Title: **Reinterpreting the Virtual Visitor Experience of the Dorrance H. Hamilton Fernery**

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Abstract:

The purpose of this project was to update and improve the web presence for the Dorrance H. Hamilton Fernery at the Morris Arboretum. To do this I first evaluated the resources already present on the website, and then researched how other gardens and institutions utilize their online resources. Using this information I created a new design template for the website, which included an interactive comprehensive timeline feature, a downloadable self-guided tour, and external resource links. Once fully implemented the new Fernery website will be a place for people to visit and learn about the structure, the history, and the fern collection housed within the Dorrance H. Hamilton Fernery.

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INTRODUCTION & GOALS

The Morris Arboretum of the University Pennsylvania is home the Dorrance H. Hamilton Fernery, the only existing freestanding fernery in North America. It is a very unique structure rich in history, architectural ingenuity, and botanical treasures. Many visitors however do not realize this, and subsequently do not truly appreciate the time they spend in the Fernery. Though signage is present around the Fernery and the Fernery Plaza, not all of it is relevant to the structure, and few people take the time to read all of it. The challenge thus becomes how to reach out to people prior to visitations and provide them with the information needed to better their time inside the fernery. Thanks to the work of Sara Levine, The McLean Endowed Education Intern in 2010-2011, the Morris Arboretum website has a new look, increased visitation, and more importantly increased average visitation has opened new possibilities in reaching out to guests. This project focused on the Fernery section of the website and looked at how it could be redesigned and improved to try and educate visitors, students, and the general public. To do this the original Dorrance H. Hamilton Fernery website was completely redone with many new sections added, educational material created, and external resources provided. While the scope of this project only focused on the Fernery website, the new design created could easily be used as a template for the improving the websites of other features at the Morris Arboretum.

RESEARCH – Initial Design

To start on this endeavor, it was first necessary to understand the current resources available online for the Fernery at Morris Arboretum. The website was very simple consisting of only three paragraphs and a single picture at the bottom of the page (Figure 1). The website was lacking real substance and was not engaging. Websites have the potential to be a great tool for disseminating information, but the first obstacle to overcome is to convince online visitors to stay on the page. According to the 2011 Google Analytics Report the average viewer stays on a page for only 5.23 minutes, yet this is not enough time to achieve the desired affects. By adding some interactive feature to the website it draws viewers in and encourages them to stay longer on the website and learn more about the Fernery before navigating away. At this point it was necessary to start researching how other public gardens have attempted to provide online information about their garden attractions. It quickly became clear that in fact many gardens are using a similar model for website design as the Morris Arboretum does. There were very few, if any, good examples to emulate for the Fernery website. Possibly the best model I discovered was already being used by the Arboretum for the Springfield Mill at Bloomfield Farm, designed by Robert Gutowski, Director of Education. This website contains a slideshow of pictures, contact information, and an in-depth historical time line, along with links to external resources, and downloadable documents. Though there was no exemplary example to use as a starting point, I was able to gather various ideas and concepts that could be combined into remaking the website. The sections would include a slideshow of historical and modern pictures, a short description of the Fernery and the

collection housed inside, an interactive illustrated timeline, a downloadable illustrated tour and supplemental fern list, and external resources.

RESEARCH – Online Content

With the new design set, more research had to be conducted to pull together all the information that would be presented on the website. First I consulted the slideshow that was created by Shelley Dillard, Propagator at Morris Arboretum, on the restoration of the Fernery back in 1994. This slideshow contained photographs of the Fernery, and the ferns, going all the way back to 1901. Six of these photos were selected to be used as a small photo-gallery placed at the top of the new website (figure 2). Then, with some small editing, the description of the Fernery, from the old website, was used to give visitors a quick overview of what the Fernery is. The first big feature, however, on the website is the interactive timeline.

The first challenge in creating this was assembling all of the information for it. Luckily over the years there have been several publications that have either focused exclusively on the Fernery or mentioned the Fernery in some aspect. Most of these are housed in the Morris Arboretum Library. Furthermore the Historical Collection at the Morris Arboretum Library contains many original documents pertaining to the Fernery such as John T. Morris's ledgers (figure 3), correspondences with architects (figure 4), and even the original blueprints for the Fernery (figure 5). Using all this information I was able to assemble a comprehensive timeline of the Fernery (figure 5). The next part was finding a template to use to create this interactive feature. The goal was to find something that would allow the information to be presented in a more streamline form, not requiring the viewer to scroll through lots of information, and something that was intuitive and easy to use. A template was found online that included a time-bar on top with bars representing each important date. When a user clicks on one of those spots a window opens below it with more information and pictures (optional).

The final piece of intense research and development that needed to be done was to create an illustrated self-guided tour of the fernery. With the help of Dianne Smith, Fernery Volunteer, twenty ferns were selected as important or notable in some way. As I began to write the actual tour however, I realized for time reasons, it was going to be unfeasible to use all twenty in one tour. The tour would be very long and few visitors would want to print it out and bring it with them. So from those twenty ferns, the top ten were chosen to be integrated into the tour. The criteria used to select these ferns was that they must be dispersed out around the Fernery, must have some importance, and must be able to be used to teach visitors about ferns, ecology, or history. A copy of the tour is provided as Figure 7. The other ten ferns not integrated into the tour were still organized into a list with some information about them and will also be available to visitors who are interested as a supplemental fern tour. Fern enthusiasts can use these, or returning visitors who wish to discover some ferns that they may not have noticed previously.

The final part the website is a list of external links for those who wish to learn more about what ferns are, how to grow them, or research being conducted with them.

The purpose was to find links for all types of visitors – those who are new to ferns, home gardeners, and scientists. By offering more services on the website there are more reasons for people to come visit the site and to stay longer on it. This not only raises awareness about the Fernery, but about the Morris Arboretum in general and could possibly even lead to more first time visitations. The sites selected were the British Pterdiological Society, the America Fern Society, the Hardy Fern Foundation, and Microsoft's Photosynth. The latter is a simulated three-dimensional representation of the Fernery created by a volunteer. By clicking on this link you are able to virtually tour the Fernery and see stunning photographs of the structure and ferns from the inside. This can allow those from far away to still get a sense of what ferneries are like even if they are unable to come in person.

IMPLEMENTATION

As of writing this paper, the new website has not been made live and accessible to the public. The next step of this project will be meet with Zac Brooks, Morris Arboretum webmaster, and work with him to actually implement the project. All the data has been collected a conceptual design has been created so ideally this last step of the project will be the simplest. After the website is satisfactory and running online I will provide the new link with staff members, volunteers, and other interested persons to not only promote the website but to also get their feed back and comments. Since there are still several months before the internship finishes, this will allow for time to fine-tune and correct any mistakes that may have made it onto the website.

FUTURE-LOOKING

While the main goal of this project was to re-create the website devoted to the Dorrance H. Hamilton Fernery at the Morris Arboretum, the product created has implications for the Morris Arboretum website at large. Some of the features and concepts used could be easily repurposed for other sections of the website. The most obvious application of the design is to use it for redoing the web content for other features at the Morris Arboretum. The structures, gardens, and sculptures could all use the design created for this project, either in its entirety or relevant selections. This would build continuity through the website as well as improving each site individually.

The concept of streamlining, and condensing information into smaller window spaces was highly influential when working on this project. There is already evidence of this appearing on other parts of the website, and hopefully the design presented here will encourage this trend to persist. Things like slideshow windows, interactive screens, and user friendly menus all encourage visitors to spend longer amounts of time on the website and to therefore glean more information and build interest.

CONCLUSION

The Dorrance H. Hamilton Fernery at the Morris Arboretum of the University of Pennsylvania is a wonderful unique feature that has the potential to draw in more visitors then it currently does. One of the largest obstacles that it faces is a lack of communication of the information about the structure or the collection housed inside. Though there are educational signage placed around the Fernery, it is really only accessible to those already visiting. To help improve this situation the website devoted to the Fernery has been redesigned and improved upon. Online visitors are now able to learn about the history of the building and the collection inside. While also on the website a visitor is able to download a self-guided tour, view pictures of the Fernery, explore other websites devoted to ferns, and even take a virtual of the building.

Figure 1

Morris Arboretum of the University of Pennsylvania
Official arboretum of the Commonwealth of Pennsylvania

Always Growing
THE CAMPAIGN FOR MORRIS ARBORETUM

Garden Buildings

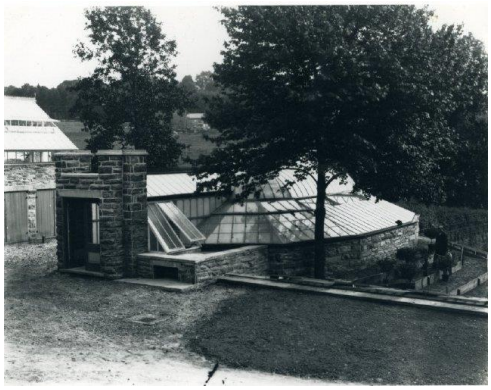
The Dorrance H. Hamilton Fernery

The Dorrance H. Hamilton Fernery is the only remaining freestanding Victorian fernery in North America. The Fernery documents a time when Victorians were consumed with ferns and glasshouses. It was designed by the original owner and namesake of the Arboretum, John Morris. The Fernery nestles in a curve of land below the Rose Garden, its filigree roof sparkling in the sunlight.

Over the decades, the Fernery fell into disrepair and was renovated a number of times. In 1957, Arboretum staff spared the Fernery from certain destruction by replacing the unique carved roof with a traditional sloping roof and updating the heating system. To return the Fernery to its original Victorian essence, the Arboretum completed a meticulous restoration in 1994, funded by board member Dorrance H. Hamilton and other donors who responded to a major matching grant from the National Endowment for the Humanities.

The $1.2 million renovation included reconstruction of the curving roof, replacing the electrical and heating systems, as well as restoring the waterfalls, pools, and stone walls. The rustic wooden bridge was replaced with a new structure hewn from Arboretum cypresses. In front of the Fernery, an elegant bluestone plaza now welcomes visitors.

Figure 2



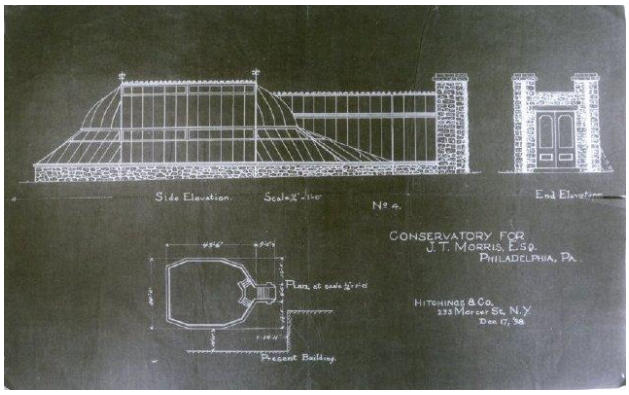

Side Elevation.
No 4.
End Elevation
CONSERVATORY FOR
J. T. MORRIS, E.SQ.
PHILADELPHIA, PA.
HITCHINGS & Co.
233 Mercer St. N.Y.
Present Building.

Figure 3

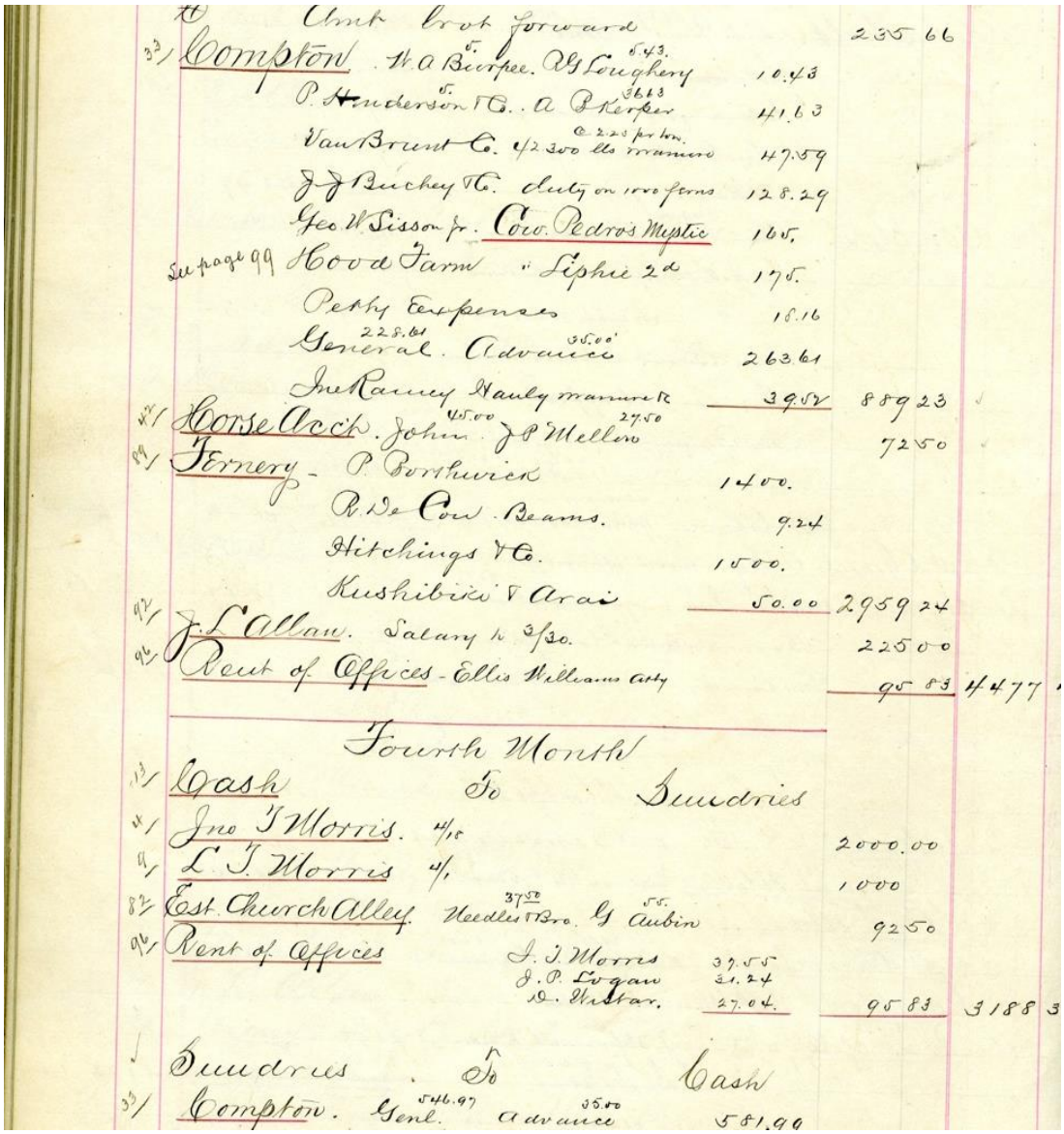
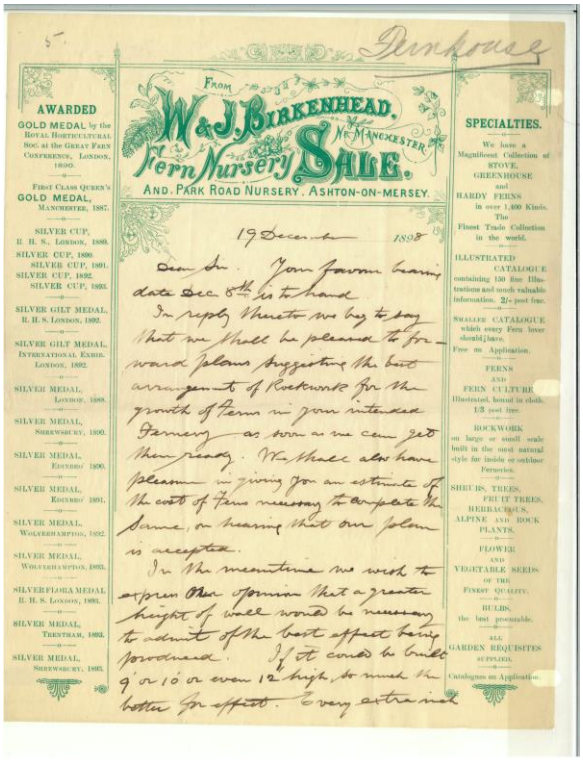

Amt brot forward 235 66
33/ Compton . H A Burpee. A G Loughery 543. 10.43
P Anderson & C. . A B Kerper 3613 41.63
Van Brunt & Co. @ 2.25 per ton. 4/2300 lbs manure 47.59
J J Buckey & C. duty on 1000 ferns 128.29
Geo W Sisson Jr. Corv. Pedros Mystic 165.
See page 99 Hood Farm " Liphue 2d 175.
Petty Expenses 18.16
General. 228.61 Advance 35.00 263.61
Jas Ranney Hauly manure &c 39.52 889 23
42/ Horse Accts. John 45.00 J B Mellon 27.50 72.50
89/ Fernery - P Berthwick 14.00.
R. De Cou. Beams. 9.24
Hitchings & Co. 15.00.
Kushibiki & Arai 50.00 2959 24
92/ J. L Allan. Salary to 3/30. 225.00
96/ Rent of Offices - Ellis Williams Cashy 95 83 4477
Fourth Month
13/ Cash To Sundries
44/ Jno J Morris. 4/5 2000.00
9/ L J. Morris 4/ 1000
82/ Est. Church Alley. Needles & Bro. 37.50 G Aubin 55. 92.50
96/ Rent of Offices J. J. Morris 37.55
J. P. Logan 31.24
D. Ustar. 27.04. 95 83 3188
Sundries To Cash
33/ Compton. Genl. 546.97 Advance 35.00 581.90

Figure 4



Complete transcription
19 December 1898

Dear Sir

You Favour bearing date Dec. 8th is to hand.

In reply whereto we beg to say what we shall be pleased to forward plans suggesting the best arrangement of Rockwork for the growth of Ferns in your intended Fernery as soon as we can get them ready. We shall also have pleasure in giving you an estimate of the cost of Ferns necessary to complete the same, on hearing that our plan is accepted.

In the meantime we wish to express our opinion that a greater height of wall would be necessary to admit of the best effect being produced. If it could be built 9' or 10' or even 12' high so much the better for effect. Every extra inch in altitude tends to increase the impression of boldness produced by the rock structure. Of course a greater elevation would necessitate a greater amount of heating power to maintain a given temperature in winter; & this & other things must be taken into account in arriving at a decision as to the best height of wall to fit you. We should require to know if the height of the walls is increased before we could make out a list & estimates of the necessary ferns.

The heating pipes should go round the bottom or near the bottom of the wall; & should be encased in a brick chamber; into the bottom of which air passages should be made from the front of the rockwork i.e. from the path right under the rock [ ] to the air chamber. From the top of the air chamber upright shafts should be built at intervals for the passage of the heated air to the base of the roof. By this means the most perfect circulation of air is secured and the top of the air chamber is useful as a support for the rock built up at the back. This should show in our plan.

Our cable address is "Birkenhead Nurserymen Sale England" the word "accepted" would be enough to tell us the plan would do. We shall be pleased however to hear from you again as to the height of the walls.

We are dear sir
Yours obediently
W. & J. Birkenhead.

Figure 5

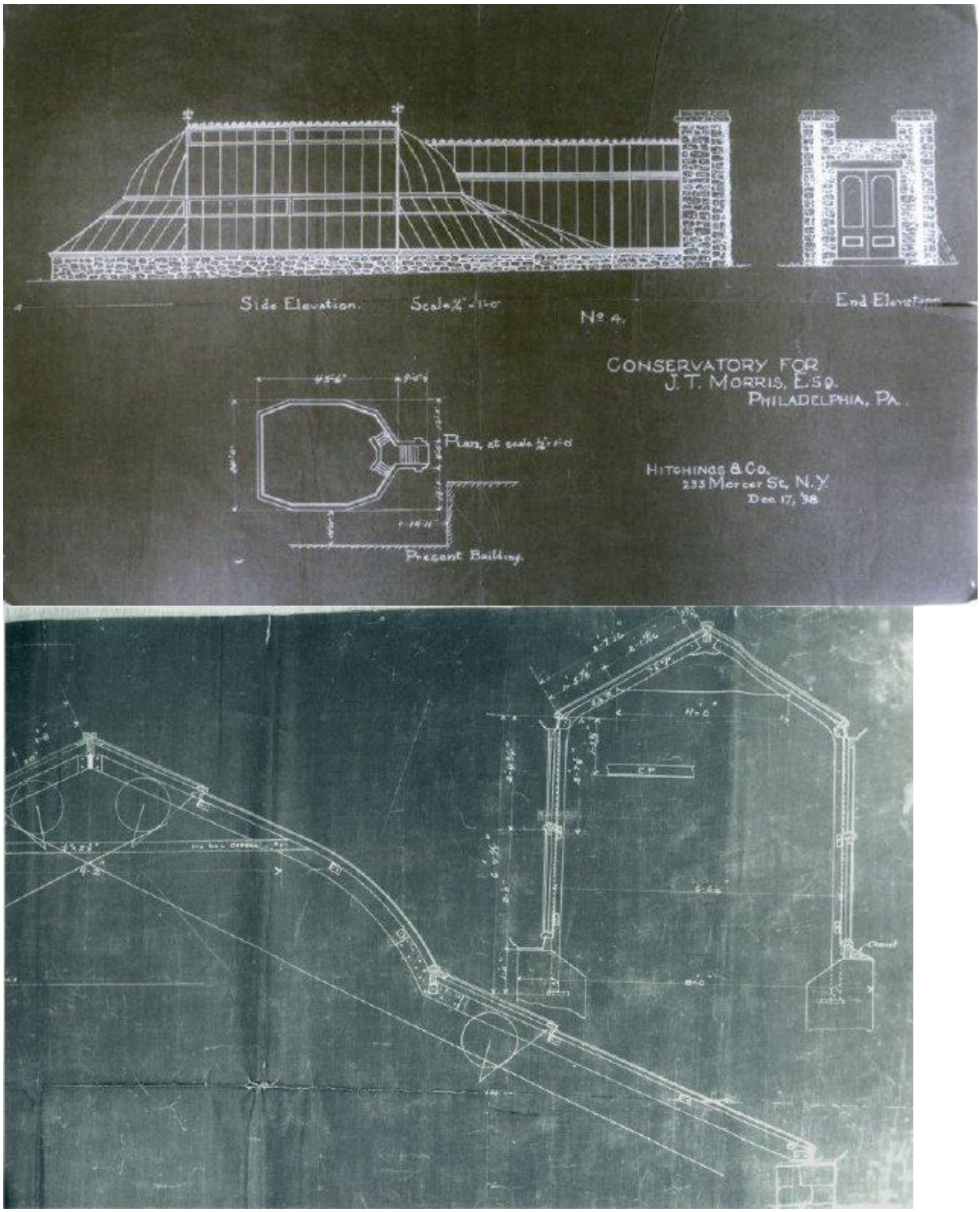

Side Elevation. Scale ¼"-1'-0"
End Elevation
No 4.
CONSERVATORY FOR
J.T. MORRIS, ESQ.
PHILADELPHIA, PA.
Plan, at scale ⅛"-1'-0"
HITCHINGS & Co.
233 Mercer St. N.Y.
Dec 17, '58
Present Building.

Figure 6

1887 – Compton Estate founded by John T. Morris and Lydia T. Morris in Chestnut Hill

1898 – Designs for Fernery are completed and drawn and foundation excavation completed. John Morris begins to correspond with fern experts W. & J. Birkenhead about the interior design of the fernery including rock work, water features, and paths.

1899 – J.T. Morris hires Kushibiki & Arai from Japan to help design the rock work inside of the fernery. Once the Fernery is completed Frank Gould, Compton Gardener, installs over 575 different varieties of ferns and selaginellas ordered from the W. & J. Birkenhead catalogue.

1915 – John T. Morris passes away leaving the estate in the hands of his sister Lydia T. Morris.

1917 – As the United States enters into World War I, coal is rationed to the public to help support the war effort. Since the Fernery was heated with coal, this threatened to devastate the Morris's collection. Lydia T. Morris appeals to then Secretary of Treasury William McAdoo and is granted an exemption for the Fernery due to the "irreplaceable and scholarly character of the fern collection".

1932 – Lydia T. Morris passes away and grants the Compton Estate to the University of Pennsylvania. At this time the University creates the Morris Arboretum.

1933 – The Morris Arboretum of the University of Pennsylvania is opened to the public

1956 – The Fernery is deemed unsafe for the public and closed while the administration works on completing necessary repairs including replacing the roof, fixing the heating system, and repainting sections of metal work.

1987 – The A-frame roofed (installed during the 1956 renovation) is deemed structurally unsound and the Fernery is closed to all visitors. Volunteers and staff are allowed to enter for maintenance and up keep of the collection.

1994 – With support from Dorrance H. Hamilton the Morris Arboretum restored the Fernery to its original condition. This included restoring the curved roof, replacing the heating system, reconstructing the rockwork, and installing the blue flagstone plaza outside of the fernery.

Figure 7

Welcome to the self-guided Dorrance H. Hamilton Fernery Tour. The Fernery was first built in 1898 by John T. Morris, the original owner of the Morris Arboretum property, and is fashioned after the traditional Victorian Fernery Style that was extremely popular in England at the turn of the 20th century. The Dorrance H. Hamilton Fernery is the only free standing Fernery left in North America and is home to over 200 different species of ferns and fern allies. During this tour you will be introduced to some of the most notable ferns in the current collection and be able to learn a little bit more about them.

As you enter the Fernery you will be on a balcony overlooking the two coy ponds. From here you can see many ferns, but our tour will begin with the largest fern:

Birds-nest Fern (*Asplenium nidus*): This fern is in the Spleenwort Family (Aspleniaceae) and is native to Southeast Asia and Eastern Australia. This fern is quite noticeable for its long undivided fronds that form a distinctive bowl shape in the middle (a bird's nest). In places where the fern is native, the new fronds of young ferns are used as salad greens. If you flip over the fronds you will see many sori, collection of sporangia each containing hundreds of spore. From just this one plant you could start growing a lot of fern salad greens!

To the left of the Birds-nest fern you will see a fern with large rhizomes growing over the rocks this is:

Bear-Paw Fern (*Aglomorpha meyeniana*): This fern native to the Philippines and Tiawan is a member of the Polypodiacea family (one of the largest fern families). It is an epiphytic fern, meaning that it grows on with its roots exposed to the air (not in the soil). The thick, hairy rhizome and pinnatifid fronds make this a beautiful fern in the collection. Some fronds have terminal fertile sections that are constricted into bead-like lobes adding to the appeal of this fern.

If you now turn around, you will find a rock covered in another epiphytic fern:

Felt Fern (*Pyrrosia lingua*): This fern, we believe, was originally purchased by John T. Morris and has been growing in the fernery ever since. It is fern is also in the Polypodiaceae family and is endemic to (native only in) Taiwan. The slightly lobed fronds grow vertically out of the rhizome that slowly creeps to form a dense mat over this rock. The name comes from the dense pubescence on the underside of each frond.

Located just to the left of the wooden bridge is:

Tasmanian Tree Fern (*Dicksonia antarctica*): 350 million years ago trees, as we know them today, had not evolved, but rather large tree ferns dominated the canopy. Though these large tree ferns no longer exist, there are smaller tree ferns still found around the globe. This fern is native to parts of Australia and is one of the three extant genra in the family Dicksoniaceae. The species can grow to over 20' tall in nature and can withstand temperatures dropping to below freezing making this a very unique specimen.

(Figure 7 continued)

On the far side of the bridge are two more tree ferns:

Australian Tree Fern (*Cyathea cooperii*): These tree ferns belong to the scaly tree fern family (Cyatheaceae), but also native to Australia as the name suggests. These are much faster growing tree ferns and are commonly used as ornamentals. These ferns can reproduce easily and have become a problem in parts of Hawaii. For more information you can read the sign located at the base of these two ferns.

While on the bridge with the tree ferns to your left on the right up on the wall you will see:

Asian Basket Fern (*Drynaria sparsisora*): This is one of the most rare ferns currently in the fernery. This epiphytic fern belongs to the Polypodiaceae family and is native to Southeast Asia. The fern gets its name from its sterile basket-looking fronds that grow over and protect the thick scaly rhizome (similar to the Bear-Paw Fern). These baskets are used to collect falling leaves and debris, creating a humus-rich soil even while growing on rocky hillsides.

Now continue down the path and look up above the waterfall, here lives:

Japanese Holly Fern (*Cyrtomium falcatum* 'Rochfordianum'): This is one of the most prolific ferns in the collection. A member of the Dryopteridaceae family, this fern easily reproduce. through spore dispersal. Look around the fernery can you can find it growing in the tiniest cracks. The fern has a very distinctive vase-shape and when mature can have fronds over a foot long. Native to Eastern Asia, this is a great option for growing at home.

Located on the slope to the right of the tunnel enterance you can find a selection of various:

Maidenhair ferns (*Adiantum*): These ferns are all part of a large genus in the Pteridaceae family and found around the globe. There are hardy species in this genus that you can grow outside in your gardens, and others that make great indoor plants for your house. The fern has very graceful foliage and some emerge with a brilliant rose color. Compare the similarities and differences of the fronds between the large leafed *A. peruvianum* and the smaller *A. capillus-veneris*.

Pass through the tunnel, and as you start up the stone steps look to your right and you will see:

Australian King Fern (*Todea Barbara*): This is a low growing tree fern (notice the multiple bulbous stems) native to southern Australia. This tree fern is a member of the Royal Fern Family Osmundaceae and is not actually a true tree fern, in fact it is in the Order Osmundales, different then the other two true tree ferns seen today (both in the Order Cyatheales). The King Fern can grow to be around 5 feet tall with fronds over 4 feet long, and can withstand temperatures down to 15 ^{o}F making it possible to grow in southern parts of the country.

(Figure 7 continued)

We conclude this tour with possibly the most remarkable, but small fern located to left of the stairs leading up to the overlook (please do not climb the stairs). Look for a fern with simple undivided fronds and a distinct blue color:

Blue Fern (*Microsorum thailandicum*) – This fern is very unique and known for its blue sheen that is almost iridescent. It is an epiphytic fern that grows on limestone outcrops in Taiwan and southern China. This is a unique specimen and is often over looked or missed by visitors.

This concludes the guided tour of the Fernery, but it does not mean there aren't more amazing ferns to see. Take some time to walk around more and observe the plants closely. If you would like you can also download the supplemental plant list and learn more about some selected ferns.