterways is an integral part of this initiative. The proposed landscape improvements would be integral to the Environmental Cooperative and provide students, alumni, visitors, faculty, and staff with an immersive experience that inspires ecological stewardship.

The green infrastructure plan developed around the Vassar Barn is an important component of the Cooperative's education initiative about watershed health and the impacts of stormwater. Having a working system that is adjacent to the Environmental Cooperative will help to facilitate education programs focused on healthy watersheds. With the Vassar Barn acting as a demonstration site, education and outreach programs can utilize the space to not only demonstrate green infrastructure practices but to illustrate concepts such as: the water cycle, runoff and evapotranspiration, and the use and value of native plantings for pollinator conservation, aesthetic value, and habitat sustainability.

The space will be used as an outdoor classroom for active educational initiatives such as staff and community trainings and school programs as well as function as a living laboratory for student research projects and an outdoor classroom. Since the Vassar Barn is in a high traffic area, accessible to the general public, passive education will also occur through interpretive signage located on site.

COST ESTIMATES

The overall cost to implement the entirety of this master plan, not including further renovation of the Barns or future renovation of the Cow Barns or the Corn Crib, is approximately 275,000 dollars. This estimate is for construction services only and does not include possible project contingencies, Vassar staff's time monitoring and implementing the project, long-term maintenance, permitting needs, or related design services.

Depending on the speed of fundraising, the project can be implemented over a series of phases. The project team has identified an initial phase, for under \$100,000 that would lead to the initial establishment of the swale and wetland system.t

Once completed, the project will require weeding, initial short-term irrigation, spot-replanting as needed, and this work should be done by the installer, another qualified vendor, and/or trained Vassar staff located at the Environmental Cooperative. The stewardship work is ideal for Vassar students interested in ecological restoration, botany, or related subjects. Over time, the plantings must be allowed to grow and change to best fill in the vegetated areas. Each spring, in March, herbaceous material should be cut down to knee height. A detailed long-term management schedule should be created in the next phase of design and installation.

Conceptual Estimate for Vassar Cow Barn GI



PHASE I

This estimate is not final, and subject to revision. It is intended for planning purposes only.

Phase 1

Excavation & Grading	\$34,750
Item 4 Access Rd	\$24,000
Building Drainage	Not Included
Bioretention Planting	\$37,750
Item 4 Walkways	Not Included
Total	\$96,500

Optionally Sequenced Phases*

Gate Installation	\$1,500
Lay Bluestone	Not Included
Foundation Plantings	Not Included
Parking lot repairs	Not Included
Total	\$1,500

Architectural Restorations

Remaining Cow Barn	Not included
Corn Crib	Not included

*These phases could be done in varying sequences, but the above order is most appropriate from a construction efficiency perspective.

Phased Project Total

\$98,000

This estimate does not include any of the following:

- construction contingency costs
- assemblage of bid documents
- additional design services
- Vassar staff time
- long-term maintenance requirements

Conceptual Estimate for Vassar Cow Barn GI



MASTERPLAN

This estimate is not final, and subject to revision. It is intended for planning purposes only.

Phase 1

Excavation & Grading	\$34,000
Item 4 Access Rd	\$24,000
Building Drainage	\$17,250
Bioretention Planting	\$73,000
Item 4 Walkways	\$28,000
Total	\$176,250

Optionally Sequenced Phases*

Gate Installation	\$1,500
Lay Bluestone	\$83,500
Foundation Plantings	\$6,850.00
Parking lot repairs	\$7,700
Total	\$99,550

Architectural Restorations

Remaining Cow Barn	Not included
Corn Crib	Not included

*These phases could be done in varying sequences, but the above order is most appropriate from a construction efficiency perspective.

Phased Project Total

\$275,800

This estimate does not include any of the following:

- construction contingency costs
- assemblage of bid documents
- additional design services
- Vassar staff time
- long-term maintenance requirements

PERMITTING/NEXT STEPS

The pilot projects, even if constructed as a single phase, would not disturb more than one acre. As a result, no permit is required from NYSDEC. In addition, based on a meeting and coordination with the City of Poughkeepsie, the proposed improvements envisioned in the Vassar Barns Master Plan will not likely trigger local review and approval.

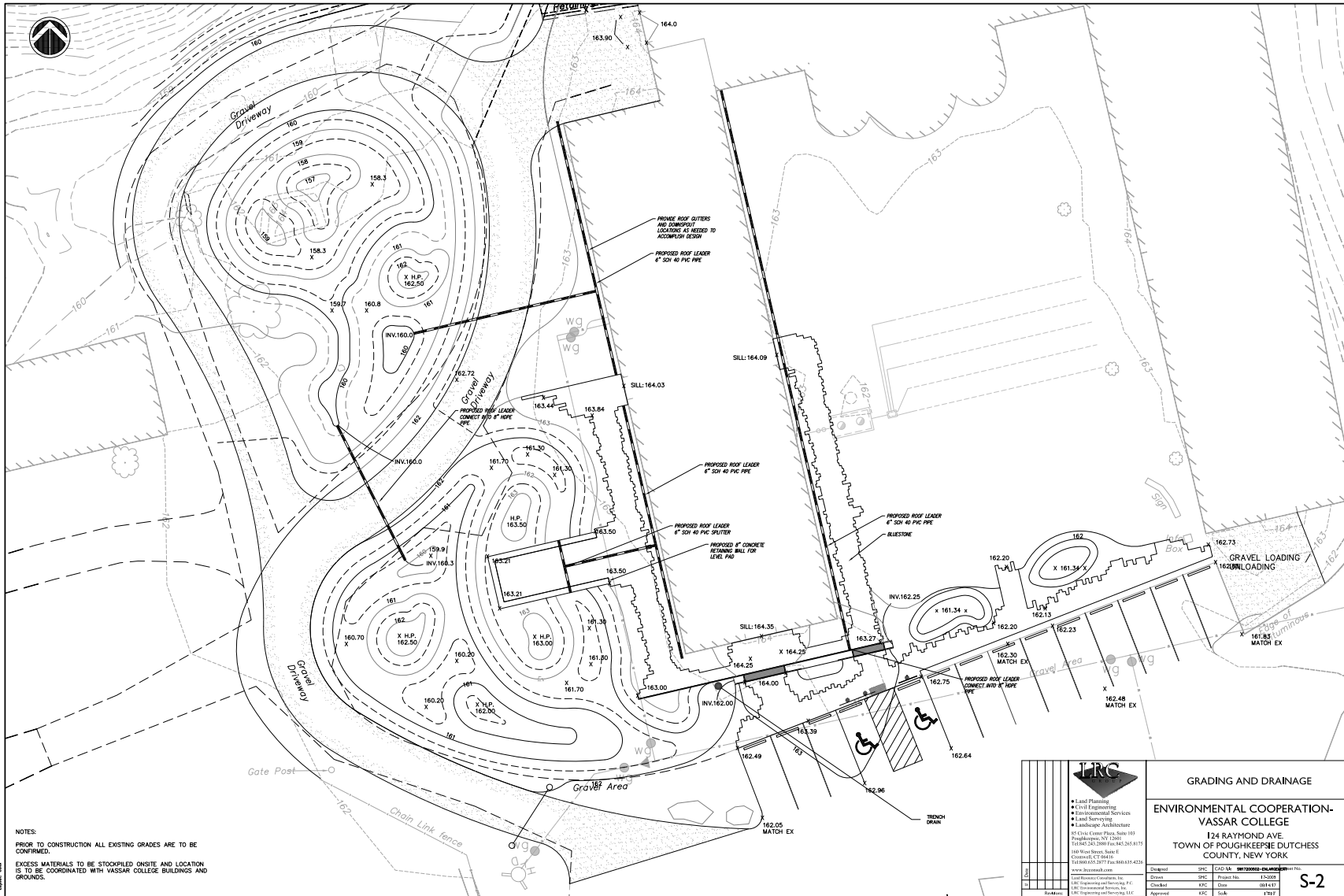
Once initial funds have been raised for implementation, the design should be revisited and updated to meet the available budget.

DESIGN EVOLUTION & ENGINEERING DETAILS

The project team worked collaboratively to review and understand site conditions and watershed health issues identified by prior studies. A variety of GSI techniques were initially considered based on the criteria developed for the Vassar Barns area. The initial design concept included converting the existing parking areas along the south side of the building to porous pavement. Given that the lawn areas surrounding the building have ponding issues and were heavily compacted as part of the reconstruction of the barn, the design evolved to focus on de-compacting the existing soils to restore the soil pore space and lawn permeability.

While there are many ecosystem benefits associated with porous pavement, particularly in areas already paved with conventional material that are under consideration for repaving, the parking areas closest to the Barn are compacted gravel and dirt. The team's Engineer identified the presence of existing utilities within the area that would have to be relocated and/or modified to accommodate the installation of porous pavement. Additionally, as the College implements its master planning vision for the Barns, overall pavement reduction and possible relocation of these parking spaces may occur in the near future. Considering these factors, porous pavement was removed from the pilot project.

The initial design concept was also refined in other ways, including expanding the rain gardens to further integrate the project into the natural landscape and provide opportunities for various plantings and collection of existing roof water. This change provides additional treatment of stormwater. While the project team initially sought to include porous pavers as part of the walkway system to the building, blue stone pavers were selected to better achieve the aesthetic goal of meshing with the architectural renovation of the barn.



NOTES:
 PRIOR TO CONSTRUCTION ALL EXISTING GRADES ARE TO BE CONFIRMED.
 EXCESS MATERIALS TO BE STOCKPILED ONSITE AND LOCATION IS TO BE COORDINATED WITH VASSAR COLLEGE BUILDINGS AND GROUNDS.

ERC

- Land Planning
- Civil Engineering
- Environmental Services
- Land Surveying
- Landscape Architecture

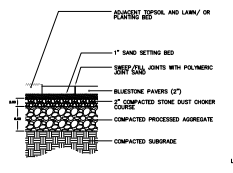
85 Civic Center Plaza, Suite 103
 Poughkeepsie, NY 12603
 Tel: 845.245.2100 Fax: 845.265.8175
 100 Wood Street, Suite 212
 Cromwell, CT 06416
 Tel: 860.435.2177 Fax: 860.435.4216
www.ercenv.com

GRADING AND DRAINAGE

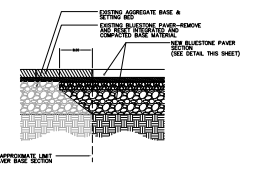
**ENVIRONMENTAL COOPERATION-
 VASSAR COLLEGE**
 124 RAYMOND AVE.
 TOWN OF POUGHKEEPSIE DUTCH
 COUNTY, NEW YORK

Drawn	SPC	Check Date	08/12/2008	Scale	AS SHOWN
Checked	SPC	Project No.	081417		
Approved	KSC	Date	08/14/07		
	KSC	Sub.	1717		

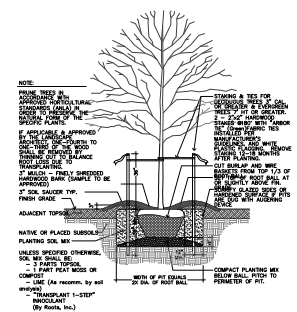
S-2



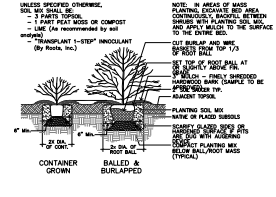
BLUESTONE PAVEMENT - AGGREGATE BASE
SCALE: 1/4" = 1'-0"



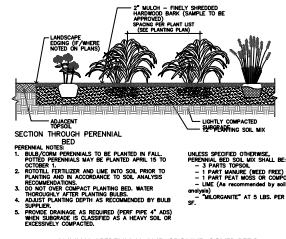
BLUESTONE PAVEMENT - TRANSITION TO EXISTING PAVEMENT TO REMAIN
SCALE: 1/4" = 1'-0"



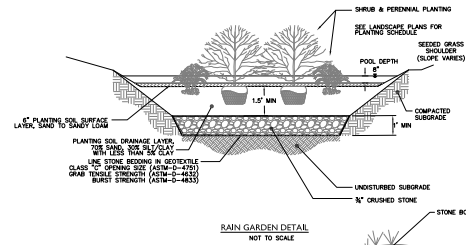
TREE PLANTING DETAIL
SCALE: 3/8" = 1'-0"



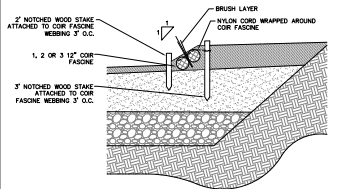
SHRUB PLANTING
SCALE: 3/8" = 1'-0"



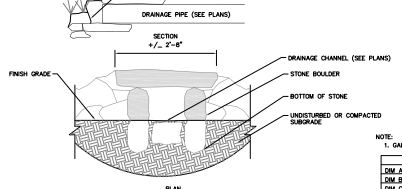
ANNUAL / PERENNIAL AND GROUND COVER BEDS
SCALE: 3/8" = 1'-0"



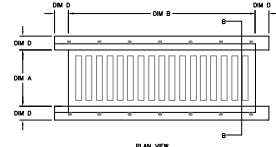
RAIN GARDEN DETAIL
NOT TO SCALE



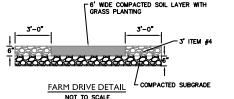
COIR FASCINE DETAIL
NOT TO SCALE



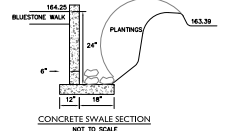
OUTFALL AREA DETAIL
NOT TO SCALE



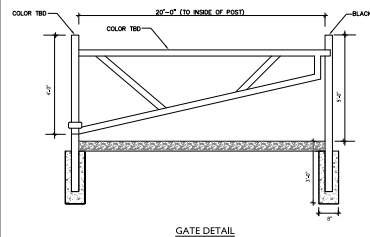
CONCRETE TRENCH DRAIN DETAIL
NOT TO SCALE



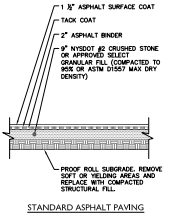
FARM DRIVE DETAIL
NOT TO SCALE



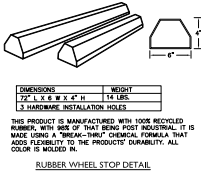
CONCRETE SMALL SECTION
NOT TO SCALE



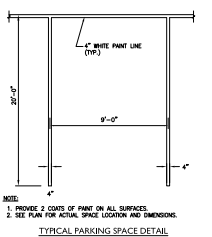
GATE DETAIL
NOT TO SCALE



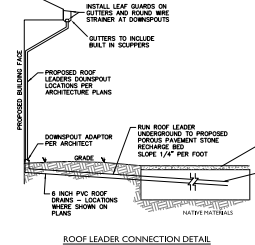
STANDARD ASPHALT PAVING
NOT TO SCALE



RUBBER WHEEL STOP DETAIL
NOT TO SCALE



TYPICAL PARKING SPACE DETAIL
NOT TO SCALE



ROOF LEADER CONNECTION DETAIL
NOT TO SCALE

NOTE: 1. GALVANIZED STEEL GRATE ALSO AVAILABLE.

DIMENSION SCHEDULE	
DM A	36"
DM B	LENGTH AS REQ'D. 4'-0" MINIMUM
DM C	24"
DM D	48"

OTHER SIZES AVAILABLE AS REQUIRED

• Land Planning
 • Civil Engineering
 • Environmental Services
 • Land Surveying
 • Landscape Architecture

80 (1st) Floor Plaza, Suite 100
 Poughkeepsie, NY 12520
 Telephone: 845.265.1400 FAX: 845.265.8173
 100 West Street, Suite E
 Cornwall, NY 12418
 Telephone: 845.247.1100 FAX: 845.247.4224
 www.iircny.com

CONCEPTUAL STORMWATER TREATMENT-DETAILS
ENVIRONMENTAL COOPERATION-VASSAR COLLEGE
 124 RAYMOND AVE.
 TOWN OF POUCHKEEPSIE DUTCHESS COUNTY, NEW YORK

Discipline	SPC	CAD/CA	DATE/ISSUE	Issue No.
Design	SPC		11/20/09	
Check/Rev	KJC	DM	08/14/07	
Approved	KJC	SKM		17007