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From Kura-Tō to Entry Door

An AOME Architects Residential Folio

Acknowledgments

This AOME Architects Works folio, much like the door transformation itself, could not have been completed without the enthusiastic assistance of many talented people.

Design Collaborators and Construction

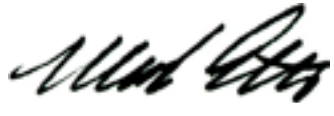
Many thanks go to my partners and Will Beilharz from my office, always ready to bounce ideas off of, they were a source of assistance and encouragement. For all of us, the kind of intense dedication necessary to complete projects like this are really an everyday thing. Beilharz also kept other aspects of the project moving forward so I could devote additional time to this complex endeavor. To Schultz Miller Inc. whose hardworking crafts people constructed the setting for the door, installed it, and led the coordination of the many subcontractors involved — they really know how to get things done, no matter how wild our ideas are. Special thanks to Ken Head, Craig Zehnder and John Kindblade (principal in charge, project manager and superintendent respectively) who were very proactive in assisting with resolution of fabrication, sequencing, and assembly issues and able to maintain a steely calm in the face of adversity.

To Len Cullum of Shokunin Do Studio who was central to evaluating if the antique could be salvaged for our purposes and who helped me invent solutions to get the door and all the little details to work (not to mention actually restoring/recrafting the antique and procuring new matching wood and fabricating the interior face of the door to match the caliber of the original craftsman's work). To Warren Brones who was invaluable in collaborating with me in further invention and with resolving solutions for what I wanted to achieve in the metal portions of the door, both decorative and structural. I was also grateful for the expertise and input from the folks at Sun Valley Bronze, Sheryl Andrist at She-Metal, Steve Elliot of Elliott Painting, and Chester Orint at Flamespray Northwest for their contributions to the decorative finishes and custom designed and cast hardware applied to complete the final look of the door. Without all of these contributors and numerous others unnamed, the door wouldn't exist, and neither would this book.

The Book

When Cullum learned of my notion to document the design and fabrication of the door and its heritage he immediately and (except for posing for pictures in his shop) enthusiastically became my personal research assistant and the chief source of historical, cultural and technical information about all things Japanese along with his traditional woodworking practices. His enthusiastic support and contributions in many cases drove the book to new unanticipated territory that definitely improved upon what I began. I also want to thank Marc Vassallo of Schultz Miller for his editing contributions to the text and layout.

Homeowners Scott and Laurie deserve special mention for encouraging all of us throughout their project to strive for better solutions and for providing the opportunity to create. Without their desire to achieve something unique and their willingness to experiment and to fund these ideas, none of this could have been completed or even conceived of.



Mark Elster
Managing Principal
AOME Architects

Introduction

In our second Works volume featuring a specific AOME Architects project, we relate the journey through time, culture and history of a Japanese Kura Tō —鞍戸 (storehouse door), following the story of this repurposed sliding gate door as it is incorporated into the new entry for homeowners Laurie and Scott's contemporary Pacific Northwest residence.

We recount the door's elaborate and complicated design and a series of careful, painstaking restorations and elaborate handcrafted additions and modifications required for the door's new life. We retrace the historic origins of the door and document the complex process of transformation from our original design conception, through the incredible handiwork (and invention) of the various crafts people involved, all the way to the final installation.

Although the custom door originally proposed by AOME Architects would have been quite special, it was to be composed of entirely new raw materials. Its craftsmanship would have been exemplary, but its story would have begun in 2008. The door would not have come with a heritage. By incorporating the 19th Century kura door in Laurie and Scott's entry we have created a unique portal to their home with a long, rich history. No completely new door could ever measure up.

Beginning life as a secure entrance to what was likely an ordinary merchant's kura, the original door was crafted with great care, though the building itself was probably simple, with a few isolated flourishes of ornamentation that would quietly reflect the status of the merchant without drawing undue attention from the ruling classes, or jealous neighbors. The history of the original kura door is almost palpable in the new door. Certainly, you sense the handicraft of a time gone by, but there is also a glimmer of what it must have been like during the waning decades of the Japanese feudal period, the age of God-Emperors, Shoguns, Samurai, and the peasants they subjugated so harshly.

As you explore the story within these covers, you may find yourself astonished at the number of individuals involved and at the level of thought, experimentation, craft, experience, and detail they each invest into a project such as this. Yet as comprehensive as this book may seem, it only touches upon the myriad details involved in making a complex element like this entry door. To some degree or another, the same can be said for all the other components that make up a fine custom home. Even if it were possible to fully describe all the design, thinking, and craft techniques that went into this project it is worth resisting the temptation to analyze the mystery of the creative process too much. As with the magician, when we learn the trick it fails to satisfy and ultimately spoils our enjoyment of it. Hopefully this book will leave you with a sense of awe, not only for the kura door and its history, but also for the mysterious creative process that lies embodied within it.

Kura 鞍

Fig. 140. — Doorway of an old Kura in Kioto.

Kura, essentially a fireproof storehouse (recall that feudal Japan was plagued by fire due to traditional wood and paper construction techniques), that typically had a pair of ponderous fireproof swinging doors that were kept permanently open (except in case of fire). These doors were composed of mud and plaster supported by a stout frame, mirroring the construction of the walls.

The opening faced the public street, as shown in this sketch, and therefore needed the additional protection of the sliding gate door that could be locked to protect the contents of the storehouse from intrusion. It is this inner door that is now the heart of the new entry door.

Fig. 141. — Key to Kura, and Bunch of Keys.

Although most of the hardware has been preserved, the keys have been lost but may have looked like those shown in the sketch. Another key operated a floor bolt that further secured the gate.

A door is found

When Laurie came across the kura door at Honeychurch Antiques in the South Lake Union neighborhood of Seattle, she knew that she'd found something special that she hoped to use at the entrance to her extensively remodeled home.

When Elster first saw the antique (via the emailed photos seen here) he recognized the unique opportunity it represented, along with the many challenges he would have to overcome to transform it into a front entry door. Visiting it in person at Honeychurch, his admiration grew almost as much as his trepidation.

The panel of beautifully figured wide planks of Keyaki—欅 (a kind of elm) was 5'-9" wide and only 6'-4" tall, not the best of proportions for a modern functional door that had to fit within the 8'-6" tall arched opening in the new foyer. Clearly any solution would require narrowing the width and somehow adding height to the panel while preserving its beauty and character.

To compound the problem, the panel was not in great shape. During the decline of the feudal era, a series of famines and economic collapses likely contributed to a diminishing ability to maintain the door. When some sacrificial parts that were meant to be replaced as they wore out, were instead left in service, the door began to suffer more and more deterioration. Sheer age and deep gouges, holes and breaches of the finish and hardware allowed moisture to penetrate and warp the door so that it apparently would no longer close and seal properly. Subsequent partial repairs added new boards to the back side, cut to fill in the bow so the door would seal once again to its jamb, but did nothing to stop

the warped door from rubbing on the opening and the track more and more. Not only was it 189 years old and worn from daily use, but it had also suffered from the change in environment moving from Japan to the drier climate of the Northwest (how often do you hear that?).

The changes in humidity exacerbated defects in the door, rapidly shrinking the wood and warping the boards so severely daylight could now be seen between them. The shrinkage was so extreme across the grain of the wide boards that the nails holding the metal hardware to the wood were bent and in places nearly sheared off or ripping the edges of the hardware. The door was almost literally tearing itself apart as it equilibrated to our climate. Fortunately, the hardware, the most important character element, was otherwise in good shape and featured exquisite hand-worked details of embossing and engraving
(more on this later).

While the unfinished back side (near left image) had its rustic charms, it was not intended for public display (as it originally faced the inside of the kura, a utilitarian space) and in no way was compatible with the refined design style of the remodeled home. This side also lacked operating hardware and would be difficult to finish and seal against weather.

After an examination by Len Cullum, the woodworker on the project, it was determined that the door could be cut down, resawn and rejointed to minimize warping and damage while preserving the original finish and patina. He proposed to use traditional methods that would be faithful to the original. All that was needed to move forward was a design concept and technical solutions. But before we review the design process, a little historical background is warranted...

The History Embodied within the Kura Door

Certainly, we crave antiquities because of their beauty and age. They represent a time gone by, unfamiliar cultures, and lost, or nearly lost arts and crafts. But we also enjoy the way in which history comes alive in the presence of certain antiques. Such is the case with the kura door, crafted with such care 189 years ago, that is at the heart of this new entry door. One can palpably sense the presence of Samurai, Shoguns, Courtesans, and the careful craftsman that made it, in the very fiber of the door and its elaborate hardware.

The kura door perfectly embodies the fascinating contradictions of the strange and wonderful Land of the Rising Sun. It is a beautiful mountainous land of temperate climate that is also assailed by typhoons, earthquakes, and volcanic activity. The same contrast and startling mixture of beauty and belligerence that typified their culture (visualize the Samurai warrior who treasures his calligraphy skills) is embodied within the functionality, art, and craft of the kura door. AOME Architects' contemporary design of the hand-crafted additions that surround the kura door were conceived to celebrate and extend those contrasts.

When Europeans first came to Japan in the 16th Century, they found a system of feudalism reminiscent of their own and, despite the obvious and exotic differences, recognized there was much to share between the cultures. But the singularly jingoistic Japanese rulers considered the Europeans barbaric and (correctly) a threat to their rule and the insular, militaristic, ritual and tradition–bound way of life they enforced, and immediately erected a self-imposed isolation that would last for more than 200 years.

It was during this period of isolation that our door to the kura was crafted. A period shut off from the world and seemingly frozen in time, but also of hidden cultural upheaval and transformation. A time when Samurai often brutally suppressed any dissension and rigidly enforced the Shogun's autocratic rule over the lower classes, also gave inspiration and birth to new art-forms such as Kabuki which reached its peak around the time of the crafting of our door.

Although we know that it was salvaged in the town of Ooitaka, and from the marks on the door, where it was crafted, we cannot say who it belonged to. It is unlikely that it was part of a castle or a palace because they are generally well preserved and revered (and safe from dismantlement). Most likely it would have originally belonged to a merchant.

Merchants were caught between two worlds as their status in the rigid society changed. They had lately tended to be quite prosperous but were firmly affixed amongst the subjugated lower peasant classes. Their excess capital created a dangerous and precarious quandary for them. Always in danger of confiscation by the marauding (and typically quite poor) Samurai and their Shogun, the merchant class sought out accepted ways of enjoying their wealth that was out of the reach or attention of their overlords. The typical patron of Kabuki were merchants, "who were forbidden by the government to wear sumptuous clothes or even change professions. Starved for excitement and lavish display, they were dazzled by the Kabuki's resplendent costumes...The audiences delighted even more in scenes that presented clever commoners outwitting their social superiors in love or physical combat." (from Leonard's *Early Japan*).

The same conflict is represented in the kura door's construction and decoration and demonstrates that these same merchants found other outlets for their wealth. A stout and formidable door was necessary to keep out thieves and sometimes bullying Samurai that would otherwise freely take what opportunistically presented itself. The sturdy wood and strong joints discouraged forced entry, preserving their wealth and possessions for later use or sale. The door also presented an outlet for expression that would not draw the interest of the Samurai or the Shogun—it could be a thing of beauty while remaining worthless as an item to confiscate. So, the lavish detail and craft that went into the otherwise functional metal hardware was in some sense an expression of resistance and defiance much as the Kabuki reflected the same growing underlying social tensions.

The Builder's Mark & Symbolism

Kura doors are prized for their sturdy construction, fine craftsmanship, unusual hand wrought and engraved hardware and overall harmonious design. Our door was of the rolling gate form with a hasp-type catch at the operable strike jamb and a keyed floor bolt at the sill. The doors rolled on wheels concealed in a recessed track at the bottom rail of the door (the wheels and key mechanism for the floor bolt were missing when salvaged).

The decorative escutcheons feature exquisite iron work with extensive hand wrought engraving. The original door had a smaller decorative plate for the strike lock (evident because no finish is present in a smaller area around the lock mechanism). The larger escutcheon plate was added later, either as part of maintenance and repair or as a gesture to enhance the appearance of the door. The material is of a somewhat different alloy of iron in a more elaborate decorative motif than the original X shaped floor bolt escutcheon.

The metal plate at the edge of the sliding gate functioned as a strike that housed the latch or hasp hook that mated with the jamb of the original storehouse opening. The image at near right shows the strike in its original location on the unaltered door. Since this face is no longer visible, the strike plate was relocated to the interior face on the wood panel of the new door because of its special importance to the door.

Fortunately, it was the custom for the craftsman of the era to engrave his name, the build year and the town of origin on the strike hardware. Although worn and corroded, on close examination the Kanji characters can be discerned on the surface of the strike plate (opposite — in this image the plate has been dusted with talcum powder to make the marks more visible).

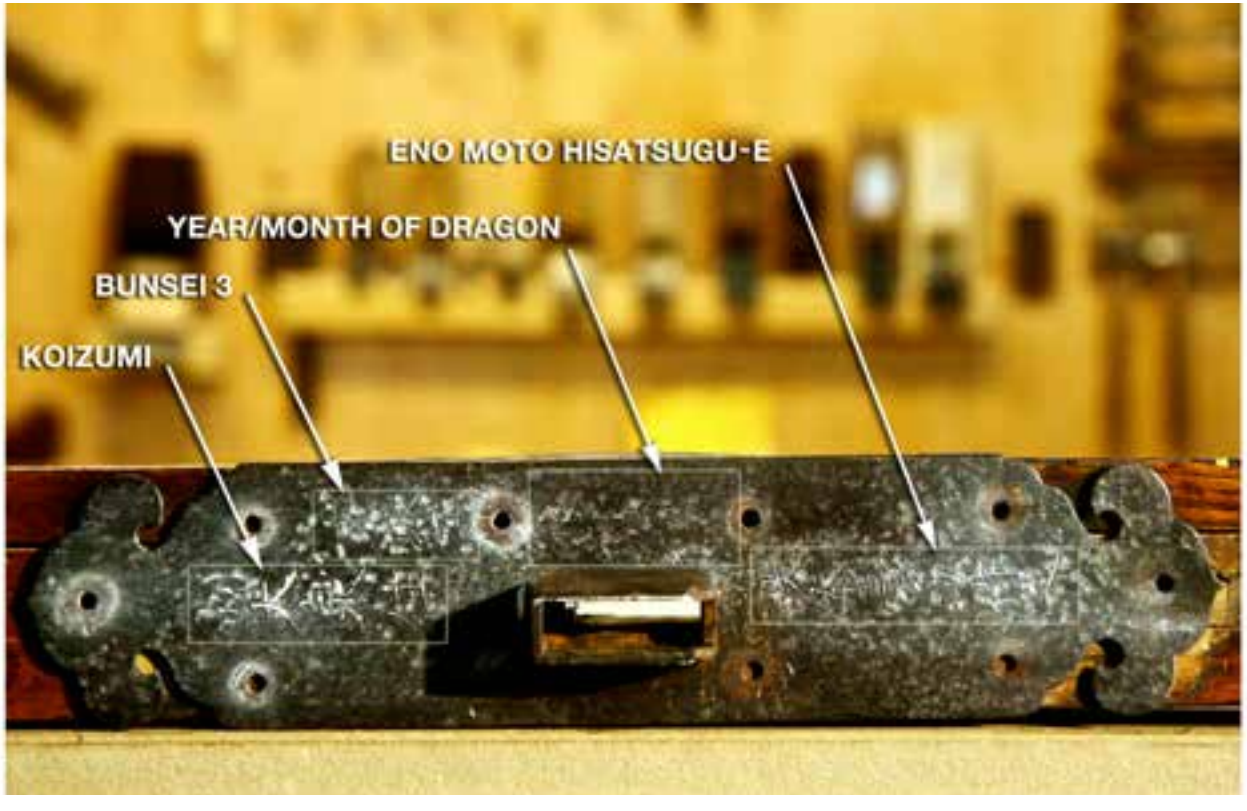
The craftsman, Enomoto Hisatsugu-e —えのもとひさつぐーえ, made the kura sliding gate in 1820, in the town of Koizumi —大泉町, a small town now known as Oizumi that still exists about 88 miles (141 km) northeast of Tokyo, then known as Edo —江户, the administrative capital of feudal Japan.

Bunsei—文政 was a Japanese era-name preceded by the Bunka era and followed by the Tenpō era, last of the line. From the engraving we know the door was constructed during the third year of the Bunsei era that spanned from 1818 through 1830.

Barely visible are a few characters that can only be partially seen in certain lighting conditions, that tell us the door was constructed in the year and month (March) of the Dragon. The other partial characters in this area remain a mystery but also probably relate to the date. (Curiously, the door was finally installed again in the month of March).

As noted, the elaborate main lock plate hardware was a later addition (presumably an upgrade or perhaps a gift to the merchant). The emblems of prosperity and good fortune are described on the following pages.

Had the provenance of the door been known to be Bunsei 3, as discovered by Cullum during the restoration process, it would have been valued much higher due to the scarcity and historical interest of such doors.



Emblems of Good Fortune

The long decorative lock plate is covered with decorations that held deep meaning for the owner of the original kura. As mentioned earlier, there is ample evidence that the plate was a later addition, replacing a smaller and presumably simpler plate that preceded it. One can imagine that it was a gift to the merchant or that the merchant acquired it as a gift to himself and his family to mark their blessings and to symbolize wishes for the continued good fortune of his family. The images opposite detail the symbols and corresponding block prints from the period along with other exquisite details of the engravings and iron work.

Near the top of the plate are three flaming pearls, Tama — たま (sacred jewel or pearl), "Perhaps the most intangible, yet the most deeply significant symbol in the oriental world is the tama, or sacred jewel," according to Allen in *Japanese Art Motives*. It was used to exorcise evil spirits and is a symbol of supreme intellect and spiritual being.

Below the pearls is the Hat of Invisibility, Kakuregasa — 隠れ笠. It bestows invisibility upon the wearer and therefore is considered a protection from danger. In the middle, rendered in bronze is the plum blossom crest, Ume Saku — 梅咲. It is the symbol of the Tenjin-sama, god of education or calligraphy. It is also a symbol of spring, rebirth and renewal. Ume also functions as a protective charm against evil.

Below the ume crest, is a feather robe or mantle, the Hagoromo — 羽衣. The robe of feathers was worn by the Tennin — 天人 (angels). The possession of a Hagoromo by a mortal insures to him perpetual youth and the ability to soar at will through space. It is associated with the famous play, Hagoromo (one version of the play is reproduced after the bibliography on page 50).

Directly beneath the robe is the Hammer or Mallet of Daikoku — 槌大黒天. As wielded by Daikoku, it is also known as the creative hammer that incorporates Yo and In (same concept as Yin and Yang in Chinese culture) and leads to the creation of all things. Often its face is inscribed with a Tama as may be the case here.

In fact, all of the symbols are in some way related to Daikoku who is also known as Daikokuten who is generally famous as a God of Luck. He is most familiar in Japan as a fat, smiling figure with a big sack over his left shoulder and a mallet in his right hand, standing on tawara — 俵 (bales) full of rice. He was particularly popular in the Edo period, as one of the seven gods of good fortune.

The last image at the bottom remains to be deciphered but may be a scene from Kabuki or perhaps depicts scrolls or a volcano (or as one wit speculated, a "No Solicitors" notice). A puzzle left for others to solve.

Sacred Jewel

Hat of Invisibility

Mallet of Daikoku

Daikoku & Hammer

Feather Robe

The Bunsei Era

In 1820, the year our door was constructed, after nearly two centuries of near-total self-imposed isolation as a closed society—where contact with the outside world was punishable by death—Japan was still in the midst of the waning years of the Shogun era. It would be another 34 years till Admiral Perry successfully established diplomatic and trade relations between the West and Japan.

But persistent westerners, both U.S., Russian and European, repeatedly attempted to reestablish contact with more and more frequency, always rebuffed by military force or gruff diplomacy. Yet the Japanese had gotten a taste of western science, technology and medicine and did allow the presence of Dutch and Chinese merchants, restricted to the man-made island of Dejima in Nagasaki Bay and several small trading outposts outside the country.

Through those trade colonies and the policy of Rangaku— 蘭学 (Dutch, or Western learning) Japan learned many aspects of the scientific and technological revolution occurring in Europe at that time, helping the country build up the beginnings of a theoretical and technological scientific base, which helps to explain Japan's success in its radical and speedy modernization following the opening of the country to foreign trade in 1854.

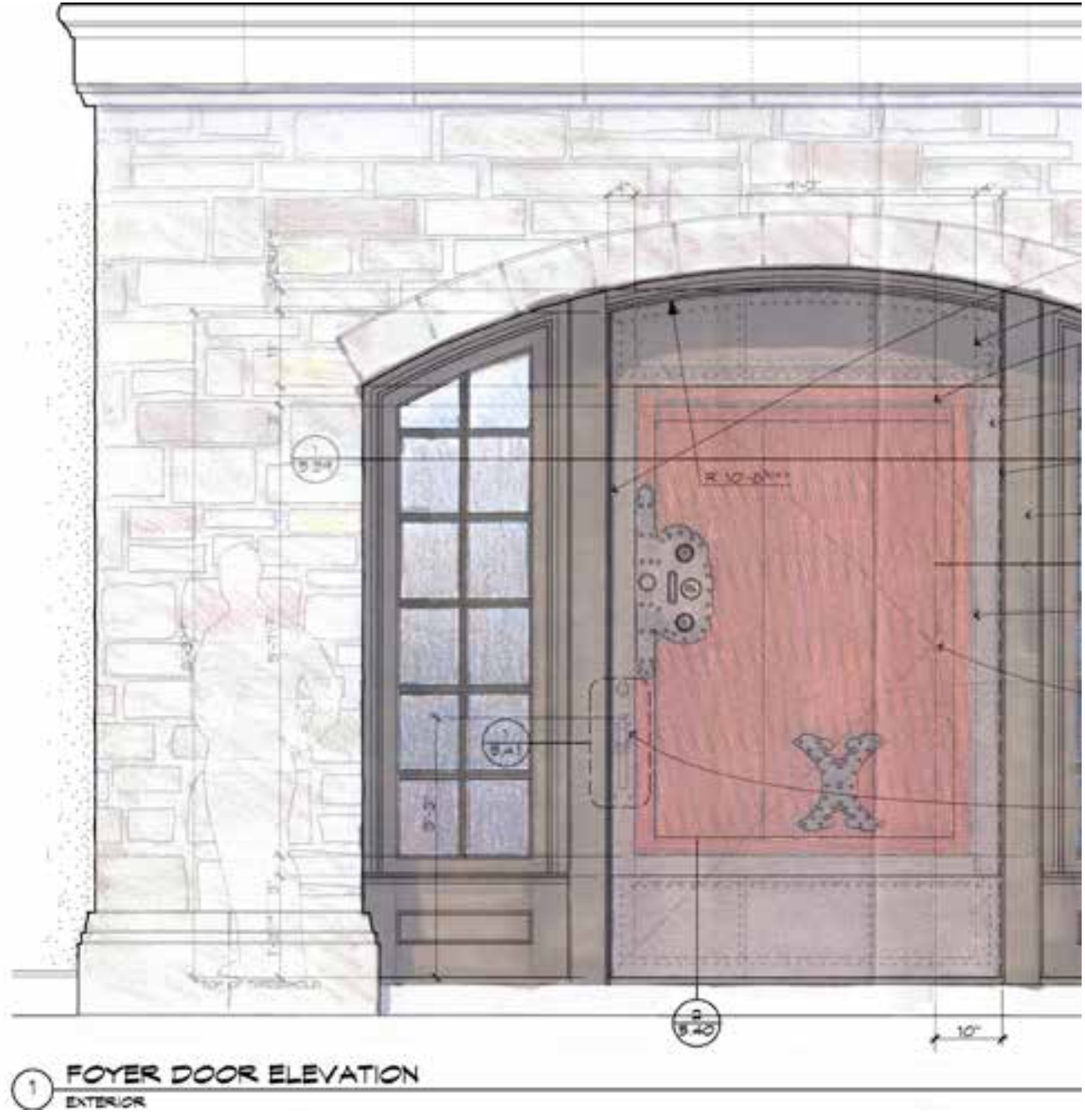
These two images from the period depict an anonymous Japanese artist's woodblock print interpretation of the "Black Ships" of the westerners and one of expedition artist William Heine's, lithographic interpretations of the historic success of Admiral Perry's contact.

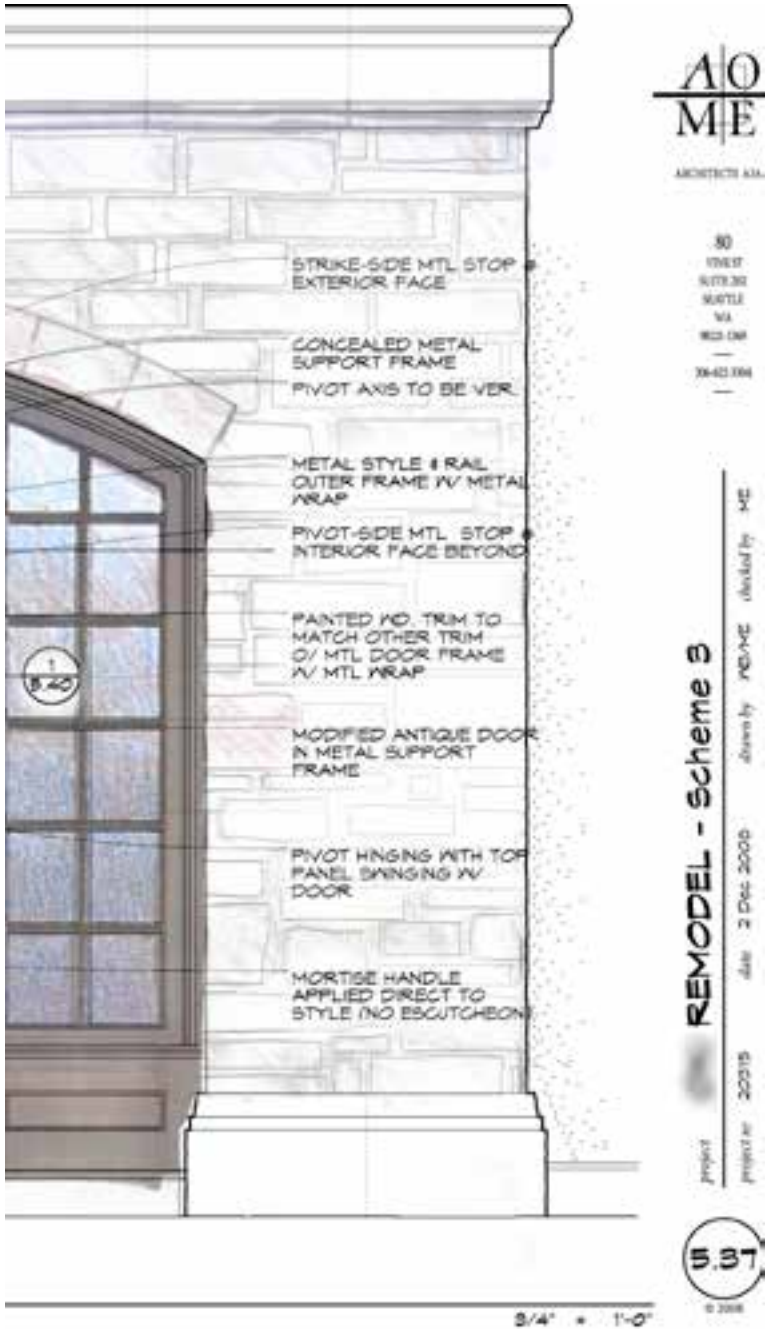
The Design

Although the kura door panel presented many dilemmas, its odd size (by modern western standards) was the first to be surmounted. Narrowing the panel to fit an opening with two sidelights would be simple enough—lengthening it by some 2'-2" was another matter. The notion of adding another wood panel of matching grain, finish and patina was rejected early on as a detraction from the authentic antique. A contrasting metal material would help highlight attention on the antique by harmonizing with it while repeating some of the metal features of its hardware.

To marry the two materials together Elster decided to add a "kickplate" panel to the bottom and a head panel to the top, connected by narrow frame members at the strike and hinge sides of the door with the wooden panel inset between. The door would be narrowed to 4'-2" to allow for two sidelights that act as a transitional element to the fenestration of the rest of the house.

A matching panel reproduction would have to be crafted since the antique interior face would be sacrificed in repairing the damaged existing boards (and recall that the existing interior face wasn't useable anyway). Woodworker Len Cullum of Shokunin Do, made several attempts to procure elm with appropriate figure and grain from sawyers from as far away as Pennsylvania





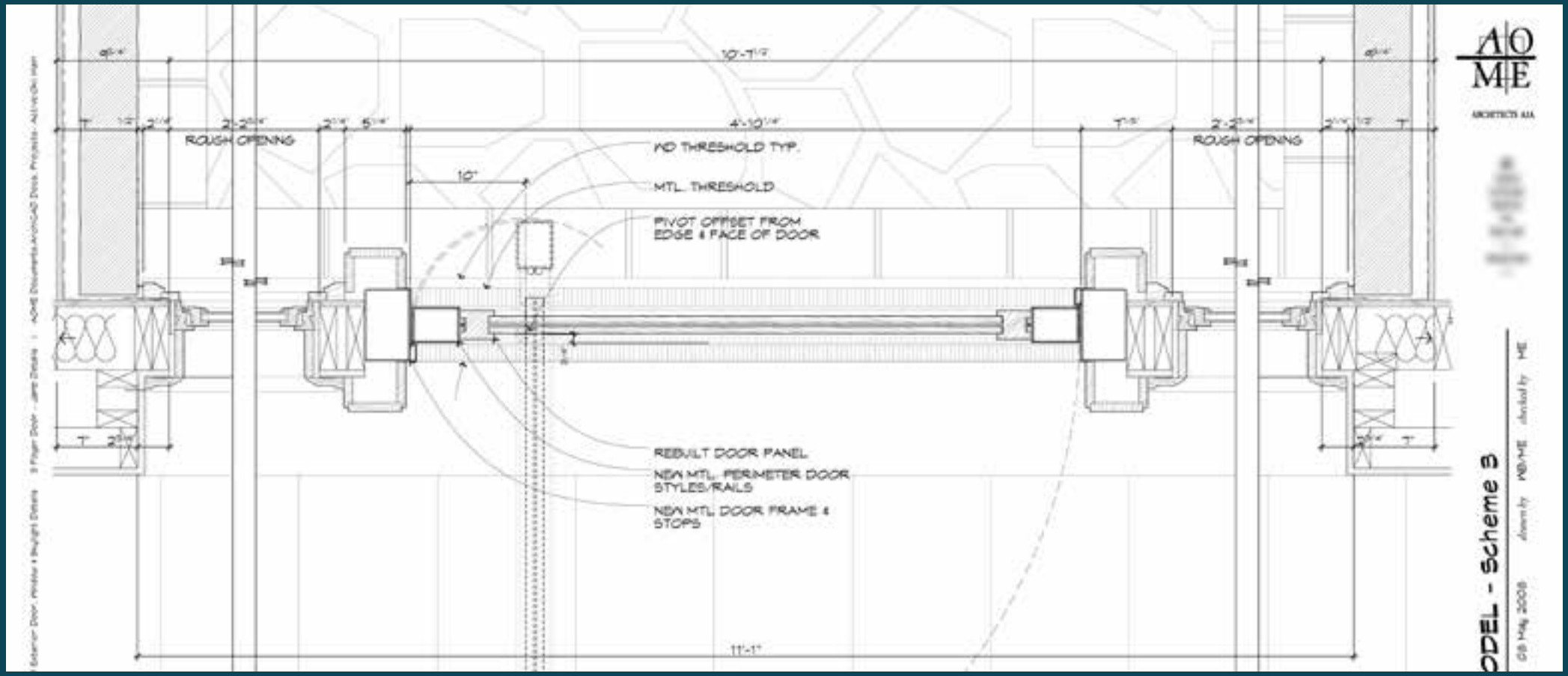
but he and Elster were unsatisfied with the results. Finally in the fall Cullum encountered a decrepit old antique board from Japan made of what they thought might be Keyaki (a Japanese elm, as in the original door). Although in pretty bad condition, the wood could be resawn to create new boards of similar figure and grain to the historic kura door boards.

The composite sandwich of reclaimed and antique wood panels with core insulation material and of new metal panels (and the metal frame to support them) would comprise a very heavy door—combined with the relatively wide opening, a pivot hinge would be required—tricky to pull off with an arched top. The geometry would have to be carefully controlled to avoid the arch top from binding as the door pivoted open and precise alignment of the pivot axis would be key to successfully swinging the door open the desired 90° plus. (More on this later).

Cullum determined that after resawing and straightening the kura boards and the acquired antique boards, the surrounding frame from the original kura door would have to be just under 3" thick. With that in mind, Elster began design details of the metal panels and frame. Consulting with Warren Brones of Brones Design, several metal candidates were reviewed and rejected till they finally settled on Aluminum. The metal was light, easily worked as required by the design, resistant to corrosion and could be finished with a flame spray method (more on this later) and chemical patinating agents that could harmonize with the weathered iron texture of the kura hardware.

Elster designed the metal panels as a series of plates with "rivet" fasteners to produce a harmonious scale and rhythm reflective of the engraved hardware of the kura door which are fastened with nails that resemble rivets.

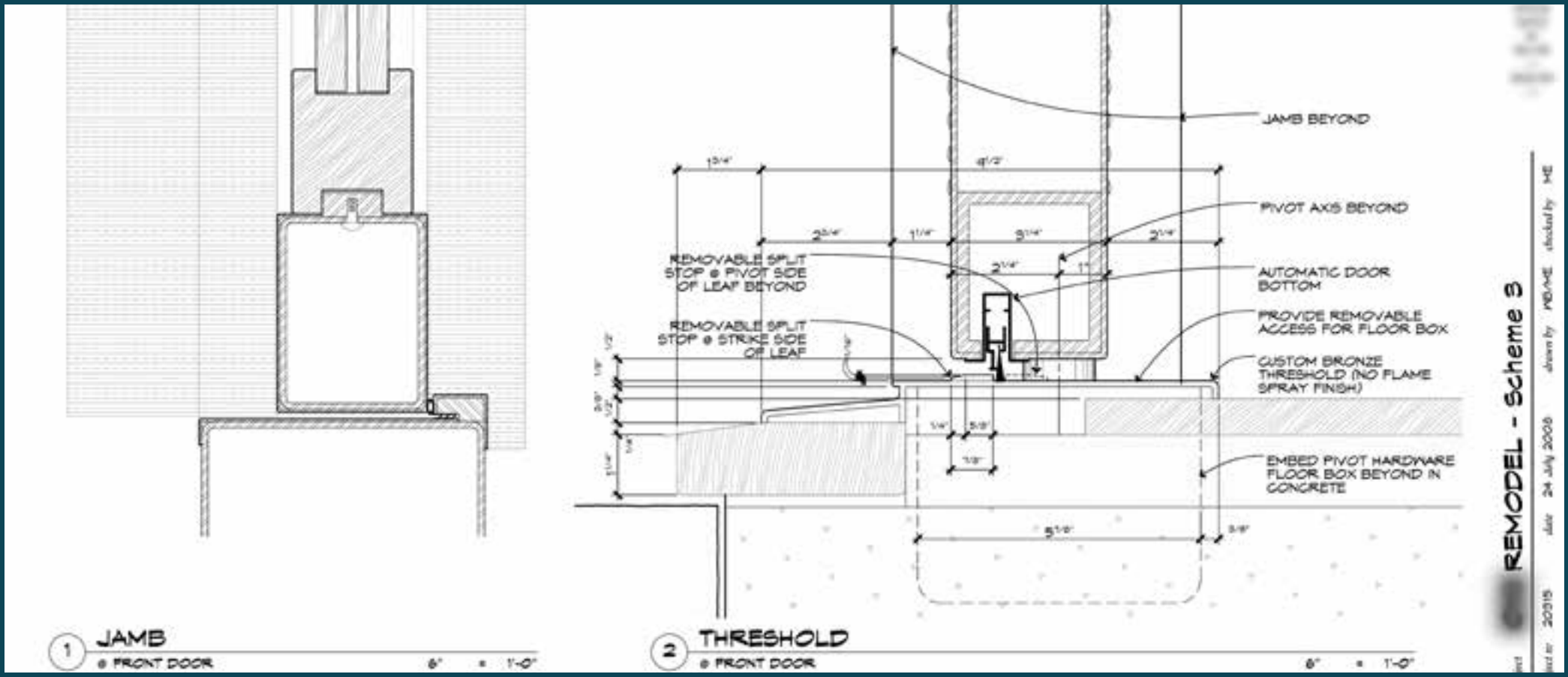
Ultimately the rivet idea introduced a more elaborate solution that would contribute another layer of interest and detail to the door that would tie back to the Japanese origins and handcrafted nature of the kura door and its hardware in unexpected ways. As for the existing antique nails and hardware, Cullum successfully salvaged most of them for reuse. A few are shown here.



As design work progressed more and more details were confronted and resolved—far too many to elaborate on here. The process of coordination between the architect, general contractor, the woodworker and metal fabricator took many months and several iterations of ideas regarding how to sequence the construction and installation of the framing, stone arch, window sidelights, metal framing, panel reconstruction, mating of the wood panels to the metal door frame and panels, installation of the pivot hardware in a modified concrete base, weatherstripping, finish sequence for flame spraying and patinating the metal, settling on a finish technique for the new wood panel, and finally custom hardware for operating the door. Each of these subjects and others not mentioned took hours of time, thought and often extensive research by all parties to resolve. Some items, the finishes in particular, required several attempts before all were satisfied so that the goal was met.

At each step Laurie's excitement grew as she became aware of just how much more special the door would become when the many additional elements came together to transform the kura door into her entry door. The drawing above shows a cut-away view of the door looking down toward the threshold. It shows how the wooden panels are captured within the metal frame that pivots in the metal jambs that are in turn encased by the wood-fin mullions dividing them from the adjacent sidelights. it also shows how the pivot hinging makes the jambs of the door swing in opposite directions. This and the details on the next page show how the pieces of the framework with these opposing function swings to seal the door when it is shut.

The geometry for the placement of the pivot axis was carefully worked out in the computer to determine the necessary clearances for the top of the door arch so it wouldn't bind.



The commercial grade pivot hardware also required a large pivot mechanism at the bottom of the door that required a custom threshold to cover it and special weatherstripping that automatically drops down as the door closes.

During testing a double weather-strip was introduced for better sealing and the pivot was set nearly to the centerline of the door. Some of the details shown here were changed as a result of mocking up and testing of the components and finishes. The joint shown above between the metal frame and the wood panel sandwich shows an intermediate metal member that was elaborated during construction meetings between Elster, Cullum, Brones,Kindblade and Zhender to make a key that would allow for the wood panel to be installed while the metal supporting frame was hung in place in its opening. This not only would allow for a better installation sequence and for potential removal of the panel should future repairs or maintenance become necessary, it also served to better seal the door to its frame while allowing for differential expansion and contraction and shrinkage of the wood. These drawings also show the original intent to construct the door with a steel frame jacketed with thinner sheet metal finished to match the antique hardware alloys. When we abandoned steel (due to weight and corrosion concerns) Brones determined that he could use aluminum tube and plates that would then be jacketed by textured metal applied with a process called flame-spraying. This greatly simplified the assembly in some respects and complicated it in others.

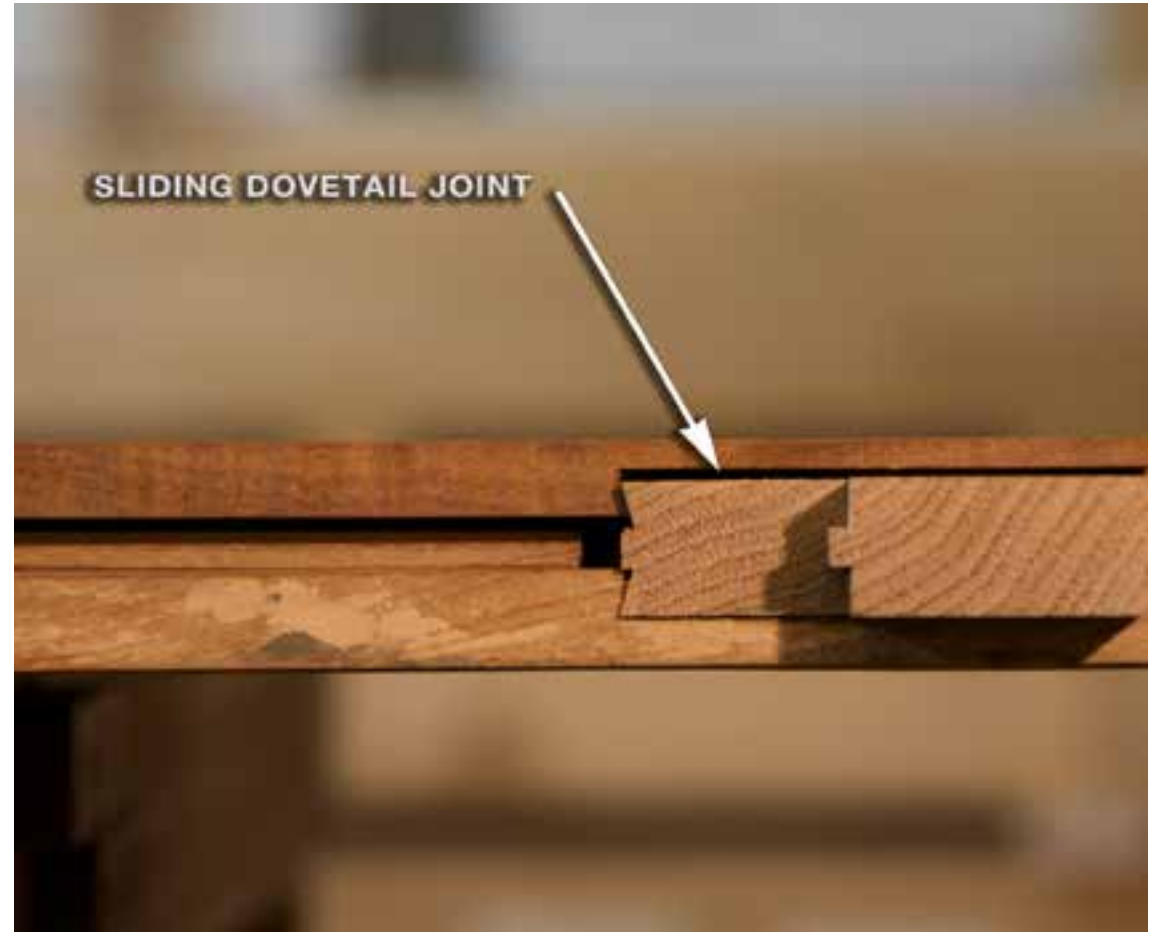
Joinery

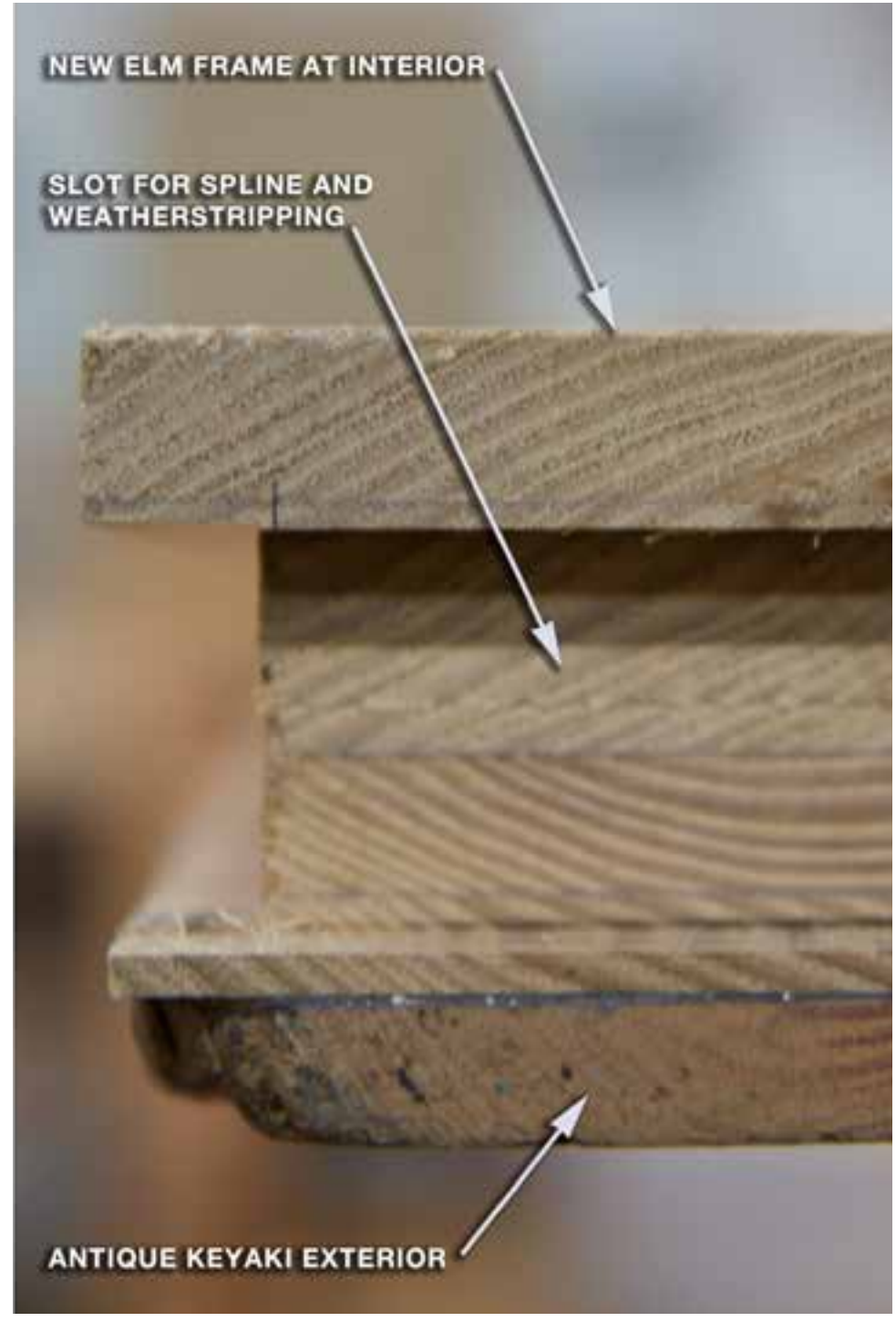
The original panels of the kura door were reinforced across the grain with a set of tapered sliding dovetail battens (suitsuki arizan — 吸付蟻桟) that strengthened the panels and helped prevent the relatively thin boards from warping.

In the recrafted door the antique panel boards of keyaki were planed down even thinner to restore them (they had warped and bent) and to enable them to fit within the overall panel sandwich thickness. Much the same was done with the new panel boards for the interior. The inner and outer panels that form the sandwich were straightened, strengthened, and held in place by a new set of double faced tapered split tongue and groove sliding dovetail battens (shown at bottom near right). The shape of the battens locks the two panels together and tightens the joint as the taper is seated home with a mallet — all without any fasteners (shown at top right).

The original stiles and rails of the door panel frame were joined with a half-lapped gooseneck mortise and tenon joint (koshikake kamatsugi — 腰掛鎌継). The new joint was modified to join the antique face to the new elm faces of the interior styles and rails with a stop mortise and tenon joint.

Many other joinery techniques were utilized in the original and the reconstruction that all contribute to the strength, flexibility (to allow the wood to move) and beautiful functionality that is so evident in both Hisatsugu-e and Cullum's work.




NEW ELM FRAME AT INTERIOR
SLOT FOR SPLINE AND WEATHERSTRIPPING
ANTIQUE KEYAKI EXTERIOR

Len's reverence for the Nanmu wood, made the prospect of cutting it into smaller boards perhaps the most difficult step in the Kura door project. Watching him address the wood for the first time in his shop, one gets the sense of his almost spiritual respect for the wood and the tree it came from, especially in the case of such a beautiful and very rare piece of wood. Before cutting he spent several minutes 'introducing' himself to the wood, learning its personality and properties. The gravity of the undertaking hung in the shop as the first cut meant there was no turning back and exceedingly little room for error.

Since the unfinished face of the antique Kura panel isn't suitable for the interior of the entry door, a new wood panel was required. Although Cullum believed finding matching material would be difficult, no one could have predicted the result.

After searching for elm locally and as far away as Pennsylvania, no acceptable sources could be found that would produce the necessary wide panels with distinctive grain that distinguish the antique (however, some of the material Cullum found did find its way into the new frame components). Just when they were preparing to accept an inferior match, or narrower boards, or both, Cullum found an antique Tokonoma — 床の間, floor board from Kyoto Japan. A Tokonoma is a recessed alcove in the traditional Japanese home that came to be used for displaying art objects, especially of a spiritual nature. As such the Tokonoma would receive special architectural and craft attention.

The Tokonoma board we found was indeed special and would have come from the home of a very wealthy person. Although it was quite old and worn, it was a massive 34 " wide by 115" long and 1 ½" thick! The size would allow the new panels to be just as large or larger than the original but would require that Cullum resaw the board in half to obtain enough material — no easy task — especially since he intended to do it by hand with traditional tools. Elster and Cullum were especially excited at the figure (grain pattern) of the wood, it is truly remarkable. It was however of a different species. At first Cullum surmised that the wood species was Tochi—栃 (a type of horse chestnut) but while

Using a traditional rip saw Cullum begins the arduous task of cutting the board in half length wise with muscle power. Even though Nanmu wood is dimensionally stable, the panels warped as the cuts relieved internal stresses. As the cuts progressed through the massive boards the line drifted, resulting in some of the ends of the boards being unusable. Elster and Cullum worked out a new panel arrangement that made use of the remaining material (this is why the interior panel consists of two sections).

The partially assembled frame and panel sandwich showing some of the concealed joinery and components between panels.

cutting it realized that it must be something he'd not seen before. After some samples were examined by a forensic wood identification service we learned it is from a tree called Nanmu (*Persea nanmu Oliv.*) also known as Coffinwood, because of its popularity for use in coffins due to its inherent resistance to decay.

Native to China, but driven to extinction during the Ming Dynasty (the forbidden city and many other sacred buildings are built of it), our wood board predates 1650, prior to when the species was logged to extinction and is very rare and no doubt very costly to have originally imported to Japan.

Although the grain of this wood, which is similar to mahogany, rivals that of the antique Kura panel, Elster was determined that the new panel should not masquerade as an antique original. Cullum used traditional hand techniques to craft it, but otherwise we let it be new.

Faux Rivets

When Elster related his intention to add fastener heads to the metal panels of the door as a form of decoration that would complement the rivets on the antique hardware, Cullum was immediately interested. He showed Elster a hand-forged nail that had a curled head that was often used to both fasten and decorate surfaces. Based on what he'd learned in Japan, he was fairly certain he could reproduce the handmade nail. Not possessing a forge, Cullum devised the simple fixture seen here (an article on the clever solution was published in *Make Magazine* in June 2009). Once the raw nails were heated cherry red the head is deformed and gradually rolled over as shown here.

In the original the nails would've been fastened into an underlying wood substrate — not possible with a metal core. The sample rivets shown at lower near right illustrate 4 of the methods that were tested.

After rejecting epoxied heads, ultimately Brones realized that he could weld the shank of a threaded screw to the stub end of each of Cullum's hand forged nails so they would function as a machine screw. Each fastener is machined to allow the head to rotate so their axes align as they are tightened to fasten the decorative outer plates to the metal frame.

The resultant panels and fasteners constitute a contemporary interpretation of the sheet metal cladding many medieval Japanese doors received and a way to æsthetically tie the old wood door to the modern metal frame it would hang in.

The Lock

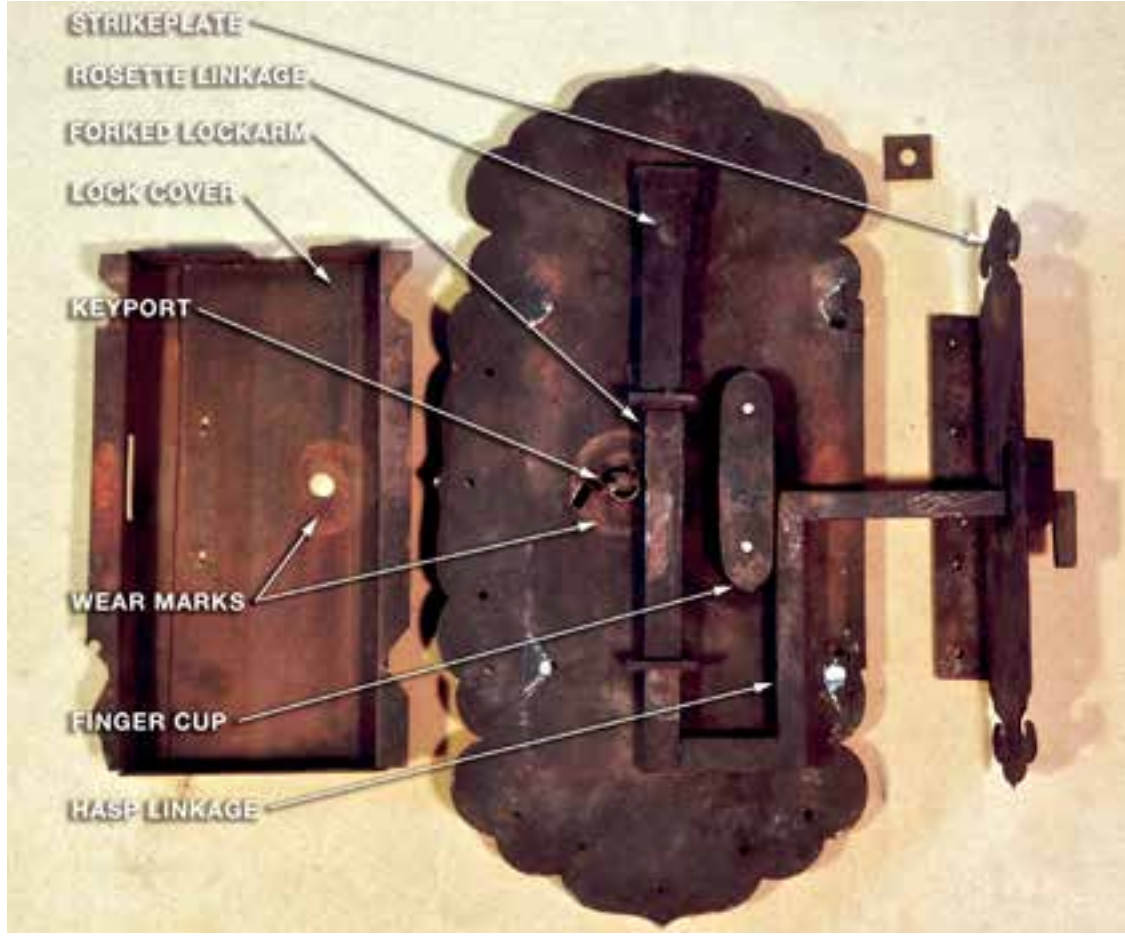
The existing hardware is an example of a traditional Japanese lock mechanism that is uncommon in the west, and another example of the handcrafted attention the door received.

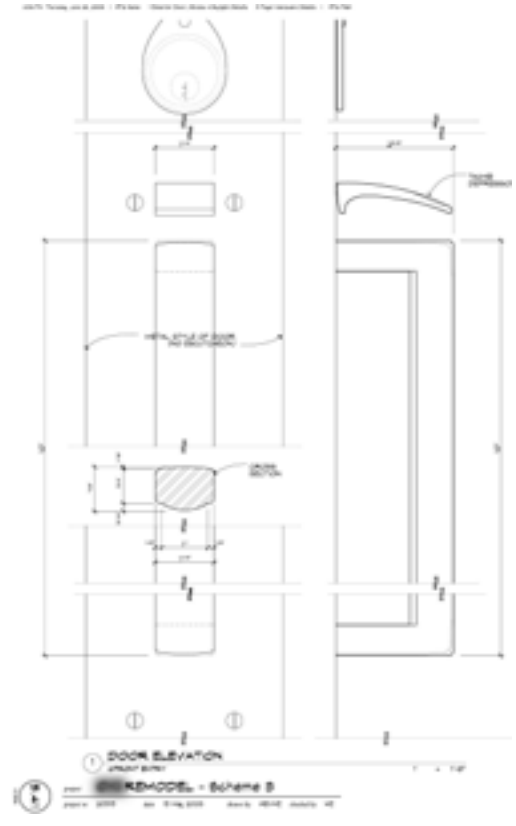
Due to the new configuration of the door panel with its new nanmu wood interior face, the internal portion of the lock hardware could not remain (it is literally thick enough that it would daylight out through the inner face otherwise).

Cullum and Elster agreed that although the mechanism would be removed, the upper rosette (shown below right and at the far right opposite in exploded view) would be re-fabricated so it would continue to slide up and down as originally intended. In the original, after the key was inserted and rotated thus pinching the split fork lock arm so it could pass through the restraining lock-way, shown below near right, the rosette could be slid upward to raise the hooked hasp through the interconnected linkage.

The hand work throughout the mechanism demonstrates classic Japanese blacksmith techniques that, given his personal signature on the strike plate, may have been performed by Hisatsugu-e himself. Of particular beauty are the finely wrought chrysanthemum rosettes, the fixed one at the bottom is shown opposite in its assembled form).

Taken together the mechanism required a rather large key to allow for the required leverage to pinch the lock forks together. Wear marks can be seen on the inside of the face plate where the key was rotated. Wear marks can also be detected at the moveable rosette, which probably was difficult to slide up and down due to friction that grew worse as corrosion of the wrought iron progressed through the years.





Custom Handle

Because of the massive bulk and size of the entry door Elster decided the handle would need to be heftier than the typical off-the-shelf hardware that would seem puny on a door of this scale. He set about designing and constructing a full-scale model of the bronze handle, hand-crafted in his workshop out of wood for review by Laurie.

The drawings to the left show the final design which is modeled after Sun Valley's Contemporary Collection with significant improvements in addition to enlarged scaling. The handle cross–section was improved to better fill the palm and fingers of the grasping hand with a more comfortable shape and heftier proportions to suit the larger handle. The weight and inertia of the door dictated that all the edges required a greater radius to make casual contact while passing by the door more comfortable as well (you don't want to run into crisp edges on a door this heavy).

The thumb piece also had to be scaled up while maintaining pleasing proportions and functioning with the manufacturer's existing lock mechanism. While shaping the wooden model, Elster introduced a depression sized so the average thumb would have a better grip on the lever (a feature Sun Valley Bronze is now incorporating into their line).

Once Laurie had confirmed the custom shape felt just right and looked better with the large door, the wooden model went off to Sun Valley Bronze's foundry to serve as the actual blank for mold-making and casting.

The images show some of the steps in creating the wooden blank and the foundry casting process in action, along with the final product.

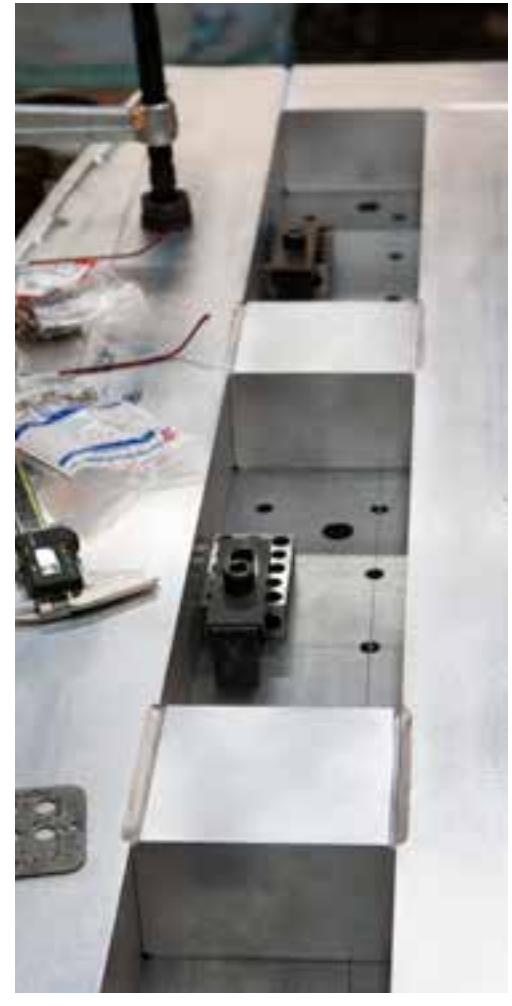
Metal Frame

In the Brones shop the meticulous machining and engineering process began near the end of the door project. Brones worked with Elster to refine the details of the weatherstripping, fabrication, fastening methods, operation, and finish options over an extended period of months with regular input from Kindblade and Zhender.

Metal materials are machined to much finer tolerances than can be done with wood, which also tends to change shape as it transpires moisture. Combined with the tendency of the welding process to cause the metal components to deform and warp there is definitely an art to making it all fit together.

Brones used full scale drawings to prepare for the work, exploring every detail of the door and hardware components. Prior to final fabrication he assembled several mockups (one is seen at the far right opposite) for Elster and Kindblade to review. These tested modifications to the design that improved how the pivot and weatherstripping would function but also made the clearances at the arched top much more critical.

Once final fabrication and assembly began Elster was able to provide a full–scale layout in the shop of the decorative but functional ‘rivets’ on cardboard templates.



As fabrication progressed Brones and Cullum devised alternate methods for fastening the metal splines that would hold the wood panel in place that required making custom made machine screws to minimize their presence on the jambs of the door (Brones is shown above using his lathe to turn down the diameter of the screw heads). Many other parts required similar types of custom fabrication. In addition, custom jigs and fixtures were also devised and crafted by Brones to aid in installation and fabrication.

In the final fitting, shown here, the pivot hardware box was permanently set in grout at the base. The tolerances are quite close, so Brones meticulously adjusted the frame and plumbed the pivot to be directly below the top pivot bearing of the installed frame (see top left image on next page).

As so often happens, mother nature entered the picture with an unexpected late season snow storm that dropped the temperatures enough to crack the grout and spoil the careful placement of the pivot hardware box. So, they broke it all out and reset and re-grouted the box one final time. Once hung, the swing could be tested for clearance to achieve the 95° opening angle the design required. To accomplish this the top of the arch door has a small notch that nests right against the end of the interior door stop end.

The pivot hardware handles the weight of the door with a silky–smooth swing that seems to defy the actual bulk of the door and gravity. The hinge itself is fully adjustable for closing and opening force, and hold open features controlled by hidden hydraulic pistons and powerful springs. Virtually everyone who opens the door for the first time is surprised at how it glides open and shut.

Flame Spray

Flame spraying is a gritty industrial process you've probably never heard of, in which wire is fed through an electrode surrounded by powerful air jets. Instantly the molten metal is converted to a blazing aerosol that literally fuses to the metal surface to which it is applied. The process is messy, loud, and literally incandescent.

The holes and any other surface not to be coated were carefully masked or plugged and then thoroughly sandblasted to prime the surface to receive the sprayed bronze coating.

The spray produces a noxious fluorescent–green bronze gas that is extremely toxic, so the application is done in a sealed booth (a masked Chester Orint is seen peeking into it at upper far right) and the applicator wears full protection and a breathing mask. Special filters ensure that there are zero emissions from the booth.

The spraying process, shown opposite is quite spectacular. Garcia applies the coating expertly in a thin even layer as if handling an ordinary spray-paint gun. Elster entered the booth to take this picture in lighter protection gear. The bronze gas is heavy, so he had a maximum of two minutes in the booth before the gas would rise to the level of his face, at which point, even with a gas mask, death would have been imminent.

The detail of the bronze coating (lower right) shows how bright, granular and unnatural the finish is after spraying — much is left to be done to create the final finish, but it wouldn't be possible without this step.

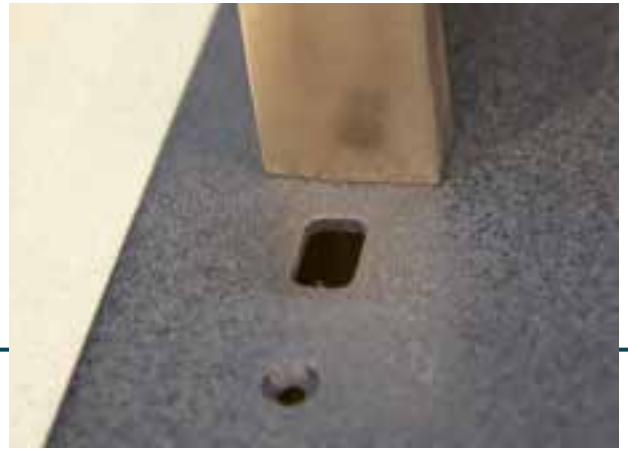
Patina Finish

The rough and too bright finish of the flame sprayed door parts were sanded down at the She-Metal finishing shop by Sheryl Andrist and her crew. Just enough surface relief was left to mimic the texture of somewhat pitted mill finished steel.

The sanding process was complicated by the heat-warping of t he larger panels during the flame spray process. One panel required counter-bending on a press to remove high spots that would have shown through after sanding.

With the surface thus prepared Andrist applies acids to the surface which immediately begin to darken the bronze. By using a very dilute mixture she can control how rapidly the bronze patina builds through multiple applications. Ultimately, her artistic eye determines when the desired patina and color is achieved. After rinsing and sealing, each piece is hot–waxed to add depth and sheen and to protect the finish from the elements.

Andrist has an infectious passion for metal and the finishes she creates. It is indeed startling to see the panels dramatically transformed from the raw somewhat characterless flame sprayed surface to the rich dark metal components that will complete the door.



Wood Finish

The original finish of the antique kura door was applied with a labor–intensive technique called urushi–nuri—漆塗 (literally, lacquer coating). The lacquer comes from the sap of the sumac tree family. After a careful refinement process, the lacquer is applied to the wood that has been smoothed and filled with finely powdered baked earth and a whetstone. The clear lacquer was tinted the distinctive orange red tone to enhance the grain.

The resultant extremely durable finish typically takes 13 steps over many days and was probably repeated during the door's lifespan. More recently a modern urushi lacquer was applied to restore the finish prior to resale. Due to the care with which it was handled by Cullum only a few existing scratches needed touchup.

The interior and exterior sides are shown opposite fully assembled and complete prior to finishing. The panels (seen at right receiving the first coat of dye in the Elliot shop) are beautiful but distinctly different in color and character as are the stiles and rails of the interior. Steve Elliot experimented with several modern techniques to finish the interior to match the appearance of the urushi finished antique.

Different combinations of aniline dye and wood stain on the elm and nanmu were applied over a sealer (to slow the absorption). These were followed by nine layers of clear lacquer that slowly built–up thin layers that also filled the open pores of the wood. Once complete the surface was buffed with super fine abrasive to take off just a touch of the gloss and coated with a thin dark wax.

Final Install

As Brones and Kindblade worked feverishly in the shop to prefit and machine the last parts, final prep work on the panel and hardware was completed in the Shokunin Do studio. With all the components complete, installation could begin over the course of six weeks (including trim surrounding the door).

First the jamb and aluminum core frame were carefully fitted to the opening and fine-tuned for swing and fit over the course of two and a half days including a Saturday.

Another whole day was required to insert the wood panels and inner seals that kept 5 to 6 people busy for the duration (on the day pictured here, Warren Brones, Len Cullum, John Kindblade, Craig Zhender, Dave Jones, and Mark Elster all contributed to squeezing the kura door wood panel into its final home).

The following day Brones and Kindblade installed the metal panels and the faux rivet anchors. Simultaneously, work began on the final tune–up of the custom hardware (tweaks to the thumb–latch mechanics) and the custom bronze threshold.

In the remaining 2 weeks the finish received a final touchup and all the trim and stonework was completed around the door opening while the door hardware operation was fine–tuned.

A New Door

Finally, after many months of preparation and work, when all the diverse elements of the door are joined in harmony, it just seems right. The interplay and contrasts of western and eastern, of old and new, metal and wood, hard and soft, light and shade, smooth and textured, create an ensemble of parts and details that unite in balance to delight the senses and our intellect.

At first encounter, the completed door startles the viewer as the entry is approached. One is drawn to it by a need to observe it at close hand. There is a compelling desire to examine it in detail and to touch it, almost with reverence.

The completed door is a luxury signature element that marks the entrance to a fine estate, handcrafted with great care and reverence for the antique that inspired the effort. One can imagine that Hisatsugu-e would no doubt be honored and pleased with the association.

The Kura Door Project Team

Architecture:
AOME Architects
- **Project Architect/door concept:** Mark Elster
- **Principal Design Collaborator:** Will Beilharz
- AOMEArchitects.com

Construction:
Schultz Miller, Inc.
- Terry Miller, Principal
- Craig Zhender and Ken Head, Project Managers
- John Kindblade, Superintendent
- schultzmiller.com

Woodwork and Forge:
Shokunin Do Studio
- Len Cullum, Principal
- shokunin-do.com

Metal Work:
Brones Design
- Warren Brones, Principal
- bronesdesign.com

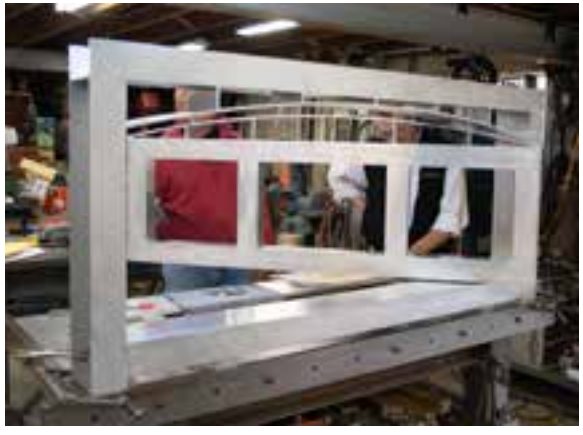
Bronze Casting:
Sun Valley Bronze
- Marc Cervarich, Shop Foreman
- sunvalleybronze.com

Metal Finishes:
She-Metal (metal patina)
- Sheryl Andrist
- she-metal.com

Flamespray Northwest
- Chester Orint, Principal
- flamespray.us

Wood Finishes:
Elliott Paint Company, Inc.
- Steve Elliott, Principal

Book Concept and Content:
Mark Elster, AOME Architects
with extensive assistance from Len Cullum



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Photography and Artwork

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Page 9: Image and quotation, *The Great Ages of Man*, Early Japan, by Jonathan Norton Leonard, published by Time-Life Books, 1968.

Page 13: Images of Tama (Flaming Pearl), Feather Robe Hagoromo, Tsuchi (Hammer of Daikoku), and Kakuregasa (Hat of Invisibility), *Japanese Art Motives*, by Maude Rex Allen, published by A.C. McClurg, 1917. Image and facts regarding Daikokunen, Janus Japanese Art and Architecture, www.aisf.or.jp/~jaanus/deta/d/daikokuten.htm

Page 14: Black Ship Landing, color woodblock print from the period. Source of image from website that is no longer active, artist AndoHiroshige. Such stylized images were popular for many years after the landing.

Page 15: Landing of Commodore Perry, Lithograph, Brown University Center for Digital Initiatives, from the original lithograph by William Heine, expedition artist, first published in 1855.

Page 21: Images of bronze pouring and casting courtesy of Sun Valley Bronze.

Page 48: Image from Nō theater production of the Hagoromo, www.tokyo-ws.org/english/archive/images/企画6_山口.jpg

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Hagoromo 羽衣

‘The Robe Of Feathers’
By Zeami

Feather robe

Characters

Waki ・・・・・・・・ a fisherman
Waki-tsure ・・・・ two fishermen
Shite ・・・・・・・・ an angel

Some fishermen are walking at Matsubara on Mio Bay when one of them finds a beautiful robe hanging from the branch of a pine tree.

He is about to take this home when an angel comes to claim it, explaining that it is a feather robe from Heaven. This makes the fisherman determined to keep it as a national treasure, but when the angel tells him that without it she can never again ascend to Heaven he is so moved by her distress that he agrees to return it if she will dance for him.

He at first refuses to give it back before she dances for fear that she will fly away as soon as the robe is hers again, but when the angel tells him that such behavior is only to be found in the ways of men, he shamefacedly gives up the robe.

Overjoyed now, the angel puts it on and dances. Then, calling down blessings without number on the land, she disappears up to Heaven among the mists and clouds.

An image from a contemporary Nō play of the Hagoromo. It is considered a primitive form, more or less an excuse to present elaborate dances.

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