MINNESOTA LANDSCAPE DETAILS

A CRITICAL REVIEW OF RESIDENTIAL LANDSCAPE ARCHITECTURE TO IMPROVE CRAFTSMANSHIP

Andrew Herzog | May 2014 | North Dakota State University

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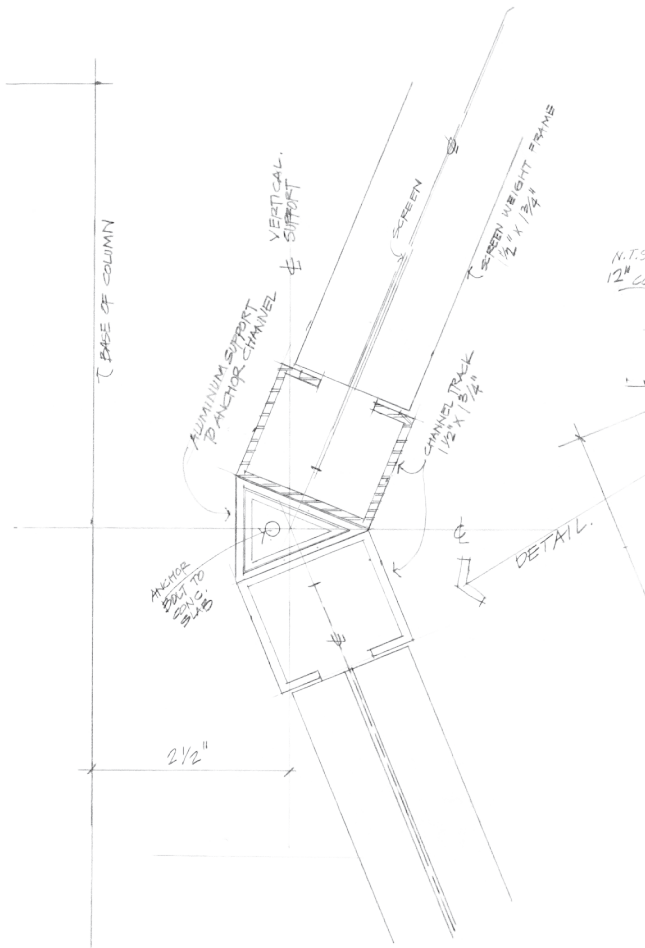

PLAN - SCREEN CHANNEL GUIDES & ANCHOR

1" = 1'

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A critical review of residential landscape architecture to improve craftsmanship

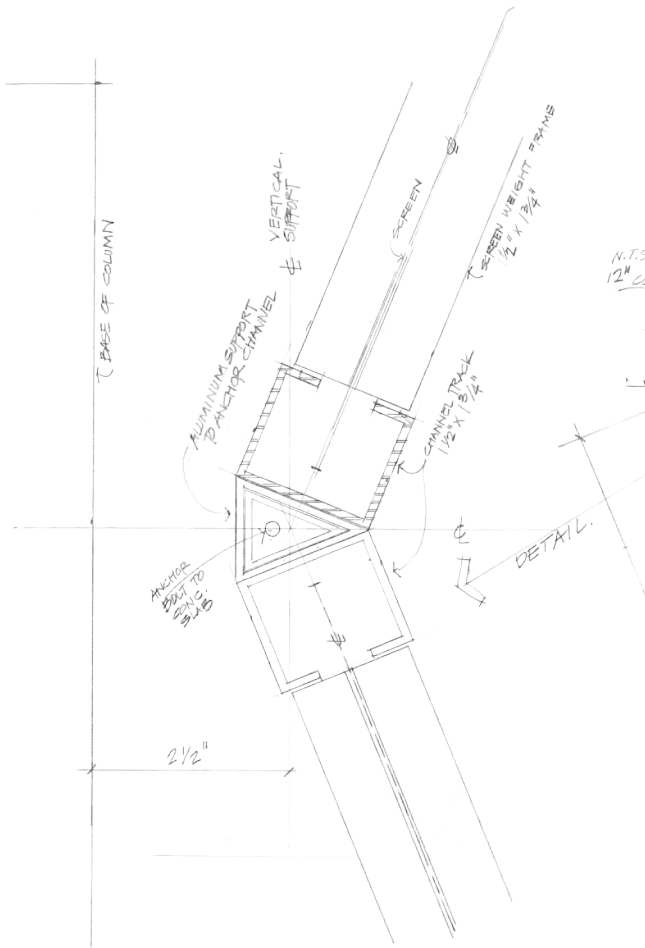
A Design Thesis Submitted to the
Department of Architecture and Landscape Architecture
of North Dakota State University

In Partial Fulfillment of the Requirements
for the Degree of
Bachelor of Landscape Architecture

Primary Thesis Advisor

Secondary Thesis Advisor

May 2014
Fargo, North Dakota



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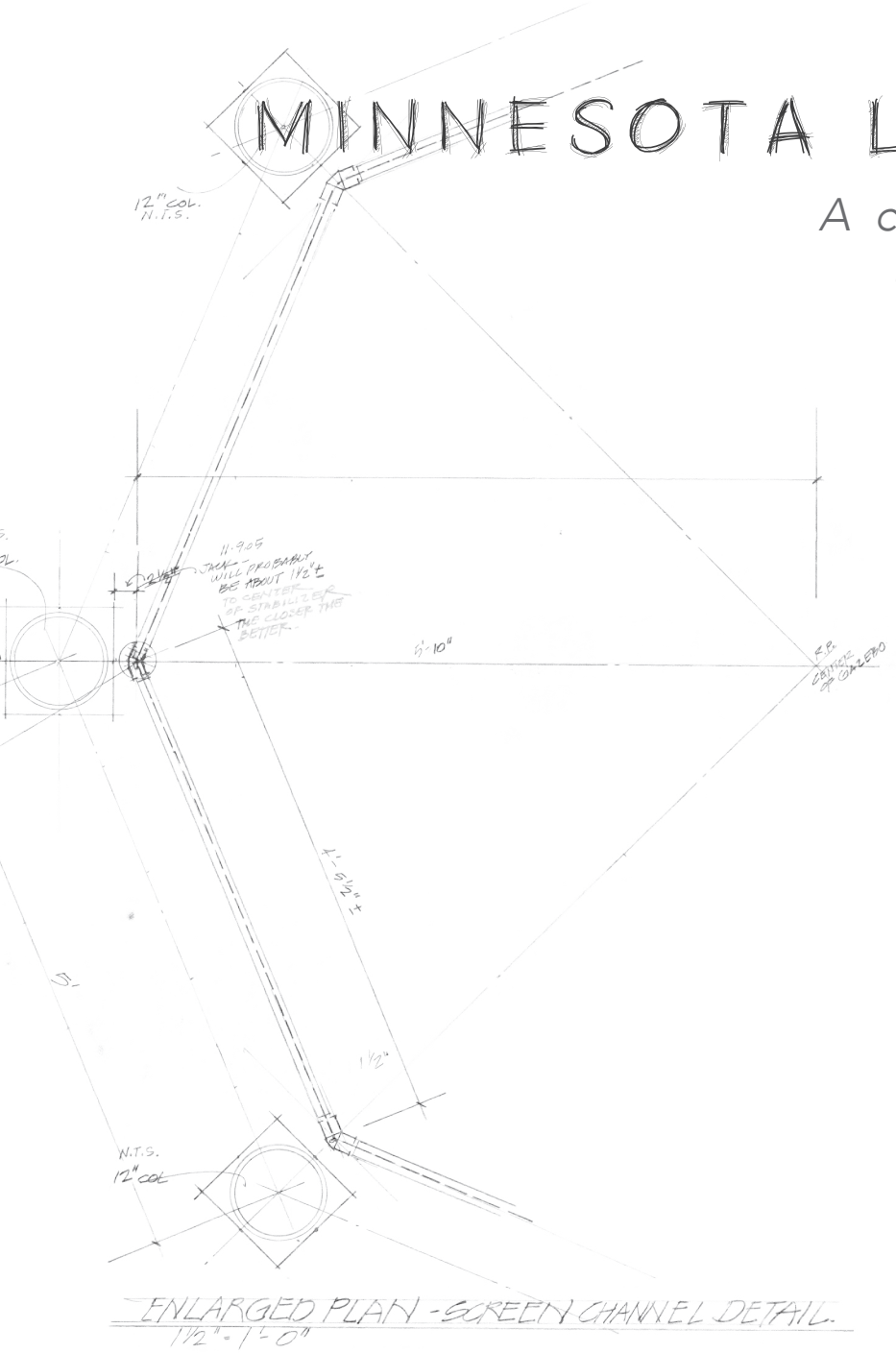

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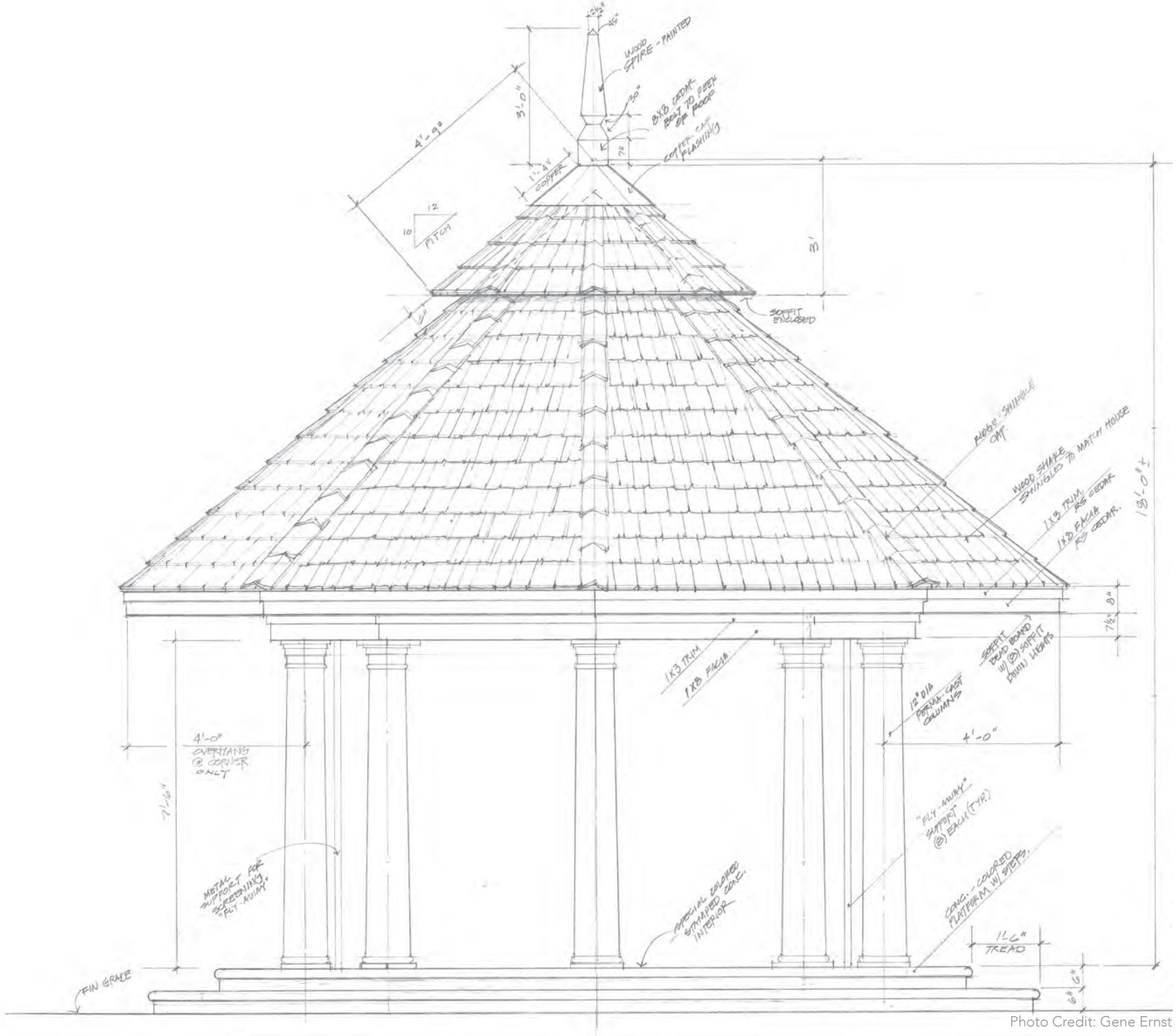

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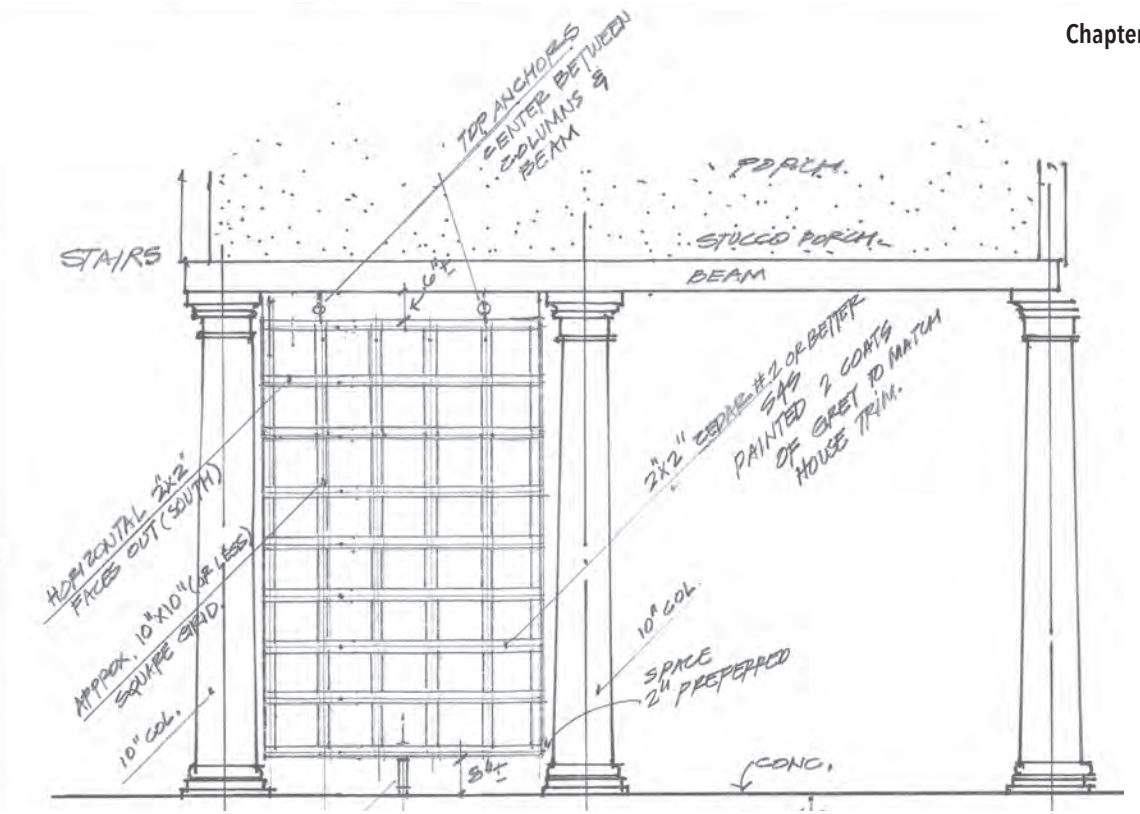
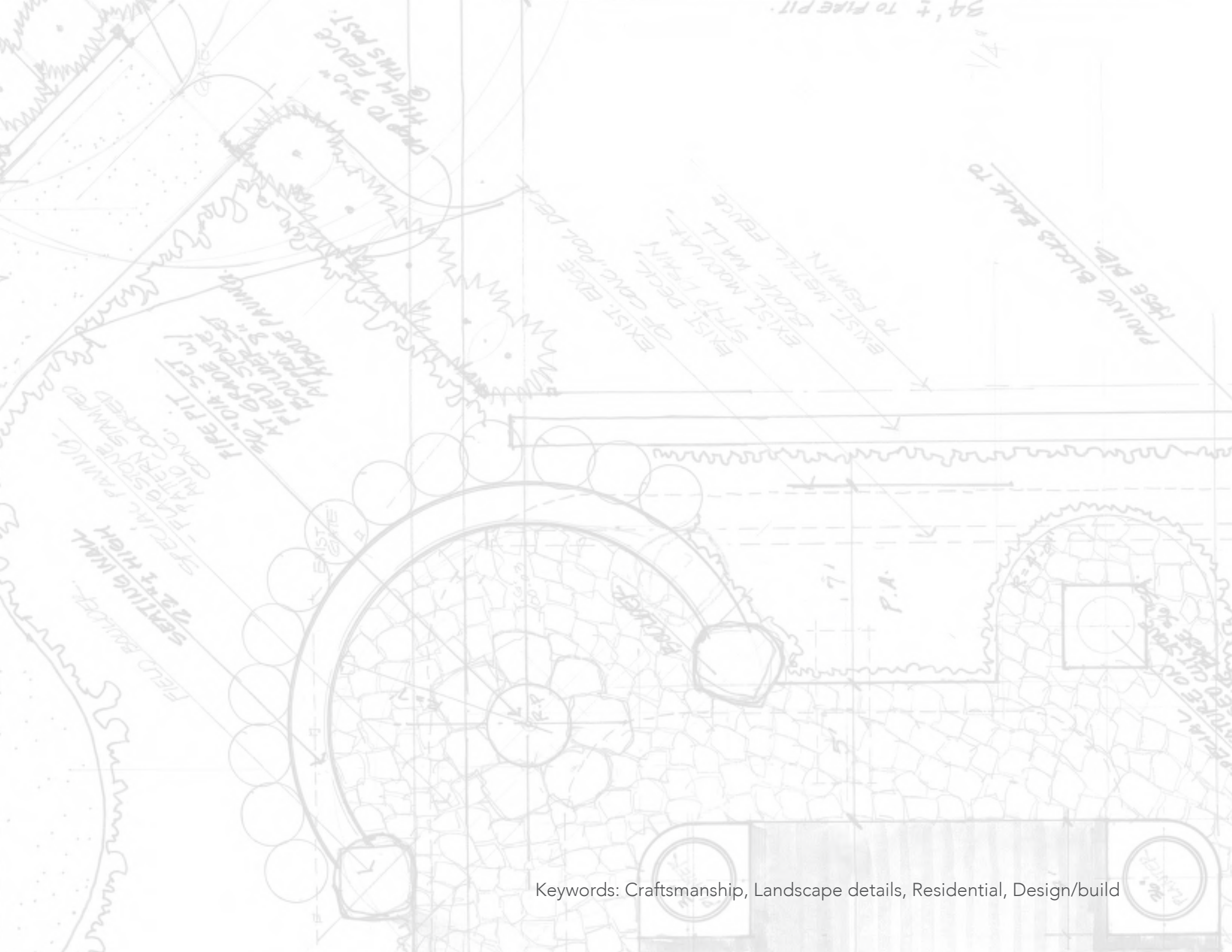
TABLE OF CONTENTS





Keywords: Craftsmanship, Landscape details, Residential, Design/build

ABSTRACT

"It is by far the largest market subsector," in referring to which aspect of residential design is often overlooked and under appreciated (McKee, 2013). Out of 4,000 landscape architecture firms surveyed by the American Society of Landscape Architects (ASLA, n.d.), 81percent provide residential design services (ASLA, n.d.). In this thesis, the research topic is craftsmanship of residential landscape architecture. For this thesis, the term craftsmanship will be defined as, the quality of design and work shown in a specific detail designed by the designer and built by the contractor. The question that will be answered is:

How can the craftsmanship of small details, which generally are less than one square foot in size and in a residential landscape, be constructed to a degree where they are durable, last ten plus years, connect to the site with either materiality or history, and provide the site with a sense of place?

The site this research will be applied to is a single family home located in Chaska, Minnesota, a southwest suburb of Minneapolis. On the site, this thesis exhibits the attention to the details within the hardscape elements. *Minnesota Landscape Details* explores and elaborates on why the small details work or do not work within the context of the site. Further, this thesis exemplifies the durability factors of details and why details are in their current condition on the site. Niall Kirkwood, a professor of landscape architecture says, "the designer must be adept in the landscape detail practices of construction", and extra time and effort need to be put into these details during design and construction phases (1999). If the designer knows the construction process for a specific detail in the landscape, then they know how to design the details accurately and practically. Frequently, the homeowner has minimal knowledge in craftsmanship and overlooks the details. This allows designers and contractors to take short cuts and not include details into the built landscape, reducing the quality and durability.

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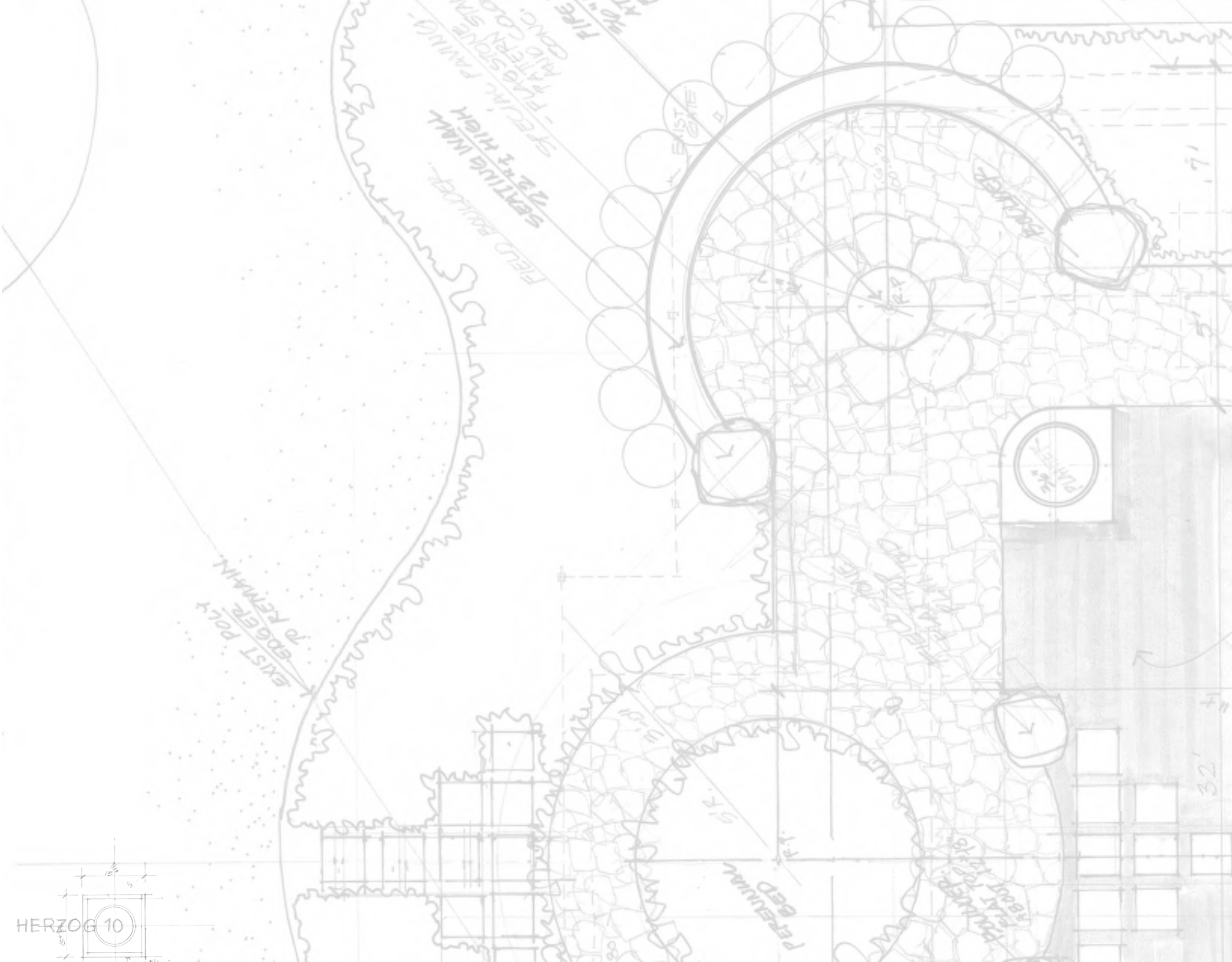

CHAPTER 1: INTRODUCTION

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PROJECT TYPOLOGY

The craftsmanship of landscape details are important in design because they give the site scale and tie the architecture to the landscape. After looking at built landscapes, craftsmanship is not always present in projects due to lack of designer creativity, time, budget, or scale of the project, "this is particularly true of those who work in urban landscape design and urban planning," where details and craftsmanship typically come from a catalog rather than being specifically designed by the designer (Kirkwood, 1999). Designers work under strict deadlines, which is another reason why details are sometimes forgotten. Details are not always used to their potential because, "designers today have to learn an immense quantity of information about changing methods of landscape installation, landscape materials and their qualities, and the regulations and codes covering the issues of public health and safety" (Kirkwood, 1999).

In residential landscape designs, details have the ability to enhance or diminish the design, "as a major determinant in the final form and expression of built work in landscape architecture, landscape detail is first and foremost a design activity, a way of pursuing ideas about landscape form and space at a particular scale" (Kirkwood, 1999). Often only a trained eye notices the craftsmanship in the landscape details, where a client with minimal experience in the landscape details of design may not notice the level of craftsmanship. Craftsmanship is needed to give elements character in a residential design because "landscape detail translates design ideas into a built landscape" (Kirkwood, 1999). Designing details "includes the concerns of form, structure, design language and expression, material choice, dimension, and texture, and the demands of implementation, climate and maintenance," without these elements making up the landscape details, there will not be a strong connection between the details and landscape (Kirkwood, 1999).

Figure 1.1: The soldier course on this patio was built with craftsmanship. The 90 degree corner was miter cut (1), and the soldier course around the circle was tied into the boarder soldier course (2).

Photo Credit: Andrew Herzog

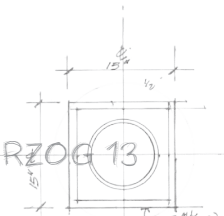
INTRODUCTION

In landscape architecture design, "the landscape detail has a narrow but significant role" (Kirkwood 1999). The role of the detail is narrow because it concerns the smallest identified part of the landscape, and the detail is significant because the project at pedestrian scale depends on the performance and durability of a consistent detail form, which is why the craftsmanship of these details is so important (Kirkwood 1999). Details in any landscape design tie the project together. The designer and contractor put extra time and effort into making sure these details are perfect for their application, and without a trained eye, the homeowner may overlook or not know the effort that went into a specific detail.

A landscape detail translates conceptual ideas into a built landscape and ought to be considered and designed throughout all phases of a project (Kirkwood, 1999). Landscape details have an important role in residential design. They "establish scale, articulate space, contain, and express design ideas at the scale of detail resolution" (Kirkwood, 1999). Landscape details define space in a design and without them there is potential for confusion in the definition and purpose of the space.

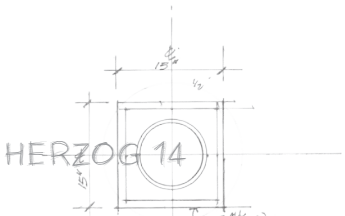
As Kirkwood (1999) writes, "It is the aesthetic and artistic possibilities that landscape detail presents which, in the end, constitute the most significant consideration for designers," and that is why it is essential for details in a built landscape to be constructed with craftsmanship. If the contractor has an artistic hand, patience, and craftsmanship, the landscape detail will be built and interpreted as the designer had envisioned.

The significance of this study is to provide reasoning and explain the importance of details in residential landscape design for the field of landscape architecture. This will be done by exploring how durable these details are, how the details connect to the site and architecture, and how the details provide a sense of place. Craftsmanship is an important factor in the overall appearance and feel of any landscape design, but the smaller the scale of the project, the greater the value and importance the details hold. The homeowner will relate to the landscape because "the designer had to use their sixth sense to figure out who the client" is and how to make a detail oriented design specifically for that client using craftsmanship throughout the details of the design (McKee, 2013).



SITE INFORMATION, OPPORTUNITIES, & CHALLENGES

- The architecture of the building may have historical significance. The historical significance can be the inspiration for the design, thus being translated and incorporated into the details of the landscape.
- The site may have historical significance. The historical significance can be the inspiration for the design, thus being translated and incorporated into the details of the landscape.
- There may be a variety of materials, such as concrete, stone, and wood on the site; three materials on site would show a variety in level of condition. Materials may be chosen appropriately for their intended purpose and the craftsmanship of these materials could be either in perfect condition or in need of repair.
- Landscape details on the site connect to the details in the neighborhood, elements such as a lighting posts or mailboxes.
- The details of the site require durability. These features can be preserved to maintain cultural characteristics and provide the landscape a place in history.
- The site is to have an existing sense of place in a suburban setting.
- The site has value, special features or characteristics that make the site unique from other sites. Examples of this may include a lake view or golf course view. This characteristic will provide opportunity for a backdrop or to set up views to the special feature.
- A house value of more than $500,000. This value is determined by houses around this value and higher tends to hold elegance and richness in the craftsmanship of the house. This provides a potential for the craftsmanship of the landscape to complement the architecture of the house and vise versa.
- Craftsmanship varies throughout time periods, and the site may be in a time period where craftsmanship was present in the construction.
- Materials, such as wood, on the site may show a change in time based on the products.
- It would be beneficial if the site had human imperfections and site-specific elements. This shows craftsmanship, uniqueness, and gives the space character. This also shows that the details were not mass-produced and used on other sites.



RESEARCH QUESTIONS

Why is craftsmanship important to demonstrate in the details of residential landscape architecture? How durable are these details? What is the importance and function of these details? Where did the detail inspiration come from? How can these details be implemented into a landscape in a way that the client can appreciate the details as much as the designer?

Figure 1.2: Hardscape detail.

From research for this thesis, details are not always designed in line with the rest of the project. Details turn out to be an afterthought or are not designed at all due to lack of time budget, or scale of the project. Often details take months to design and develop, and the craftsmanship of these details is noticeable in the final outcome (Kirkwood, 1999). These are the details that set great landscape designs apart from good landscape designs. Successful landscape details are thought of from start to finish of the design process and re-worked multiple times. Landscape details can come in all shapes and sizes, some for aesthetics and others for functionality.

Inspiration for these details can come from a variety of places such as the surrounding architecture, geometry, site history or ecology. Landscape details inspired from the architecture of the house can compliment the house in the landscape. Connecting lines and forms to create details can tie the entire design together by extending views or connecting spaces using geometry. Using local and native materials for details can strengthen the design and connect back to the history of site as well. There are many layers of design to go through to create a detail; they take time and craftsmanship to be completed correctly.

Photo Credit: Landscape Architects Network

CASE STUDY

THE SULLIVAN RESIDENCE

- Project name: The Sullivan Residence
- Location: Minneapolis, MN
- Landscape architect: Coen + Partners
- Architect: Domain Architecture & Design
- General contractor: Reuter Walton Construction Inc.
- Landscape contractor: Landscape Renovations
- Arborist: Rainbow Tree Care
- Structural engineer: Archstructures
- Cost: Approximately $550,000, including the swimming pool and rooftop terrace (but not including the pergola or fireplace structure designed by Domain Architecture).
- Schematic/conceptual design phase: 11 months
- Construction phase: Began in late 2007 and concluded in early 2008
- Program: To create a dynamic space with a modern approach, a minimal palette, and a subtle respect for the context that belies innovative solutions and construction methods.
- Size of project: 3500 SF
  (Coen + Partners, n.d.)

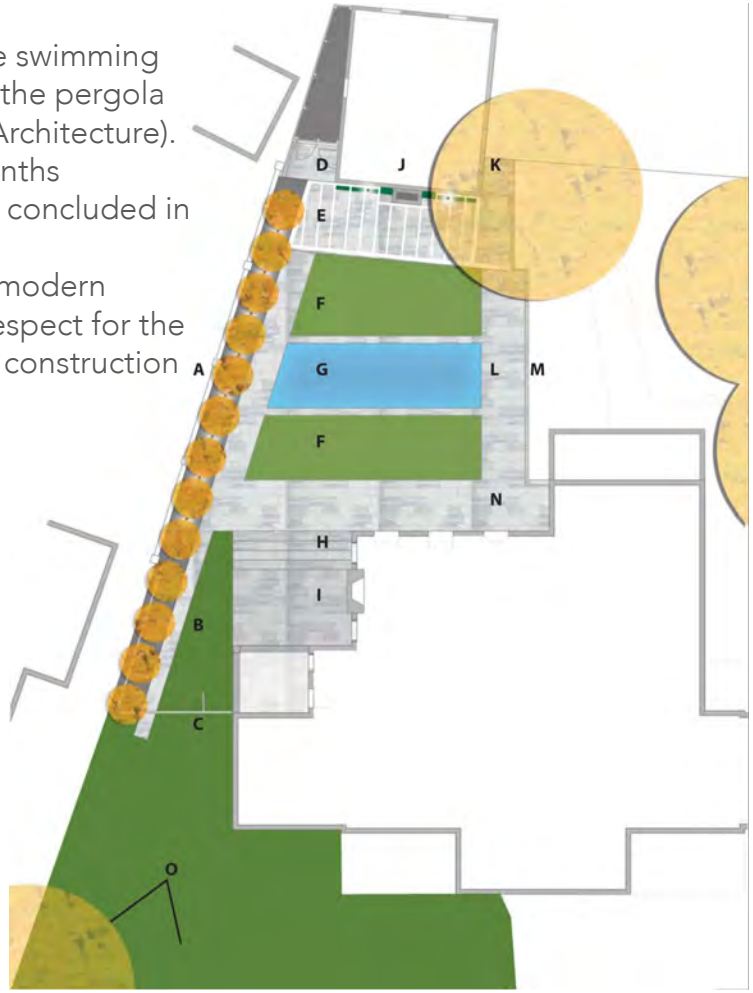


Figure 1.3: Sullivan residence masterplan.

A birch row in beach pebble bed

B dry stack bluestone wall

C custom steel frame and cable fence

D relocated garage entrance

E bluestone upper terrace with pergola

F lawn panel

G pool

H floating bluestone stair with steel frame

I bluestone lower terrace

J bluestone outdoor fireplace

K preserved mature oak

L dry set bluestone paving integrated with pool coping

M custom wood fence and gate

N bluestone paving over concrete plank

O significant view to Lake of the Isles

0 20

Photo Credit: Coen + Partners

Figure 1.4: A dry stack of bluestone extends from the main terrace leading the eye toward Lake of the Isles.

Photo Credit: Coen + Partners

Figure 1.5: The main terrace has been elevated to address the drainage problem.

The Minnesota Chapter of ASLA award winning Sullivan residence is located along the shores of Lake of the Isles in Minneapolis Minnesota. Like many homes located on the lake, the Sullivan's home has excellent views of the water. What makes this house unique is that it is actually two residences. Carrie Ann Christensen, Associate ASLA, is a designer and writer in Minneapolis; Christensen says, "The 1920's mansion has been subdivided into two condominium units, with two distinct yards and two separate owners," this made the designing difficult for Coen + Partners because they had to work with two different owners who had conflicting opinions of how historic elements should be used in the designing of the space (2010). With a limited area to work with, Coen + Partners took advantage of the views of the water. By incorporating views of the lake (public space), the limited space had more potential. The existing backyard of the Sullivan residence was overgrown and had poor drainage making some doors to the house unusable. The once uninviting space that had been formerly unusable was transformed by using strong geometry and a simple plant palette. The design of the Sullivan's residence consists of bluestone terraces, a pergola, fireplace, wading pool, and a custom grill. Not to take away from the historic purity and beauty of this home, "Coen referenced one of the pergola columns, which has a feature based on the historic detail in the home, and the tile along the pool's edge, which plays off the house colors" (Christensen, 2010). In the article Coen states, "small projects take just as much time as large projects, this project was all about the details." From the conceptual design to the final construction documents took 11 months to complete, for the size of this residence the time spent designing and detailing was shown in the final outcome of the details in the project. A project of this scale could have been designed in a much shorter amount of time, but the details and craftsmanship would have turned out differently. One of the bigger problems on the Sullivan residence was solving the drainage issues. The terrace was designed essentially like a deck, except it was concrete. That way no earth had to be piled up against the building (Christensen, 2010).

The Sullivan's residence is an excellent study on details in the residential landscape setting. The design was focused on the details, whether it is matching a detail from the architecture of this historic house to the design on the columns for the pergola, or the color and texture of the Minnesota native bluestone tile that plays off the color of the house.

The geometry of the fence was also an important detail because of the lack of division and privacy between the two condominiums. Both homeowners had different opinions of how historic elements should be used on the site, and the fence had to please both homeowners as well as define the separate spaces and tie to the history of the house. These small details and others could have been forgotten in the design process or completely avoided but without the details to tie the site together, the end result would have been a different and much less pleasing design.

The details were planned and thought of throughout this design and it is apparent based on the end result that the details were the main focus of the project, "while the technical expertise exhibited in detailing is critical to the success of the project, the aesthetic consistency and ability of the space also make it clear why the Sullivan residence recently received a 2010 Residential Design Award from the Minnesota Chapter of ASLA." The craftsmanship that Coen + Partners put into the details through out the design made this project award winning (Christensen, 2010).

Figure 1.6: The pergola creates human scale and matches the geometry of the fence.

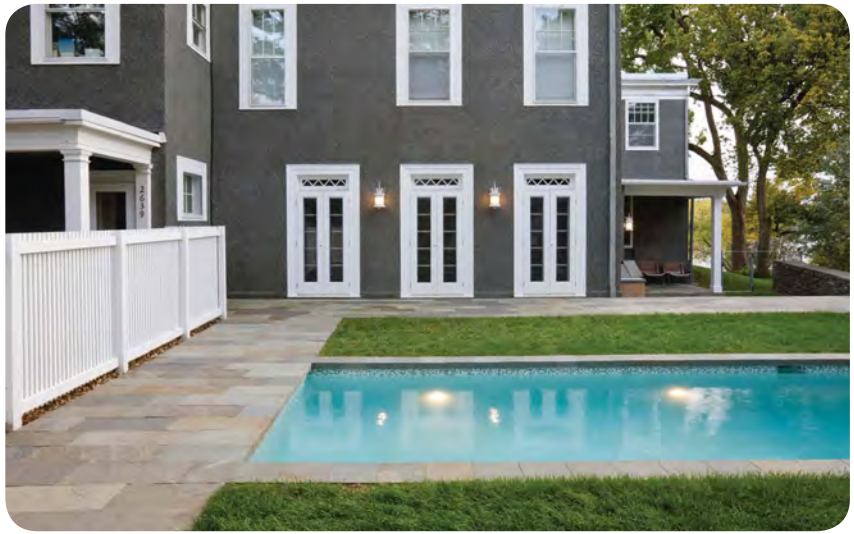


Photo Credit: Coen + Partners

Figure 1.7: The color of the bluestone compliments the color of the house.

CASE STUDY
ALLEGHENY RIVERFRONT PARK

Project name: Phase 1, Allegheny Riverfront Park
Location: Allegheny Riverfront, Pittsburgh, PA
Landscape architect: Michael Van Valkenburgh
Artist: Ann Hamilton, Michael Mercil
Lead engineer: Ove Arup & Partners
Civil engineer: Frederick R. Harris, Inc.
Geotechnical engineer: GAI Consultants Inc.
Contractor: C & M Contracting, Inc.
Cost: Withheld
Schematic/conceptual design phase: 1994-1997
Completion: 1998
Program: To provide a linear park intended to reconnect the citizens of Pittsburgh with the riverfront and encourage residential development in the adjacent downtown area.
Size of project: 10 acres, 4,000 by 35 feet
(Kirkwood, 1999)

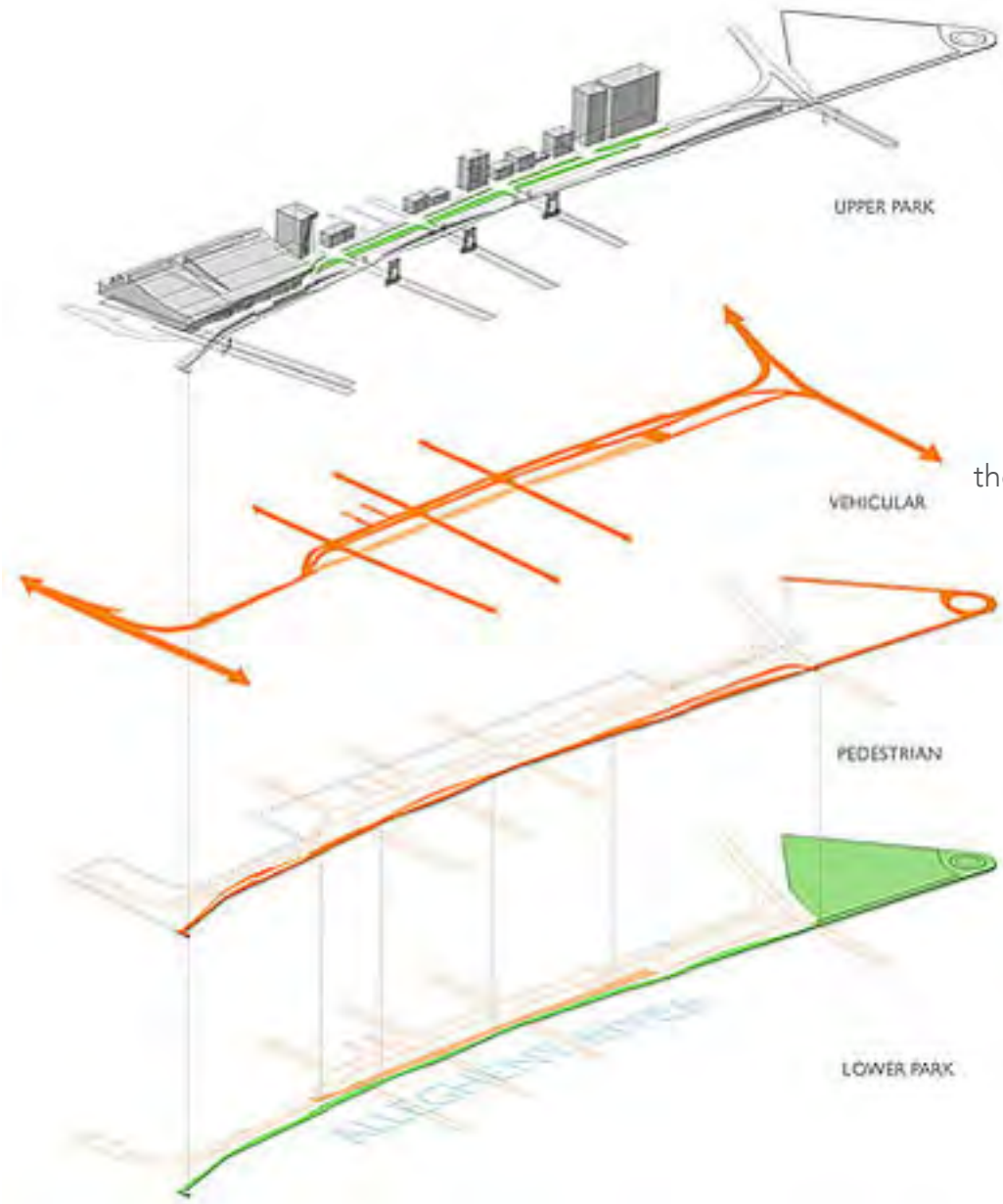


Figure 1.8: Allegheny Riverfront Park masterplan.

Photo Credit: Michael Van Valkenburgh Associates Inc

The Allegheny Riverfront Park is located in Pittsburgh, PA. The 35-foot by 4,000-foot strip of land is bounded by the Allegheny River to the north, downtown Pittsburgh to the south, the elevated Fort Wayne Railroad Bridge to the east, and Point State Part to the west (Kirkwood, 1999). The site is split into two terraces; the lower terrace is approximately three feet above the river, floods annually, and incorporates a former parking pier and a four-lane highway. The upper terrace, 20 feet above the river, includes part of a street. The upper park has more of an urban character while the lower terrace features a more irregular edge (Kirkwood, 1999). Kirkwood asked the designer, Michael Van Valkenburgh, about the detail design part of the process and how long it could take with any project. Michael stated, "We're often thinking about the detail design of the project early in the process; not making decisions about detailing, and not making decisions about materiality, but just starting to corral the choices from which we will later choose our final design. So what evolves early, translates the conception into an idea of the felt experience a landscape will provide" (Kirkwood, 1999). One of the details implemented into the lower terrace is a wetland reed species imprinted into the concrete. This species grows in the Allegheny River, but it is illegal to cut. So seeds were collected and shipped to Florida to be grown and harvested there, to not only be shipped back, but to be used to imprint the concrete (Amidon, 2005). Jane Amidon, a professor and director of landscape architecture at Northeastern University, stated when interviewing Laura Solano, one of Michael's co-workers, "To work in the reed texture, Michael and Ann were going to train and work closely with union concrete finishers, but they realized that they had to do it themselves (with assistants) to achieve just the right gesture and feel. Ann kneeled on staging with wheels to lay the reeds and the concrete finishers came behind and floated the reeds into the top surface. The reeds washed out as they dried" (Amidon, 2005). This detail in the project was so important to get right that the landscape architect and artist chose to step in and do it themselves. If they had not done it, the inlay may have given the space a different feel or texture.

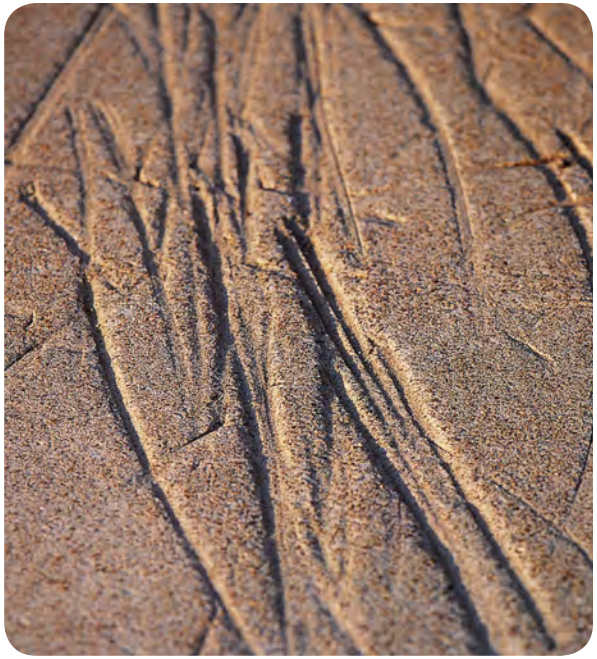


Photo Credit: Annie O'Neill

Figure 1.9: Concrete texture.

Photo Credit: Michael Mercil and Ann Hamilton

Figure 1.10: The designers had to step in to lay the reeds into the concrete to get just the right feeling.

Figure 1.11: Reed inlaid concrete sidewalk, smooth enough to bike on, yet detailed enough to notice.

The Allegheny Riverfront Park makes a relevant study of designing details into the landscape. Michael Van Valkenburgh implemented details very well throughout this park. The walkway on the lower terrace could have been concrete with standard relief cuts, but Valkenburgh made this into an important place making detail. He transformed the common into the unique by something as simple as changing the texture. Details like this take extra time and effort but are well worth it in the end. For the imprinted concrete, "weeks and weeks of testing were conducted by Ann Hamilton and Michael Mercil in a warehouse" to get the texture just right (Kirkwood, 1999). In landscape design, "people pay a great deal of attention to what is underfoot and immediately in front of them" (Booth, 1983). Thus the visual quality of pavement is an important factor to determine the interest and attraction of the design (Booth, 1983). The reed-imprinted concrete is not something people see everyday; it is something unique that a person may only experience once. Because of how different the concrete is compared to a city sidewalk, people walking on it notice it and appreciate the change from the ordinary.

Valkenburgh showed that even on a large-scale site, details can be implemented throughout the design and still be effective. The same method of detailing Valkenburgh used can be applied to a residential design; the main difference between the Allegheny Riverfront Park and a residential site is the scale of the site. Details can be inspired by environmental objects found in nature like the reeds used to imprint the concrete, or by the built environment.

Photo Credit: Michael Van Valkenburgh Associates Inc

LITERATURE REVIEW

PAVING DETAILS

According to Norman K. Booth, a landscape architecture professor at Ohio State University, paving patterns and forms are an important part of landscape architecture and architecture because people tend to pay attention to what is beneath and in front of them (Booth, 1983). Choosing paving materials is a challenging design opportunity. Many factors such as appearance, strength, slip resistance, availability, and durability are taken into consideration when deciding what material to use (Lisney & Fieldhouse, 1990). Paving patterns can create a strong sense of place if the design is carefully thought out (Booth 1983). Pavement can be used to unify and coordinate elements together in the landscape, but should be represented the same as other materials on the site.

As with any design, the number of materials used may be simplified to help show unity throughout the site (Booth, 1983). Too many pavement materials can produce visual chaos and disorder. One paving material can be used in different locations on a site to tie the spaces together and to define the spaces in a similar way.

The durability of paving has a close relationship to the installation and craftsmanship of the pavement (Kirkwood, 2004). Paving is a very common element in the built landscape, according to Kirkwood; the following are examples of paving with potential results caused by weather:

Surface, weedy: windblown seeds and pods rooted between sand-bed pavers
Surface, dirty or stained: weather, traffic, pollution; oil, grease, paint spills
Loose, cracked, or crumbling: weather and traffic, roots or de-icing salts
Sunken or heaved: weather and traffic
Spreading or crooked: edging misaligned or damaged, no edging
Edging loose, sunken, or heaved: weather and traffic

All of these problems are due to lack of craftsmanship, improper installation, or lack of maintenance, they are preventable with proper knowledge, craftsmanship, and attention to detail.

The articles for this literature review conclude that there are many factors in choosing a paving material and pattern. The design of pavement could be argued as the most important detail because it is one that people are in contact with when they walk across the landscape. Because it has such a large part of human interaction with the landscape, it is essential that pavement is designed with craftsmanship in mind.

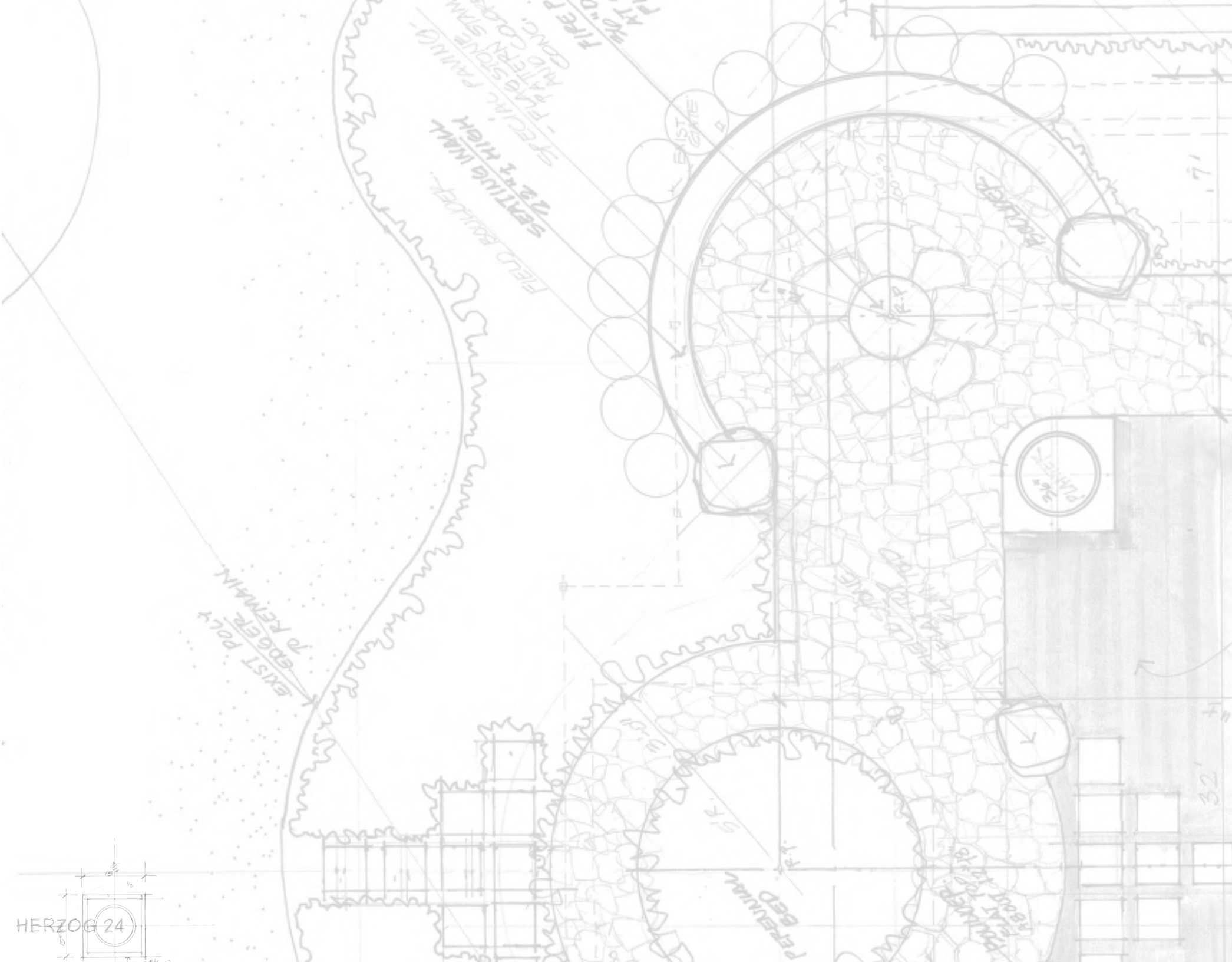
Figure 1.12: Pavers are sinking next to concrete sidewalk.

Photo Credit: Andrew Herzog

Figure 1.13: Only two different plants were used in this planting bed. The plants chosen were most likely used for hardiness, availability, and low maintenance.

Photo Credit: Andrew Herzog

Planting designs can be an afterthought or used for aesthetic reasons only in some designs. According to Lisney and Fieldhouse (1990), practicing landscape architects, one of the steps of design is to "carefully select plant materials appropriate to the site and to the design concept." It would be best if the plant material were selected to compliment the design and function of the site, "the use of a single plant species throughout a scheme as the dominant element, with other materials complimenting or contrasting with it, can be most effective for small-scale design" (Lisney & Fieldhouse, 1990). Some functions of plants other than aesthetic value are wind shelters, air quality control, and soil stabilization. Jack Ingles, a plant science professor at State University of New York, states, "plants may be selected for reasons of sentimentality, easy availability, low price, or trendiness" (2004). Ingles also states that although those reasons may have occasional validity, if the chosen plants are not appropriate in site specific ways, it is unlikely the plants will serve the landscape properly if selected for only those reasons (2004). Too often the designer abbreviates the process of selecting plants or does it incorrectly, which can be inconsistent with the inspiration behind the landscape (2004).



CHAPTER 2: METHODOLOGY

Photo Credit: Drawings by Gene Ernst, edited by Andrew Herzog

RESEARCH APPROPRIATE METHODOLOGY

The research approach required to conduct this thesis is to examine successful residential landscape designs and find out how and why landscape architects or designers used landscape details successfully in their designs. The residential designs studied may not all be 100 percent successful. Small elements in the design may be ineffective or lacking in design or detail. In a successful landscape design, the landscape detail will have a reason or inspiration behind the design linking it together as a whole. The parts of the landscape will work together and compliment each other: "in short, landscape detail[s] establish scale, articulate space, and contains and expresses design ideas at the scale of detail resolution" (Kirkwood, 1999).

Research required to complete this thesis will be case studies on successful residential designs and what specific details and craftsmanship are successfully used in those residential designs. Research on material selection and durability of the material will also be essential in this thesis. Historical, ecological, and geometric data from the site will be required to be collected to choose site specific materials, forms, and spaces in the landscape design.

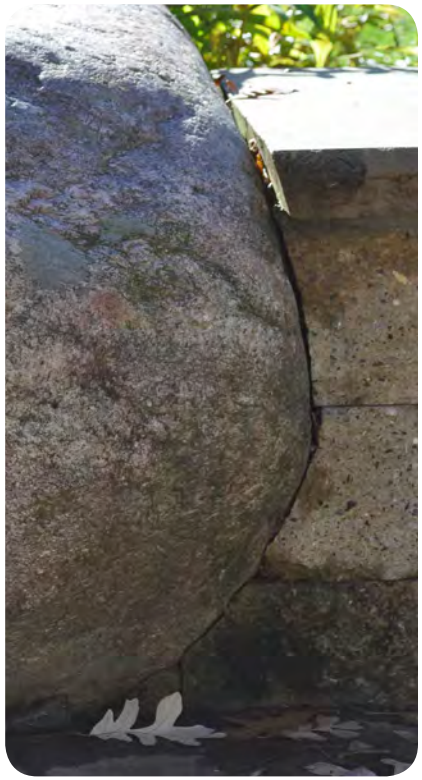


Figure 2.1.

Figure 2.2.

Two examples of the same detail of a wall butting up to a boulder, one side constructed well (figure 2.1) and the other constructed poorly (figure 2.2).

Photo Credit: Andrew Herzog

Figure 2.3: One of the landscape features noted during a site visit.

The data required to design details in a residential single family home will be a base map with the existing structure and all existing features, including: driveway, sidewalks, planting beds, trees, property lines, and any other features the property may have. This information will be collected from Google Earth with help from physically measuring features on site. If possible, original drawings will be collected from the architect and landscape architect or designer of the property. Inventory will be collected through multiple site visits during different seasons. The inventory that will be collected will include, but not be limited to: circulation, sun and shade patterns, wind, water drainage, present wildlife, sounds, and micro-climate conditions, and macro-climate conditions. During the site visits, field notes will be taken along with pictures of the existing landscape design. This data will be studied and compared to the research in this thesis. Once the inventory is thoroughly completed, the data and research will help form an analysis of the site inventory to determine the future design and craftsmanship of the details. The analysis of the data will determine the condition of the details and whether to repair them or not. If there are details missing or if spaces are not linking together, the overall craftsmanship of the existing landscape design needs to be improved.

Photo Credit: Andrew Herzog

SITE INTRODUCTION

The site for this thesis is located in the Midwest because the climate in the Midwest has four distinct seasons. During these four distinct seasons the landscape changes. In the fall and winter, trees lose their leaves and snow piles up giving the landscape a new look. In the spring, once the snow is melted, the landscape is given new life as the plants and trees bloom. Midwest landscapes change throughout the year depending on the current season. This change is a unique feature to this region of the United States, which is why the Midwest was chosen for the site.

The site is a single-family home located in Chaska, Minnesota, a southwestern suburb of Minneapolis, Minnesota. The house is located on the Hazeltine Golf course and features a view of a pond in the backyard. The house is tucked away off of the main roads in a quiet neighborhood. The architecture of the house is a mix of craftsman style and Tudor-style. The home is valued above half a million dollars, and the property is just over one acre in size. The house was built in 1988, and Ernst Associates designed the current landscape in 2005.

There is an opportunity to make a well-crafted, detail-oriented residential landscape design. This is also one of the most challenging aspects because designing details and executing them in the construction phase can be difficult with lack of experience by both the designer and contractor. Using details to tie the entire landscape together and make the landscape function as a whole will be the biggest challenge of the project. Designing the details in the landscape and relating the materials, geometry, and spaces to the history, ecology, and/or architecture will be a challenge. It is important for the details to relate to the entire project, not just themselves. This gives the small details an important role in the overall landscape design.

Figure 2.4: Tri-state area

Figure 2.5: Twin Cities

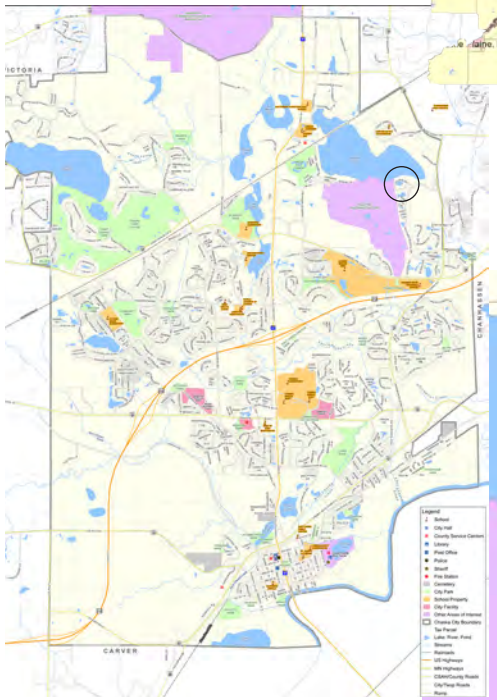


Figure 2.6: City of Chaska

Figure 2.7: Neighborhood
Graphic Credit: Andrew Herzog

USER/ CLIENT DESCRIPTION

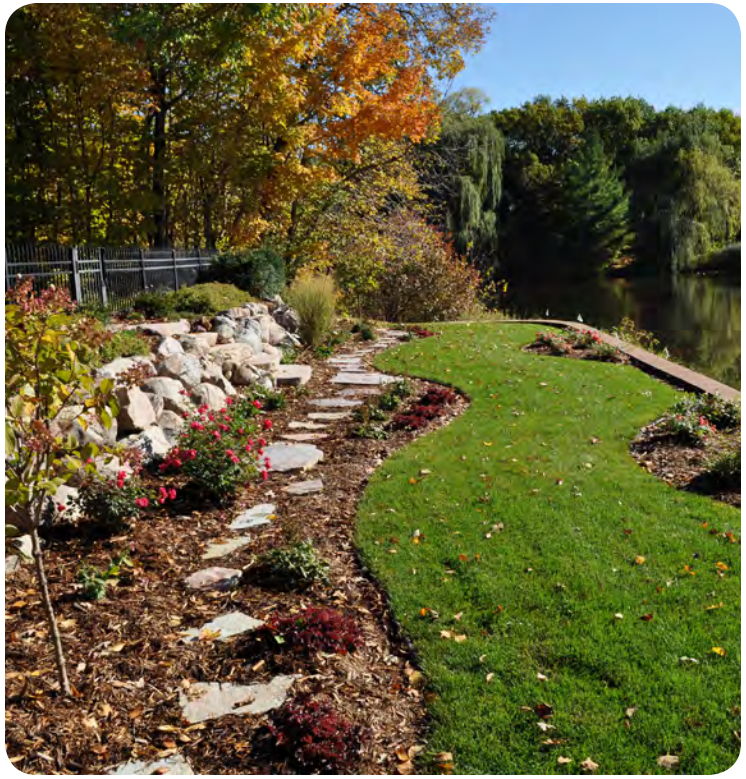
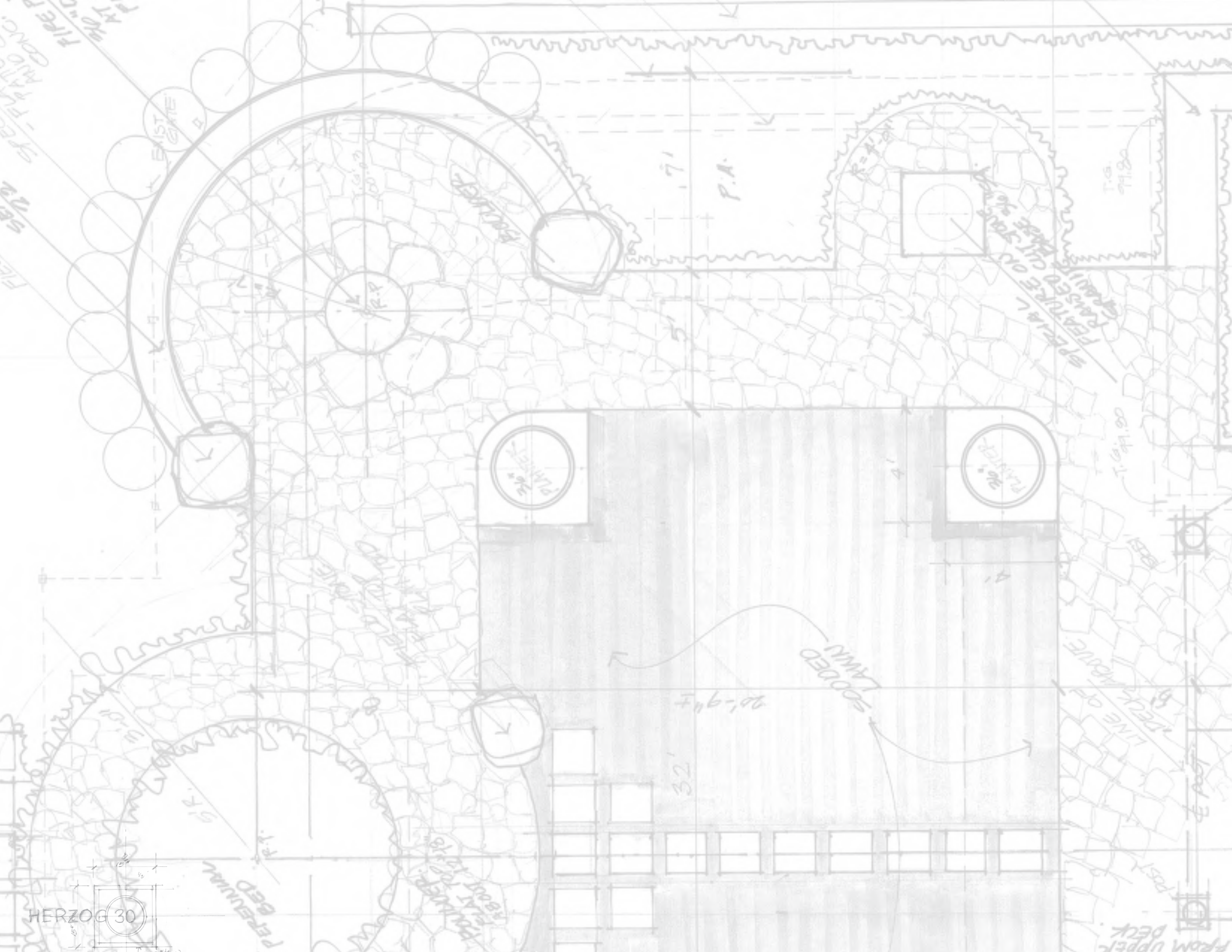


Figure 2.8: An existing part of there yard has an equal balance of both planting beds and open lawn area to please both Judy and Jim.

The clients, Jim and Judy Dauwalter, own the property on which the research and design for this thesis will be completed. They are a retired couple in there 60s with children that have moved and started their own families. The Dauwalter's have a second home in Florida. They live in Chaska during the summer months but travel to Florida on occasion during the summer for short periods of time. Judy loves to garden, maintaining the planting beds and containers, while Jim loves to take care of the grass. Because of this, it is essential there is a happy medium of both planted areas and open lawn areas to please both Judy and Jim. Between the two of them, the property is well kept. They are both very involved in maintaining their yard. This is also why they notice the imperfections and deteriorating elements currently in their yard. Both have a strong passion for maintaining their property, and want it to look the absolute best it can be. Besides maintaining their property at a high standard, Jim is an avid golfer and Judy takes care of her three dogs. Both Jim and Judy like to entertain; there is an existing gazebo in the backyard that makes for a great spot to host a few guests. The Dauwalter's are a very active and social couple that takes pride in everything they do, including the maintenance of their landscape design.

Photo Credit: Andrew Herzog



CHAPTER 3: RESULTS, SITE INVENTORY & PROGRAMMING

Photo Credit: Drawings by Gene Ernst, edited by Andrew Herzog

SITE INVENTORY

HISTORY & COMMUNITY

The city of Chaska's recorded history began in 1769, but it was inhabited years before. In 1776, Jonathan Caver explored land along the Minnesota River and took notes along his journey. The name "Chaska" is derived from a Dakota word often given as a name to the first-born male child. With the city located on the river, there was an abundance of high quality clay that led to the start of brick making in 1857 ("City of Chaska Minnesota," n.d.).

With Chaska being known as a historically thriving brick manufacturer ("City of Chaska Minnesota," n.d.). This history could be used for the design of this project by reclaiming old bricks and re-using them as detailed elements in the residential landscape design. The use of local and historic materials is the start to a well-crafted landscape.

Not until the 1950s did Chaska begin to transition from a small town to a metropolitan community. Today, one hundred to three hundred homes are built every year, and dozens of new industries have located in Chaska and continue to do so. The downtown was redeveloped in the 1980s and 1990s, with steady growth throughout the past years.

Although this site is not downtown, it was built during the 1990s, the same time the downtown was being redeveloped.

Chaska combines the best of both worlds: a friendly small town with a modern city feeling ("City of Chaska Minnesota," n.d.).

The site chosen for this thesis has the same feeling of a small town with modern amenities. The site is located deep in a neighborhood, so it is very quiet and with minimal traffic, which provides the sense of a small town. Within a ten-minute drive there is shopping and dining, which are the modern amenities.

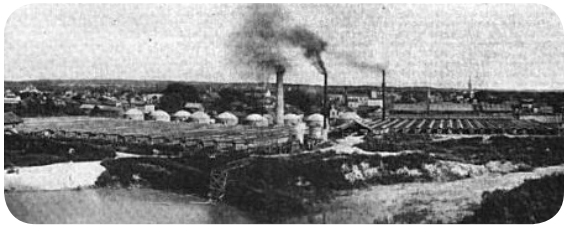


Photo Credit: Minnesota Bricks

Figure 3.1: Brick factory.

Photo Credit: City of Chaska Minnesota

Figure 3.2: Chaska brickworkers.

SITE INVENTORY
HOMEOWNERS

Figure 3.3: Aerial of the Dauwalter residence.

Photo Credit: Google Earth Pro

Judy and Jim Dauwalter purchased the property in 1991. They are a retired couple that live in their Chaska residence during the summer months and reside in their Florida home during the winter months. Judy has a passion for gardening and her three dogs, and Jim loves to take care of the lawn and golf in his free time.

The site is used for the Dauwalter's leisure, with both Judy and Jim having an interest in the maintenance of their yard; the site also acts as a place to escape the day-to-day life. They both spend multiple hours a day outside working on projects and the upkeep of their yard so it looks its best.

SITE INVENTORY

SITE CONTEXT

The site is a 1.07-acre residential property (Google Earth Pro).

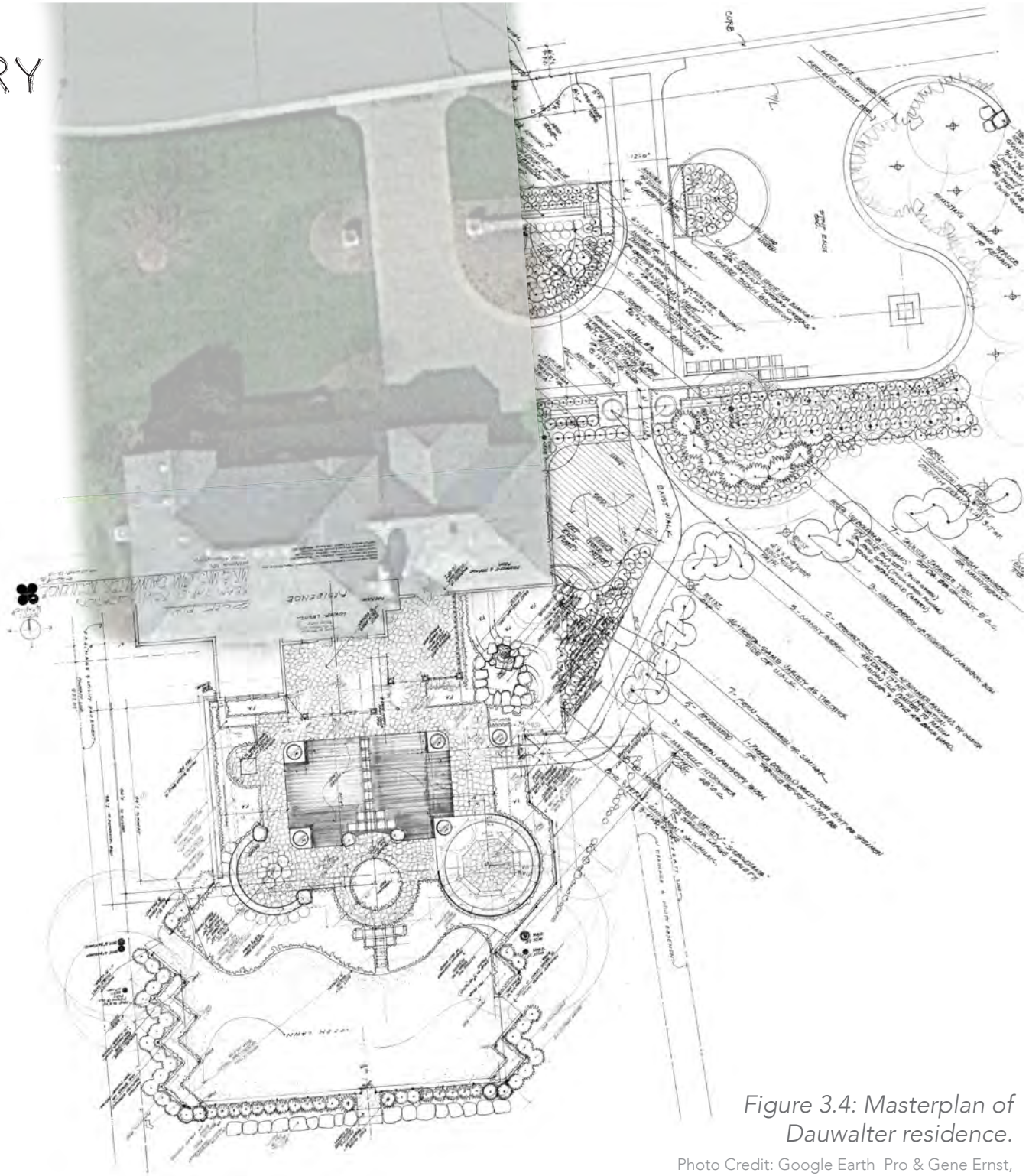


Figure 3.4: Masterplan of Dauwalter residence.

Photo Credit: Google Earth Pro & Gene Ernst, edited by Andrew Herzog

SITE INVENTORY
HARDSCAPE MATERIALS

Figure 3.5: Paver driveway with stamped concrete border.

The driveway is concrete pavers with a stamped concrete border. The stamped concrete continues around the side of the house to the backyard and is used as a patio space. There is also a gazebo with a concrete floor on site in the backyard. The paver driveway will reduce the rainfall runoff slightly, while the concrete will run off completely.

The driveway is about 2,600 square feet (Google Earth Pro). And the stamped concrete patio and gazebo in the backyard equal about 1,365 square feet (Google Earth Pro).

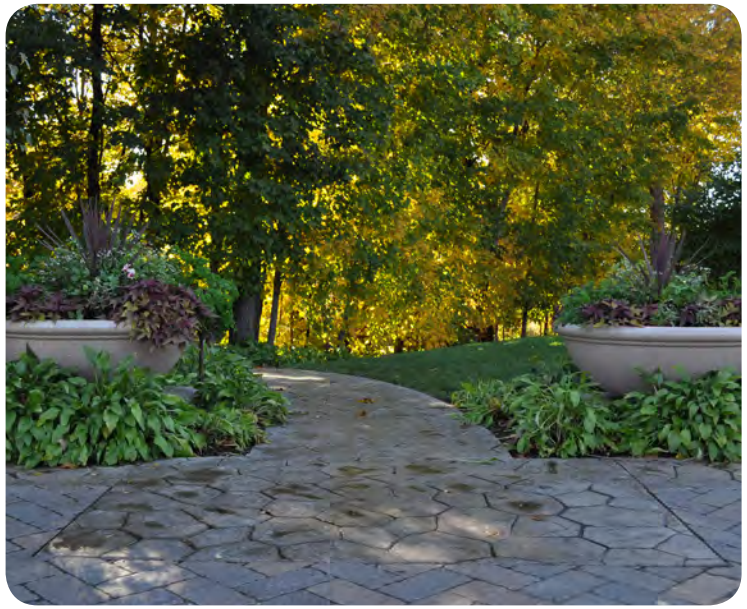


Figure 3.6: Path continues from the frontyard to the backyard.
Photo Credit: Andrew Herzog

Figure 3.7: Side entrance to backyard.

SITE INVENTORY

PLANT LIFE

There are a variety of plants and gardens on the site: perennial beds, containers with annuals, and a more formal garden in the backyard. Some of the perennials on site include many different varieties of hostas, daylilies, coral bells, daisies, and grasses. During the site visit, many of these perennials along with others were dying because it was fall.

There are two rows of lilac trees in the front yard that act as a barrier and a softer entrance to the wooded area on the property, which is located directly behind the row of lilac trees.

There are a variety of shrubs planted on the site, including roses, boxwoods, yews, hydrangea, and spirea.

Figure 3.8: One of the several annual planters.

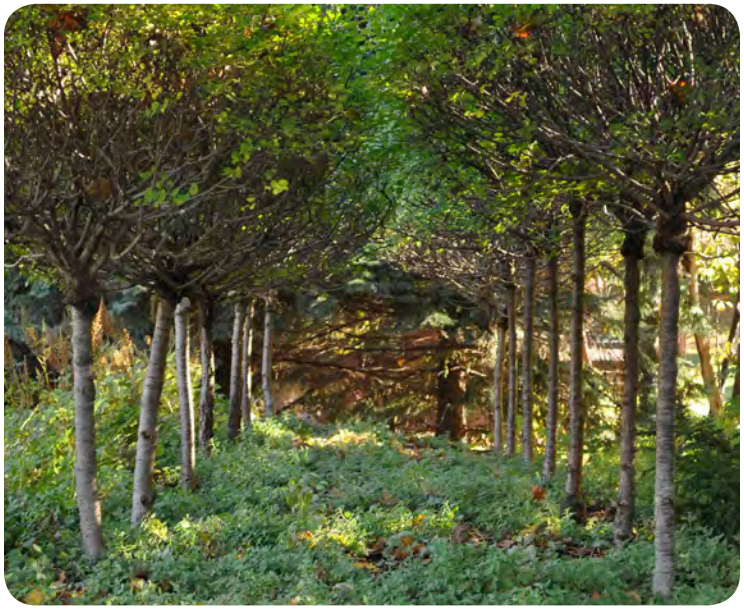


Figure 3.9: The two rows of Lilac trees.

Figure 3.10: One of the several perennial beds.

Photo Credit: Andrew Herzog

SITE INVENTORY
RECENT PLANT CHANGES

Two over grown arborvitaes that blocked a portion of the view to the water were removed in the summer of 2013 and replaced with smaller boxwoods.

A new planting bed was also added during the summer of 2013 in the backyard near the pond.

Figure 3.11: New planting bed added summer 2013.

Figure 3.12: Before: Gate to pond with overgrown arborvitaes.

Photo Credit: Andrew Herzog

Figure 3.13: After: Gate to pond with new boxwoods.

SITE INVENTORY
WATER FEATURES

A pool in the backyard was removed in 2005 and filled in with engineered soil.

Behind the yard is a pond about 1.3 acres in size that creates a backdrop for the site (Google Earth Pro).

There is about 250 feet of established buffer to help stabilize shoreline along the pond (Google Earth Pro).

Currently, there is a fountain in the backyard.

Photo Credit: Gene Ernst

Figure 3.14: Fountain in backyard.

Photo Credit: Google Earth Pro, edited by Andrew Herzog

Figure 3.15: 1.3 acre pond in relation to site.

Figure 3.16: The site is private property, but has views to public property including the pond and Hazeltine Golf Course. This map also shows the proximity of the surrounding neighbors. Views to the golf course are only present when foliage on the trees and shrubs is minimal. In the summer, there is no view to the golf course due to the thick foliage. The view to the pond is determined by where you are in the backyard. The yard slopes down toward the pond, so the closer you are to the house, the less able you will be able to see the water.

Photo Credit: Google Earth Pro, edited by Andrew Herzog

SITE INVENTORY
WEATHER

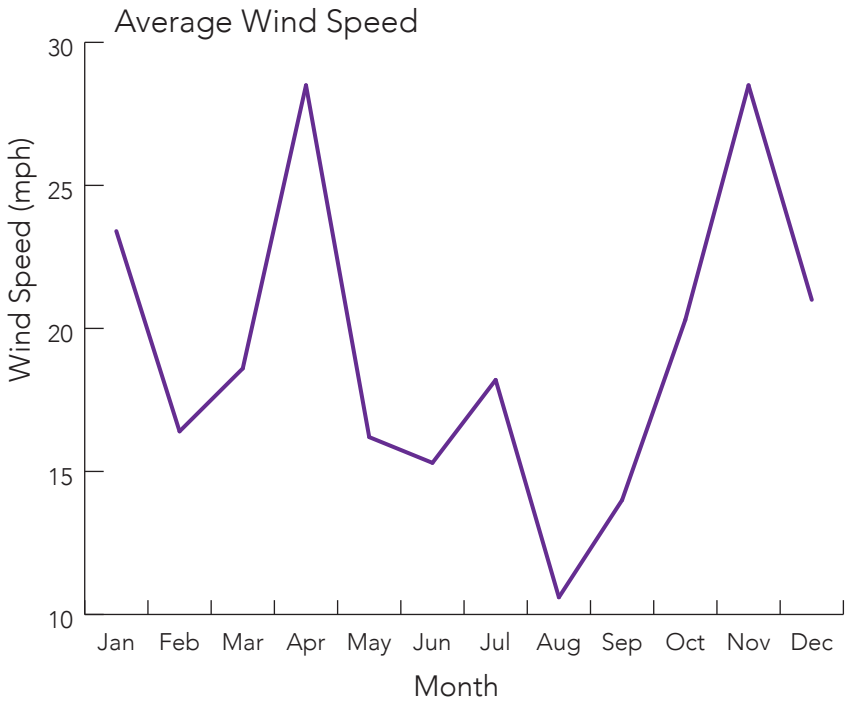


Figure 3.17: The average wind speed for Chaska is 19.24 mph (Chaska, MN Weather, n.d.).

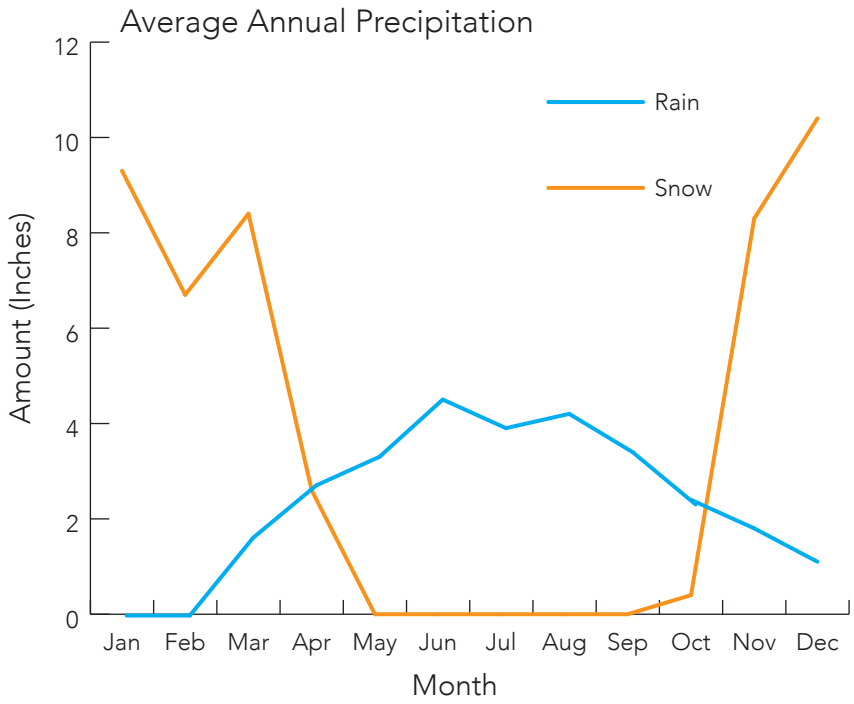


Figure 3.18: The average yearly rainfall for Chaska is 30.90 inches (Chaska, MN Weather, n.d.).

The average yearly snowfall for Chaska is 45.80 inches (Chaska, MN Weather, n.d.).

Graphic Credit: Andrew Herzog

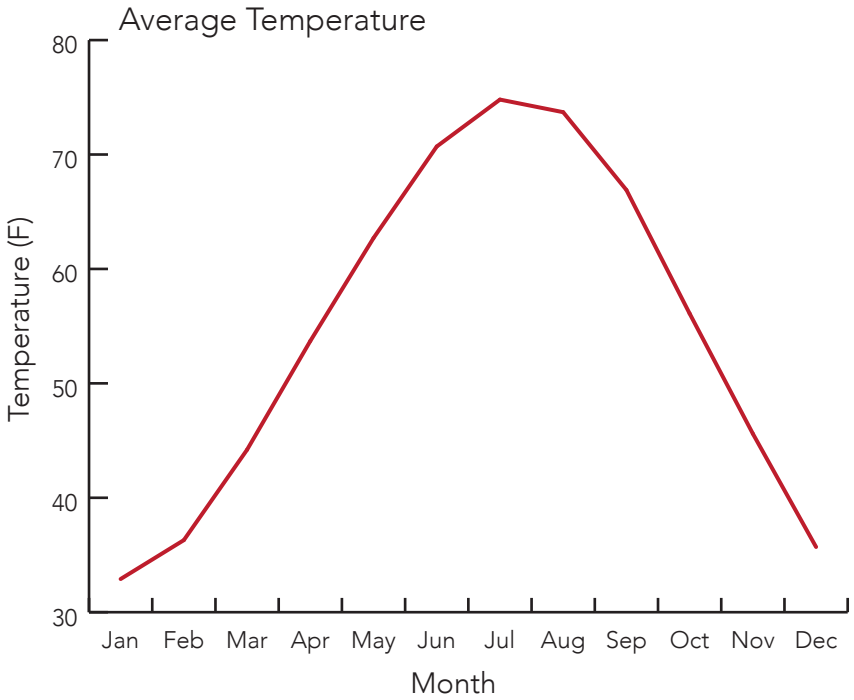


Figure 3.19: The average temperature for Chaska.

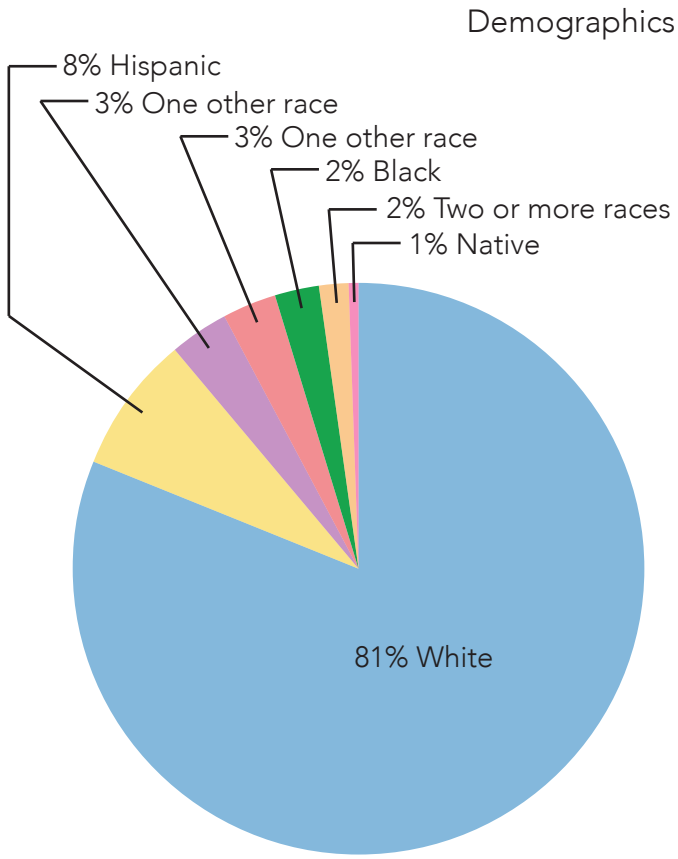


Figure 3.20: The demographics for Chaska.

Graphic Credit: Andrew Herzog

SITE INVENTORY
WEATHER

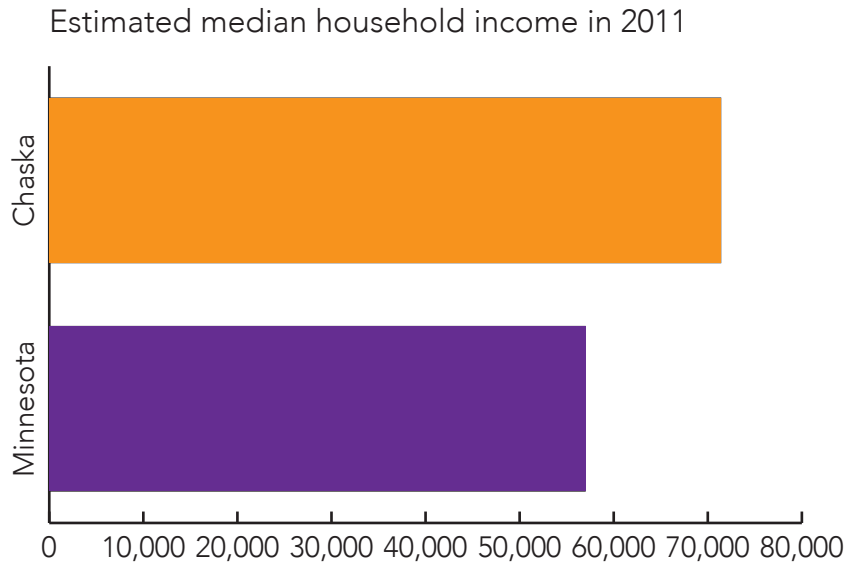


Figure 3.21: The estimated median household income in 2011 for Chaska.

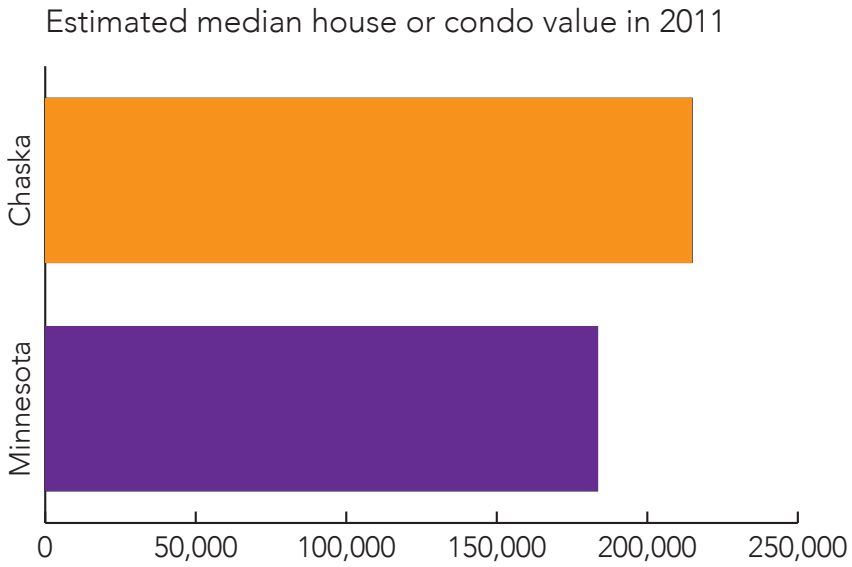


Figure 3.22: The estimated median house value in 2011 for Chaska.

Graphic Credit: Andrew Herzog

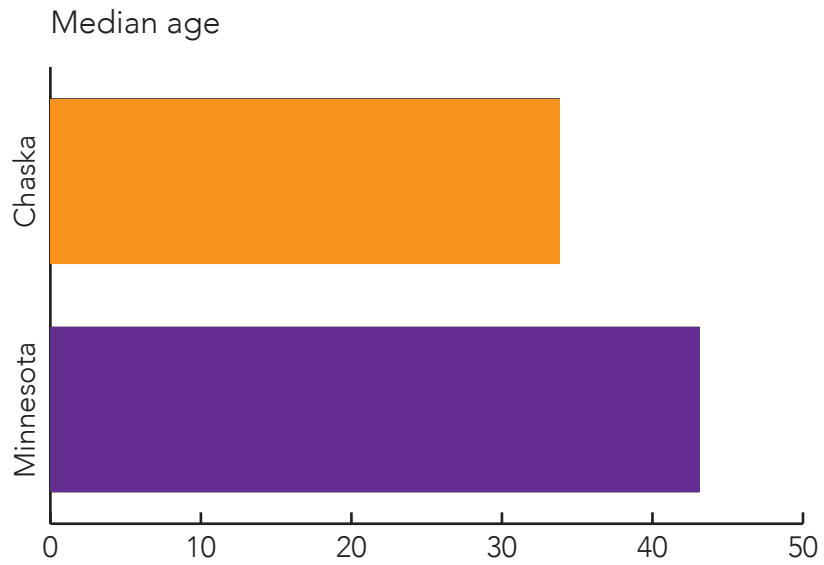


Figure 3.23: The median age for Chaska.

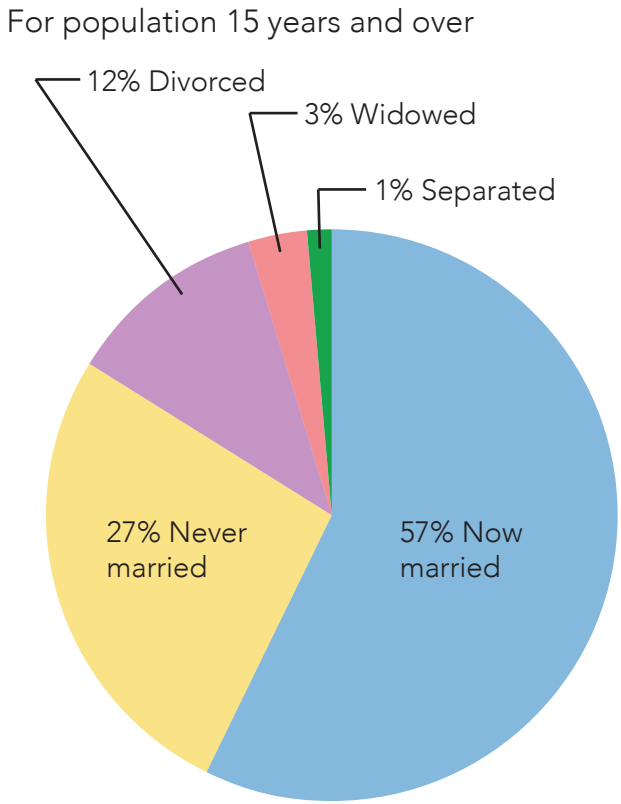


Figure 3.24: The marital status for Chaska.

Graphic Credit: Andrew Herzog

SITE INVENTORY
ARCHITECTURE

The house was built in 1988. It is two stories and about 3,500 square feet. The house is a combined craftsman style and Tudor-style combined. It is constructed of brick, stucco, and wood. The roof has cedar shakes. The gazebo's materials and architecture match the house. The gazebo also has cedar shakes and the pillars on the gazebo match the pillars on the deck in the backyard. During a site visit and examination of the roof, it looked to be about a 12/12 pitch. The pitch of the gazebo matches the steeper pitches of the house.

Photo Credit: Caver County

Figure 3.25.

Photo Credit: Andrew Herzog

Figure 3.26: The matching roofs of the house and gazebo.

SITE INVENTORY

SITE CIRCULATION

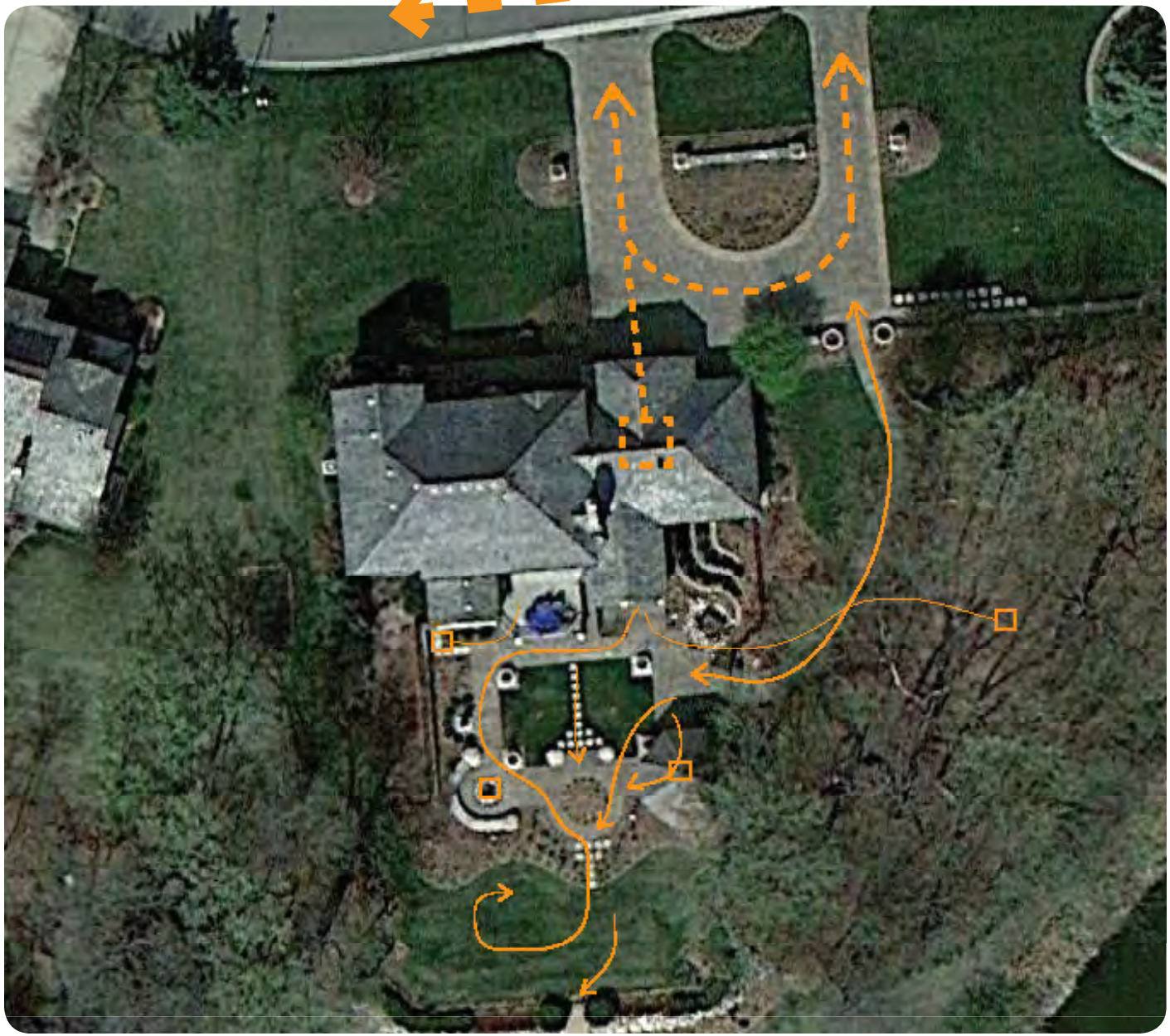


Figure 3.27: Site circulation.

Photo Credit: Google Earth Pro, edited by Andrew Herzog

The driveway on the site is u-shaped. This makes turning around easy for parking in the garage. It can also fit 6 cars comfortably and still allows guests to maneuver without having to park on the street. On the east side of the house, there is a sidewalk that connects the front yard and driveway, to the backyard. This is the primary access point to the backyard.

Legend

- Pedestrian Traffic
- Pedestrian Feature
- Vehicular Traffic
- Vehicular Feature

SITE INVENTORY
UNIQUE FEATURES

The house is set back 70 feet from the road which is further compared to surrounding neighbors (Google Earth Pro).

A wooded area about a quarter of an acre in size on the southeast corner of the property exists with mature trees. The inner area is thinned out and cleaned up. There is no ground cover or low growth plants in the wooded area.

Photo Credit: Google Earth Pro, edited by Andrew Herzog

Figure 3.28: Wooded area on site in relation to house and pond.

Figure 3.29: The screened-in gazebo. Photo Credit: Gene Ernst

Figure 3.31. Photo Credit: Philips Hadco

Figure 3.32. Photo Credit: Philips Hadco

Special moonlighting techniques were used to light the landscape in place of traditional lighting techniques.

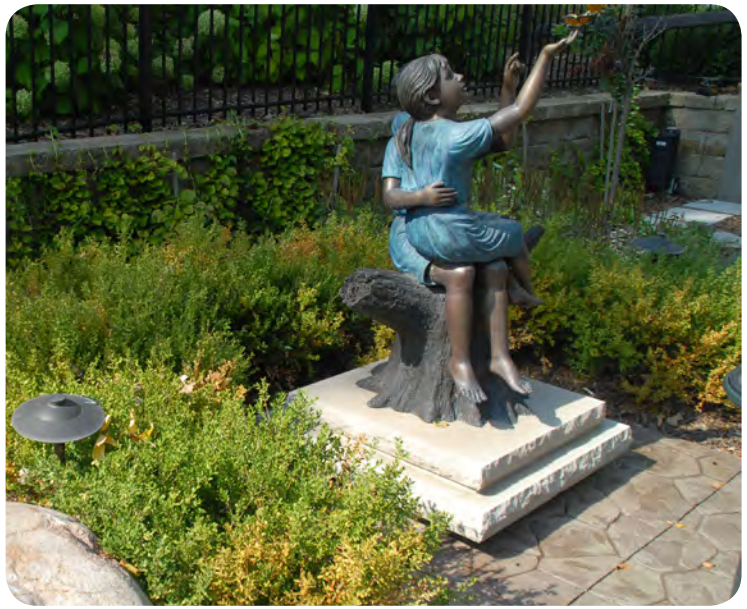


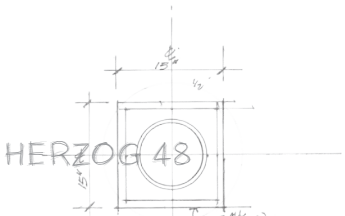
Figure 3.30: A piece of art as a focal point. Photo Credit: Gene Ernst

Figure 3.33. Photo Credit: Philips Hadco

FINDINGS FROM RESEARCH

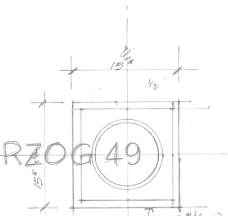
RESULTS FROM TYPOLOGY RESEARCH

Craftsmanship of landscape details is an important element in design, but they are not always implemented into the built work due to lack of designer creativity, time, budget, or the scale of the project. The contractor also has a role in how the details turn out in the design. The designer may have spent a great amount of time designing one single detail, and the contractor may not implement the details the way the designer intended. One of the challenges of implementing craftsmanship in the details is having an experienced and knowledgeable contractor. No matter how crafty a landscape architect is one important factor the design comes down to is the contractor and their craftsmanship and ability to effectively execute the landscape architects design. This is one factor that determines how a project will turn out. Possible outcomes due to a contractor lacking craftsmanship include: poor craftsmanship, poor detailing of elements, poor project management, and the possibility of going over budget and finishing the project late. A non-crafty contractor may have received the job because they were the lowest bidder. Contractors should not be chosen solely based on the price. Once the project is completed, it is up to the homeowner to maintain the landscape to its fullest potential. In residential landscape architecture, the designer, contractor, and homeowner all have a significant role in creating and maintaining a well-crafted and detailed landscape.



FINDINGS FROM RESEARCH
RESULTS FROM RESEARCH QUESTIONS

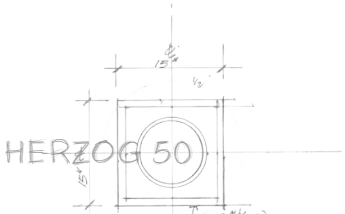
Craftsmanship in residential landscape architecture is not always present due to the time frame, budget, or even the scale of the project. Lack of details in a landscape design reduces the overall outcome and successfulness of the design. To implement details successfully, it is essential for the designer to develop the details at the very beginning stages of the design process. It is common for these details to be redesigned and reworked throughout the entire design phase of the project. In the two case studies, the Sullivan residence and the Allegheny Riverfront Park, the details were being developed from day one of the designing phase. In both projects, the details were a significant part of the overall design and they were constructed with craftsmanship. The landscape details in both of these projects are effective because they were not an afterthought, they were planned into the budget, and time was not a factor. These details are also powerful because they are site specific. They were designed based on the surrounding history, geometry, and architecture of the overall site. Based on the research of implementing details effectively into a landscape, the development and redesigning of the details occurs throughout the entire design process.



FINDINGS FROM RESEARCH

RESULTS FROM THE CRITERIA FOR THE PROJECT AND THE SITE

The criteria for the project and site are: a single family home located in Chaska, Minnesota. The home will be of a certain economic income with details present in the architecture of the house, along with a landscape that varies in craftsmanship. There are good qualities along with qualities that could be improved, and everything between. All of these criteria determined the site chosen for this thesis, however not all of them may be met. The site was chosen in Chaska, Minnesota based on meeting a majority of the criteria along with easy access and a potential to make multiple site visits. There was also the potential to get the original drawings from the landscape architect. These were all important factors in choosing the site and they were all taken into consideration.

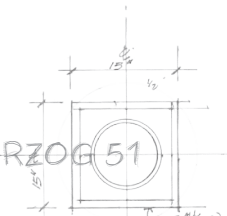


FINDINGS FROM RESEARCH
RESULTS FROM CASE STUDIES

The Sullivan residence showcases how much craftsmanship and detailed elements can be worked with in such a small area. This 3,500 square foot area was designed over 11 months by Coen + Partners and could have been designed in a much shorter time frame had the number of details not been so extensive. This award winning design shows that small projects can take just as long as larger projects to fully develop. This design of the Sullivan's residence was all about the details in the design. From the history of the house to the local material choices, the details throughout this design were thought of from the very beginning phase of the project and carried out with a contractor with excellent craftsmanship and an eye for detail.

The Allegheny Riverfront Park, located in Pittsburgh Pennsylvania, is a great example of how small details can be used in public settings and how even large scale projects can have details incorporated into them. The designer, Michael Van Valkenburgh, believes that it is important to think about the details of the design very early in the designing process, not making decisions or choosing materials, but starting to corral the choices from which they will later choose the final details. The details in this park are like no other details because they were thought out right from the beginning phase of the project. The details were not an afterthought; the designers were planning to incorporate details from the very start of the project. If Michael Van Valkenburgh and his colleagues had not started to think about the details from the beginning, they would not have been as successful in their project.

In both the Sullivan's residence, and the Allegheny Riverfront Park, the details were starting to be developed in the very early phases of the project. Details were developed alongside the development of the design, and the details were changing throughout the design development. This shows that no matter the scale of the project, small or large, and whether private or public, details and craftsmanship in the design matter and it is essential for details to be considered right from the beginning. When details are being thought of from the beginning, there is the opportunity to develop them as the overall design progresses and strengthen their meaning behind the overall design, than thinking of the details at the last minute.



FINDINGS FROM RESEARCH
RESULTS FROM LITERATURE REVIEWS

Paving in any design is important because people tend to look down at their feet and pay attention to where they are walking. There are many factors that go into designing any paved area. Material and pattern of pavers are important, but there are other factors that go into paving details such as tactile surface, connecting destinations together on site with the use of materials, the geometry of the paving pattern and how it coordinates with the bordering course. For example, the corner of a soldier course can be constructed in a few different ways. Depending on the intention of the designer and contractor, both designs have specific ways of guiding the movement of people and their eyes. In figure 3.34, two soldier courses meet, one stops, and one continues. This can look awkward in certain situations, but may be used if the designer intended to use the soldier course that does not end to draw the users eyes to a focal point off into the distance. Figure 3.35 shows a better crafted paving corner, in which a miter cut was used along with a little square. If multiple paving materials are being used on the site, the contractor could make this little square out of another material for more of an accent piece. This mitered corner turns the user's eyes around the corner and does end awkwardly like figure one.

Figure 3.34: The user's eye follows the strong line of the soldier course.

Figure 3.35: The user's eye follows the corner.

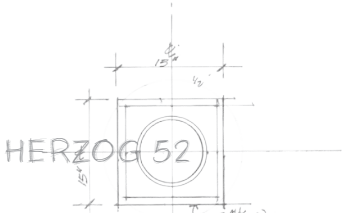


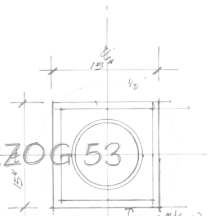
Photo Credit: Andrew Herzog

FINDINGS FROM RESEARCH

RESULTS FROM THE RESEARCH METHODS

The research required to successfully complete this thesis project is to search for case studies that pertain to landscape designs in which details were implemented and the main focus of the project. Other research that is useful is information on the durability of certain materials, so those materials can be chosen carefully and not be implemented in a way that the material is not intended for. The result of this research will provide an understanding to the use of details in a landscape and the craftsmanship behind them. Seeing what has worked successfully in past landscape designs and what has not been successful will provide key information that will help design this thesis.

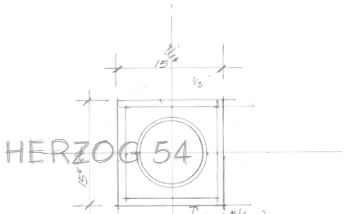
In order to understand the site, inventory must be completed over multiple site visits, each of which will be a different day at a different time. This way the site will be seen in different light and conditions. The inventory that is collected is the existing plant material and structures, driveway, sidewalks, and any other features that are on the property. The existing conditions will play a part in the decision making process regarding the design. For example, a well-crafted detail may be preserved and worked around, while a poor crafted detail or a space with no detail will be reworked. The details that are kept provide the landscape a place in time, while the new details enhance the landscape and tie to the architecture, geometry, ecology, or history of the site.



FINDINGS FROM RESEARCH

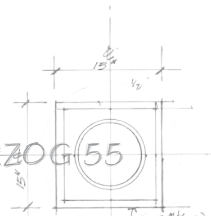
RESULTS FROM THE CLIENT RESEARCH

After talking to the Dauwalters, their vision for their property was starting to come together. For them it is important to have an equal balance of planting bed and open lawn area. They travel to their Florida home in the winter to leave the cold Minnesota winter behind, so the winter landscape is not a concern for them. Since they both spend much of their time outside maintaining their property, they notice the imperfections of the landscape. They have not put much thought into why the durability of some elements in the landscape is already starting to deteriorate five years after the initial install. However, now that this has been brought to their attention, they are interested in the result of this thesis document and would like to learn more about craftsmanship in the residential landscape and how the durability of the materials selected affects the life of a detailed design.



APPLICABLE VALUES FOR SITE AND RESEARCH

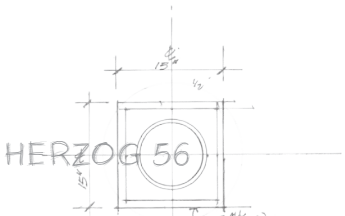
Based on the research completed for this thesis, historically, residential sites designed by landscape architects have details and craftsmanship implemented into the design. There may not be a high presence of detailing or the design may only be partially detailed, but there are elements and signs that details and craftsmanship were built into the landscape. This may be due to budget, time, or the landscape architect felt only certain features may be built with a high standard of craftsmanship while the other areas were designed with a lower design standard. If budget and time were not an issue, the level of craftsmanship in the details would be present on more constructed landscapes. While the projects designed by landscape architects were highly or partially built and detailed with craftsmanship, projects designed by landscape designers were lacking in the details and craftsmanship. Usually these landscape designers work for a design build firm, where the time frame to draw up a plan is much shorter than what a landscape architect would have. From my experience, in a design build firm, it is the designer(s) job to keep the installation crew(s) busy. A landscape architecture firm, with no crew to manage, will design the plan, and when they have spent an adequate amount of time designing the plan and are finished, they will send it out for a contractor to bid on. In this situation, it may not matter when they send it out to bid. They do not have an install crew to manage and keep busy. So because the landscape designer working for the design build firm has a much shorter turn around, the plan lacks in craftsmanship and details. It is then up to the installation crew to interpret what the designer intended for the space and to make it artistic in the way they install the landscape. It is important to have a crew that takes pride in the craftsmanship of the details or to even have someone on the crew who has a designing background to help with what the designer did not have time to do. This did not come up in the research, but from personal experience of being apart of a landscape installation crew for a design build firm in the Twin Cities area, there were occasions where the plan from the designer was merely a colored sketch not drawn to scale.



This is where the artistic side of the installation crew became known. The crew had to be craftsmen to construct a landscape off of a sketch. They also had to add details where they thought appropriate in the design. This style of business; leaving the crew up to making some of the design decisions can be both good and bad depending on your crew. If the designer does not have much knowledge about how details are constructed, it may be best to leave it an open interpretation for the crew to design and construct in the way they think best. However if the crew is inexperienced and lacks in craftsmanship, this could have a negative effect on the final outcome of the project. In this case, it would be the designer's best judgment to draw out every single detail for the crew. This way there is no confusion or misunderstanding and the landscape is constructed with craftsmanship.

This thesis is being conducted to find out why and how details and craftsmanship are missing in residential designs and how they can be applied to more residential designs in the future. Details are an important design feature and bring uniqueness and character to the built form. Without details shown in a built landscape, there is a lack of craftsmanship from both the designer and the contractor. Although either the designer or contractor may be at fault, it is ultimately the designer's responsibility to design with details and craftsmanship in mind and to pass that interpretation onto the contractor with confidence. The designer has to trust that the contractor will use their experience and artistic hand to show the craftsmanship in the details.

Economically, a landscape with no craftsmanship and details would take less time to construct versus a landscape with craftsmanship and detail, thus saving the firm time, which, in turn costs the firm less money. However, a built landscape without craftsmanship may not be as durable or have as long as a life expectancy as a well-crafted landscape. So as the client, you either save money at the front, and spend more money later fixing the elements that have failed in your landscape, or you spend more money up front to have a well-crafted and durable landscape from the beginning. It could be argued by the contractor that they practice ethically and build it right the first time, or the contractor could argue the home owner may want to update sooner rather than later to take advantage of the current trends.

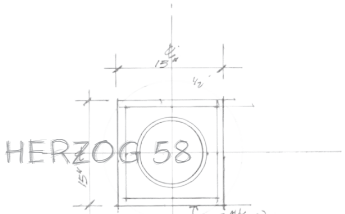


Culturally, details in a landscape design show craftsmanship and elegance. This can be seen as a status symbol in certain situations, but is perceived as a well-built landscape in which people will admire. People enjoy spending time outside. The relationship between humans and the residential landscape has been a close one for many years. Kevin Thwaites, a teacher and researcher at the University of Sheffield, and Ian Simkins, co-founder of a research facility concerned with the development of experimental landscape, say, "The concept of human-environment relations associated with modern landscape architecture originates predominantly in the scientific revolution which gradually unfolded over two centuries from 1500-1700" (Thwaites & Simkins, 2007). Humans like to interact with nature. The closest relationship people have with nature is their residence, and people take pride in its appearance. Having a well-crafted landscape requires routine maintenance. This can be difficult for homeowners due to lack of knowledge and time, or just not having the desire to maintain it. This is where designers come into play; according to Norman K. Booth and James E. Hiss, "homeowners call a landscape designer in search of someone to solve problems that exist on their site" (1991). Economically, being a proud owner of a well-crafted and maintained landscape can be a financial concern for homeowners if they do not have the knowledge or time to maintain it themselves. If this occurs, a landscape built with craftsmanship can deteriorate over time. Besides routine maintenance, the way the landscape is constructed can also determine the overall appearance and durability. As a contractor, it is part of your job to have every project be profitable. If a project is costing more than initially thought, the contractor might build the landscape in a less expensive way, saving the company money. This could compromise the durability of the landscape in the long run. Construction practices by the contractor are a big factor in how a landscape design looks when it is finished as well as how long it lasts. Going back to landscape architects versus landscape designers, landscape designers do not have the time and sometimes the training or education to make a detailed plan with construction documents, leaving it up to the contractor to make those decisions. If this is the case, the contractor has to construct the landscape with craftsmanship in mind because if they do not, the landscape will fall apart sooner than expected.

A PLAN FOR PROCEEDING

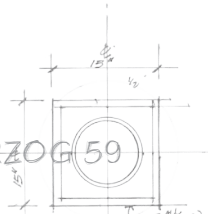
For this thesis document so far, many trips have been made to the library to collect research and hours spent writing. Learning how to find books and articles with credible and relevant information was one of the more difficult tasks. Having only taking the two required English classes at North Dakota State University, I was highly unprepared for the research and amount of writing this thesis document required. Writing was always a weak subject and no class in my college career has prepared me for writing this document. Because writing was not my strongest subject, many trips to the writing center were required. I was also fortunate enough to have a classmate review and revise my document multiple times. Without all the help I have received thus far I would not be where I am right now.

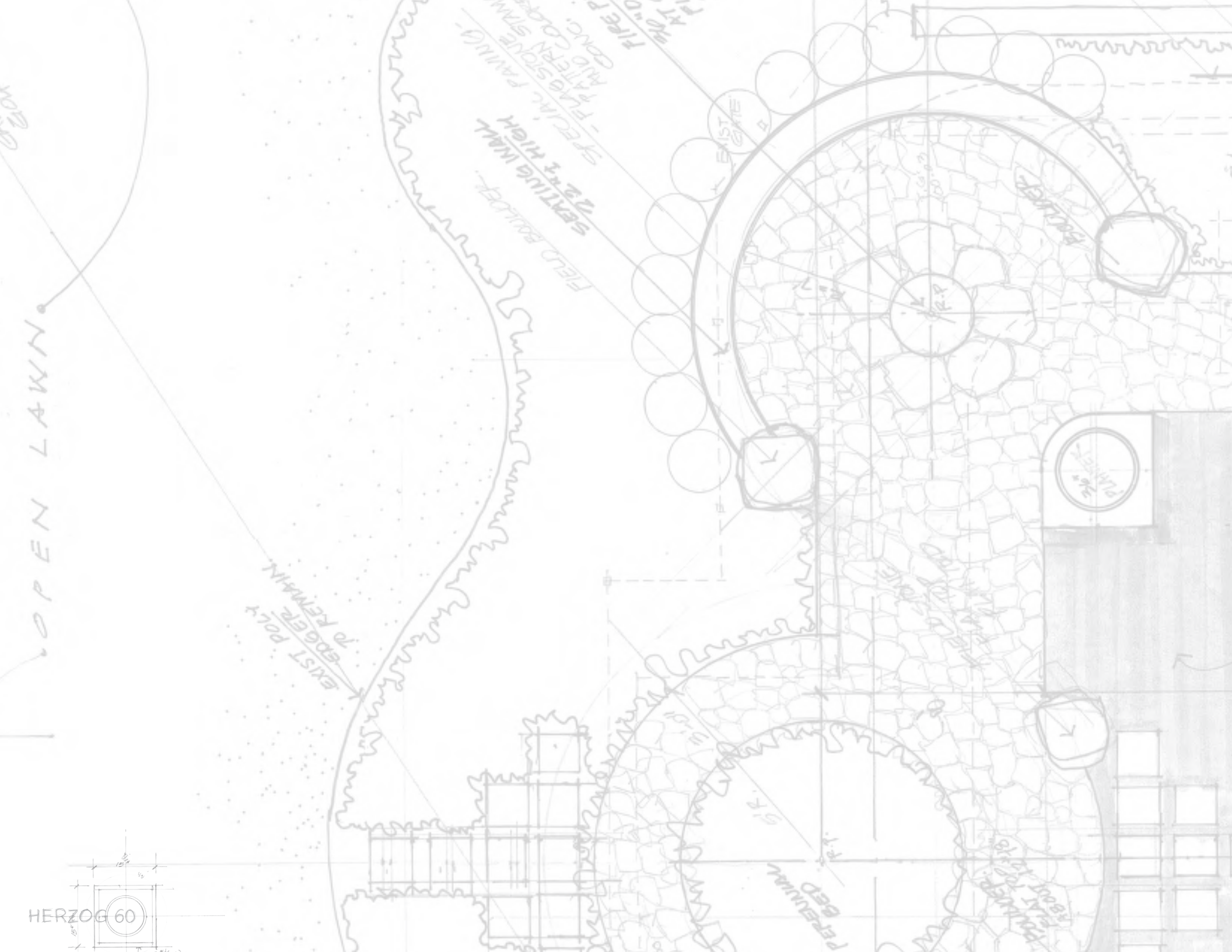
To complete this thesis document successfully, I have to continue to reach out for help from my classmates, the writing center, and my professors. Although research and writing are mot my strongest skills, I am organized and I do have good time management skills. For this to continue to progress, goals will have to be set and achieved for both the writing and graphic parts for the remaining part of this thesis document.



DESIGN GOALS

A theoretical goal from this thesis will be to have the reader be able to gain knowledge and insight on craftsmanship in landscape details and to be able to relate this thesis document to their life and possibly their career. This document can help both landscape architects and designers with their future project and help with adding craftsmanship and details into the design by linking them to the architecture, ecology, and site history. Physical goals of this thesis are to compile a set of details that are well constructed with craftsmanship for the Dauwalter's residence. Some of the existing details will be revised while others will be completely changed and improved. Construction documents, sections, and perspectives will be used to show and explain these details. Social goals for this thesis are to improve the use of spaces with craftsmanship in details. This can be done by designing spaces that are not awkward to the user or leave the user lost or with a confused feeling about the space. All of these details combined will give the field of landscape architecture a new way to look at and incorporate in future designs.




OPEN LAWN
SEATING WALL
12"+/- HIGH
EXIST POLY
ROOFER
TO REMAIN
PERENNIAL
BED

CHAPTER 4: DISCUSSIONS

Photo Credit: Drawings by Gene Ernst, edited by Andrew Herzog

DISCUSSION AND LIMITATIONS

With all of this research that has been completed, there is an opportunity to inform the landscape architecture community that craftsmanship in details matter and that they are an important element in any design. The case studies also show how details can be site specific, whether that is incorporating the details into the architecture of the building, using local materials on the site, or designing the details with the site history or ecology as the inspiration. Along with this research came challenges. Some of the challenges are how to educate the layperson about the craftsmanship behind these details, and how to properly construct the details so they have a long life expectancy. There are many methods to construct a detail and there are many material choices to choose from. What materials and what method of construction is the best is up to the landscape architect and contractor depending on each specific situation. Details are not to be reused on different sites; they are site specific and constructed for one site only. If a detail is constructed using the same method on two different sites, the site the detail is not intended for could fail and not live up to its life expectancy due to different site conditions.

This thesis highlights craftsmanship of details in a residential landscape. The questions that were answered are:

Why is craftsmanship important to demonstrate in the details of residential landscape architecture? How durable are these details? What is the importance and function of these details? Where did the detail inspiration come from? How can these details be implemented into a landscape in a way that the client can appreciate the details as much as the designer?

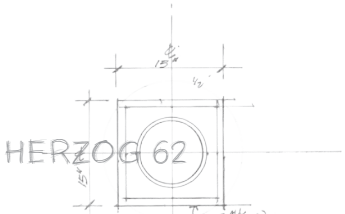


Figure 4.1.

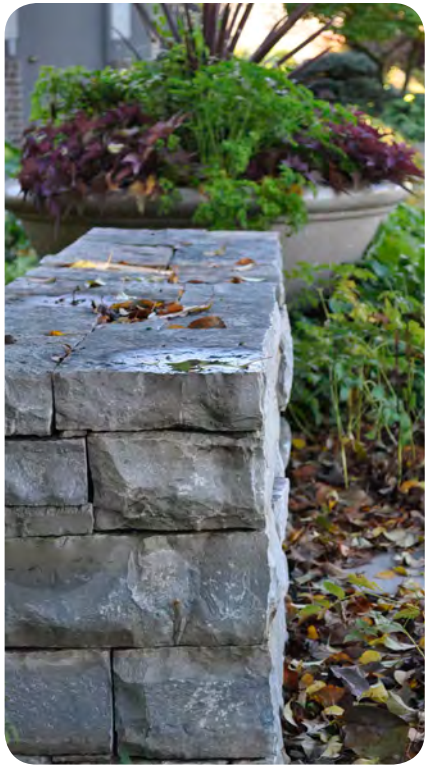


Figure 4.2.

From the research, craftsmanship is an important feature in the residential landscape because it is identified as the smallest part of the landscape, but yet at the pedestrian scale it is dependent on the performance and durability of the overall design. Part of craftsmanship is the durability of a specific detail and to have a detail withstand weathering elements and use, not only does the designer have to choose the correct materials and implications but the contractor has to install the materials correctly. From the research, poorly or improperly installed materials deteriorate faster than properly installed materials. A well crafted detail's life expectancy and appearance will out live a poorly constructed detail.

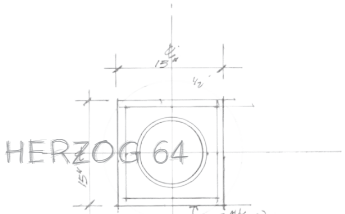
At the Dauwalter's residence, part of the landscape was constructed in 2008 and there are a few elements that are starting to deteriorate. After only five years this dry stacked stone bench was starting to fail (figure 4.1). It was starting to settle in the middle and pieces were falling off. The life expectancy of this bench should have been much longer than five years. To retain the dry stack and not mortar the joints, the contractor could have used caulking to glue all the pieces together so the bench was one solid piece. Now the designer may have not specified to glue the entire bench because he wanted to leave the bench somewhat accessible in the future for repairs or to make it easier for removal when the landscape gets redesigned in the future. However, if the entire bench was glued, it may not need to be repaired. During a site visit and examination of these benches, I noticed only the top course was glued together. This is common in the trade to only glue the top course to the second to the top course. However in this situation, something else should have been done to give these benches a longer life expectancy than 5 years.

Through this research, this thesis will show what could have caused this bench to deteriorate so fast; whether that is poor material choice, contractor installation error, or the designer not specifying how to construct and secure the bench together. The design portion of this thesis will show possible solutions to this bench failure. The research and design will show why or how the bench failed, what could be done to repair the bench, and what should have been done to give the bench a longer life expectancy.

Photo Credit: Andrew Herzog

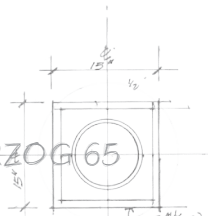
OPPORTUNITIES AND CHALLENGES OF OUTCOMES AND EARLIER RESEARCH

The main goal of this research is to inform the reader and the residential landscape architecture community that craftsmanship in small details is an important feature and that the craftsmanship in the details should not be overlooked. The smaller ideas of this research are reasons why the craftsmanship in details fails; some of those reasons are lack of time, budget, designer creativity, contractor knowledge, wrong material use, and weathering. Some of these smaller ideas are answered in the research and others are partially answered. Time and budget depend on the project, every project is different and varies in these two elements. Designer creativity can vary depending on the time and budget. If the time and budget allow, the designer can spend more time designing and adding details, whereas if the time and budget are limited, the designer will only complete the bare minimum in the design. Contractor knowledge depends on many variables, such as how long they have been in business, what type of work they have done in the past, and if they have any specialties or licenses. Designers should check past work on a contractor before using them for a project. Designs tend to look great on paper, but it comes down to the contractor and their knowledge and craftsmanship to determine how a project will turn out. Material choice is the designer's decision; the designer needs to have vast knowledge about different materials. They should understand what the material is made out of, how strong is it, what is the durability, what is it typically used for, how much it cost, is it readily available, and what colors the material comes in. This is just a small amount of materiality knowledge a designer ought to retain. Knowing materials well and their proper use is not only essential for designing a well-crafted landscape that will have a long life expectancy, but is also helpful when consulting with the client on site.

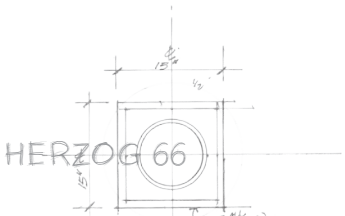


The client may have material questions that a designer with vast material knowledge can answer right on site. Weathering goes along with materiality closely. Materials weather faster when they are improperly installed and when they are used in the wrong application. This goes back to the designer having strong materiality knowledge and choosing the correct materials for the application. Without a wide variety of material knowledge, the wrong material may be used in an application in which it is not intended for, resulting in a faster detoriating element in the landscape. All of these small factors determine the outcome of a well-crafted landscape. They all relate to eachother. If one factor does not turn out it effects the rest of the factors. For example, a designer with minimal material knoweldge may use a material not intended for its applicaton, which will lead the material to weather faster, or the contractor may never have seen this material used in this way and installs it improperly.

Landscape details are shown through construction documents, the amount of craftsmanship put into these details when they are implemented is up to the contractor. The construction documents produced by the designer are how the designer envisions the detail to be built. However, the contractor may cut corners and not follow the construction document exactly as it is drawn. It is important for the contractor to follow the construction documents that the designer provided. If the plans are not followed, the design and durability are compromised. It is best for the contractor to follow the construction documents and not alter them because once the contractor alters the way the detail is constructed, the designer is no longer at fault if something happens to fail or an injury occurs. The contractor would be at fault because they altered the design of the landscape designer. It is the contractor's best digression to take the extra time to follow the construction drawing so in the future if part or all of the design fails, deteriorates, or someone gets hurt, the contractor is not at fault.

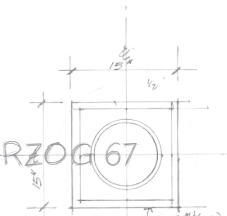


With experience, a designer will be able to assess a landscape by looking at it. They will be able to tell if the design is holding up or if portions need to be replaced because they are weathered and deteriorated. A designer can learn a lot from revisiting projects once they have been used and the plants have matured. A designer's comparative analysis is important in revisiting mature projects. They can learn what worked well and what did not work as well and apply this information to future project in similar situations. Revisiting a site can also be useful for a contractor. Just like a designer, a contractor can learn what worked well and what did not work so well and use this information on future builds. For both the designer and contractor, an important trait to develop is the ability to compare landscape designs and to analyze the strong and weak portions of each. This trait comes with experience and time, and will not be mastered immediately.



APPLICATIONS OF RESULTS WITH RESEARCH FROM PREVIOUS CHAPTERS

The results from this research will help the field of landscape architecture by making the designer more aware of the details they are implementing in a project. If the designer were using details in their projects, this research will give the designers a new way to think about details along with new ways to implement the details. If the designer was not using details in their design, this research will introduce them to the world of details in design. The research gives designers new ways to link details to elements in the site, whether that is linking back to the architecture of the building, linking to the history of the site, or using local materials to strengthen the link to the surrounding ecology. Applying the results from this thesis to landscape architecture will improve the meaning behind the design of the details in the landscape. If before details were ordered from a catalog and not made to be site specific, this research will help a designer by giving them ideas on how to design a site specific detail and how to link it to the rest of the design so it has a specific meaning in the landscape rather than a element that was found in a catalog and is used on other sites as well. The results from this research will open up designer's minds when designing details and give them new theories to think about. Landscape designers and architects will realize how important details are in a design and they will see how much the details enhance and bring out the overall design. Going back to the soldier course corner example of either running one side straight and leaving it longer then the adjacent side, or mitering both sides and adding a small detailed square. Bringing this to attention will get designers to start to think about other small paving pattern elements and how if effects the user or client. Using the soldier course corner example once again, do you want the users eye to see a focal point in the distance or do you want the users eye to take the corner and continue looking at the paving directly in front of them. Implementing small details like this to develop a certain reaction from the user is key for the overall effect the designer is trying to achieve. Depending on how details are implemented, they can have either a positive or negative impact on the use and movement through a space. The interpretation of the design by the user should be clear if the space was well designed. If there is confusion in the space, it is possible that details are missing or misleading the user of the space. This research will help landscape architects and designers to avoid these awkward situations to the user by making the design clear for what it is intended for.



DISCUSS OUTCOMES APPLY TO SITE CONCEPT AND ELEMENTS

Some preliminary design principles for this thesis include small hardscape details throughout the design in elements such as retaining walls, patios, benches, and containers. An example of a retaining wall detail is the way the cap pieces are laid and cut. There are a few different ways retaining wall cap can be laid and cut. One way is to double cut every other piece, this is when one cap is uncut, the next cap is cut on both sides, then followed by another uncut cap, and repeats the patter along the curve. Another way to lay retaining wall cap is to cut every single cap along the curve, some caps may be double cut while others only need to be single cut. From my experience working on a landscape installation crew, the first method where every other cap is double cut is more aesthetically appealing. Depending on the designer, the method of cutting retaining wall cap may not be specified and is up to the contractor to make that decision during installation. A detail regarding a paver patio, that is often not detailed out, is not to have lines longer than four feet in a random pattern layout. With the variety of different size pavers, straight lines ought to be kept to a minimum. The details implemented into this site will work together; materials, color, and the level of details will be uniform throughout the design. Depending on how the details are implemented the user or client's action will be directed in a certain way. The designer has to put a lot of thought into the design to make it function effectively as a working space to control the users movement, feeling, and even the direction the user looks. Designing landscape details with a purpose and a function is no easy

Photo Credit: Oneonta Block Company

Figure 4.3: Double cutting every other cap.

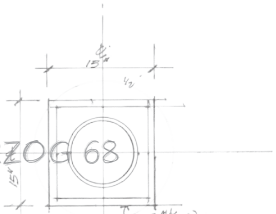


Photo Credit: City of Chaska Minnesota

task. Designing details takes time and the research shows details need to be started at the beginning of the project along side everything else. Thinking about small details at the beginning stages of the design allows the ideas to grow and become more developed as the project progresses. Another fundamental feature for this project is construction detail drawings. Construction drawings are important because they communicate between the designer and the contractor how an element it built. The craftsmanship and durability of a landscape detail depends on the construction methods. It is the designer's job to design a landscape detail that will last years in the future; and it is the contractor's job to follow the designer's drawings and build the detail so the it shows craftsmanship in the future. If the contractor does not follow the construction drawings, they are putting the design at risk of low craftsmanship and durability. A contractor may do this if they are behind schedule, over budget, or have lack of knowledge and experience. A detail may look perfect on a piece of paper, but it is up to the contractor to construct the detail with craftsmanship.

Photo Credit: Anchor Block Company

Figure 4.4: A bad example of a random paver pattern with straight lines longer than four feet.

Photo Credit: Andrew Herzog

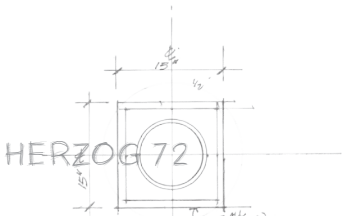
Figure 4.5: A good example of a random paver pattern with no straight lines longer than four feet.

CHAPTER 5: SITE INFORMATION

Photo Credit: Drawings by Gene Ernst, edited by Andrew Herzog

OPPORTUNITIES AND CHALLENGES

To the field of landscape architecture and design, this research provides new ideas and ways of thinking about details and craftsmanship in a residential setting. This research also gives the field new ways of incorporating and connecting the details to the overall design. This can be done in a variety of ways through geometry, or connection to the architecture or ecology of the site. Details are an important element in any design but they are often left out due to budget, scale of the project, or lack of designer creativity. When details are lacking in a design it is possible that they were an after thought or not thought of at all. To prevent this, thinking about the details, their materiality, how they will be incorporated, and what purpose they will give during the early stages of design will give the appropriate amount of time and importance to developing the details. This will ensure they are not generic or appear to be an afterthought. The case studies clearly show that developing the details at the beginning and throughout the life of the project is the most successful way to design details. The Sullivan residence is only 3,500 square feet; yet the landscape architect spent eleven months designing the space. This is because details were the main element of this project and it was apparent in the final result. The Sullivan residence received the 2010 Residential Design Award from the Minnesota Chapter of ASLA Due to the level of craftsmanship that went into the design of the details. The second case study of the Allegheny Riverfront Park is another great example of the implementation of details, but this time on a much larger scale. The riverfront park is ten acres in size, yet Michael Van Valkenburgh, the landscape architect, implemented many details into the site. He connected the local ecology to the park by imprinting the concrete sidewalk with reeds from the river. This idea was derived from the local environment and ties the riverfront park to the river. It is a site-specific detail that would not make sense to use anywhere else. Both of these case studies use details to showcase the landscape to its' fullest potential. To achieve successful details like in these case studies, not only does the designer need to start developing the details from the first phase of the project, but the contractor also needs to be familiar with the materials and has to be able to exhibit craftsmanship in the final constructed design.



The research from this thesis will be applied to the Dauwalter's residence in Chaska, Minnesota. A critical review of the landscape will be performed and the parts of the landscape that do not work well and are deteriorating will be redesigned to create a longer life expectancy. The parts that are redesigned will be designed with craftsmanship in mind, connecting back to the architecture of the house, history or ecology of the site, or the surrounding geometry as a whole and giving the site a sense of place. The landscape details on the site will be improved and better incorporated to the overall design. Parts of the landscape that are deteriorating will be improved so they last longer and do not weather as quickly. The goal of this project is to give this client a long lasting, detail oriented, and well-crafted landscape that will bring years of enjoyment and use. In addition, this project will increase the knowledge of the residential landscape architecture community on the importance of details regardless of the size of the project and that they need to be incorporated into the design from the beginning and not forgotten.

Figure 5.1: Deteriorating feature that will be redesigned to create a longer life expectancy.

Photo Credit: Andrew Herzog

CHAPTER 6: DESIGN

Photo Credit: Drawings by Gene Ernst, edited by Andrew Herzog

MASTERPLAN

Figure 6.1: Garden display masterplan, the booth is 20'x20'.

Photo Credit: Andrew Herzog

Figure 6.2: There are three entrances into the exhibit, each displaying different entrance opportunities.

Figure 6.3: Various lighting elements are incorporated in the design to light the entrances, fireplace, and vegetation.

Figure 6.4: Each exhibit has a component that draws potential clients into the exhibit. In this exhibit the fireplace is that.

Photo Credit: Andrew Herzog

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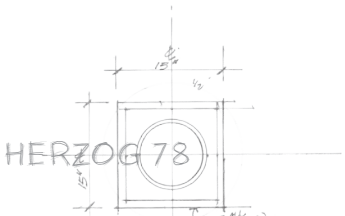

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About Chaska. (n.d.). About Chaska Minnesota. Retrieved November 1, 2013, from http://www.chaskamn.com/cityhall/ns_history.cfm
The city's website had great information about the history of the town, and how it came about. This website also stated what the town was know for and what brought the town an increase in population.

Amidon, J. (2005). Michael Van Valkenburgh Associates Allegheny Riverfront Park. New York: Princeton Architectural Press.
Michael Van Valkenburgh is a very well known landscape architect and Amidon displays Valkenburgh's work on the Allegheny Riverfront Park well. Valkenburgh along with artists turned this run down wasted land along the river into an urban refuge that has successfully renewed the city's core.

Booth, N. K. (1983). Basic elements of landscape architectural design. Prospect Heights, Ill.: Waveland.
Booth's book offers upcoming landscape architects key thought and design theory fundamentals in a clear and straightforward way. Through the many diagrams, Booth also brings awareness of the major physical components to the outdoor environment.

Booth, N. K., & Hiss, J. E. (1991). Residential landscape architecture: Design process for the private residence. Englewood Cliffs, N.J.: Prentice Hall.
This text covers all the fundamentals of residential landscape design. The entire design process from initial contact with the client to a completed master plan is explained in a step-by-step guide with numerous illustrations.

Chaska, MN Weather. (n.d.). Chaska, MN Weather. Retrieved November 1, 2013, from http://www.usa.com/chaska-mn-weather.htm
This website has everything weather related on it, average temperature, yearly snow fall and precipitation, and wind speed to name a few.

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The Sullivan residence in Minneapolis, MN was an award winning residential design by Coen + Partners in 2010. Coen + Partners had many challenges designing this historic home that was split into two residents and now a condominium. The design focused on the small details because space was limited with the scale of the site.

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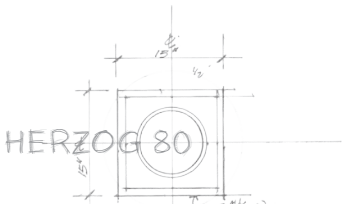
Hannebaum provides a complete view of the landscape design process for students, professionals, designers, architects, and salespeople. The book offers the latest trends, new design ideas, and the complete design process from analysis, to material selection, and the proper use of materials in the landscape.

Ingels, J. E. (2004). Landscaping: Principles and practices (6th ed.). Clifton Park, NY: Thomson/Delmar Learning.
Ingles focus's on three areas of professional practice, they are design, contracting, and management. He also touches on plant installation, pricing, interior landscaping, xeriscaping, water gardens, and safety. A very useful book for students and practitioners.



Kirkwood, N. (1999). The art of landscape detail: Fundamental, practices, and case studies. New York: Wiley.
Kirkwood offers a fresh, holistic approach to the theories, approaches, and practices of landscape details. Kirkwood demonstrates the role that landscape details play in the design process and outlines landscape details as a primary design activity, both practical and poetic, using a range of built landscape examples. He also talks about landscape detail construction, durability, and highlights eight case studies taken by current landscape design projects.

Kirkwood, N. (2004). Weathering and durability in landscape architecture: Fundamentals, practices, and case studies. Hoboken, N.J.: John Wiley.
Weathering and durability are examined and thoroughly talked about by Kirkwood in his book. Weathering happens in even the most innovative landscape designs and Kirkwood explores a variety of design approaches and strategies practiced in the industry today to change and evolve the landscape over time instead of deteriorate it.

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Lisney and Fieldhouse focus on everything hardscape in a landscape design in this volume. The design of paved spaces, enclosures, and landscape furniture are all discussed into great detail.

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Volume 1 that Lisney and Fieldhouse wrote is all about softscapes in landscape design. They talk about the functional role of trees, shrubs, and herbaceous plants along with their growth habits and how to establish them once they are planted.

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McKee, B. (n.d.). Landscape Architecture Magazine. Land Matters: Domestic Unease. Retrieved October 30, 2013, from http://landscapearchitecturemagazine.org/2013/05/01/land-matters-domestic-unease/
This article talks about private versus public work. The advantages and disadvantages between the two and how residential design has helped a lot of firms get through the resesion.

Planning Department. (n.d.). Chaska Minnesota. Retrieved November 1, 2013, from http://www.chaskamn.com/cityhall/codeenfns.cfm
The planning department for the city of Chaska had a very detailed map of the zoning throughout the entire city. It also had maps of land uses, streets, and trails.

Statistics: City of Minnetonka. (n.d.). City of Minnetonka: Home Page. Retrieved September 28, 2013, from http://www.eminnetonka.com/about_minnetonka/statistics.cfm
The city of Minnetonka's website features statistics from the 2010 census and other city related poles. The statistics range from population, number of households, average sale price of a home, to average age of the city.

Survey Reveals Most Landscape Architects Furnish Residential, Hospitality Projects | land.asla.org. (n.d.). Survey Reveals Most Landscape Architects Furnish Residential, Hospitality Projects | land.asla.org. Retrieved October 30, 2013, from http://www.asla.org/land/LandArticle.aspx?id=40026
This survey of more than 4,000 firms preformed by ASLA has a lot of stats about what types of projects firms are designing, what elements are included in those designs, and even the average price of those projects in certain cases.

Thwaites, K., & Simkins, I. (2007). Experiential landscape: An approach to people, place, and space. London: Routledge, Taylor & Francis Group.
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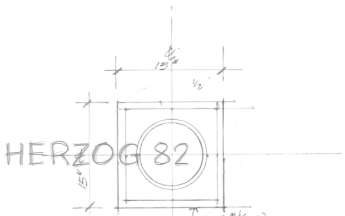
Trulove, J. G. (1998). The New American garden: Innovations in residential landscape architecture: 60 case studies. New York: Whitney Library of Design.
Featuring 60 residential landscape design case studies, all of which were designed in the 1980's and 1990's in the Unites States, each of which exhibit innovation and originality spanning different climates across the country. The book includes site plans, technical data, construction details, and various other elements in the case studies.



GRANITE BOULDER
GRANITE FIELD STONE
FIRE RING
SPECIAL PAVING
PLAN -
1/2"=1'-0"
LARGE FIELD BOULDER - FLAT TOP - GRANITE
SPECIAL PAVING
FIRE RING
TOP SET LEVEL
PLANTING AREA
SECTION
1/2"=1'-0"
FIREPIT -

APPENDIX A

Figure 1.1: Herzog, Andrew J. (2013). *Dauwalter's residence inventory.* [Image].

Figure 1.2: Landsscape Architect Network. (n.d.). *Hardscape detail.* [Image].

Figure 1.3: Coen + Partners. (n.d.). *Sullivan Residence Masterplan.* [Image].

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Figure 1.8: Michael Van Valkenburgh Associates Inc. (n.d.). *Allegheby Riverfront Park Masterplan.* [Image].

Figure 1.9: O'Neill, Annie. (n.d.). *Concrete texture.* [Image].

Figure 1.10: Mercil, Michael & Hamilton, Ann. (n.d.). *Inlaying reed texture.* [Image].

Figure 1.11: Michael Van Valkenburgh Associates Inc. (n.d.). *Allegheby Riverfront Park sidewalk.* [Image].

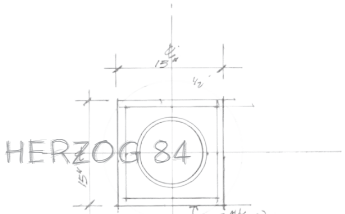

Figure 1.12: Herzog, Andrew J. (2013). City sidewalk. [Image].

Figure 1.13: Herzog, Andrew J. (2013). *Roseville fire station.* [Image].

Figure 2.1: Herzog, Andrew J. (2013). *Dauwalter's residence inventory.* [Image].

Figure 2.2: Herzog, Andrew J. (2013). *Dauwalter's residence inventory.* [Image].

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Figure 2.8: Herzog, Andrew J. (2013). *Dauwalter's residence inventory.* [Image].

Figure 3.1: Brick and Clay Record. (1910). *Minnesota Bricks.* [Image].

Figure 3.2: East Knoll. (2013). *Chaska Brick Chaska MN.* [Image].

Figure 3.3: Google Earth Pro. (2013). *Dauwalter's residence aerial.* [Image].

Figure 3.4: Ernst, G., Google Earth Pro, & Edited by Herzog, A. (2013). *Dauwalter's residence masterplan.* [Image].

Figure 3.5: Herzog, Andrew J. (2013). *Dauwalter's residence inventory.* [Image].

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Figure 3.14: Ernst, Gene. (2008). *Dauwalter's residence.* [Image].

Figure 3.15: Google Earth Pro, & Edited by Herzog, Andrew J. (2013). *Dauwalter's residence aerial.* [Image].

Figure 3.16: Google Earth Pro, & Edited by Herzog, Andrew J. (2013). *Dauwalter's residence aerial.* [Image].

Figure 3.17: Data from City-Data, Graphic made by Herzog, A. (2013). *Chaska data.* [Graph]. Retrieved from http://www.city-data.com/city/Chaska-Minnesota.html

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Figure 3.28: Google Earth Pro, & Edited by Herzog, A. (2013). *Dauwalter's residence aerial.* [Image].

Figure 3.29: Ernst, Gene. (2008). *Dauwalter's residence.* [Image].

Figure 3.30: Ernst, Gene. (2008). *Dauwalter's residence.* [Image].

Figure 3.31: Coghlan, C., DePorter, D., Ellis, R., Massey, F., Murphy, D., Lightscape, King, N., King Lighting, Signature Lighting, Forma, T., & Drury, B. (2010). *Philips Habdco.* [Image].

Figure 3.32: Coghlan, C., DePorter, D., Ellis, R., Massey, F., Murphy, D., Lightscape, King, N., King Lighting, Signature Lighting, Forma, T., & Drury, B. (2010). *Philips Habdco.* [Image].

Figure 3.33: Coghlan, C., DePorter, D., Ellis, R., Massey, F., Murphy, D., Lightscape, King, N., King Lighting, Signature Lighting, Forma, T., & Drury, B. (2010). *Philips Habdco.* [Image].

Figure 3.34: Herzog, Andrew J. (2011). *Personal experience.* [Image].

Figure 3.35: Herzog, Andrew J. (2012). *Personal experience.* [Image].

Figure 3.36: Herzog, Andrew J. (2013). *Fall semester calendar.* [Graphic].

Figure 3.37: Herzog, Andrew J. (2013). *Spring semester calendar.* [Graphic].

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Figure 4.3: Oneonta Block Company. (2013). *Capping a wall.* [Image]. Retrieved from http://www.oneontablock.com/srwinstall.html

Figure 4.4: Anchor Block Company. (2013). *Britton Paver Patio.* [Image]. Retrived from http://www.anchorblock.com/products/pavers/britton-paving-stones/default.aspx

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Figure 5.1: Herzog, Andrew J. (2013). *Dauwalter's residence inventory.* [Image].

Figure 6.1: Herzog, Andrew J. (2014). *Masterplan.* [Image].

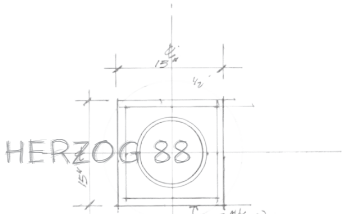
Figure 6.2: Herzog, Andrew J. (2014). *Day perspective.* [Image].

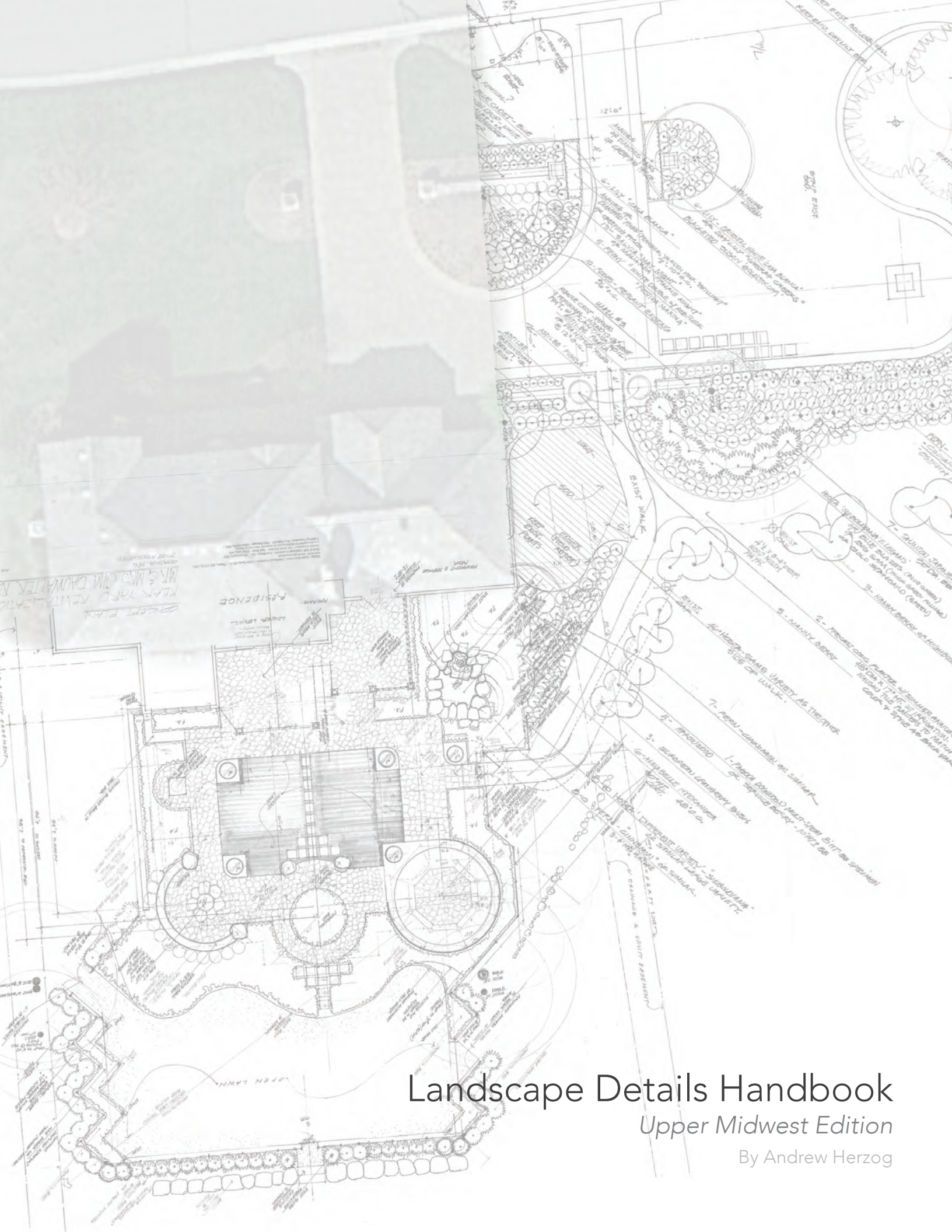
Figure 6.3: Herzog, Andrew J. (2014). *Night Perspective.* [Image].

Figure 6.4: Herzog, Andrew J. (2014). *Detail perspective.* [Image].

APPENDIX B

Landscape Details Handbook: Upper Midwest Edition





Landscape Details Handbook

Upper Midwest Edition

By Andrew Herzog

Material Calculations

Base formula:

length(feet) x width(feet) /3 x depth(inches) (divide by 65) = Tons of non-compacted base
One yard equals 1.4 tons.

Concrete formula:

Multiply the length of the sidewalk times the width times the depth (4 inches = .33 feet). Divide that number by 27. A good rule of thumb is to order an extra 5% then round up to the next ¼ of a yard.

Decorative rock and sand formula:

One ton will cover:
200 SF at 1" deep
100 SF at 2" deep
70 SF at 3" deep
50 SF at 4" deep
*Minimun depth is twice the size of the largest rock with a minimum of 2" of rock

Mulch formula:

One cubic yard will cover:
324 SF at 1" deep
162 SF at 2" deep
108 SF at 3" deep
81 SF at 4" deep

Fieldstone, boulders, outcroppngs, and rip rap formula:

One ton will cover:
2"-8" covers 40-45 SF
4"-10" covers 32-35 SF
6"-12" covers 20-25 SF
6"-18" covers 12-15 SF
12"-24" covers 8-10 SF
18"-30" covers 5-7 SF

Black dirt formula:

One cubic yard covers:
108 SF at 3" deep
80 SF at 4" deep
65 SF at 5" deep
54SF at 6" deep

Table of Contents

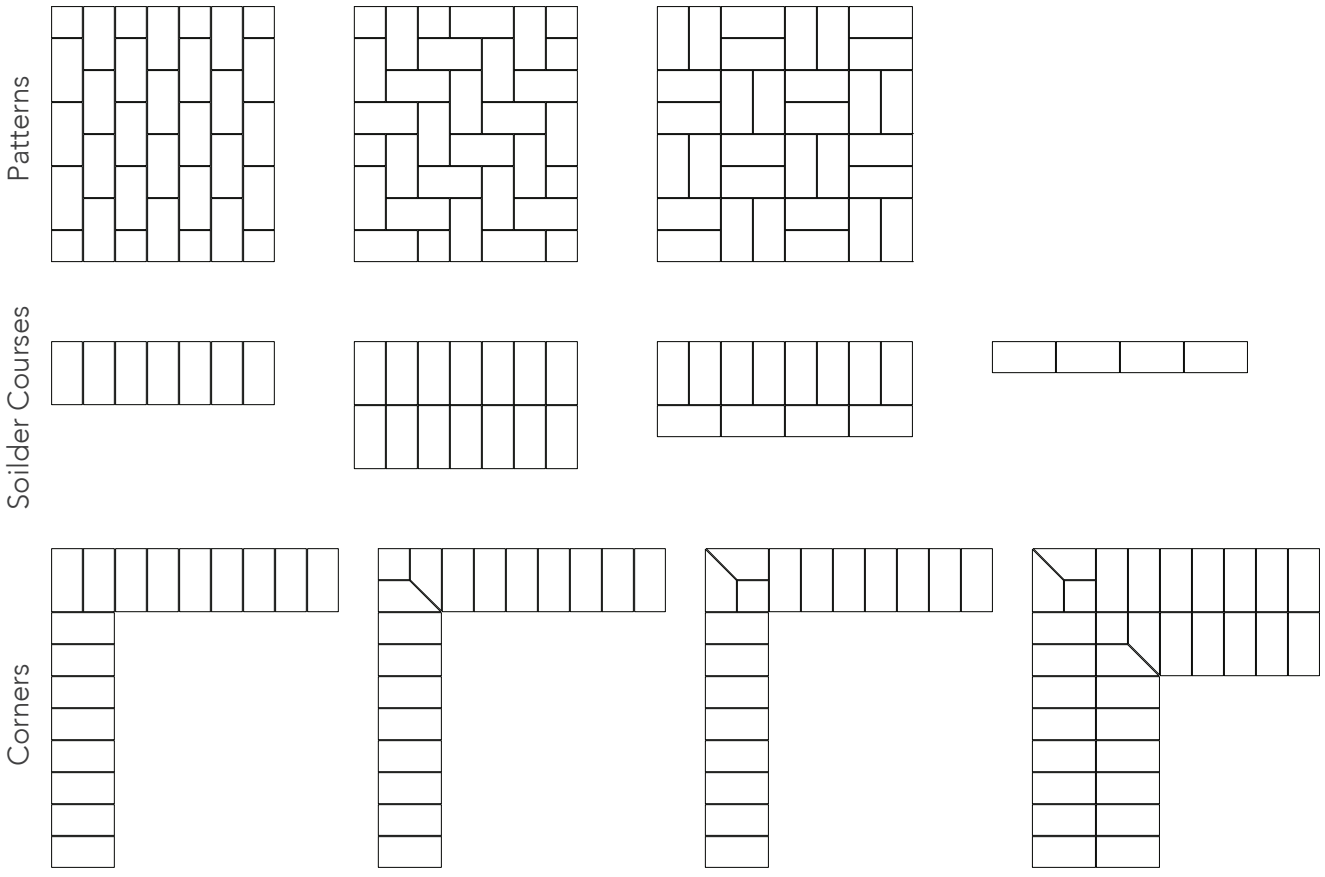
Pavement

Flexible

Sand Set Pavers | Flagstone | Slate

Pavement has been around for thousands of years; from early trade roads to the super highways, the technology and materials have changed dramatically. Pavement can be ridged or flexible. Flexible pavement moves with the ground during freeze and thaw cycles, which can happen up to 100 times a year in the upper Midwest. When flexible pavement moves with the ground it is less susceptible to cracking than ridged pavement because ridged pavement does not move with the freeze thaw cycles.

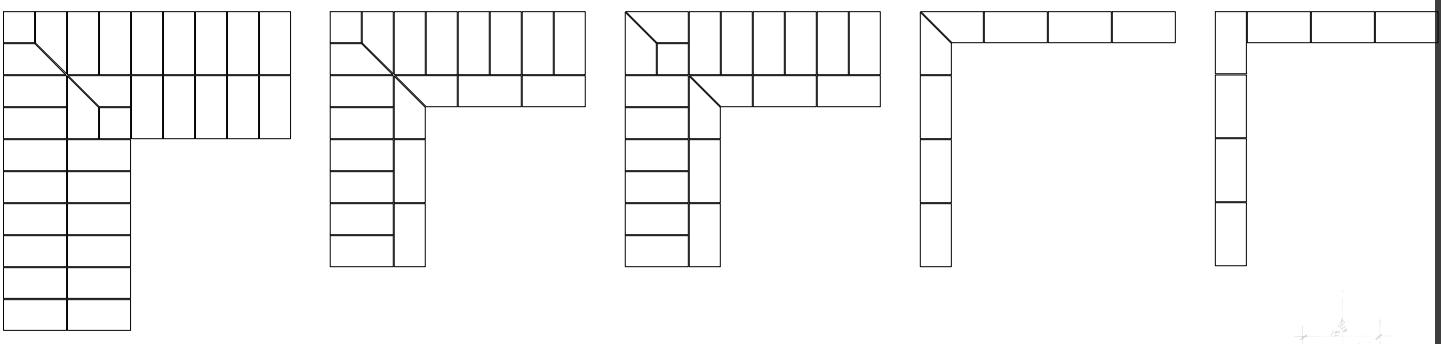
Common Paving Options



Tools needed for paver installation:

Marking paint
Transit
Wide blade masons chisel
3-5 lb hammer
Masons string (twine)
Stiff bristle street broom
3-5 lb mallet
1" diameter sand screed guides (pipe, wood, etc.)
Sand screed board 6-8' Length of a 2"x 4" or 2"x 6"
3hp to 5hp plate compactor (not a jumping jack)
Masonry saw with diamond blade or a paver splitter

Small pry bar
4 ft Level
Speed square
Wheelbarrow
Trowel
Flat shovel
Marking crayon or red pencil
Hard tooth garden rake
Chalk line
25 ft tape measure



Installation instructions for a residential non-vehicular application:
We are assuming a loam type of soil

Determine where the paver patio is going to go and use the marking paint to layout the shape of the paved area. You will need to over excavate an extra 8″ past the painted guideline.

Have utilities located before any digging occurs.

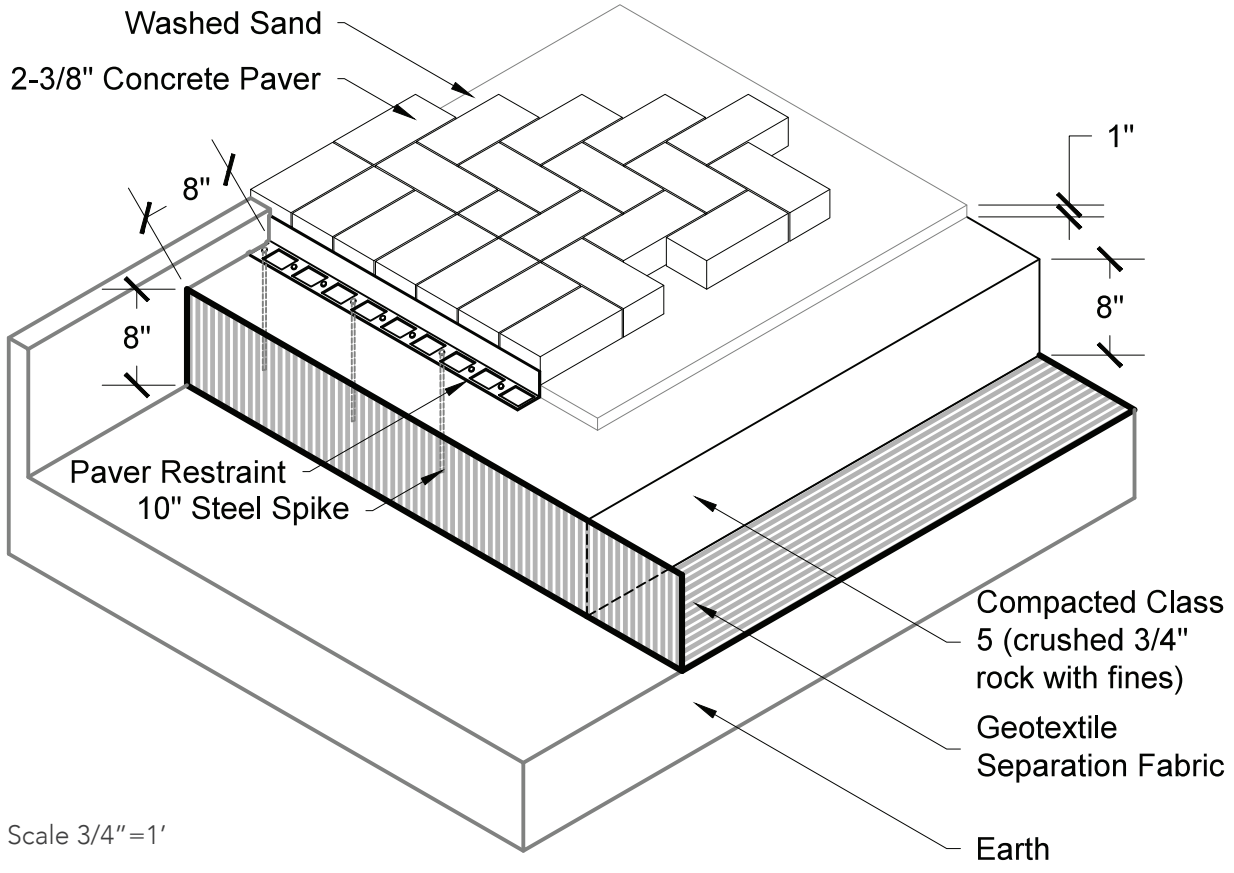
If hand digging, make sure to use a square shovel to keep the soil firm at the bottom. To determine the depth you need to excavate, take 8″ of base material plus 1″ of washed sand plus the thickness of the pavers you are using (typically 2-3/8″ in a residential setting) totaling 11-3/8″. The pavers should be .5″ above finished ground height to allow for settling and tamping in later stages. You also need to over excavate an extra 8″ past your painted guideline.

The use of a transit can help to make sure you have a level hole dug.

Once excavation is complete, inspect the hole for large boulders and organic material, remove if necessary and replace with clean fill and compact with plate compactor.

Geotextile separation fabric should be laid down in the hole and cover the entire bottom. It should go up the sides to keep the class 5 gravel contained and not contaminated with soil. The fabric should be overlapped by 12″ and there should be no wrinkles in the fabric.

Class 5 gravel (3/4″ angular rock with fines) should be brought in and tamped with two passes in 2″-4″ increments depending of the size of your tamper, a mist of water while tamping may be added to firm the class 5 gravel. Repeat this step until you have 8″ of a solid base or until you are 3-3/8″ from your final height. If there is any unevenness in the base, use the hard tooth garden rake to level out the area.



Scale 3/4″=1′

If done correctly, the compacted class 5 base should be as firm as concrete.

It is important to determine slope and grade before the next step.

Next take your sand screed guides and place them on the class 5 base 4'-6' apart and parallel to each other. Make sure they are level to each other but slope the direction you want the water to run. The slope should be .5%-2% for adequate water drainage. Using a few shovels of sand, make sure the screed guides are firmly in place and will not move (usually one shovel on each end of the screed guide is sufficient). Shovel sand in between the screed guides and use the creed board to level the sand between the screed guides. Do not worry about any voids the guides or board cause, you will fill them with sand and smooth with a trowel as you lay the pavers.

Start laying pavers from a permanent edge such as a driveway or house (NOTE: it is okay if the height of the pavers are less than 1/2" higher than the permanent edge, they will be tamped and settled into place later making the transition perfect). Work in rows and lightly lay the paver into the sand. Make sure they are in a straight line; you can use the chalk line to help with this or use the small pry bar to correct this. The joints between the pavers should be between 1/16"-3/16" depending on the pavers being used.

Gaps greater than 3/8" need to be filled with a cut paver. Mark a paver with a crayon or red pencil and cut using a masonry saw with a diamond blade or a paver splitter. If using a masonry saw, the pavers may be wet or dry cut.

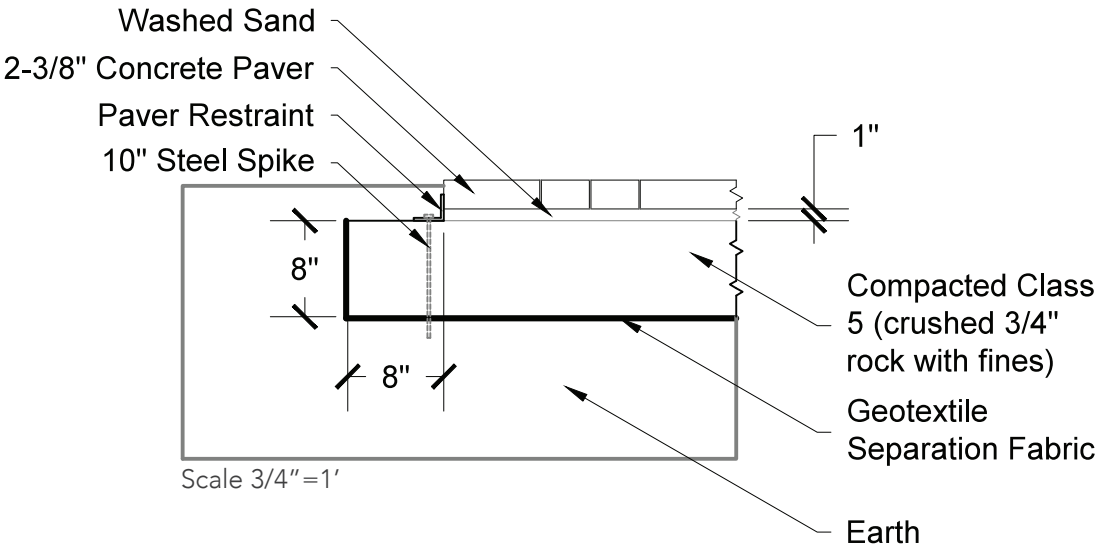
Install paver restraint edging along the edge of the pavers. The paver edging should sit on the compacted class 5 so remove any sand if necessary. With the paving restraint firmly against the pavers, drive 10" spikes into the paver restraint. On straight paver edges, the spikes need to be put in every third hole. On a curved paver edge, spikes need to be in every other hole.

Once all the paver restraints are installed, use the vibratory plate compactor to tamp the pavers into place. The pavers will settle up to ¼". Make two passes with the vibratory plate compactor.

Use a dry sand to sweep into the paver joints, alternate between sweeping and tamping to work sand into all the joints completely. With dry sand it should take 2-3 passes with a broom and vibratory plate compactor. Wetter sand should be dried before use.

Sweep off all excess sand.

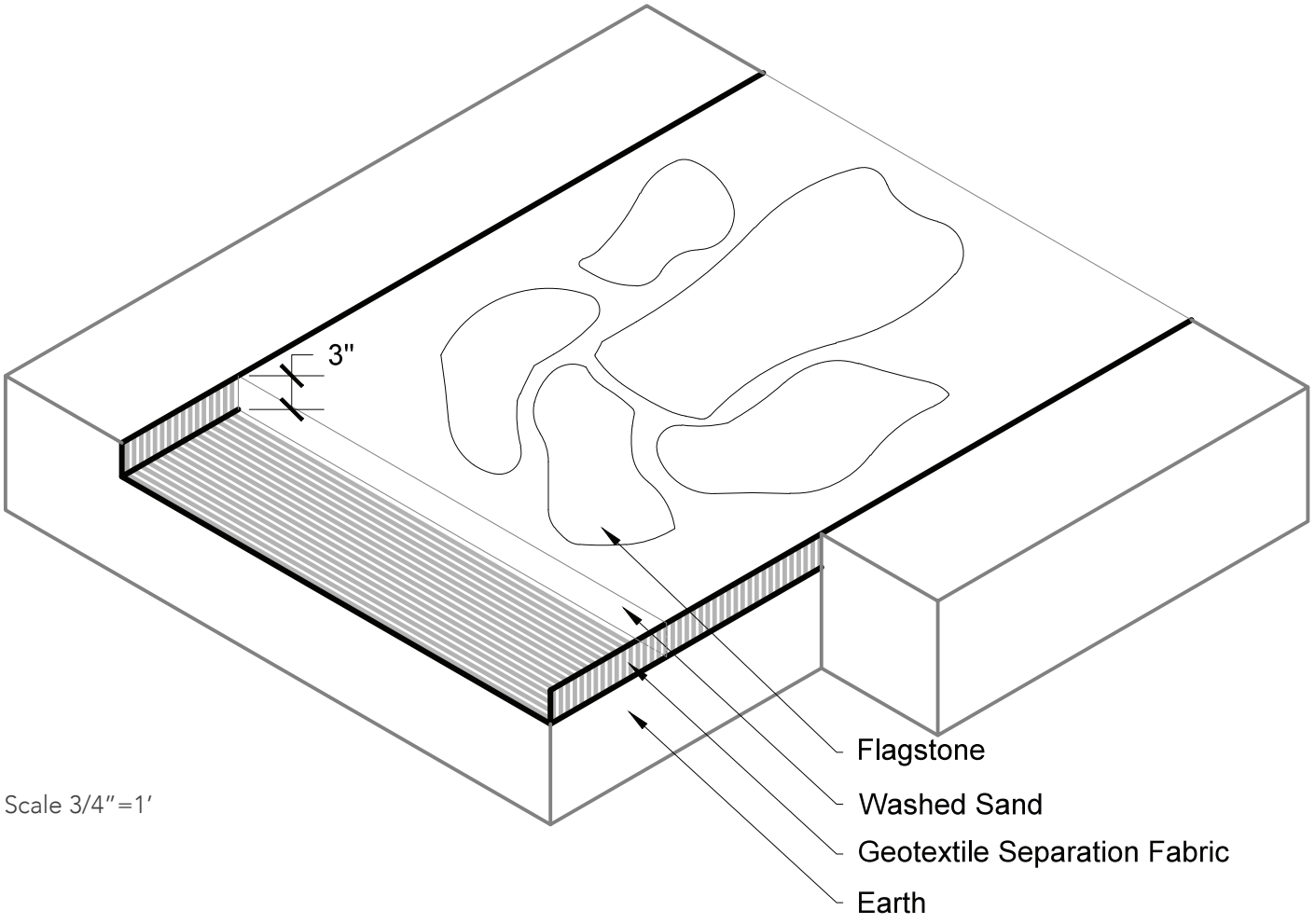
Backfill edges with topsoil and seed or sod the area.



Scale 3/4"=1'

Tools needed for flagstone installation:

Square shovel
2-5 lb hammer
Utility knife
2' level
Marking paint



Scale 3/4"=1'

Locate utilities before any digging occurs.

Use the marking paint to paint out the area you would like the flagstone path to be located.

Dig a trench 4-5 inches deep, and 4 inches wider than your painted outline.

Lay geotextile fabric in the trench and up along all the sides. Cut excess off with the utility knife.

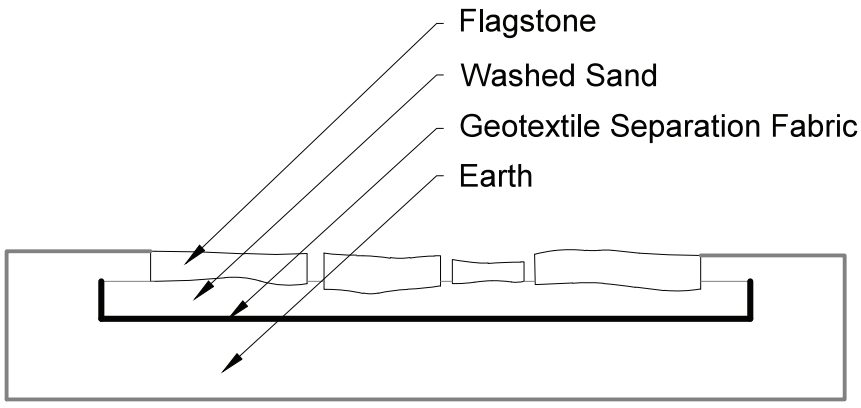
Spread 2-3 inches of sand in the trench, depending on the thickness of your flagstone the amount of sand may vary. The sand does not need to be perfectly spread because flagstone does not have a smooth bottom and you will adjust each piece accordingly.

The top of the flagstone should be even with the grade.

Start on one end and work your way down the path. Lay one piece of flagstone at a time and seat it in the sand. Depending on the slope of the grade it may not be level, but the flagstone should be level with one another. There is no right or wrong pattern to lay flagstone, you can have thick or thin (1 inch) cracks, whatever appeals to you the most.

Laying flagstone takes time, you can use the hammer to break pieces into shapes you need or to create smaller pieces when needed.

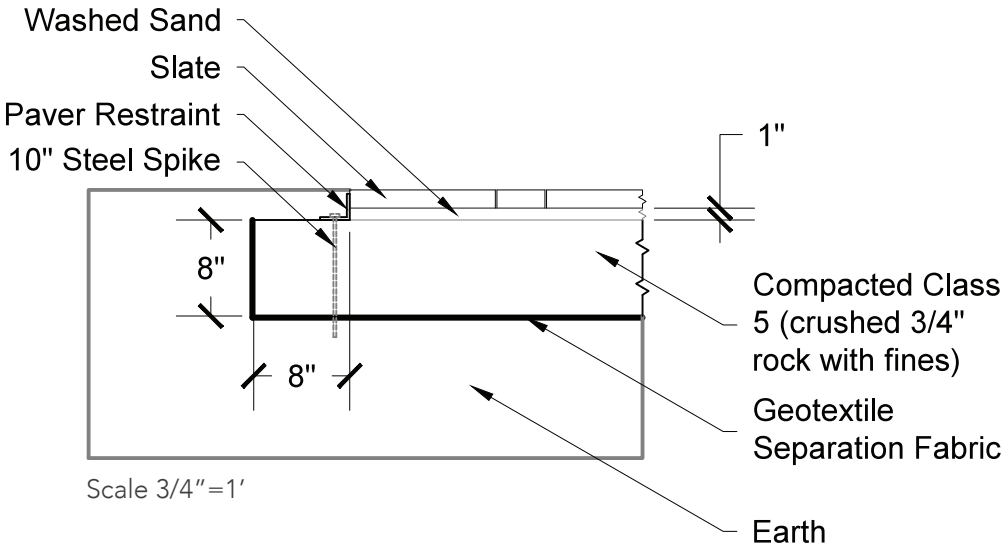
When you are finished, you can fill the cracks with dirt and seed, rock, mulch, or sand.



Scale 3/4"=1'

Tools needed for slate installation:

Marking paint
Transit
Wide blade masons chisel
3-5 lb hammer
Masons string (twine)
Stiff bristle street broom
3-5 lb mallet
1" diameter sand screed guides (pipe, wood, etc.)
Sand screed board 6-8' Length of a 2"x 4" or 2"x 6"
3hp to 5hp plate compactor (not a jumping jack)
Masonry saw with diamond blade or a paver splitter
Small pry bar
4 ft Level
Speed square
Wheelbarrow
Trowel
Flat shovel
Marking crayon or red pencil
Hard tooth garden rake
Chalk line
25 ft tape measure



Scale 3/4"=1'

Installation instructions for a residential non-vehicular application:
We are assuming a loam type of soil

Determine where the patio is going to go and use the marking paint to layout the shape of the paved area.

Locate utilities before any digging occurs.

If hand digging, make sure to use a square shovel to keep the soil firm at the bottom. To determine the depth you need to excavate, take 8" of base material plus 1" of washed sand plus the thickness of the tiles you are using (typically 1-1/2" in a residential setting) totaling 10-1/2". The tiles should be .5" above finished ground height to allow for settling and tamping in later stages. You also need to over excavate an extra 8" past your painted guideline.

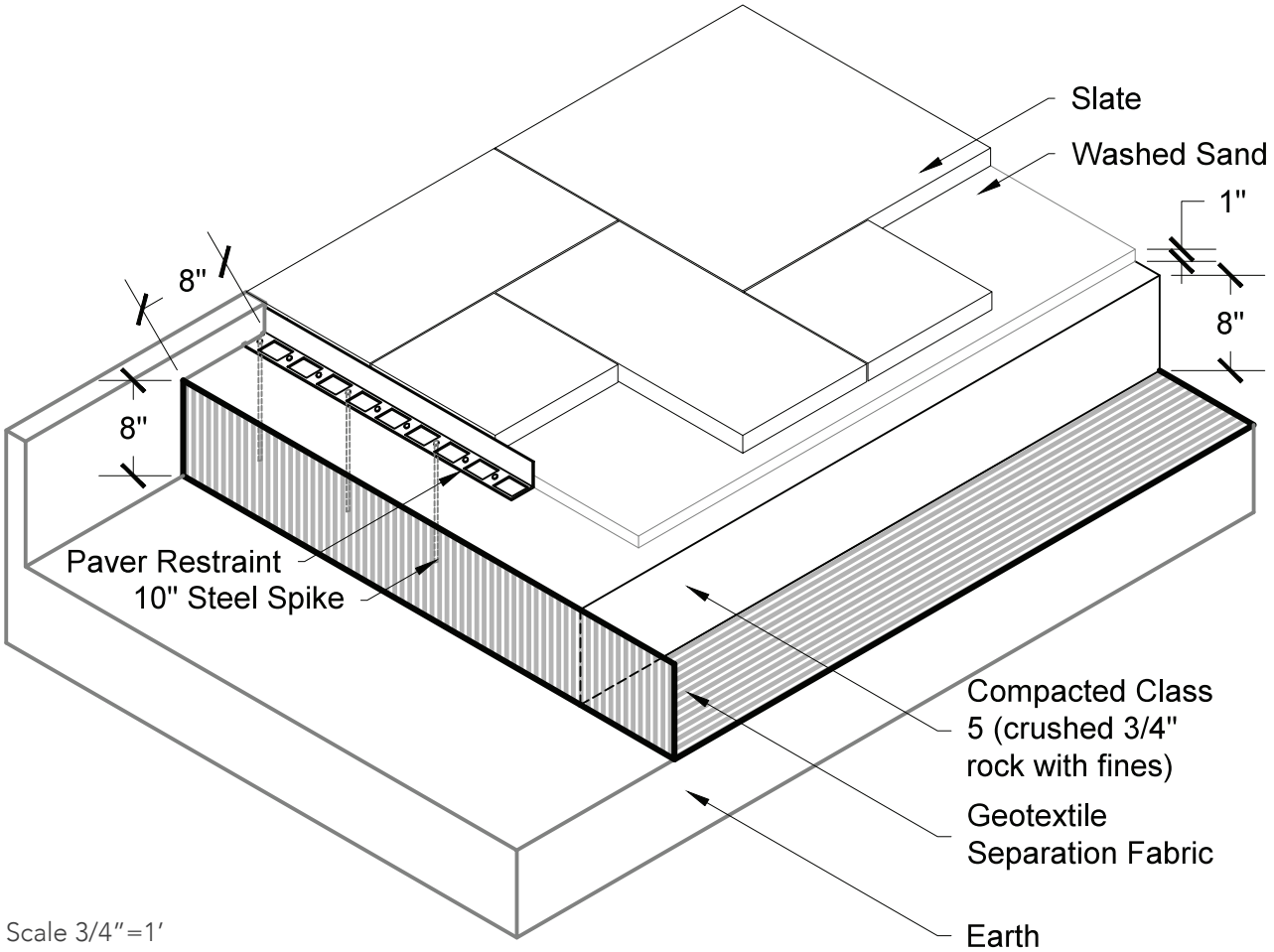
The use of a transit can help to make sure you have a level hole dug.

Once excavation is complete, inspect the hole for large boulders and organic material, remove if any and replace with clean fill.

Geotextile separation fabric should be laid in the hole. Cover the entire bottom and go up along the sides to keep the class 5 gravel contained and not contaminated with soil. The fabric should be overlapped by 12" and there should be no wrinkles in the fabric.

Class 5 gravel (3/4" angular rock with fines) should be brought in and tamped with two passes in 2"-4" increments depending of the size of your tamper, a mist of water while tamping may be added to firm the class 5 gravel. Repeat this step until you have 8" of a solid base or until you are 2-1/2" from your final height. If there is any unevenness in the base, use the hard tooth garden rake to even out the area.

If done correctly, the compacted class 5 base should be as firm as concrete.


Slate
Washed Sand
1"
8"
8"
8"
Paver Restraint
10" Steel Spike
Compacted Class
5 (crushed 3/4"
rock with fines)
Geotextile
Separation Fabric
Earth

Scale 3/4″=1′

It is important to determine slope and grade before the next step.

Next take your sand screed guides and place them on the class 5 base 4'-6' apart and parallel to each other. Make sure they are level to each other but slope the direction you want the water to run. The slope should be .5%-2% for adequate water drainage. Using a few shovels of sand, make sure the screed guides are firm in place and will not move (usually one shovel on each end of the screed guide is sufficient). Shovel sand in between the screed guides and use the creed board to level the sand between the screed guides. Do not worry about any voids the guides or board cause, you will fill them with sand and a smooth with a trowel as you lay the pavers.

Start laying the tiles from a permanent edge such as a driveway or house (NOTE: it is okay if the height of the tiles are less than 1/2" higher than the permanent edge, they will be tamped and settled into place later making the transition perfect). Work in rows and lightly lay the tiles into the sand. Make sure they are in a straight line; you can use the chalk line to help with this or use the small pry bar to correct this. The joints between the tiles should be between 1/16"-3/16" depending on the tiles being used.

Gaps greater than 3/8" need to be filled with a cut piece. Mark a tile with a crayon or red pencil and cut using a masonry saw with a diamond blade or a paver splitter. If using a masonry saw, the tiles may be wet or dry cut.

Install paver restraint edging along the edge of the stone pieces. The paver edging should sit on the compacted class 5 so remove sand as necessary. With the paving restraint firmly against the tiles, drive 10" spikes into the paver restraint. On straight paver edges, the spikes need to be put in every third hole. On a curved paver edge, spikes need to be in every other hole.

Once all the paver restraints are installed, lay ½" or thicker plywood down on the patio to prevent the tamper from breaking of scratching the stone. Use the vibratory plate compactor to tamp the stone into place. The stone will settle up to ¼". Make two passes with the vibratory plate compactor.

Use a dry sand to sweep into the joints, alternate between sweeping and tamping to work sand into all the joints completely. With dry sand it should take 2-3 passes with broom and vibratory plate compactor. Wetter sand should be dried before use.

Sweep off all excess sand.

Backfill edges with topsoil and seed or sod the area.

Pavement

Ridged

Sand Set Pavers | Flagstone | Slate

Tools needed for concrete installation:

2 contractor grade wheelbarrows
Bull float with an extension handle
Concrete broom
Groove that cuts control joints one inch deep
2 magnesium hand floats
2 edgers
Iron rake to move around wet concrete
Hand maul
Bolt cutters
Sod cutter (if you have grass to remove)
Screw gun
Circular saw
Marking paint

Installation instructions for a residential non-vehicular application

Locate utilities before any digging occurs.

Lay out the path with 6 inch ripped strips of hardboard siding tacked to temporary stakes. This will start to give you an outline for digging. Cut a spacer board the length of the width of the sidewalk. Place the cut board against the ripped strips of hardboard and use the marking paint to mark both sides. This will give you an even shape.

Remove the temporary form and start excavating. If you have to remove a lot of sod you might want to consider using a sod cutter. After the sod is removed, excavate 6 inches below grade.

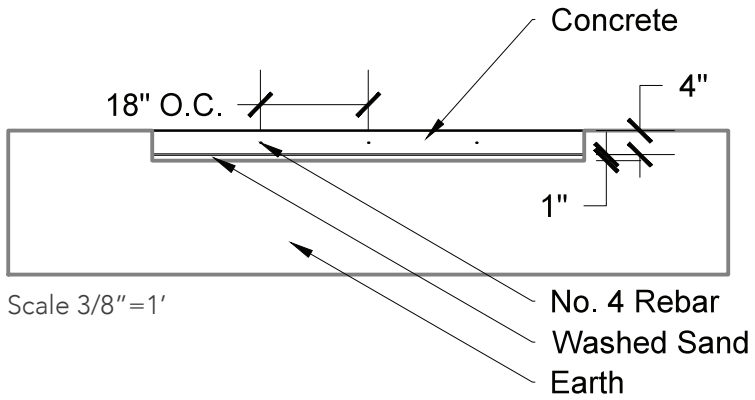
If your edges are straight, you can use 2-by lumber to make the forms, if there are curves, use hardboard siding ripped down to 6 inch strips.

Pound stakes into the ground every 3 feet and screw the forms to the stakes. If the sidewalk does not slope the length of the sidewalk, one form should be 1 inch lower than the other for a 4 foot wide sidewalk for proper drainage.

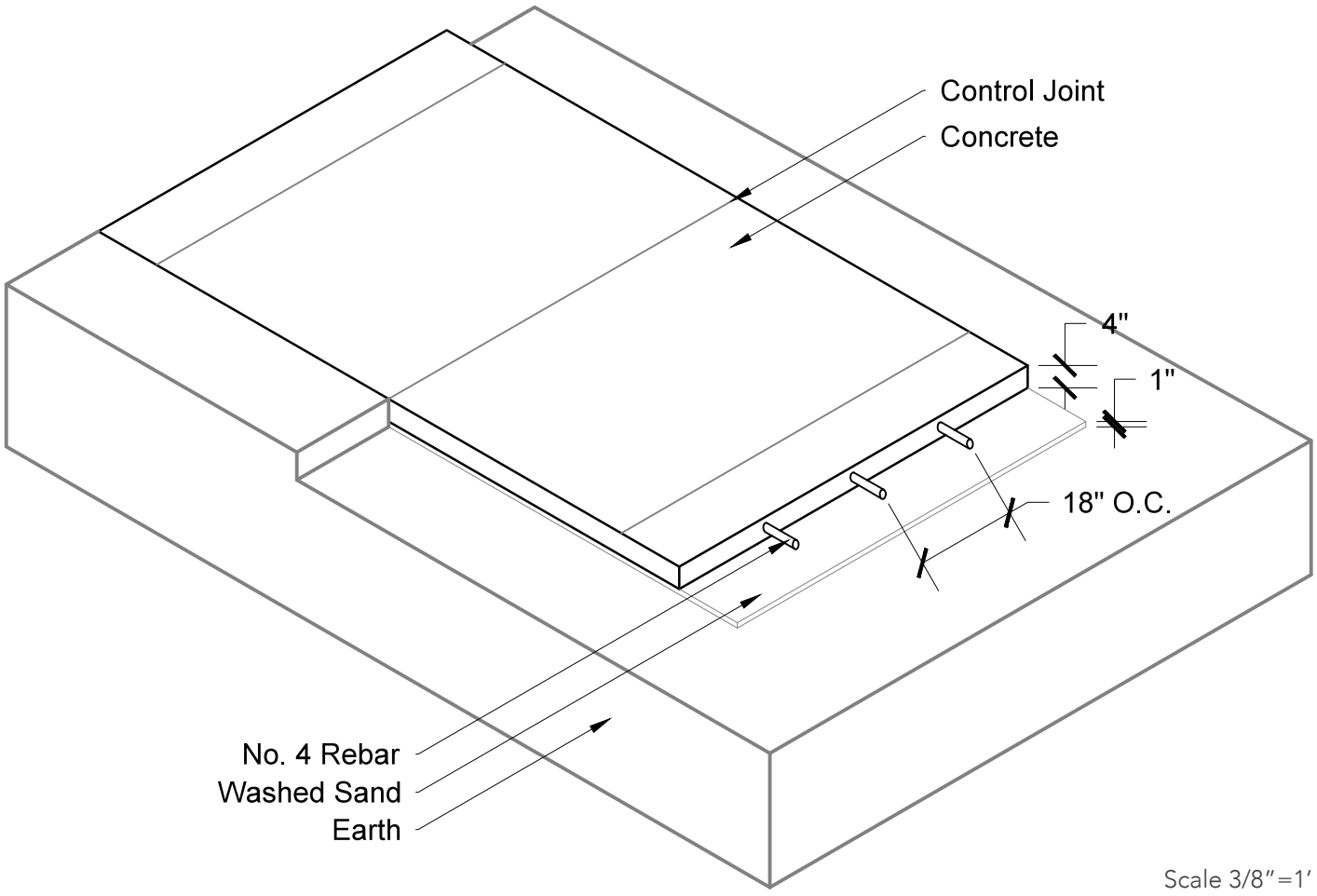
Spread out evenly 2 inches of sand or gravel (3/4 inch crushed rock) as a base for the concrete.

Lay steel mesh in between the forms and use the bolt cutter to cut where appropriate.

Use the wheelbarrows to dump the concrete in the form. Lift the mesh as needed so it is in the middle of the concrete and not laying of the base. Do not use a shovel to spread the concrete. Use a steel rake and push it forward or backward.



Scale 3/8″=1′



Scale 3/8″=1′

Once a few feet of concrete are poured, start screeding out the concrete so the concrete is level with the top of the forms. For a smooth side, tap the side of the forms with hammer every few feet to work out the air bubbles.

Use the bull float right after screeding if there is no bleed water present (water migrates to the surface in small pools). Do not work the concrete if bleed water is present; wait until it disappears before using the bull or hand float.

Once the bleed water has disappeared, hand float the surface with a magnesium float starting at the beginning of the pour. Use a sweeping motion while lifting the leading edge of the flout.

Round the outside edge with an edging tool. Use a back and forth motion in a 1 to 2 foot length area while lifting the leading edge slightly and working your way down the length of the sidewalk.

Cut control joints in the sidewalk every 5 to 6 feet with a groover. Plan your cuts before starting so they are evenly placed. During the first pass, use a straight board to help keep perpendicular to the forms for guiding the groover.

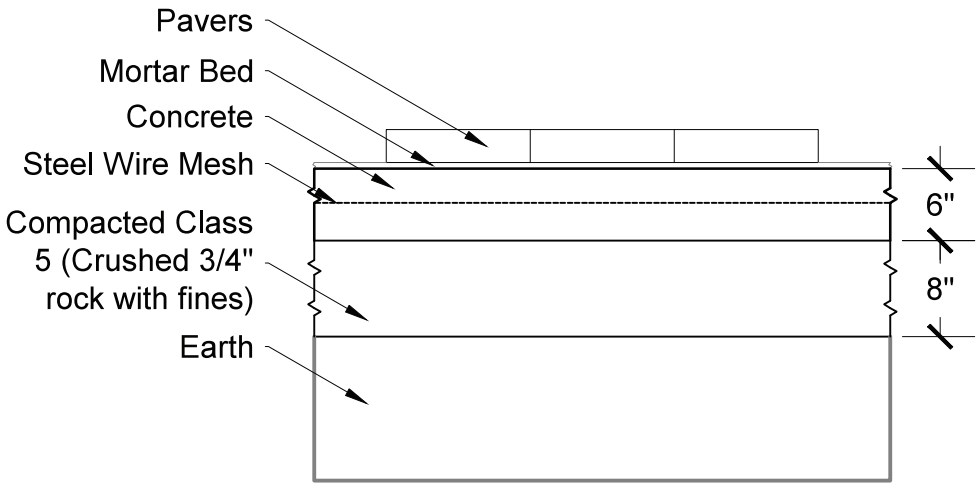
To give the concrete texture, gently rest the broom on the far side of the sidewalk and slowly pull the broom toward you and off of the edge of the form. Continue this all the way down the sidewalk, overlap the broom sweeps by 6 inches every time.

Wait until the next day before removing the forms. Place a shovel on the bottom of the form and pry up to lift the stakes straight up out of the ground.

Backfill edges with topsoil and seed or sod as needed.

Tools needed for mortar set paver installation:

Marking paint
Transit
Wide blade masons chisel
3-5 lb hammer
Masons string (twine)
3-5 lb mallet
Hard tooth garden rake
Chalk line
25 ft tape measure
Speed square
Wheelbarrow
Mixer for the mortar
Trowel
Flat shovel
Marking crayon or red pencil
3hp to 5hp plate compactor (not a jumping jack)
Masonry saw with diamond blade or a paver splitter
Masonry trowel
Bolt cutter
Circular saw
Screw gun
Iron rake
Bull float



Scale 3/4″=1′

Locate utilities before any digging occurs.

Installation instructions are for a residential non-vehicular application.

Determine where the paver patio is going and use the marking paint to layout the shape of the paved area.

If hand digging, make sure to use a square shovel to keep the soil firm at the bottom. To determine the depth you need to excavate, take 8" of base material plus 6" of concrete plus the thickness of the pavers you are using (typically 2-3/4 for mortar set pavers) totaling 17-1/4". You also need to over excavate an extra 8" past your painted guideline.

The use of a transit can help to make sure you have a level hole dug.

Once excavation is complete, inspect the hole for large boulders and organic material, remove, if any, replace with clean fill and compact with plate compactor.

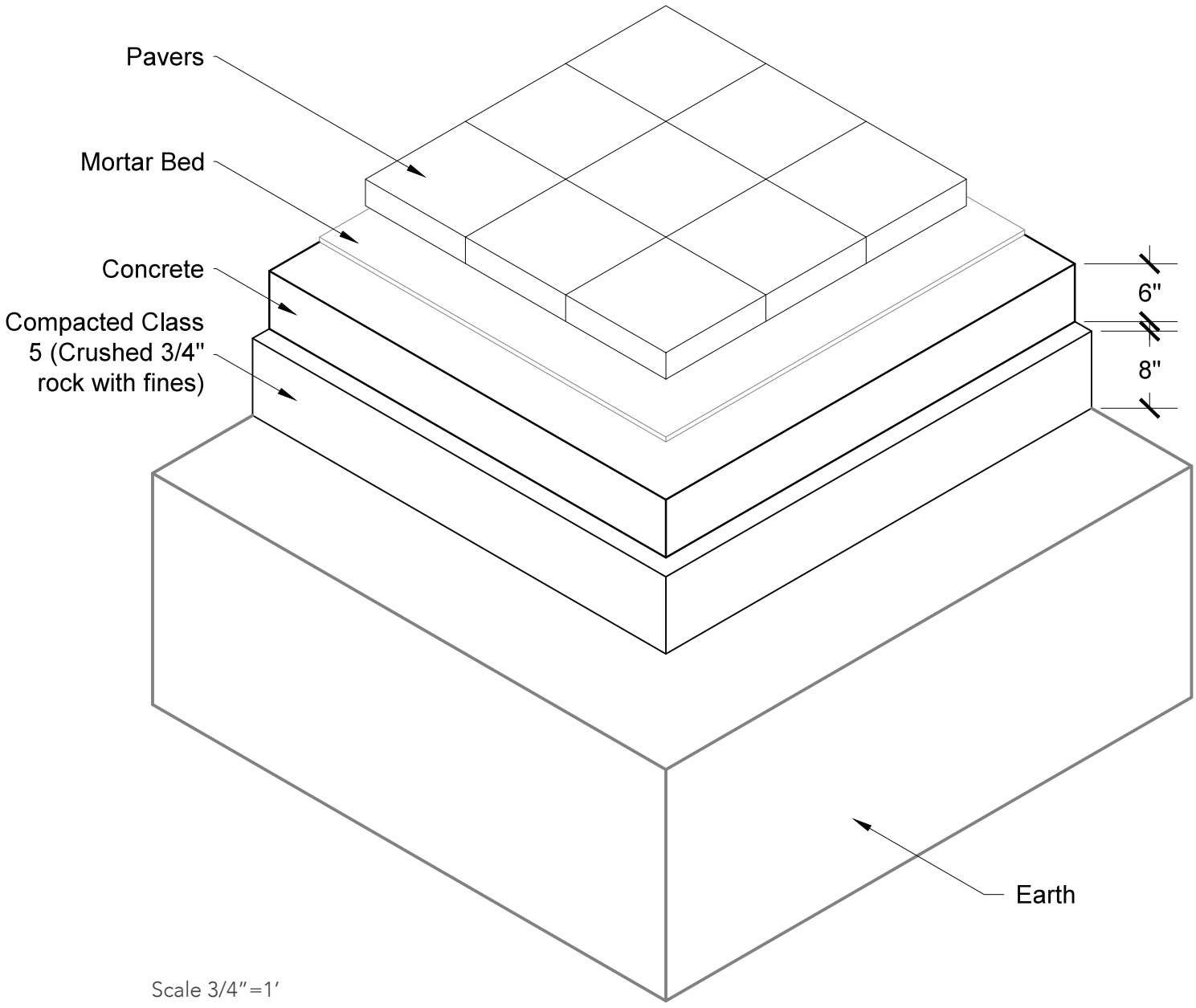
Class 5 gravel (3/4" angular rock with fines) should be brought in and tamped with two passes in 2"-4" increments depending of the size of your tamper, a mist of water while tamping may be added to firm the class 5 gravel. Repeat this step until you have 8" of a solid base or until you are 11-1/4" from your final height. If there is any unevenness in the base, use the hard tooth garden rake to even out the area.

If done correctly, the compacted class 5 base should be as firm as concrete.

Slope and grade are important to figure out before the next step.

If your edges are straight, you can use 2-by lumber to make the forms for the concrete, if there are curves, use hardboard siding ripped down to 6 inch strips.

Pound stakes into the ground every 3 feet and screw the forms to the stakes.


Pavers
Mortar Bed
Concrete
Compacted Class 5 (Crushed 3/4" rock with fines)
6"
8"
Earth

Scale 3/4″=1′

Lay steel mesh in between the forms and use the bolt cutter to cut where appropriate.

Use the wheelbarrow to dump the concrete in the form. Lift the mesh as needed so it is in the middle of the concrete and not laying of the base. Do not use a shovel to spread the concrete. Use a steel rake and push it forward or backward.

If there is no bleed water present (water that migrates to the surface in small pools) use a bull float to work the concrete smooth. Do not work the concrete if bleed water is present; wait until it disappears before using the bull or hand float.

Wait until the next day before removing the forms. Place a shovel on the bottom of the form and pry up to lift the stakes straight up out of the ground.

Mix and apply the mortar per the manufactures specifications onto the concrete.

Start laying pavers from a permanent edge such as a driveway or house. Work in small sections and apply the mortar as needed. Make sure they are in a straight line; you can use the chalk line to help with this or use the small pry bar to correct this. The joints between the pavers should be between 1/16”-3/16” depending on the pavers being used.

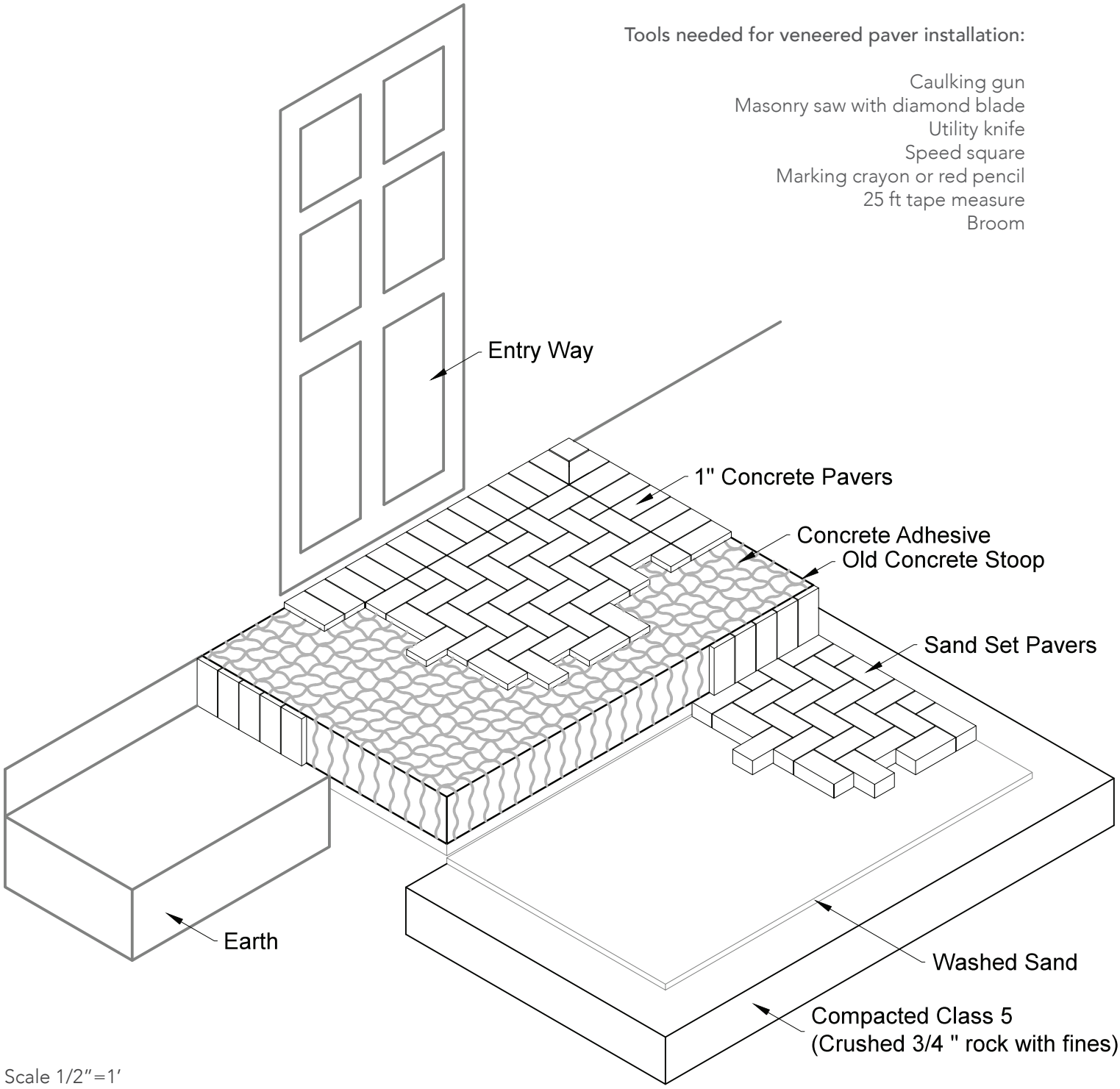
Gaps greater than 3/8” need to be filled with a cut paver. Mark a paver with a crayon or red pencil and cut using a masonry saw with a diamond blade or a paver splitter. If using a masonry saw, the pavers may be wet or dry cut.

Do not walk on the pavers until the mortar is completely dry.

Backfill edges with topsoil and seed or sod the area.

Tools needed for veneered paver installation:

Caulking gun
Masonry saw with diamond blade
Utility knife
Speed square
Marking crayon or red pencil
25 ft tape measure
Broom



Scale 1/2"=1'

Covering up an old concrete stoop to match your new paver sidewalk is an easy job that will add curb appeal to your home.

I would recommend flowing the brick pattern of the sidewalk along with the same solider course. Buy veneer concrete pavers instead of regular concrete pavers. The veneer pavers are only 1 inch thick versus a regular paver being 2-3/8″ thick.

Start by sweeping the stoop off and make sure it is clean of any debris.

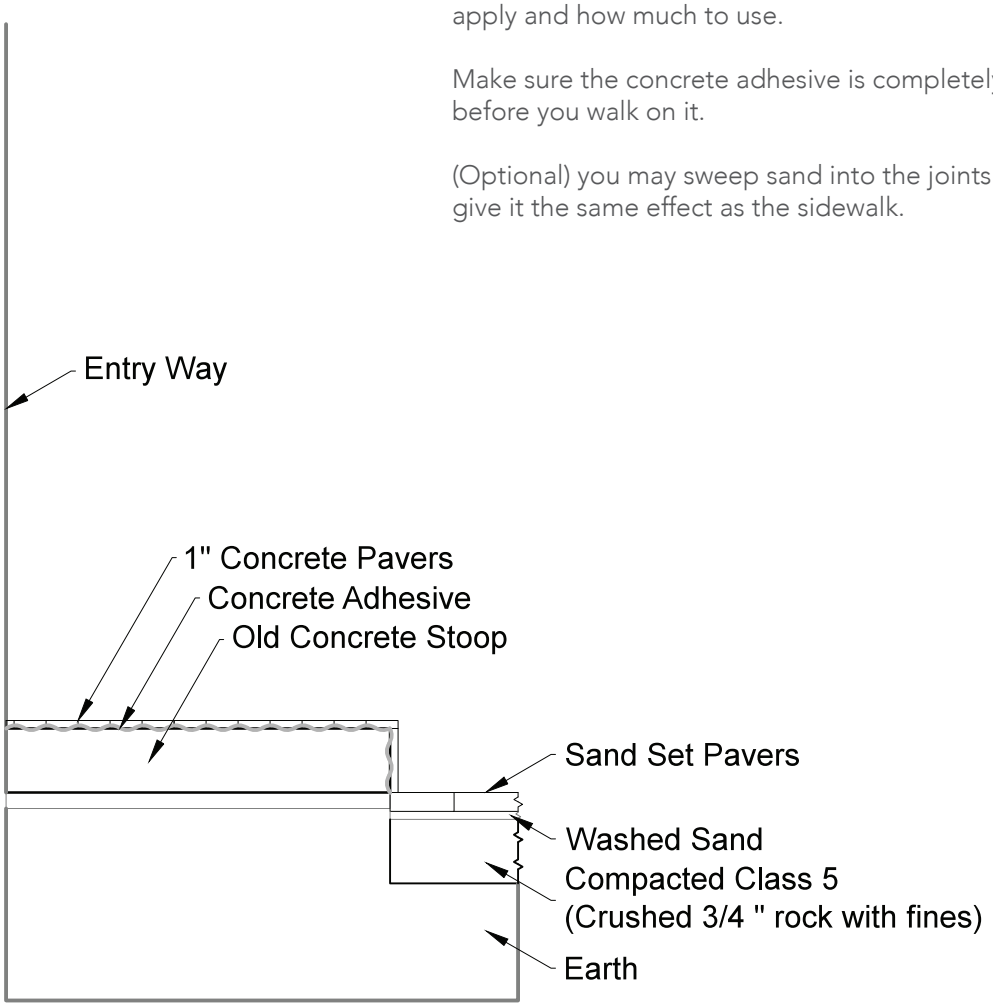
You can lay out the pattern first to visualize it before you start to glue anything down.

You may need to make some cuts with the masonry saw to get all the pieces to fit properly. The pavers can be wet or dry cut.

Start on one side and use concrete adhesive to adhere the pavers to the stoop. Follow the directions on the concrete adhesive on how to apply and how much to use.

Make sure the concrete adhesive is completely dry before you walk on it.

(Optional) you may sweep sand into the joints to give it the same effect as the sidewalk.



Scale 1/2″=1′

W a l l s

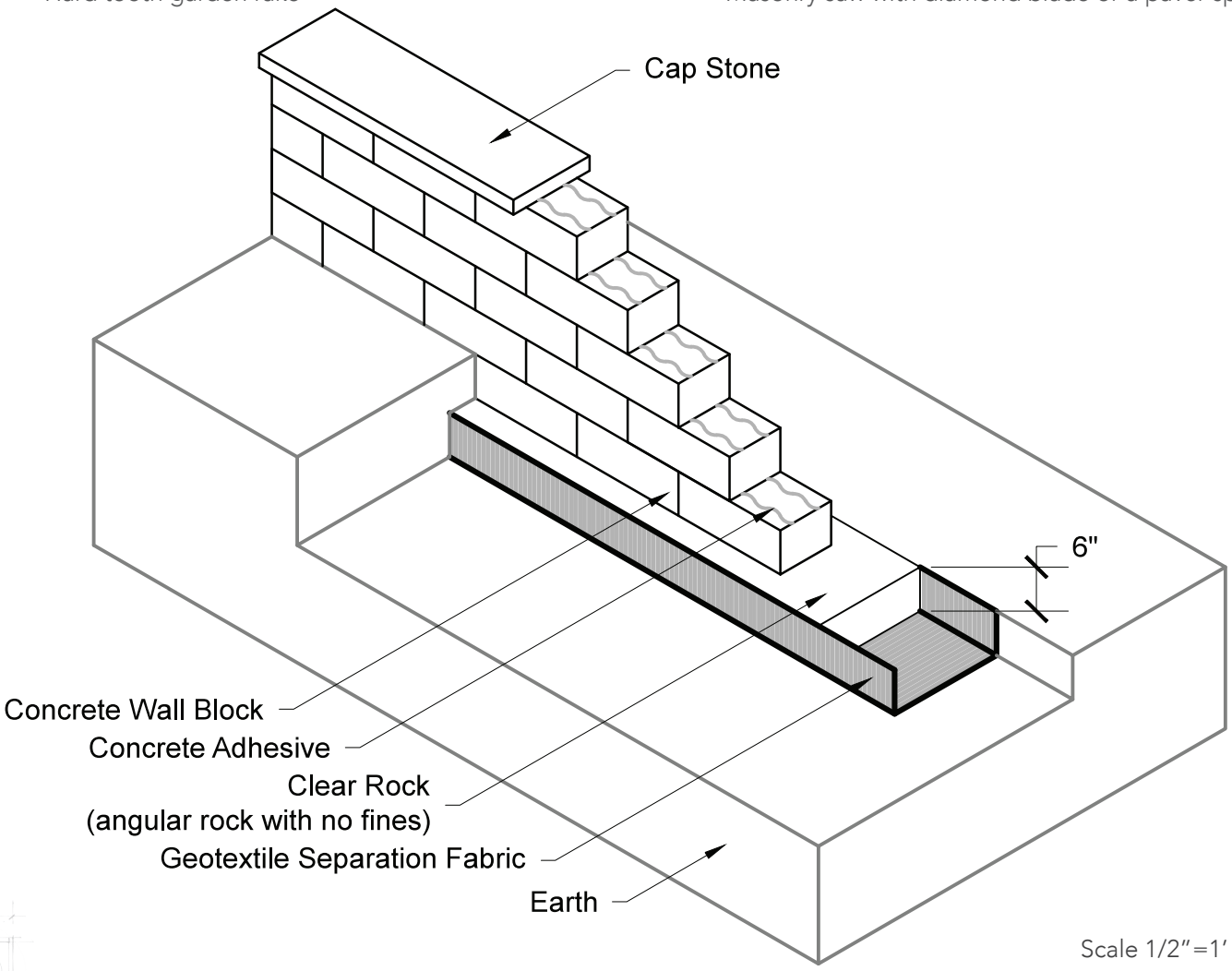
Free Standing

Alone | With pavers on one side | With pavers on both sides

Production of concrete masonry units (CMU's) started in 1850 and were made by hand. Today product capacities have been increased to meet the market demands. Chemicals and admixes have been developed to enhance manufacturing and product performance. Dye has also been created and added to create CMU's that look like a more natural stone.

Tools needed for a free standing wall installation:

Marking paint
Transit
Caulking gun
Wide blade masons chisel
3-5 lb hammer
Utility knife
Masons string (twine)
Stiff bristle street broom
3-5 lb dead blow
Hard tooth garden rake
Chalk line
25 ft tape measure
4 ft Level
Torpedo level
Speed square
Wheelbarrow
Square shovel
Marking crayon or red pencil
3hp to 5hp plate compactor (not a jumping jack)
Masonry saw with diamond blade or a paver splitter



Scale 1/2"=1'

Locate utilities before any digging occurs.

Paint a line where the wall is going to be built.

Determine the size of the block you are using, and dig a trench along the painted line twice the depth of the block and twice the width of the block. The use of a transit can help to make sure you have a level hole dug.

Once excavation is complete, inspect the hole for large boulders and organic material, remove if any, replace with clean fill and compact with plate compactor.

Geotextile separation fabric should be laid down in the trench to cover the entire bottom and go up along the sides. Keep the clear rock contained and not contaminated with soil. The fabric should be overlapped by 12" and there should be no wrinkles in the fabric.

Clear rock (angular rock with no fines) should be brought in and tamped with two passes in 2"-4" lifts depending of the size of your tamper. Repeat this step until you have 6" of a solid base. If there is any unevenness in the base, use the hard tooth garden rake to even out the area. Note the clear rock will not be level with the grade, it should be low enough for one full block to be buried underground.

If the wall is straight, use a string line as a guide for the wall. Start laying block on the clear rock one at a time, leveling each one in all directions. Use the 4' level and check to make sure the block you just leveled is level with the past blocks you have laid.

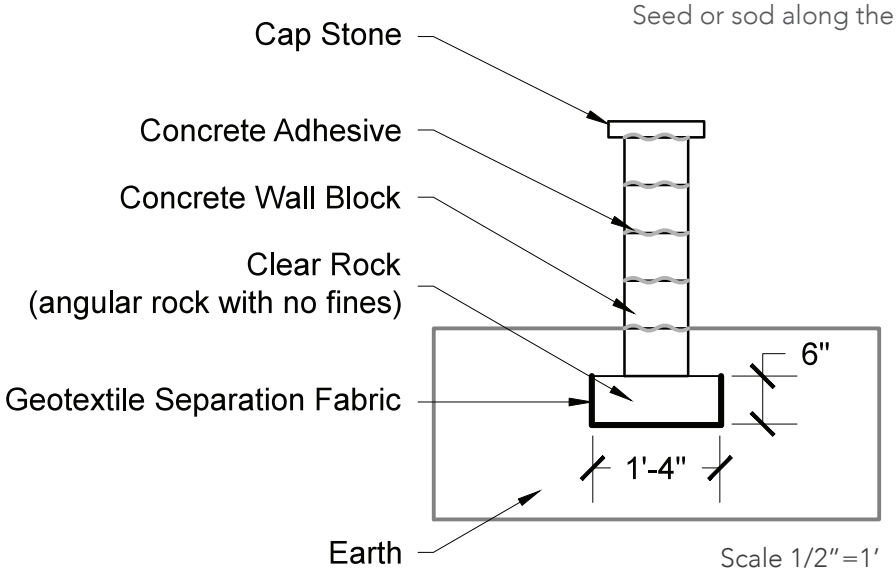
Complete the bottom (first) course before you start the second course. Use concrete adhesive to secure each new course to the one below if the blocks do not have an interlocking system, build in to each other. Blocks should be staggered so the ends of the block do not over lap one another.

Once block is stacked up past the grade, the dirt can be back filled to make access easier to the wall, walking back and forth along the wall while you continue to stack block also helps compact the backfilled area.

Continue stacking up courses of block until you have reached the desired height without exceeding the block manufactures height recommendations.

To complete the wall, lay a cap stone on top of the final course, the cap will be glued with concrete adhesive but it is best to lay the pieces out first and dry fit the cap stone before any adhesive is applied. If you have a curved wall, the cap may have to be cut with a masonry saw. Once all the pieces are dry fit, you can apply the concrete adhesive to each piece so it is firmly secured to the top course.

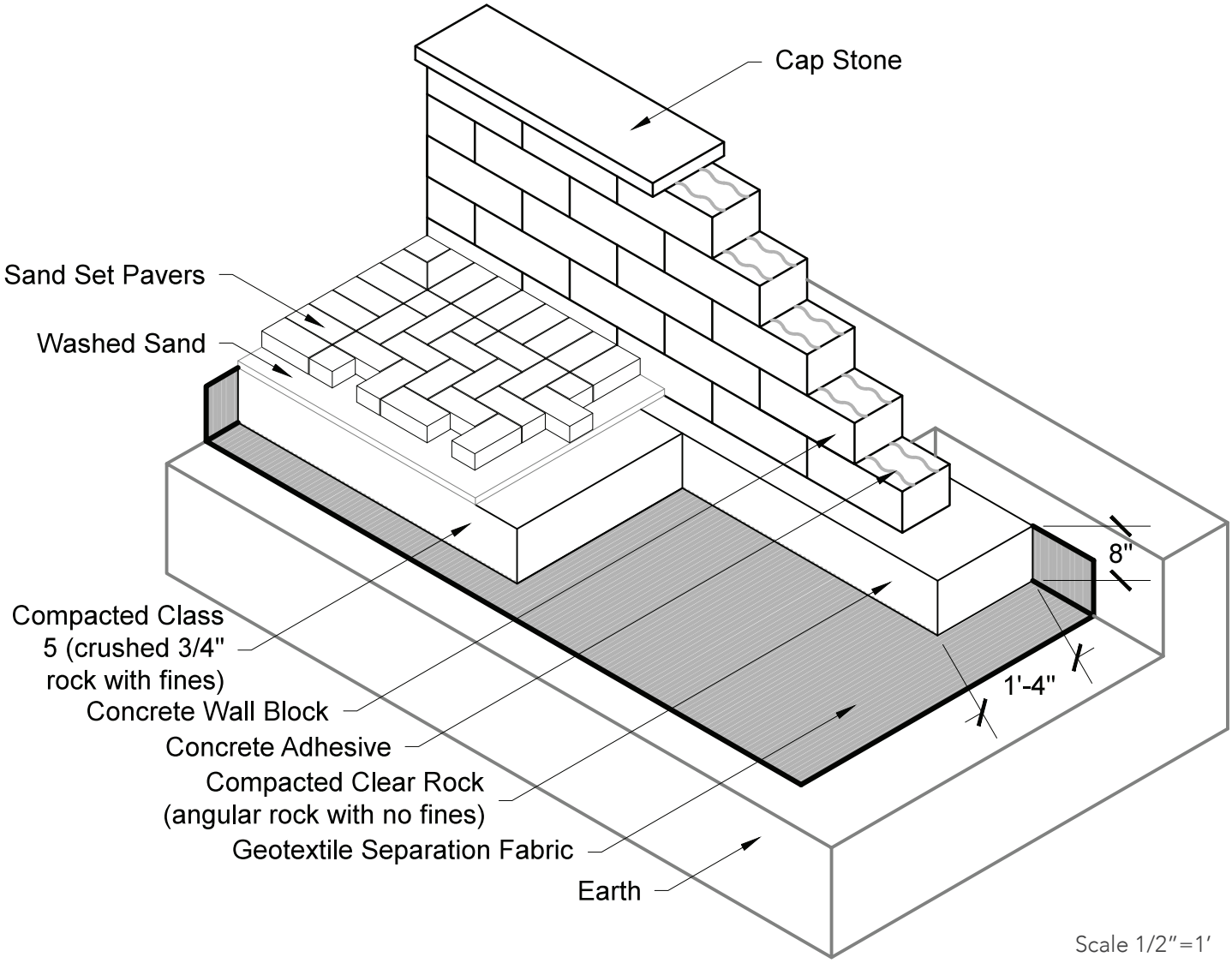
Seed or sod along the wall as needed.



Scale 1/2"=1'

Tools needed for a free standing wall installation with sand set pavers on one side:

Marking paint
Transit
Caulking gun
Wide blade masons chisel
3-5 lb hammer
Utility knife
Masons string (twine)
Stiff bristle street broom
3-5 lb dead blow
Hard tooth garden rake
Chalk line
25 ft tape measure
4 ft Level
Torpedo level
Speed square
Wheelbarrow
Square shovel
Marking crayon or red pencil
3hp to 5hp plate compactor (not a jumping jack)
Masonry saw with diamond blade or a paver splitter



Scale 1/2″=1′

Locate utilities before any digging occurs.

Paint a line where the patio and wall are going to be built.

For the wall, determine the size of the block you are using, and dig a trench along the painted line twice the depth of the block and twice the width of the block.

For the patio, to determine the depth you need to excavate, take 8" of base material plus 1" of washed sand plus the thickness of the pavers you are using (typically 2-3/8" in a residential setting) totaling 11-3/8". The pavers should be .5" above finished ground height to allow for settling and tamping in later stages. You also need to over excavate an extra 8" past your painted guideline.

The use of a transit can help to make sure you have a level hole dug.

Once excavation is complete, inspect the hole for large boulders and organic material, remove and replace with clean fill and compact with plate compactor.

Complete the construction of the wall before starting the pavers.

Geotextile separation fabric should be laid down in the trench. Cover the entire bottom and go up along the sides to keep the clear rock contained and not contaminated with soil. The fabric should be overlapped by 12" and there should be no wrinkles in the fabric.

For the wall, clear rock (angular rock with no fines) should be brought in and tamped with two passes in 2"-4" lifts depending of the size of your tamper. Repeat this step until you have 6" of a solid base. If there is any unevenness in the base, use the hard tooth garden rake to try evening out the area. Note the clear rock will not be level with the grade, it should be low enough for one full block to be buried underground.

If the wall is straight, use a string line as a guide for the wall. Start laying block on the clear rock one at a time, leveling each one in all directions. Use the 4' level and check to make sure the block you just leveled is level with the previous blocks you have laid.

Complete the bottom (first) course before you start the second course. Use concrete adhesive to secure each new course to the one below if the blocks do not have an interlocking system build in to each other. Blocks should be staggered so the ends of the block do not over lap one another.

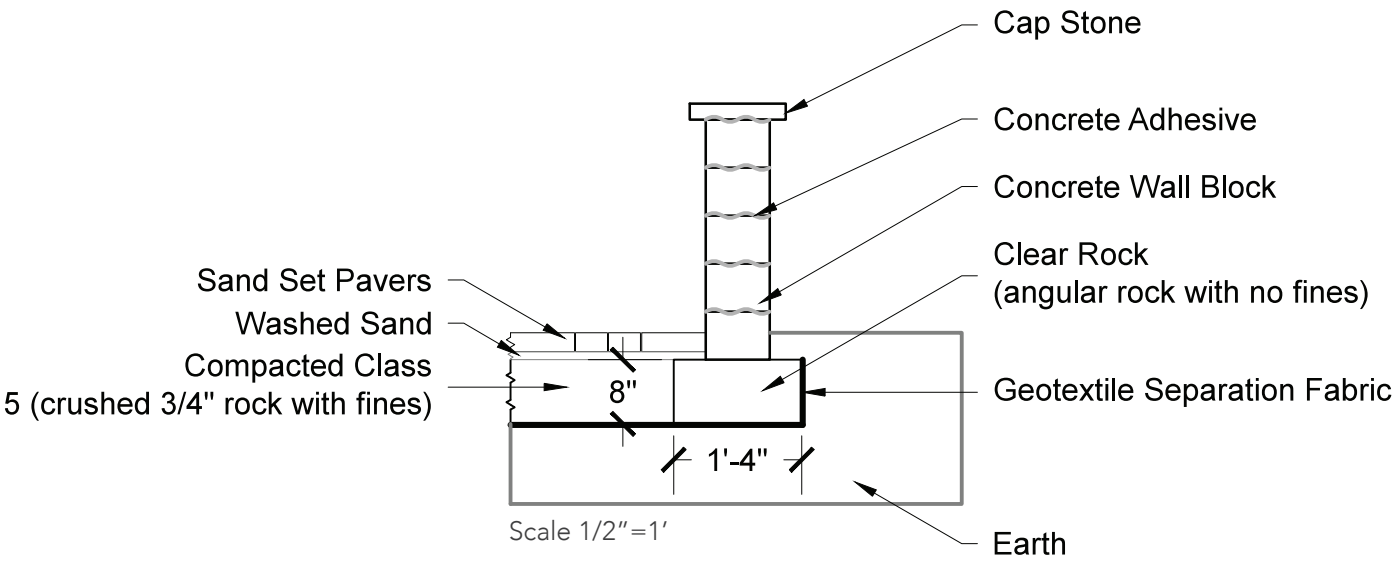
Once block is stacked up past the grade, the dirt can be back filled to make access easier to the wall, walking back and forth along the wall while you continue to stack block also helps compact the backfilled area.

Continue stacking up courses of block until you have reached the desired height without exceeding the block manufacturers height recommendations.

To complete the wall, lay a cap stone on top of the final course, the cap will be glued with concrete adhesive but it is best to lay the pieces out first and dry fit the cap stone before any adhesive is applied.

If you have a curved wall, the cap may have to be cut with masonry saw. Once all the pieces are dry fit, you can apply the concrete adhesive to each piece so it is firmly secured to the top course.

Once the wall is complete the work on the patio can begin.


Cap Stone
Concrete Adhesive
Concrete Wall Block
Clear Rock
(angular rock with no fines)
Sand Set Pavers
Washed Sand
Compacted Class
5 (crushed 3/4" rock with fines)
8"
Geotextile Separation Fabric
1'-4"
Earth
Scale 1/2″=1′

Geotextile separation fabric should be laid down in the hole. Cover the entire bottom and go up along the sides to keep the class 5 gravel contained and not contaminated with soil. The fabric should be overlapped by 12" and there should be no wrinkles in the fabric.

Class 5 gravel (3/4" angular rock with fines) should be brought in and tamped with two passes in 2"-4" increments depending of the size of your tamper, a mist of water while tamping may be added to firm the class 5 gravel. Repeat this step until you have 8" of a solid base or until you are 3-3/8" from your final height. If there is any unevenness in the base, use the hard tooth garden rake to even out the area.

If done correctly, the compacted class 5 base should be as firm as concrete.

Determine the slope and grade before the next step.

Next take your sand screed guides and place them on the class 5 base 4'-6' apart and parallel to each other. Make sure they are level to each other but slope the direction you want the water to run. The slope should be .5%-2% for adequate water drainage. Using a few shovels of sand, make sure the screed guides are firmly in place and will not move (usually one shovel on each end of the screed guide is sufficient). Shovel sand in between the screed guides and use the sreed board to level the sand between the screed guides. Do not worry about any voids the guides or board cause, you will fill them with sand and a smooth with a trowel as you lay the pavers.

Start laying pavers from a permanent edge such as a driveway or house (NOTE: it is okay if the height of the pavers is less than 1/2" higher than the permanent edge, they will be tamped and settled into place later making the transition perfect). Work in rows and lightly lay the paver into the sand. Make sure they are in a straight line; you can use the chalk line to help with this or use the small pry bar to correct this. The joints between the pavers should be between 1/16"-3/16" depending on the pavers being used.

Gaps greater than 3/8" need to be filled with a cut paver. Mark a paver with a crayon or red pencil and cut using a masonry saw with a diamond blade or a paver splitter. If using a masonry saw, the pavers may be wet or dry cut.

Install paver restraint edging along the edge of the pavers. The paver edging should sit on the compacted class 5 so remove any sand if necessary. With the paving restraint firmly against the pavers, drive 10" spikes into the paver restraint. On straight paver edges, the spikes need to be put in every third hole. On a curved paver edge, spikes need to be in every other hole.

Once all the paver restraints are installed, use the vibratory plate compactor to tamp the pavers into place. The pavers will settle up to ¼". Make two passes with the vibratory plate compactor.

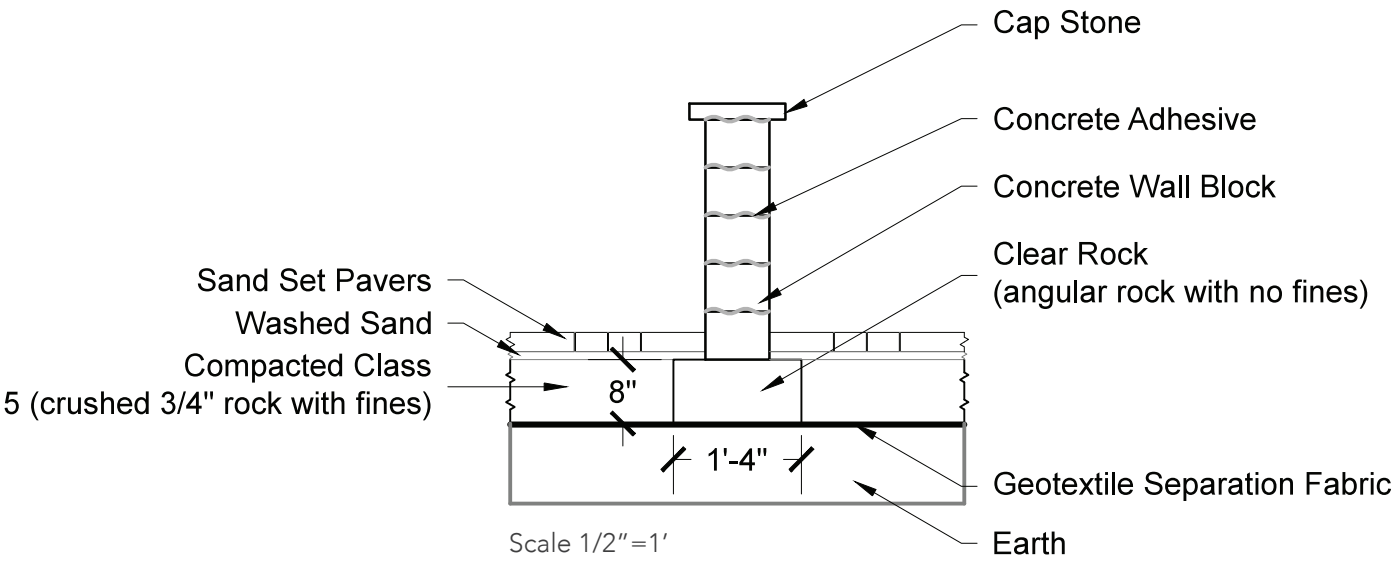
Use a dry sand to sweep into the paver joints, alternate between sweeping and tamping to work sand into all the joints completely. With dry sand it should take 2-3 passes with broom and vibratory plate compactor. Wetter sand should be dried before use.

Sweep off all excess sand.

Seed or sod along the wall as needed.

Tools needed for a free standing wall installation with sand set pavers on both sides:

Marking paint
Transit
Caulking gun
Wide blade masons chisel
3-5 lb hammer
Utility knife
Masons string (twine)
Stiff bristle street broom
3-5 lb dead blow
Hard tooth garden rake
Chalk line
25 ft tape measure
4 ft Level
Torpedo level
Speed square
Wheelbarrow
Square shovel
Marking crayon or red pencil
3hp to 5hp plate compactor (not a jumping jack)
Masonry saw with diamond blade or a paver splitter



Scale 1/2″=1′

Locate utilities before any digging occurs.

Paint a line where the patio and wall are going to be built.

For the wall, determine the size of the block you are using, and dig a trench along the painted line twice the depth of the block and twice the width of the block.

For the patio, determine the depth you need to excavate, take 8" of base material plus 1" of washed sand plus the thickness of the pavers you are using (typically 2-3/8" in a residential setting) totaling 11-3/8". The pavers should be .5" above finished ground height to allow for settling and tamping in later stages. You also need to over excavate an extra 8" past your painted guideline.

The use of a transit can help to make sure you have a level hole dug.

Once excavation is complete, inspect the hole for large boulders and organic material, remove and replace with clean fill and compact with plate compactor.

Complete the construction of the wall before starting the pavers.

Geotextile separation fabric should be laid down in the trench. Cover the entire bottom and go up along the sides to keep the clear rock contained and not contaminated with soil. The fabric should be overlapped by 12" and there should be no wrinkles in the fabric.

For the wall, clear rock (angular rock with no fines) should be brought in and tamped with two passes in 2"-4" lifts depending of the size of your tamper. Repeat this step until you have 6" of a solid base. If there is any unevenness in the base, use the hard tooth garden rake to even out the area. Note the clear rock will not be level with the grade, it should be low enough for one full block to be buried underground.

If the wall is straight, use a string line as a guide for the wall. Start laying block on the clear rock one at a time, leveling each one in all directions. Use the 4' level and check to make sure the block you just leveled is level with the past blocks you have laid.

Complete the bottom (first) course before you start the second course. Use concrete adhesive to secure each new course to the one below if the blocks do not have an interlocking system built in to each other. Blocks should be staggered so the ends of the block do not over lap one another.

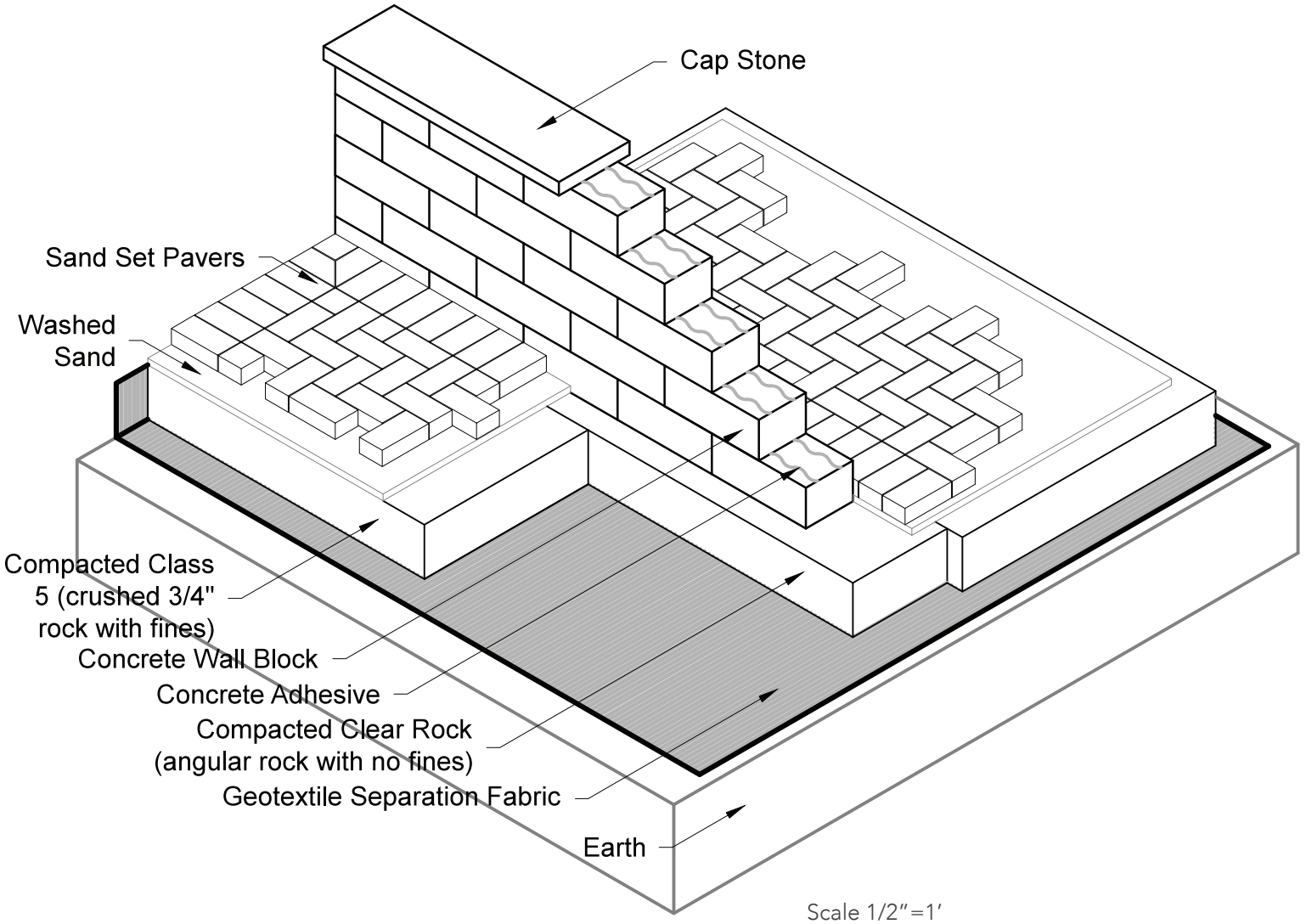
Once block is stacked up past the grade, the dirt can be back filled to make access easier to the wall, walking back and forth along the wall while you continue to stack block also helps compact the backfilled area.

Continue stacking up courses of block until you have reached the desired height without exceeding the block manufacturers height recommendations.

To complete the wall, lay a cap stone on top of the final course, the cap will be glued with concrete adhesive but it is best to lay the pieces out first and dry fit the cap stone before any adhesive is applied.

If you have a curved wall, the cap may have to be cut with masonry saw. Once all the pieces are dry fit, you can apply the concrete adhesive to each piece so it is firmly secured to the top course.

Once the wall is complete the work on the patio can begin.


Cap Stone
Sand Set Pavers
Washed Sand
Compacted Class 5 (crushed 3/4" rock with fines)
Concrete Wall Block
Concrete Adhesive
Compacted Clear Rock (angular rock with no fines)
Geotextile Separation Fabric
Earth

Scale 1/2″=1′

Geotextile separation fabric should be laid down in the hole. Cover the entire bottom and go up along the sides to keep the class 5 gravel contained and not contaminated with soil. The fabric should be overlapped by 12" and there should be no wrinkles in the fabric.

Class 5 gravel (3/4" angular rock with fines) should be brought in and tamped with two passes in 2"-4" increments depending of the size of your tamper, a mist of water while tamping may be added to firm the class 5 gravel. Repeat this step until you have 8" of a solid base or until you are 3-3/8" from your final height. If there is any unevenness in the base, use the hard tooth garden rake to try evening out the area.

If done correctly, the compacted class 5 base should be as firm as concrete.

It is important to determine the slope and grade before the next step.

Next take your sand screed guides and place then on the class 5 base 4'-6' apart and parallel to each other. Make sure they are level to each other but slope the direction you want the water to run. The slope should be .5%-2% for adequate water drainage. Using a few shovels of sand, make sure the screed guides are firmly in place and will not move (usually one shovel on each end of the screed guide is sufficient). Shovel sand in between the screed guides and use the sreed board to level the sand between the screed guides. Do not worry about any voids the guides or board cause, you will fill them with sand and smooth with a trowel as you lay the pavers.

Start laying pavers from a permanent edge such as a driveway or house (NOTE: it is okay if the height of the pavers are less than 1/2" higher than the permanent edge, they will be tamped and settled into place later making the transition perfect). Work in rows and lightly lay the paver into the sand. Make sure they are in a straight line; you can use the chalk line to help with this or use the small pry bar to correct this. The joints between the pavers should be between 1/16"-3/16" depending on the pavers being used.

Gaps greater than 3/8" need to be filled with a cut paver. Mark a paver with a crayon or red pencil and cut using a masonry saw with a diamond blade or a paver splitter. If using a masonry saw, the pavers may be wet or dry cut.

Install paver restraint edging along the edge of the pavers. The paver edging should sit on the compacted class 5 so remove any sand if necessary. With the paving restraint firmly against the pavers, drive 10" spikes into the paver restraint. On straight paver edges, the spikes need to be put in every third hole. On a curved paver edge, spikes need to be in every other hole.

Once all the paver restraints are installed, use the vibratory plate compactor to tamp the pavers into place. The pavers will settle up to ¼". Make two passes with the vibratory plate compactor.

Use a dry sand to sweep into the paver joints, alternate between sweeping and tamping to work sand into all the joints completely. With dry sand it should take 2-3 passes with broom and vibratory plate compactor. Wetter sand should be dried before use.

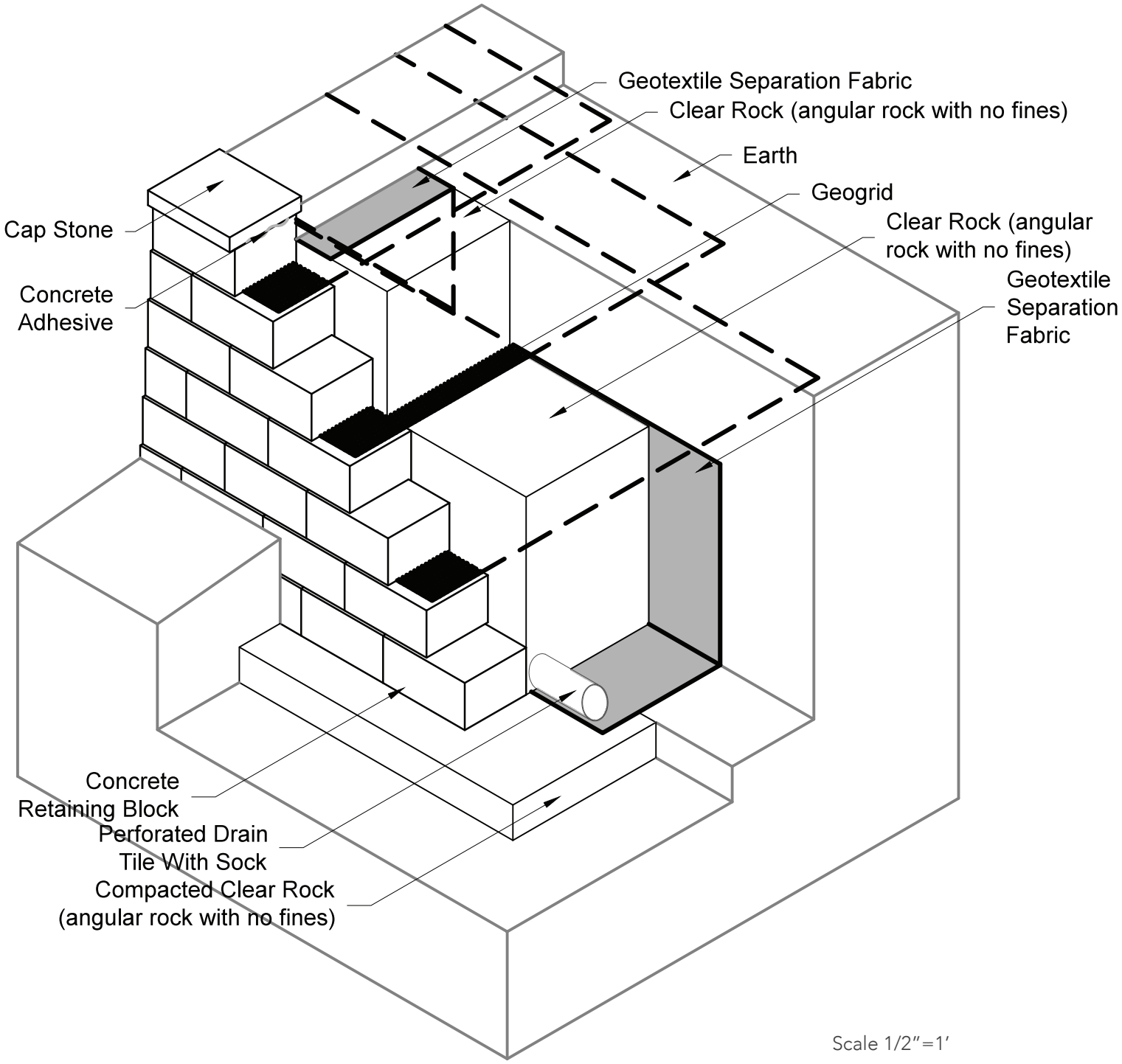
Sweep off all excess sand.

Seed or sod along the wall as needed.

Walls

Retaining

Alone | With pavers on one side | With pavers on both sides



Scale 1/2″=1′

Tools needed for a gravity retaining wall:

Marking paint
Transit
Caulking gun
Wide blade masons chisel
3-5 lb hammer
Utility knife
Masons string (twine)
3-5 lb dead blow
Hard tooth garden rake
25 ft tape measure
4 ft Level
2 ft Level
Torpedo level
Speed square
Wheelbarrow
Square shovel
Marking crayon or red pencil
3hp to 5hp plate compactor (not a jumping jack)
Masonry saw with diamond blade or a paver splitter

Locate utilities before any digging occurs.

Paint a line where the retaining wall will be located.

If the wall will be on a hill or slope, the placement of the wall will determine how much soil will need to be brought in or removed.

The trench will be 2 feet wide and a minimum of 6 inches deep plus an additional 1 inch for each 1 foot of wall height for the amount of buried block that is needed.

Next fill the trench with clear rock (angular rock with no fines) and compact the rock in 2-4 inch lifts with two passes until there is a 6-8 inch solid base, use the transit to make sure the rock is spread level and use the hard tooth garden rake to adjust the rock if needed.

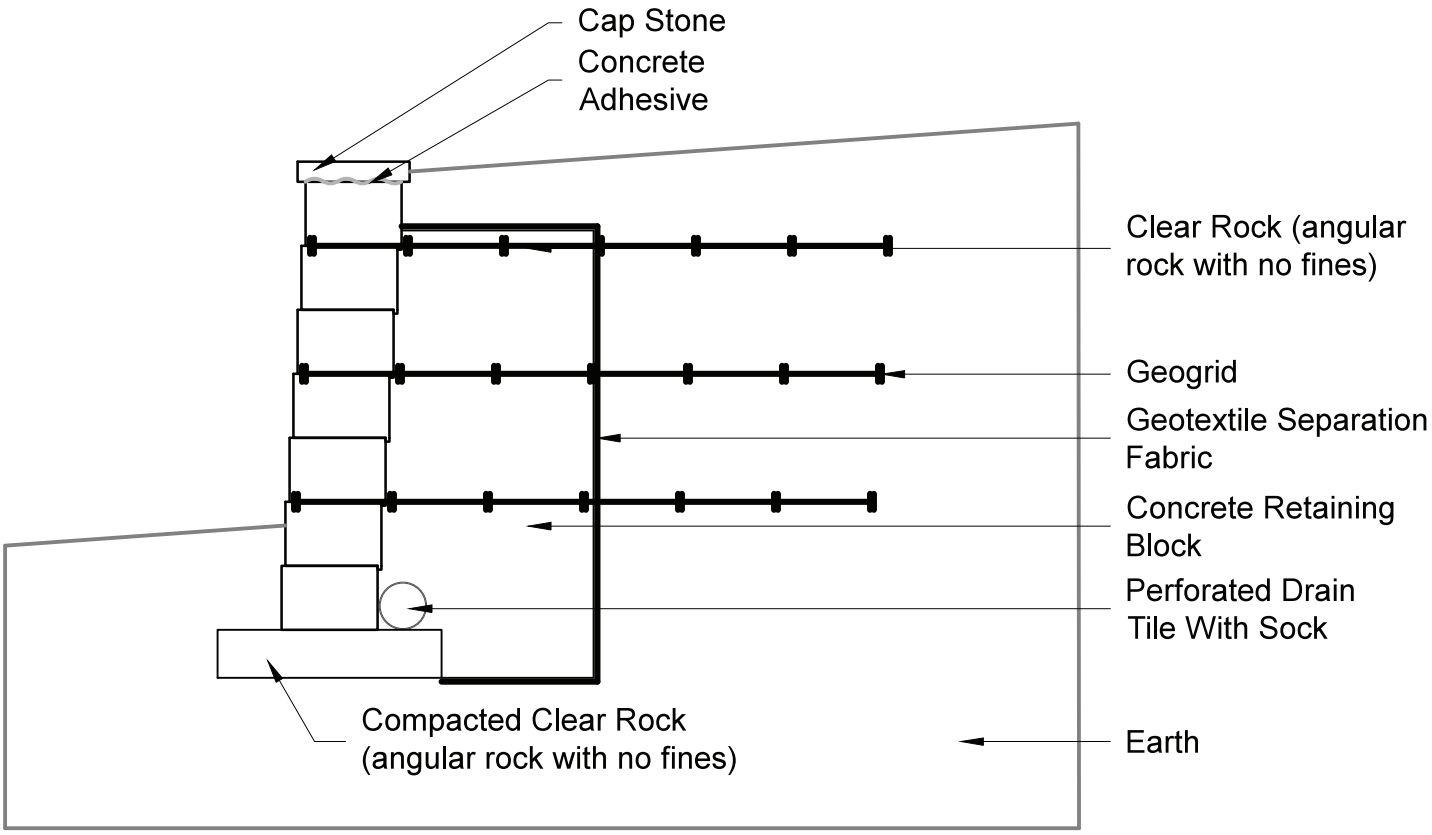
Drain tile is required if the wall is over 4 feet tall or if there is poor drainage on the site. Place the drain tile at the lowest possible point and directly behind the first course of block. Vent the drain tile to daylight every 50 feet. Make sure the drain tile is sloped so water runs towards the daylight.

If the wall is straight, use a string line as a guide for the wall. Start laying block on the clear rock one at a time, leveling each one in all directions. Use the 4' level and check to make sure the block you just leveled is level with the previous blocks you have laid.

Complete the bottom (first) course before you start the second course. Blocks should be staggered so the ends of the block do not over lap one another. Once block is stacked up past the grade, the dirt can be back filled on the front side only to make access easier to the wall, walking back and forth along the wall while you continue to stack block also helps compact the backfilled area.

Geogrid needs to be applied every three courses or every 2 feet, which ever is closer together. Geogrid helps tie back the retaining wall into the soil to prevent the wall from failing.

Continue stacking up courses of block until you have reached the desired height without exceeding the block manufactures height recommendations. To complete the wall, lay a cap stone on top of the final course, the cap will be glued with concrete adhesive but it is best to lay the pieces out first and dry fit the cap stone before any adhesive is applied.

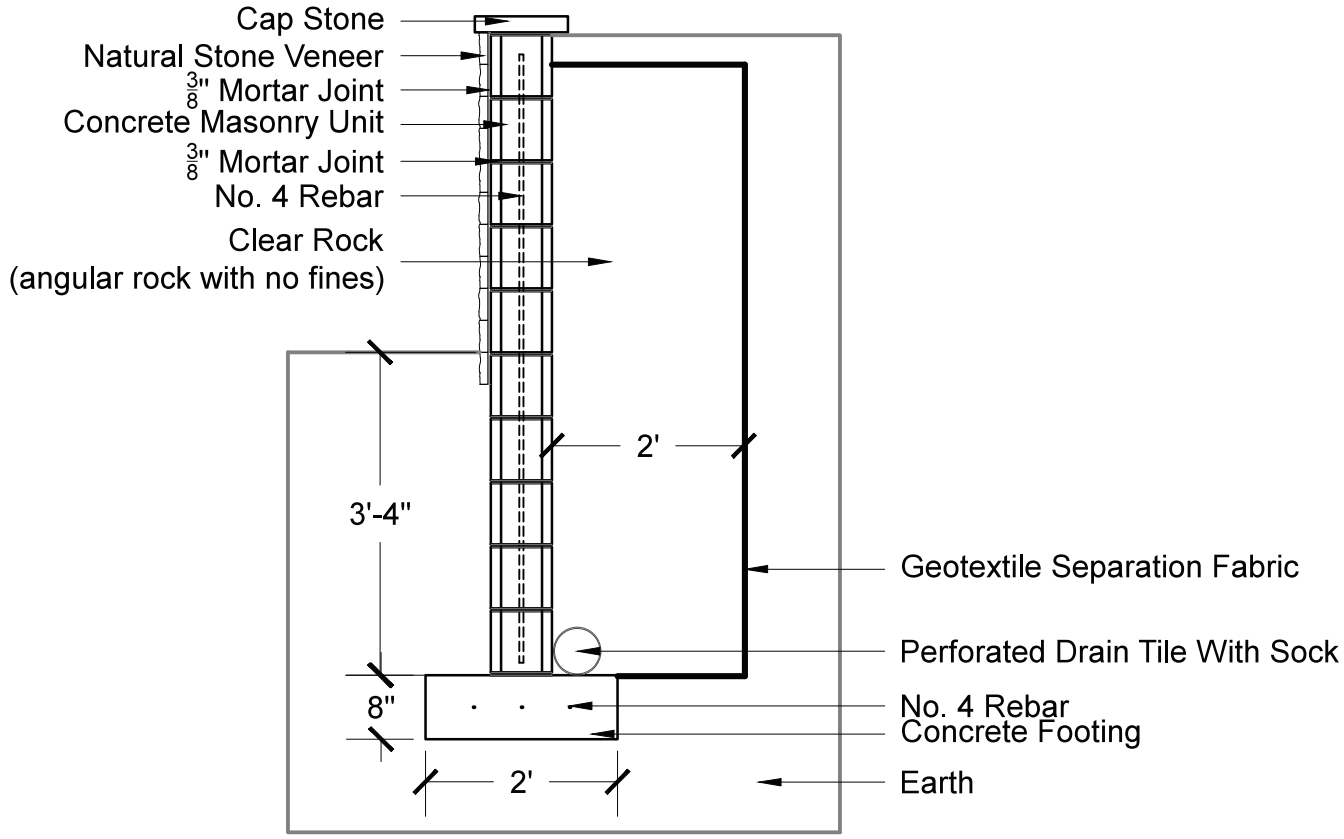

Cap Stone
Concrete
Adhesive
Clear Rock (angular rock with no fines)
Geogrid
Geotextile Separation Fabric
Concrete Retaining Block
Perforated Drain Tile With Sock
Compacted Clear Rock (angular rock with no fines)
Earth

Scale 1/2″=1′

If you have a curved wall, the cap may have to be cut with a masonry saw. Once all the pieces are dry fit, you can apply the concrete adhesive to each piece so it is firmly secured to the top course.

Once the wall is complete the back of the wall can be backfilled with clear rock (angular rock with no fines). Lay geotextile separation fabric behind the wall to separate the soil and clear rock from each other. Spread clear rock over drain tile slowly so you do not disturb the slope and placement of the drain tile. The clear rock should go up the height of a majority of the wall, leave enough room for soil if there is going to be plants or grass against the top of the wall. Fold the geotextile separation fabric over the clear rock before add any soil, this will help keep the clear rock clean and not clog up from the soil above.

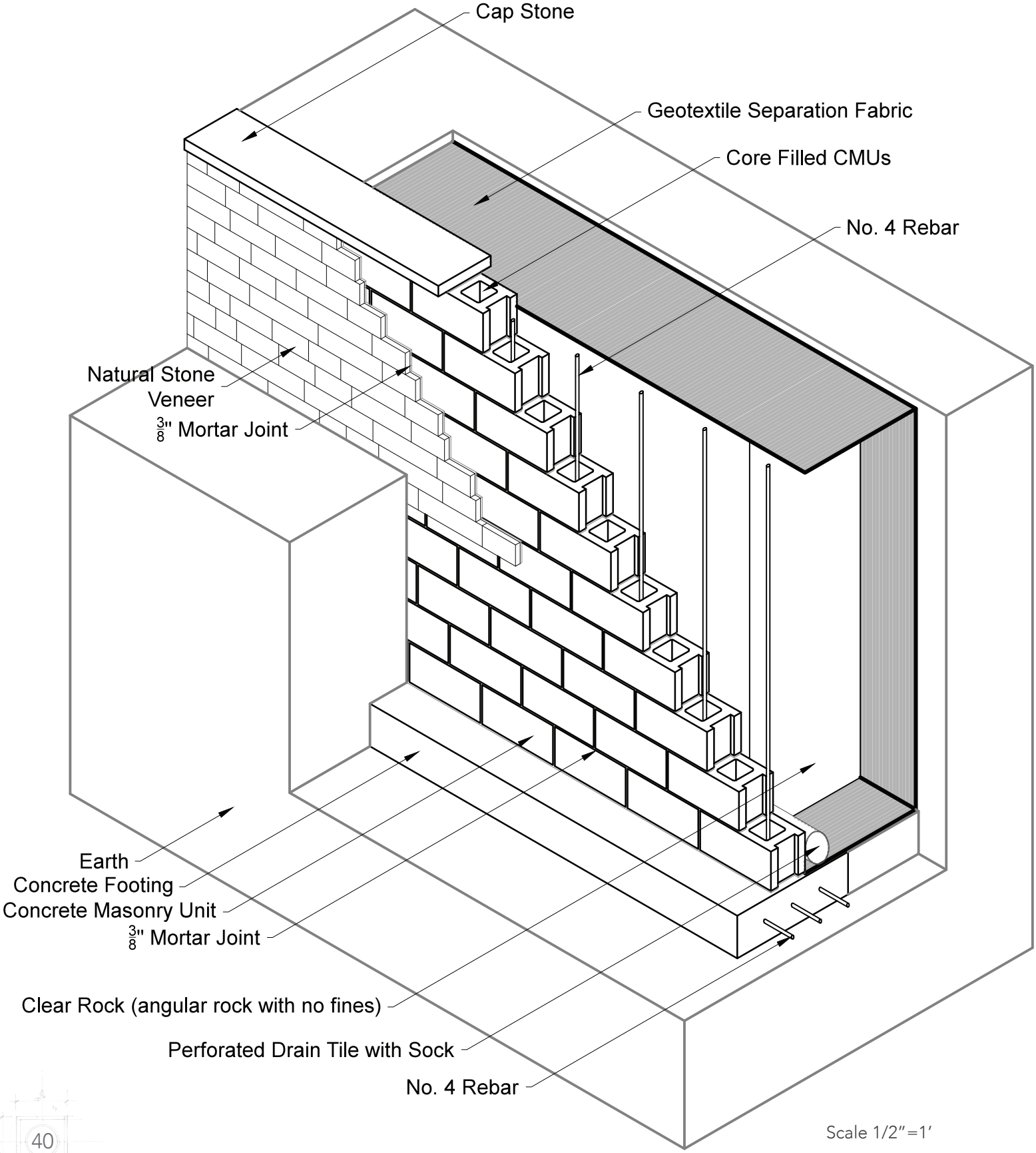
Seed, sod or plant the top and bottom of the wall as desired.


Cap Stone
Natural Stone Veneer
3/8" Mortar Joint
Concrete Masonry Unit
3/8" Mortar Joint
No. 4 Rebar
Clear Rock
(angular rock with no fines)
2'
3'-4"
Geotextile Separation Fabric
Perforated Drain Tile With Sock
8"
No. 4 Rebar
Concrete Footing
2'
Earth

Scale 1/2"=1'

Tools needed for a CMU veneered retaining wall:

Marking paint
Transit
Caulking gun
Wide blade masons chisel
3-5 lb hammer
Utility knife
Masons string (twine)
3-5 pound dead blow
Hard tooth garden rake
25 ft tape measure
4 ft Level
2 ft Level
Speed square
Square shovel
Marking crayon or red pencil
3hp to 5hp plate compactor (not a jumping jack)
Masonry saw with diamond blade or a paver splitter
2 contractor grade wheelbarrows
Bull float with an extension handle
Magnesium hand floats
Bolt cutters
Screw gun
Circular saw


Cap Stone
Geotextile Separation Fabric
Core Filled CMUs
No. 4 Rebar
Natural Stone Veneer
3/8" Mortar Joint
Earth
Concrete Footing
Concrete Masonry Unit
3/8" Mortar Joint
Clear Rock (angular rock with no fines)
Perforated Drain Tile with Sock
No. 4 Rebar

Scale 1/2″=1′

Locate utilities before any digging occurs.

If the wall will be on a hill or slope, the placement of the wall will determine how much soil will need to be brought in or removed.

Paint a line where the wall will be located.

The footing for the wall needs to be 4 feet under the ground level; the slope and placement of the wall will determine how deep you have to dig. The trench should 3 feet wide to give you room for movement in the trench.

Set up a form for the concrete footing in the trench, the footing should be 8 inches thick and 2 feet wide.

Lay 3 rows of number 4 rebar in the trench and stub up rebar for the concrete block every 4 feet.

Pour concrete in the form and let it dry completely before removing the forms.

Per manufacturers directions, use mortar to adhere the concrete blocks to the footing, with the stubbed up rebar going through the hole of the block.

Continue to stack concrete block using 3/8" mortar joints between blocks. Stagger the block so two joints do not over lap.

When the finial height of the wall is reached, let the mortar set up completely before continuing.

Cut number 4 rebar 2-3 inches shorter than the height of the wall and place the rebar into every other hole in the wall. Core fill every hole with concrete and vibrate the concrete down all the way to the bottom of the hole.

Drain tile is required if the wall is over 4 feet tall or if there is poor drainage on the site. Place the drain tile at the lowest possible point and directly behind the first course of block. Vent the drain tile to daylight every 50 feet. Make sure the drain tile is sloped so water runs towards the daylight.

Lay geotextile fabric along the dirt on the backside of the trench. Back fill the backside of the trench with clear rock (angular rock with no fines) while keeping the fabric between the clear rock and the soil so they do not contaminate. Continue backfilling with clear rock until you are about one course away from the top of the wall. Fold over the geotextile separation fabric on top of the clear rock.

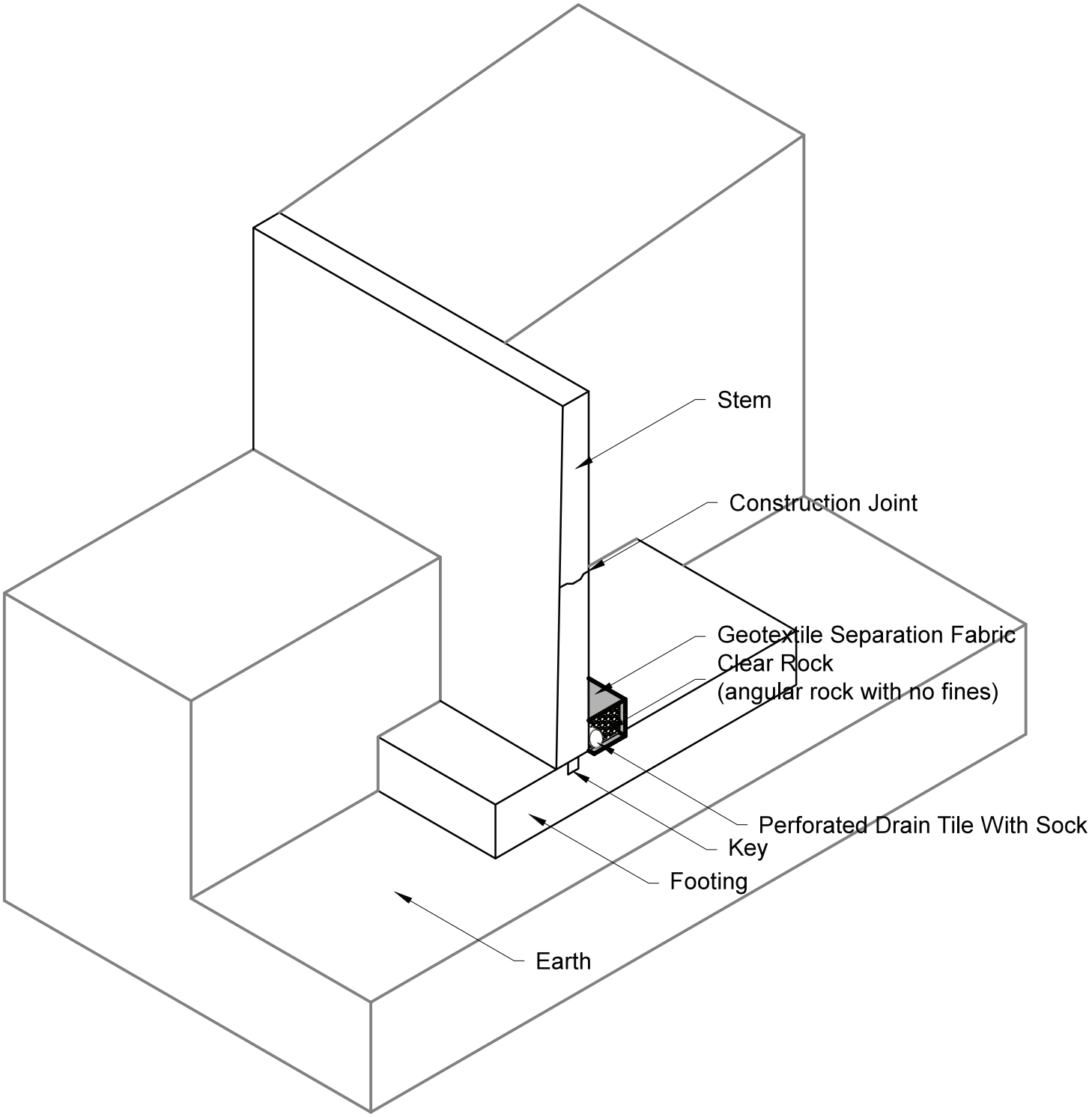
Using type S mortar per manufacturers directions and veneer the natural stone to the concrete block, start 1 foot below grade and work your way toward the top of the wall.

Let the veneer dry completely before backfilling the front side of the wall with soil.

To complete the wall, lay a cap stone on top of the final course, the cap will be glued with concrete adhesive but it is best to lay the pieces out first and dry fit the cap stone before any adhesive is applied.

If you have a curved wall, the cap may have to be cut with masonry saw. Once all the pieces are dry fit, you can apply the concrete adhesive to each piece so it is firmly secured to the top course.

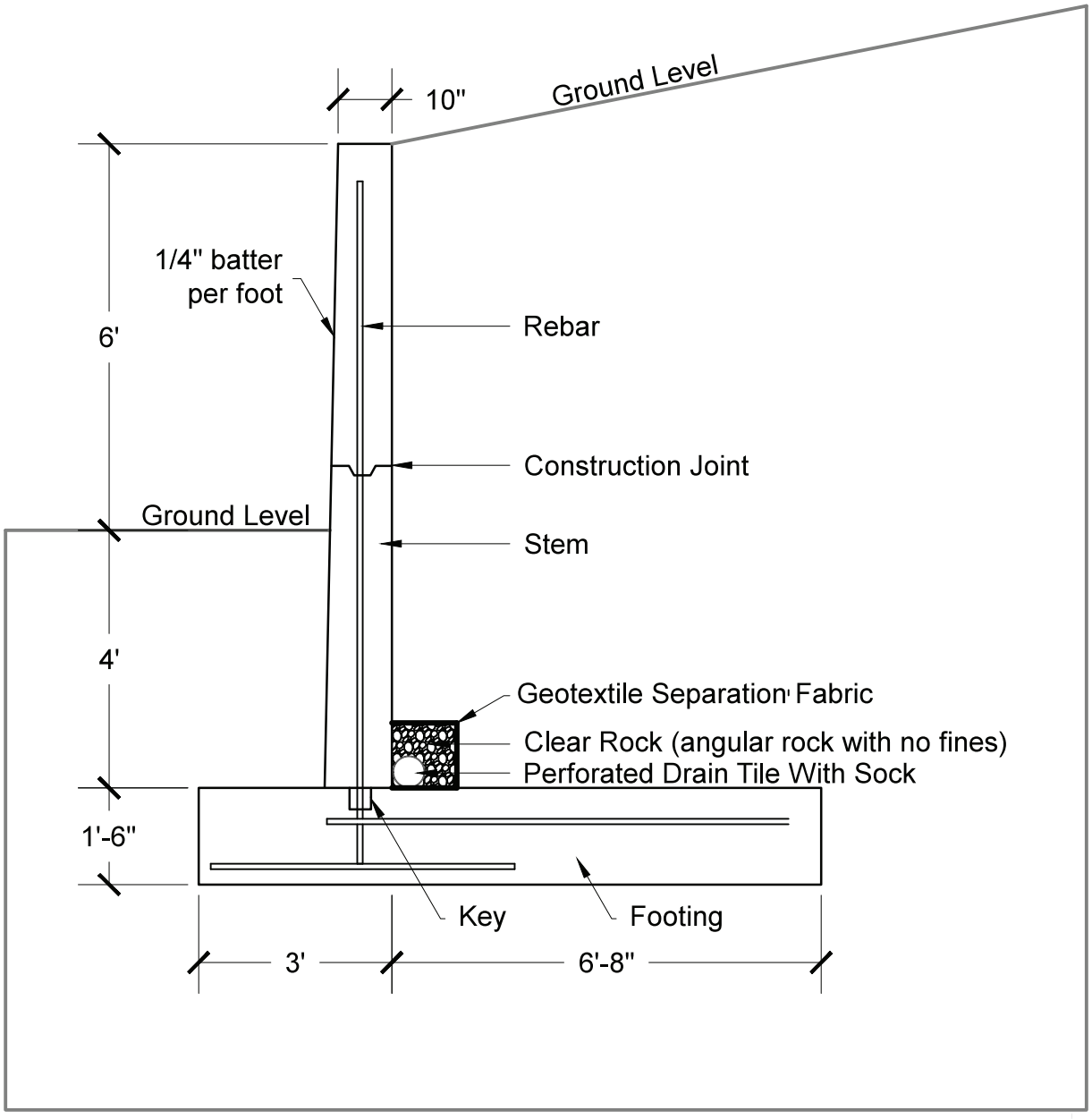
Seed or sod the bottom and top of the wall as needed.


Stem
Construction Joint
Geotextile Separation Fabric
Clear Rock
(angular rock with no fines)
Perforated Drain Tile With Sock
Key
Footing
Earth

Scale 1/4″=1′

This is only an example of a cantilever retaining wall system and how they work. Many different elements go into designing a cantilever retaining wall based on the site conditions. An engineer should be consulted before any attempt in constructing this type of retaining wall takes place.

Cantilever retaining walls are poured in place, they are not precast and brought to the site. After an extensive amount of excavation, forms are made for the footing and the footing is poured in place. After the footing is cured, forms are made for the stem and the stem is also poured in place. The stem connects to the footing by the key. Once the stem has cured the forms are removed and appropriate drainage is added on the backside of the wall. Then the wall can be backfilled on both sides.



Scale 3/8″=1′

C o l u m n s

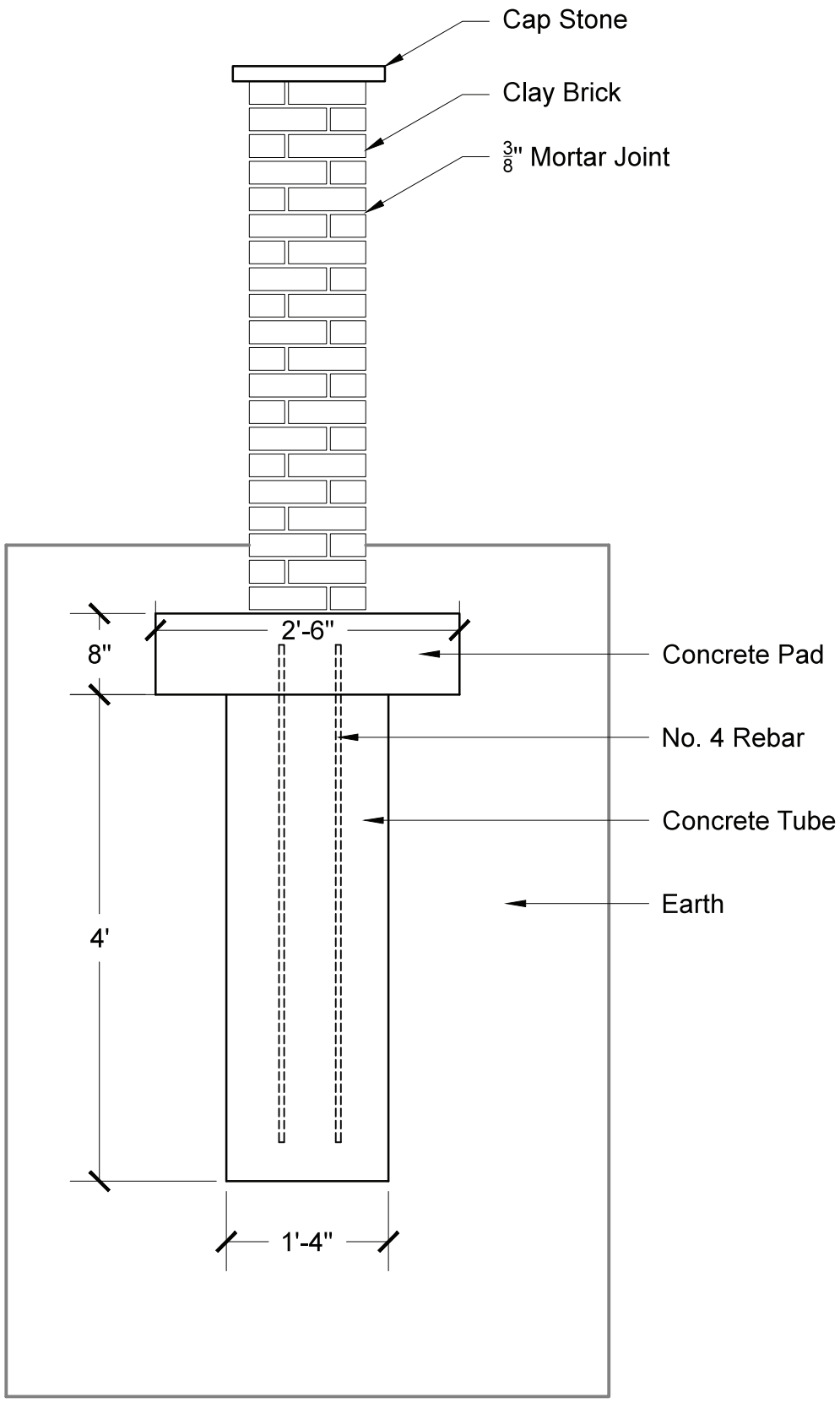
Ridged

Clay Brick | Veneered CMU's | Dry Set Block

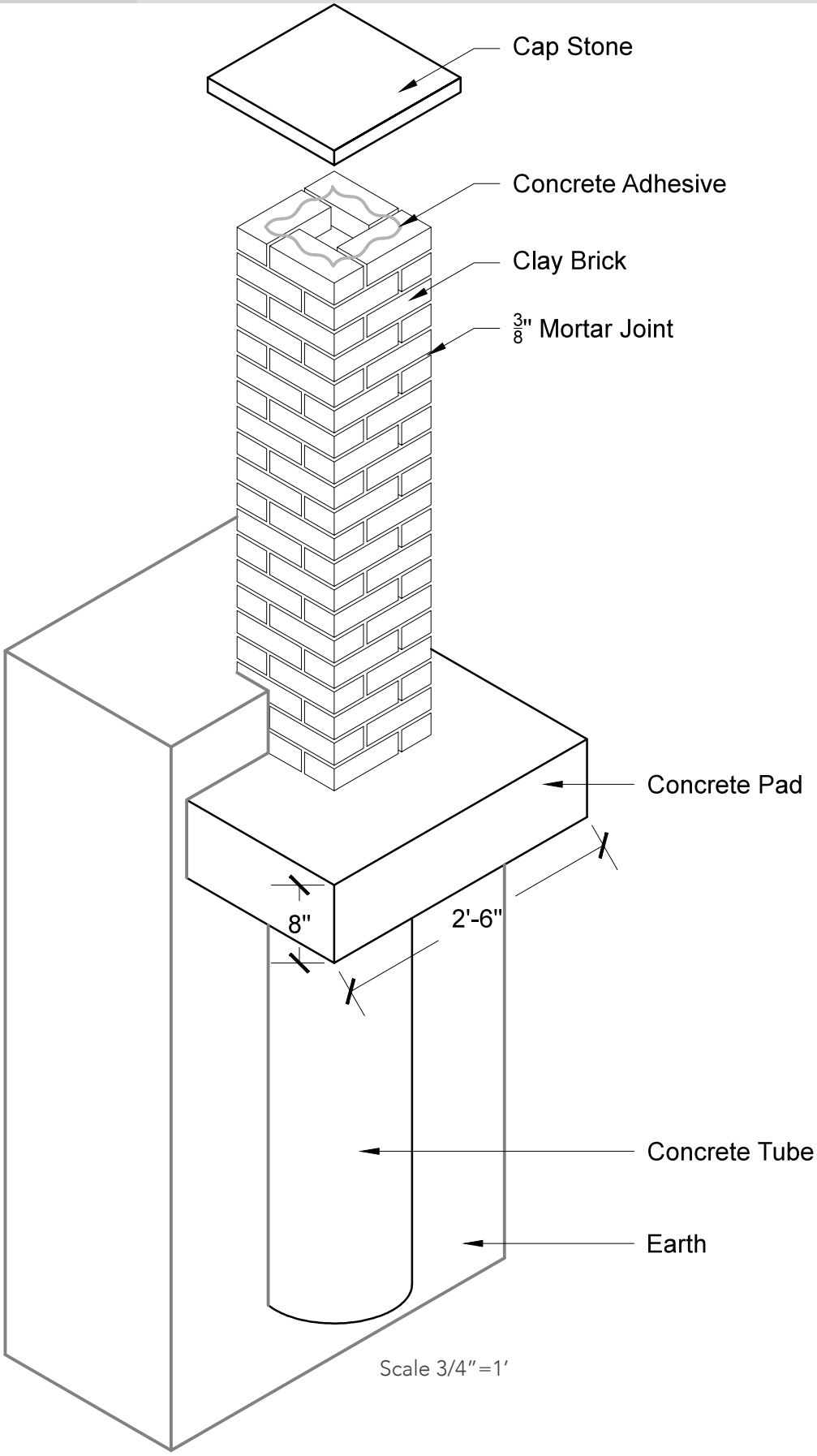
Landscape columns act as an anchor to the surrounding landscapes. They can stand-alone or be incorporated into a wall or another feature. Columns can be build out of many different materials and come in a variety of heights. Lighting, addresses, mailboxes and other elements can also be intergraded into a landscape column.

Tools needed for a clay brick column:

Marking paint
Caulking gun
Wide blade masons chisel
3-5 lb hammer
25 ft tape measure
2 ft Level
Torpedo level
Speed square
Square shovel
Marking crayon or red pencil
Masonry saw with diamond blade or a paver splitter
16" auger or post hole digger
Wheelbarrow
Bull float
Trowel
Jointer
Foxtail brush
Magnesium hand floats
Bolt cutters
Screw gun
Circular saw


Cap Stone
Clay Brick
3/8" Mortar Joint
2'-6"
8"
Concrete Pad
No. 4 Rebar
Concrete Tube
Earth
4'
1'-4"

Scale 3/4″=1′


Cap Stone
Concrete Adhesive
Clay Brick
3/8" Mortar Joint
Concrete Pad
8"
2'-6"
Concrete Tube
Earth

Scale 3/4″=1′

Locate utilities before any digging occurs.

Determine the size of the column; most are 24 to 30 inches wide.

Use the marking paint to make an outline of the location of the column.

Dig a square 30 inches by 30 inches and 16 inches deep with the painted outline centered in the excavation area.

Use a posthole digger or 16 inch auger to drill a hole in the center of the square. The hole should be 4 feet deep and have a 16 inch diameter.

Place a 4 foot by 16 inch concrete forming tube in the hole. Place two 54 inch pieces of number 4 rebar in the hole and fill with concrete. While concrete is being filled, make sure rebar is even spaced and about 6 inches is sticking up past the top of the tube. Level the concrete with the top of the tube and let cure before next step.

Make a form out of 2 by wood in the excavated square, 30 inches by 30 inches and 8 inches tall. The top of the form should still be 8 inches below grade.

Pour concrete in the form, the stubbed up rebar should now be covered with concrete. Let the concrete dry completely before removing the forms.

Mix the mortar per manufacturers directions in the wheelbarrow; the consistency should be like pudding. Too dry and it will be difficult to set the bricks, too wet and the bricks will sag.

Starting at a corner or edge, use the trowel to scoop up mortar and place a 4 to 6 inch wide band 1 inch thick on the concrete footing. Set a brick down in the mortar bed and tap it down with the handle of the trowel, until it is squared up with the outline of the column and the edge is plumb. Repeat until first course is complete. Use the trowel to cut away the excess mortar that is shoved out from under the brick as you work.

Start the second course on a corner. Start the course half a brick back so each course is staggered half a brick. Keep the height of the brick the same using the level, a standard mortar joint is 3/8" thick. Keeping the mortar joints equal will ensure a level column.

After a few courses, when the mortar has begun to set (hard enough to touch and not leave an impression from your finger), use the jointer and rub it against the mortar joint between the bricks with the curved portion of the tool to smooth out the mortar joints.

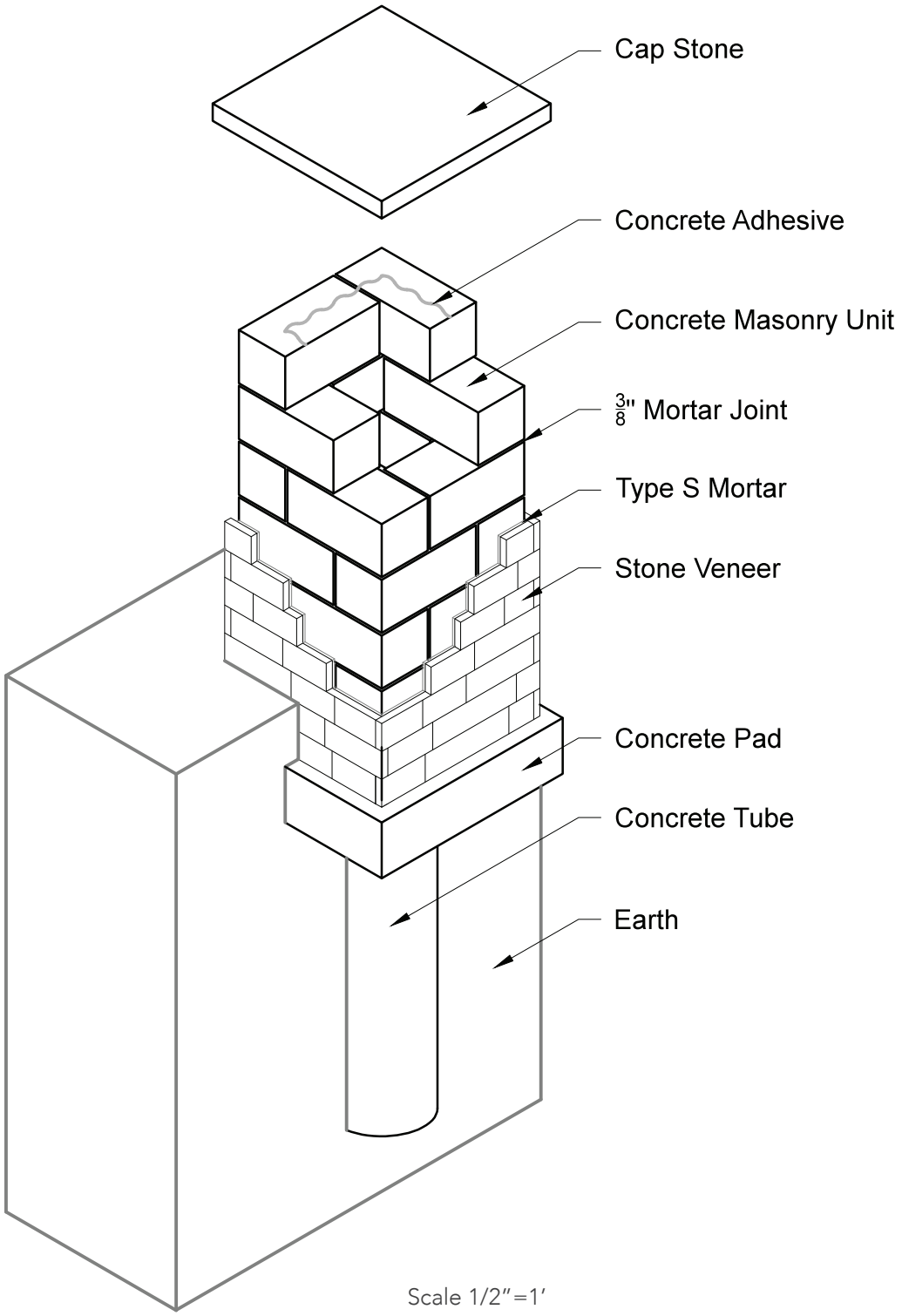
Brush the face of the brick with the foxtail broom to wipe excess mortar away and to finish smoothing the mortar.

Continue stacking course by course and smoothing the mortar joints when appropriate.

When mortar is completely dry, backfill to match the surrounding grade.

To complete the column, lay a cap stone on top of the column, the cap will be glued with concrete adhesive but it is best to lay the pieces out first and dry fit the cap stone before any adhesive is applied.

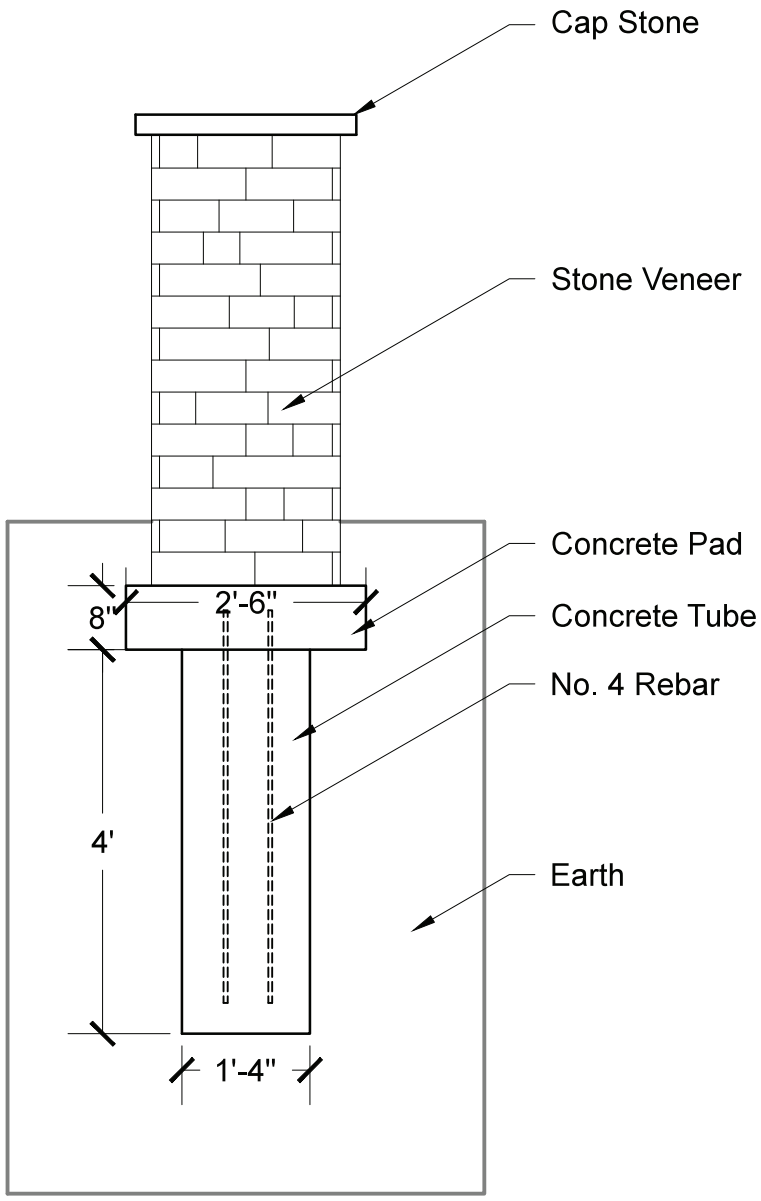
Seed or sod the area as needed.


Cap Stone
Concrete Adhesive
Concrete Masonry Unit
3/8" Mortar Joint
Type S Mortar
Stone Veneer
Concrete Pad
Concrete Tube
Earth

Scale 1/2″=1′

Tools needed for a CMU veneered column:

Marking paint
Caulking gun
Wide blade masons chisel
3-5 lb hammer
25 ft tape measure
2 ft Level
Torpedo level
Speed square
Square shovel
Marking crayon or red pencil
Masonry saw with diamond blade or a paver splitter
16" auger or post hole digger
Wheelbarrow
Bull float
Magnesium hand floats
Bolt cutters
Screw gun
Circular saw


Cap Stone
Stone Veneer
Concrete Pad
Concrete Tube
No. 4 Rebar
Earth
8"
2'-6"
4'
1'-4"

Scale 1/2"=1'

Locate utilities before any digging occurs.

Determine the size of the column; most are 24 to 30 inches wide.

Use the marking paint to make an outline of the location of the column.

Dig a square 30 inches by 30 inches and 16 inches deep with the painted outline centered in the excavation area.

Use a posthole digger or 16 inch auger to drill a hole in the center of the square. The hole should be 4 feet deep and have a 16 inch diameter.

Place a 4 foot by 16 inch concrete forming tube in the hole. Place two 54 inch pieces of number 4 rebar in the hole and fill with concrete. While concrete is being filled, make sure rebar is evenly spaced and about 6 inches is sticking up past the top of the tube. Level the concrete with the top of the tube and let cure before next step.

Make a form out of 2 by wood in the excavated square, 30 inches by 30 inches and 8 inches tall. The top of the form should still be 8 inches below grade.

Pour concrete in the form, the stubbed up rebar should now be covered with concrete. Let the concrete dry completely before removing the forms.

Per manufacturers directions, use mortar to adhere the CMU's to the footing.

Continue to stack concrete block using 3/8" mortar joints between blocks. Stagger the block so two joints do not over lap.

When the finial height of the wall is reached, let the mortar set up completely before continuing.

Using type S mortar per manufacturers directions, veneer the natural stone to the concrete block, start at the bottom and work your way to the top of the column.

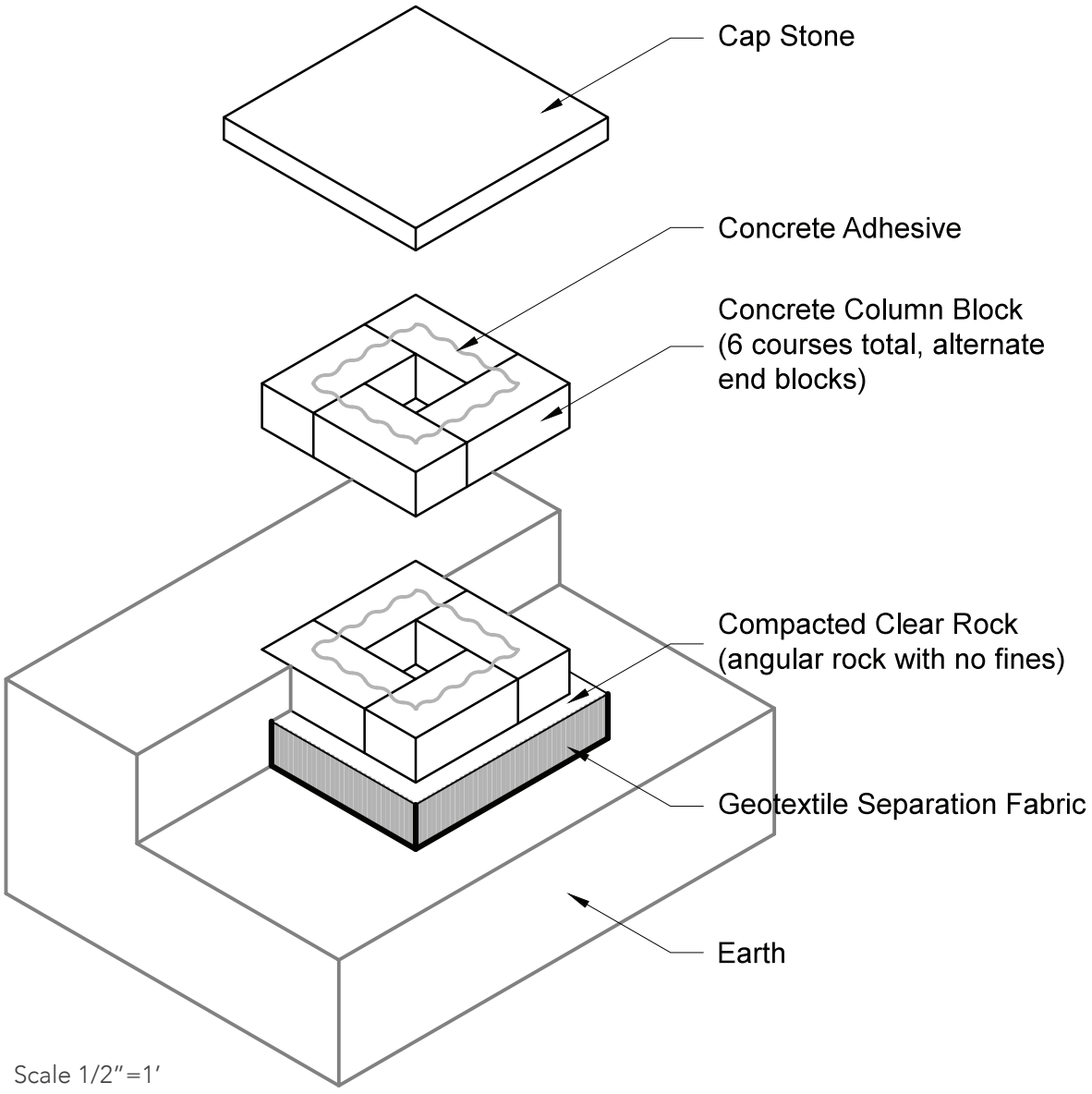
Let the veneer dry completely before backfilling with soil.

To complete the column, lay a cap stone on top of the column, the cap will be glued with concrete adhesive but it is best to lay the pieces out first and dry fit the cap stone before any adhesive is applied.

Seed or sod the area as needed.

Columns

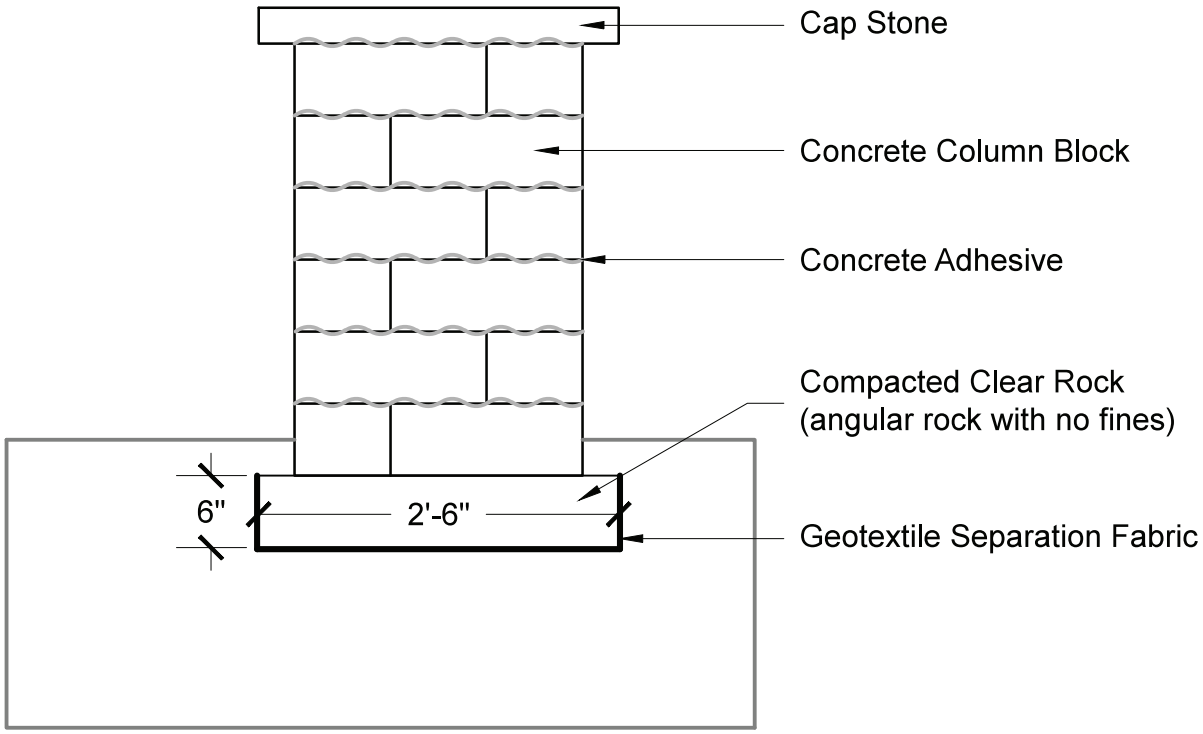
Flexible



Scale 1/2″=1′

Tools needed for a dry stacked concrete block column kit:

Marking paint
Caulking gun
Edging shovel
25 ft tape measure
5 lb dead blow
Torpedo level
2 ft level
8"x8" hand tamper
Utility knife
Square shovel
Wheelbarrow


Cap Stone
Concrete Column Block
Concrete Adhesive
Compacted Clear Rock
(angular rock with no fines)
6"
2'-6"
Geotextile Separation Fabric

Scale 3/4″=1′

Locate utilities before any digging occurs.

Determine the size of the column; most are 24 to 30 inches wide.

Use the marking paint to make an outline of the location of the column.

Excavate the area, dig 10 inches deep and 3 inches wider than the painted outline.

Lay geotextile separation fabric in the hole. The fabric should cover the bottom and all sides of the trench. When cutting the excess fabric off, leave extra on the sides to help prevent spillage of clear rock later.

Next fill the trench with 6 inches of clear rock (angular rock with no fines) and tamp firm with hand tamper. The level of the rock will be fine tuned as you lay the base course but a firm and solid base is important at this stage.

Once the hole is filled with clear rock, lay out the first course of block. Level each block individually in all directions, along with leveling each block with one another. It is important for the first course to be perfect because it affects the rest of the column. At least half of the first course of block should be buried.

Add concrete adhesive on top of the first course before stacking the second course (all courses from now on should not need to be leveled). Rotate the pattern of block 90 degrees so seems do not over lap with the course below or above.

Continue stacking block and adding concrete adhesive between every course until manufacturers maximum height if desired height has not been meet.

Finish the top of the column off by adding a cap stone to the top of the top course. The cap should also be adhered using concrete adhesive and should be centered on the top course.

Backfill the first course to match surrounding grade and seed or sod as needed.

S t a i r s / R a m p s

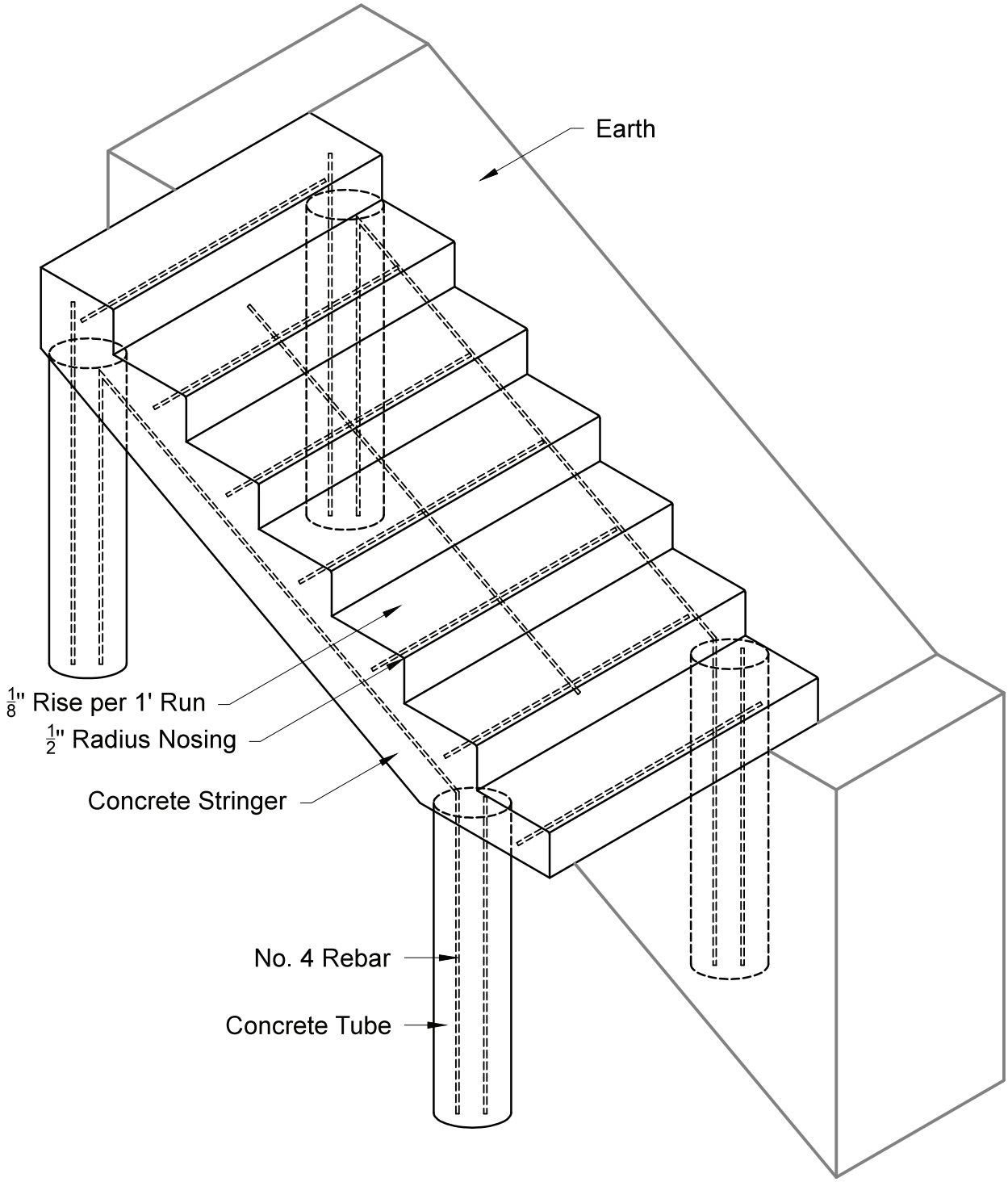
Ridged

Concrete | Veneered Stone | ADA Ramp

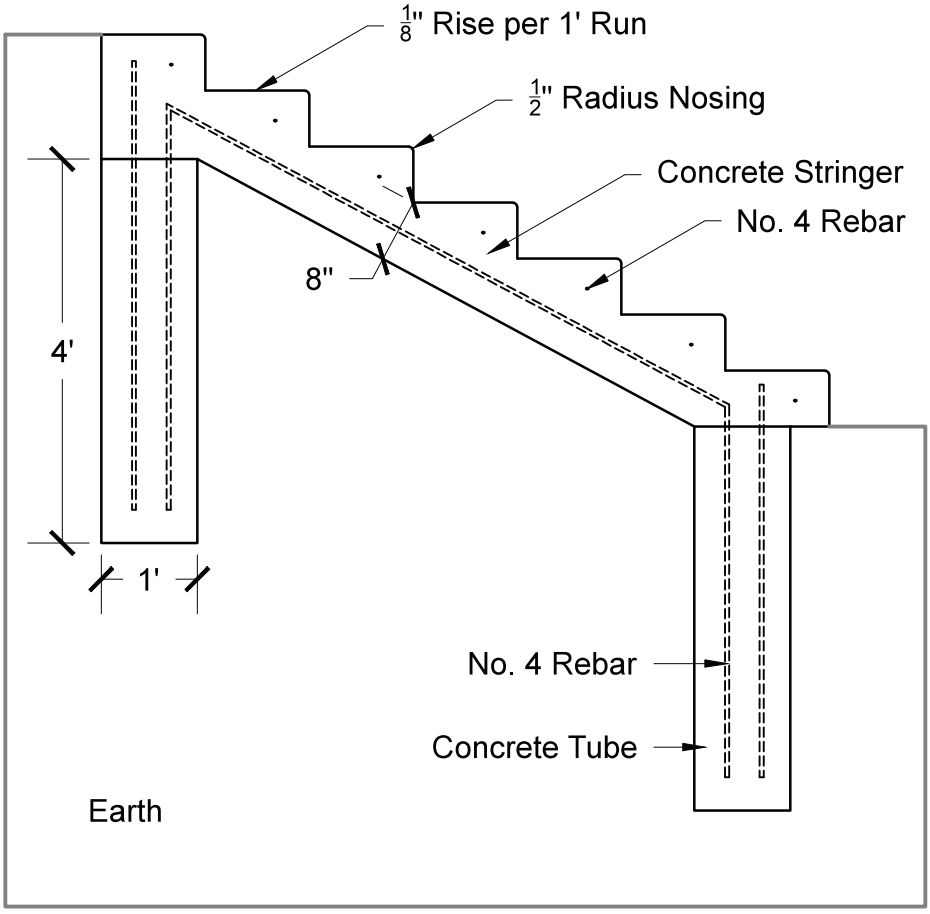
Stairs and ramps get you from point A to point B. Many building codes and standards regulate how stairs and ramps are built so there is consistency no matter where you go.

Tools needed for concrete stairs:

Marking paint
2 contractor grade wheelbarrows
Bull float
Concrete broom
2 magnesium hand floats
2 edgers
Hand maul
Bolt cutters
Sod cutter (if you have grass to remove)
Screw gun
Circular saw
4 ft level
Square shovel
25 ft tape measure
12" auger or post hole digger


Earth
1/8" Rise per 1' Run
1/2" Radius Nosing
Concrete Stringer
No. 4 Rebar
Concrete Tube

Scale 1/2″=1′


1/8" Rise per 1' Run
1/2" Radius Nosing
Concrete Stringer
No. 4 Rebar
8"
4'
1'
No. 4 Rebar
Concrete Tube
Earth

Scale 1/2"=1'

Locate utilities before any digging occurs.

Determine the location of the stairs and the location of the footings. Use the marking paint to mark where the footings are located.

Use a posthole digger or 12 inch auger to drill holes where the footings are located. The holes should be plumb, 4 feet deep and have a 12 inch diameter.

Place a 4 foot by 12 inch concrete forming tube in the hole. Place two 54 inch pieces of number 4 rebar in the hole and fill with concrete. While concrete is being filled, make sure rebar is evenly spaced and about 6 inches is sticking up past the top of the tube. Use the rebar or a shovel to get trapped air bubbles out of the concrete. Level the concrete with the top of the tube and let cure before next step.

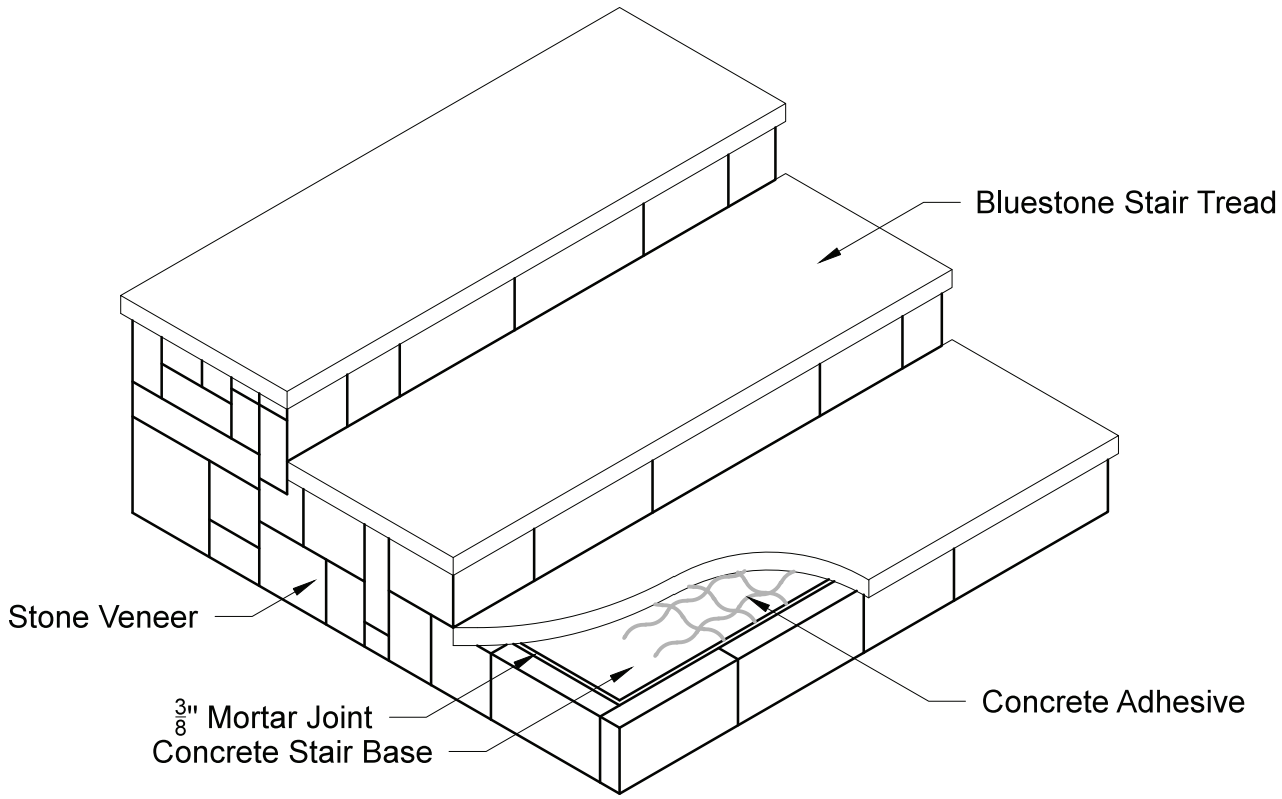
To determine an appropriate ratio for the riser and tread dimensions, use this formula: 2(riser)+1(tread)=27. Make a form out of 2 by wood for the stairs. Start by cutting out the sides of the forms. This should look like the outline of the stairs from the side. It is important that the sides are plumb and staked every 12 inches so the concrete does not push out the forms. Next add 2 by lumber to the face of the riser, these pieces should be the height of the riser. The treads should have a slight downward slope so water runs off, 1/8" rise per 1' is sufficient for water to run off.

Lay number 4 rebar under the form for the stairs. This rebar will have to be lifted up once concrete is being poured so it lays in the middle of the poured concrete and not at the bottom.

Pour concrete in the form starting from the bottom and working to the top step. Use a trowel or shovel to remove the air from the concrete and level the concrete even with the form. The stubbed up rebar in the concrete tubes should now be covered with concrete.

Once the concrete has started to firm up, use a edger to give the face of the stairs a slight curved edge. Then use a concrete broom to brush the tread to give the concrete texture so it is not slippery when wet.

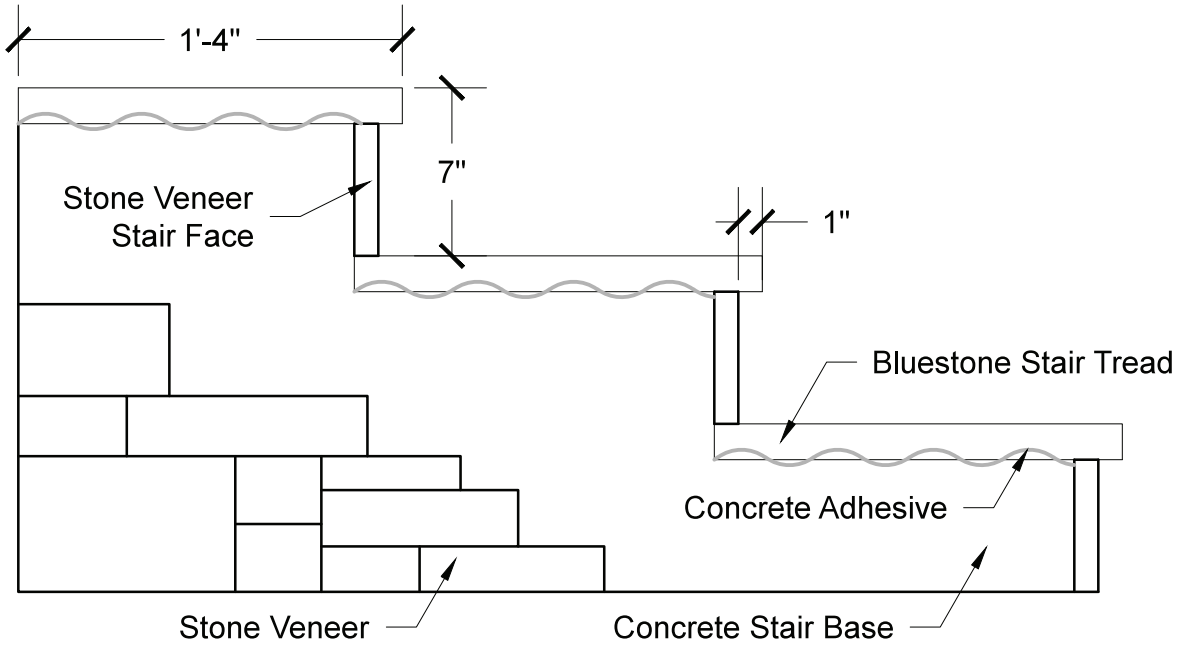
Let the concrete dry completely before removing the forms, this may be a few days.


Bluestone Stair Tread
Stone Veneer
3/8" Mortar Joint
Concrete Stair Base
Concrete Adhesive

Scale 3/4"=1'

Tools needed for veneered stairs:

Marking paint
Contractor grade wheelbarrows
Bull float
Concrete broom
2 magnesium hand floats
2 edgers
Hand maul
Sod cutter (if you have grass to remove)
Screw gun
Circular saw
4 ft level
Torpedo level
Square shovel
25 ft tape measure
Caulking gun
Wide blade masons chisel
3-5 lb hammer


1'-4"
7"
Stone Veneer
Stair Face
1"
Bluestone Stair Tread
Concrete Adhesive
Stone Veneer
Concrete Stair Base

Scale 1-1/2″=1′

Locate utilities before any digging occurs.

Know the thickness of the veneer you are using and the thickness of the stair tread. Make the concrete form for the stairs smaller than the actual dimensions to account for adding the materials later. To determine an appropriate ratio for the riser and tread dimensions, use this formula: 2(riser)+1(tread)=27. Make a form out of 2 by wood for the stairs. Start by cutting out the sides of the forms. This should look like the outline of the stairs from the side. It is important that the sides are plumb and staked every 12 inches so the concrete does not push out the forms. Next add 2 by lumber to the face of the riser, these pieces should be the height of the riser. The treads should have a slight downward slope so water runs off, 1/8" rise per 1' is sufficient for water to run off.

Lay number 4 rebar under the form for the stairs. This rebar will have to be lifted up once concrete is being poured so it lays in the middle of the poured concrete and not at the bottom.

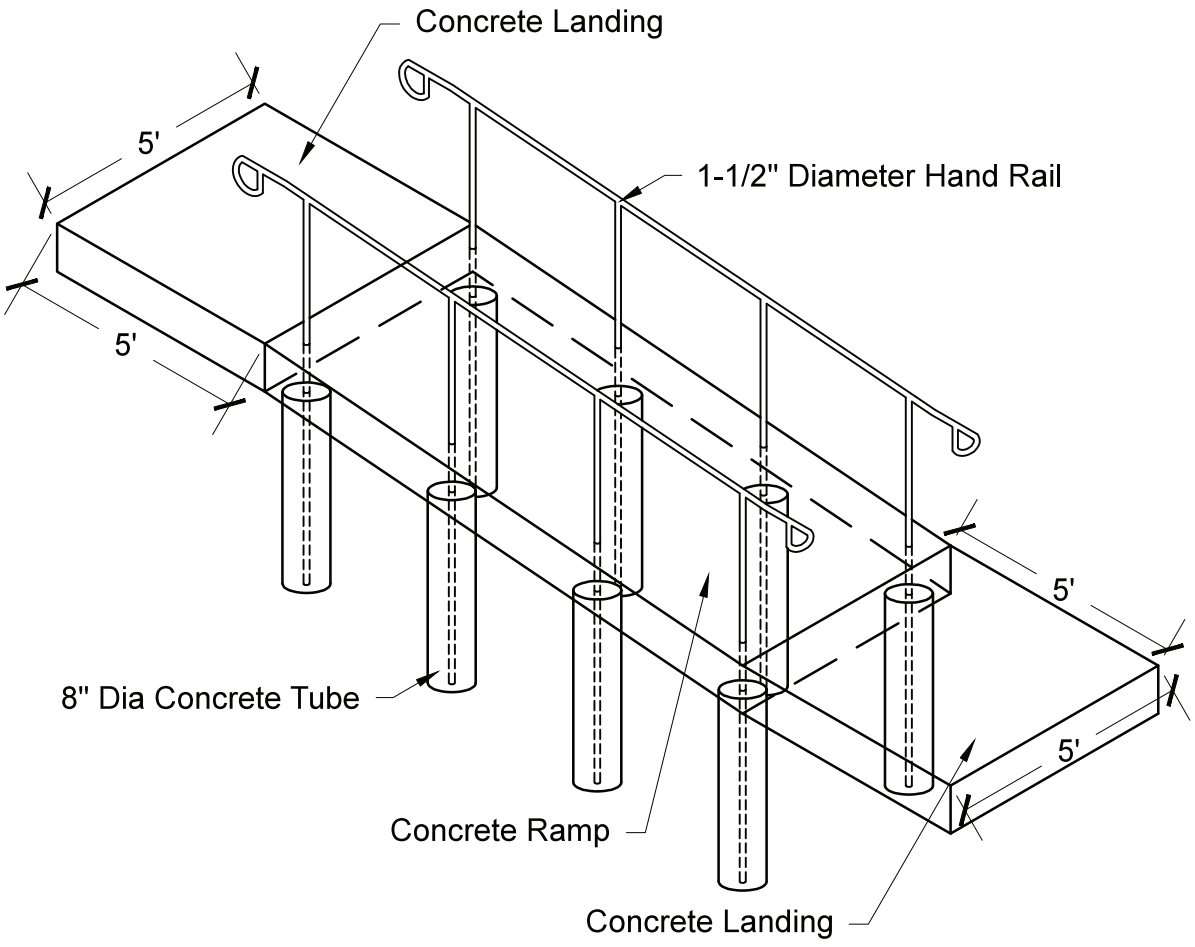
Pour concrete in the form starting from the bottom and working up to the top step. Use a trowel or shovel to remove the air from the concrete and level the concrete evenly with the form.

Let the concrete dry completely before removing the forms. This may be a few days.

Using type S mortar per manufacturers directions and veneer the natural stone to the concrete, start at the bottom and work your way to the top of the column. Some pieces may have to be broken with the chisel. Hammer to fit on the stair face or in smaller areas.

Lay the stair tread stone on the concrete step to ensure a god fit. Once a good fit is ensured, take the stair tread off and apply concrete adhesive to the concrete step per manufacturers directions and re-apply the stone stair tread. Apply pressure to confirm contact with the concrete step. Do not walk on the steps until the concrete adhesive is dry.

Seed or sod the surrounding area if needed.


Concrete Landing
5'
1-1/2" Diameter Hand Rail
5'
5'
8" Dia Concrete Tube
5'
Concrete Ramp
Concrete Landing

Scale 1/4"=1'

ADA ramps need to meet many specifications and codes regarding how they are built. It is best to check with local city codes before starting to build a ramp and to determine if a building permit is required. Here are some general guidelines to use when designing an ADA ramp:

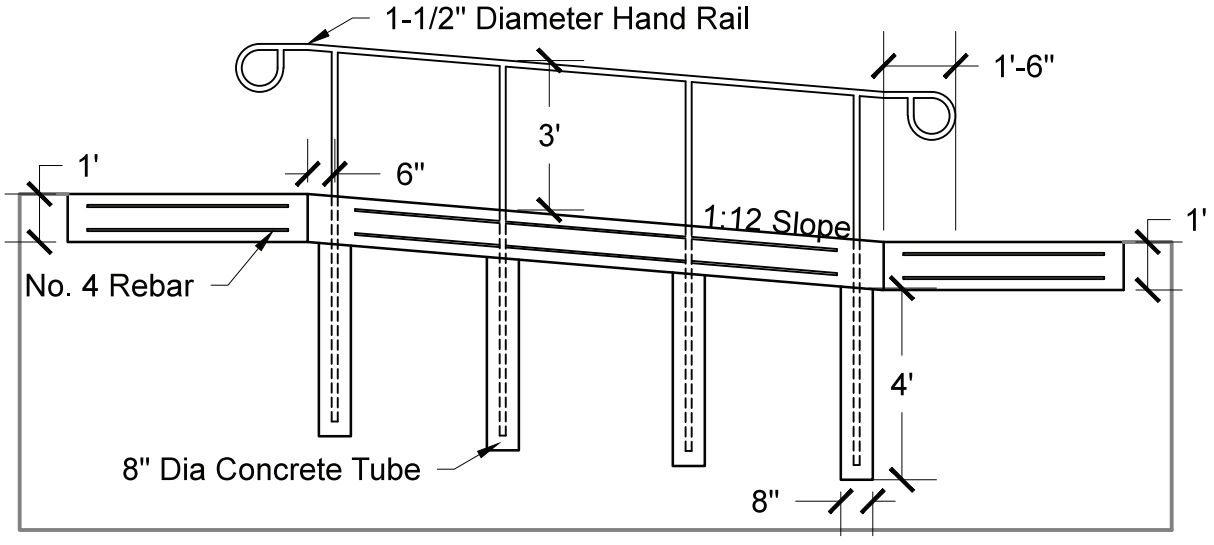
The slope should be 1:12 or less. A 1:12 slope is a 1′ rise over a distance of 12′.

The minimum width of the ramp should be 36″ and clear of any obstructions.

The landings should be at minimum as wide as the ramp. The length of the landing needs to be a minimum of 60″. The landing size for a switchback at minimum needs to be 60″ x 60″.

If the ramp has a rise greater than 6″ or a run longer than 72″, handrails are required on both sides of the ramp. The top of the handrail should be between 34-38″ above and parallel to the ramp surface. The diameter of the gripping surface of the handrail should be 1¼-1½″.

Outdoor ramps need to be designed so water does not accumulate on the walking surface of the ramp.

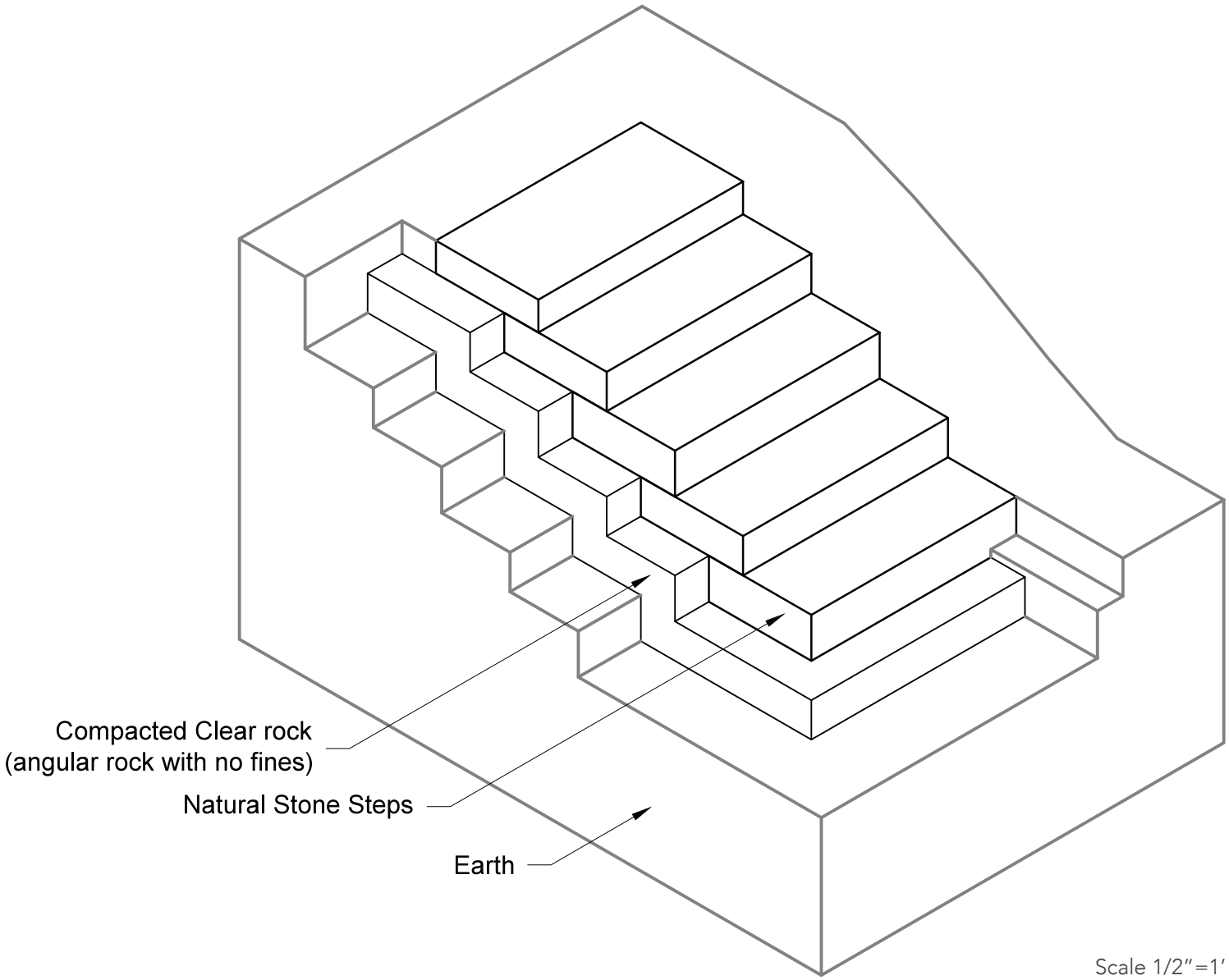


Scale 1/4″=1′

S t a i r s / R a m p s

Flexible

Concrete | Veneered Stone | ADA Ramp

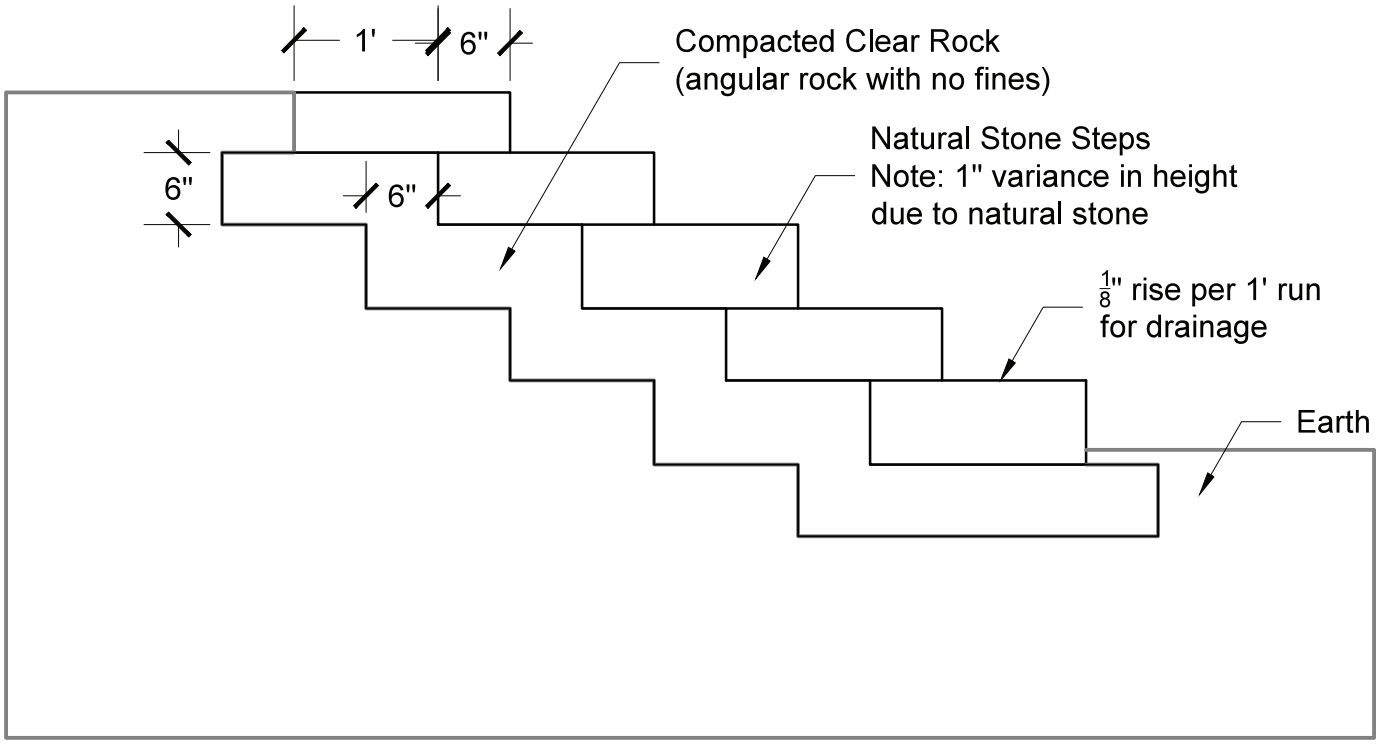


Scale 1/2″=1′

Dry Set Natural Stone

Tools needed for dry set natural stone steps:

Marking paint
Transit
2 ft level
4 ft level
Edging shovel
25 ft tape measure
5 lb dead blow
8”x8” hand tamper
Square shovel


1'
6"
6"
6"
Compacted Clear Rock
(angular rock with no fines)
Natural Stone Steps
Note: 1" variance in height
due to natural stone
1/8" rise per 1' run
for drainage
Earth

Scale 3/4"=1'

Dry Set Natural Stone

Locate utilities before any digging occurs.

Use the marking paint to make an outline of where the steps will be located.

The grade, the final height of the top step, and how many steps you need will determine the amount of excavation needed.

If the top step is meeting a fixed object such as a deck, driveway, or sidewalk, use the transit to determine where the first step needs to be so the final step ends up the correct height.

Excavate the area if needed so there are 6 inches of compacted clear rock (angular rock with no fines) under each step.

Start at the bottom step and work up towards the top step. Set one step at a time, the tread of the step should be slightly unleveled so water runs off the face; a good recommendation is 1/8" rise per 1' run.

The bottom step will determine how the rest of the steps lay out, so patience is key.

Once the bottom step is leveled in all directions, stack the second step on the first step; the steps should overlap about 6 inches. Make sure the slightly uneven slope of the tread is consistent.

While continuing to add steps until desired height, make sure steps are square to each other and an even tread face is consistent with ever step.

Continue to add steps until desired height is reached.

Backfill the sides and seed or sod the area as needed.

Edging

Flexible

Vinyl | Natural Stone | Natural Edge

Landscape edging can be flexible or ridged. Flexible edging moves with the freeze-thaw cycles where ridged edging does not. Certain edgings are better in certain situations. However all edgings have one purpose, to create a decorative border around a planting bed and to contain the groundcover from spilling out.

When buying vinyl edging, do not buy the inexpensive edging rolled up in most big box home improvement stores. You will not be able to get a straight edge with the rolled up edging and it will kink up. Landscaping supply stores supply contractor grade vinyl edging, and it comes in 20 foot straight pieces with steel stakes and connector pieces.

Locate utilities before any digging occurs.

Use the marking paint to make an outline of your landscaping bed.

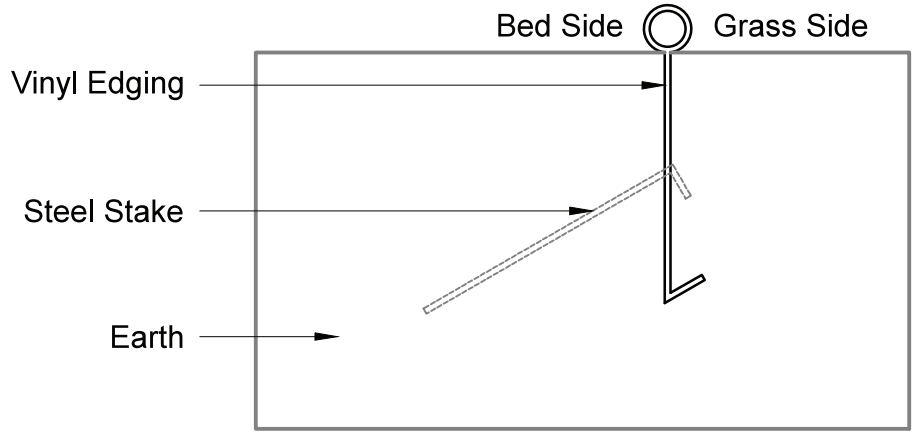
Following the painted line, dig a 6 inch deep trench with the edging shovel. Make sure there is a vertical edge along the grass side, while the inside edge on the bed side may be at an 45 degree angle.

Lay the vinyl edging in the trench with the "V" side on the bottom. The bottom of the circle should be even with the grade.

Pound stakes in the edging every 4 to 5 feet, stakes should be parallel to the ground.

Use the connector pieces to connect two pieces of edging together; make sure half of the connector is in each side of the edging and that it does not get pushed into only one side.

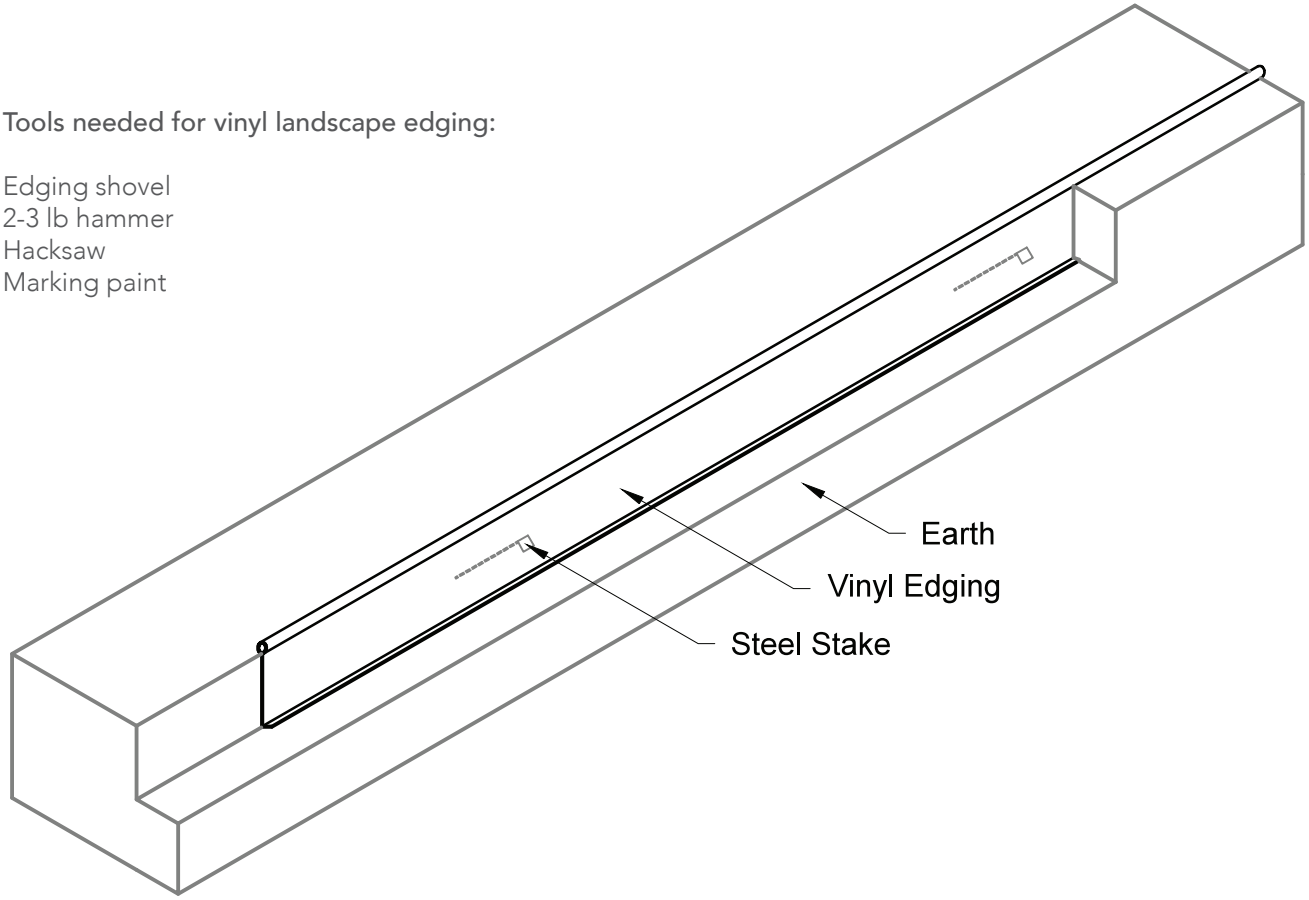
Backfill the vinyl edging so it is buried half way up the side (about 3 inches). Use your foot to stomp the dirt against the backside of the edging and to firmly secure the edging against the grass. Not filling the dirt to the top of the edging allows room for mulch or rock to pile up against the edging without spilling out into the grass.



Scale 3"=1'

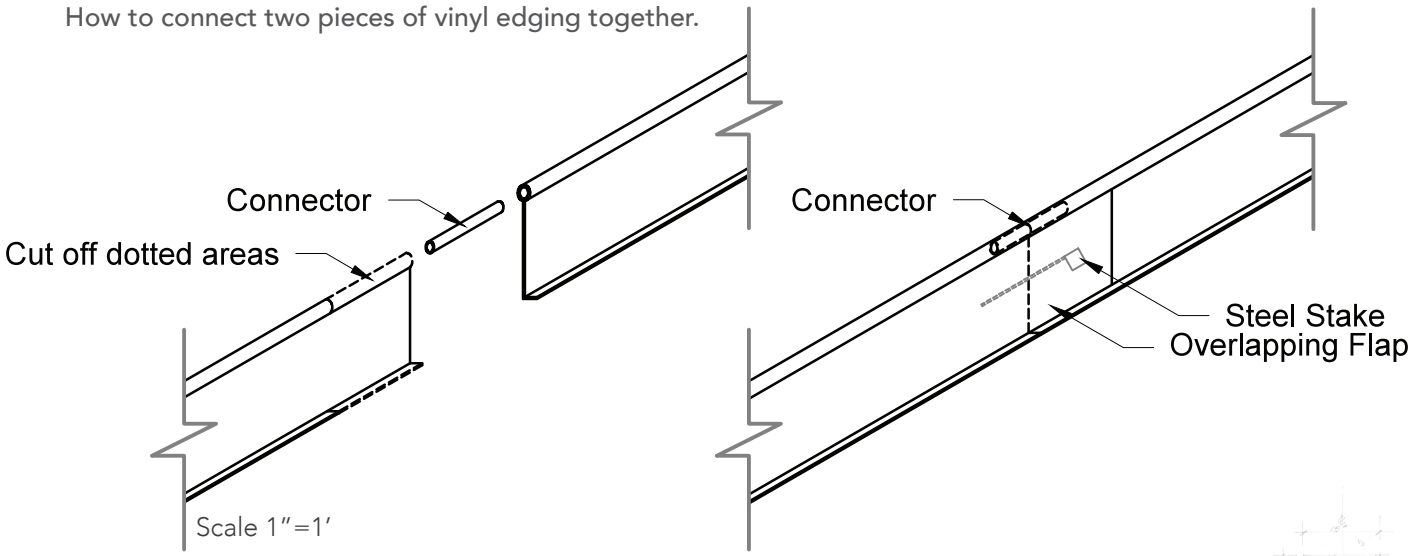
Tools needed for vinyl landscape edging:

Edging shovel
2-3 lb hammer
Hacksaw
Marking paint



Scale 3/4″=1′

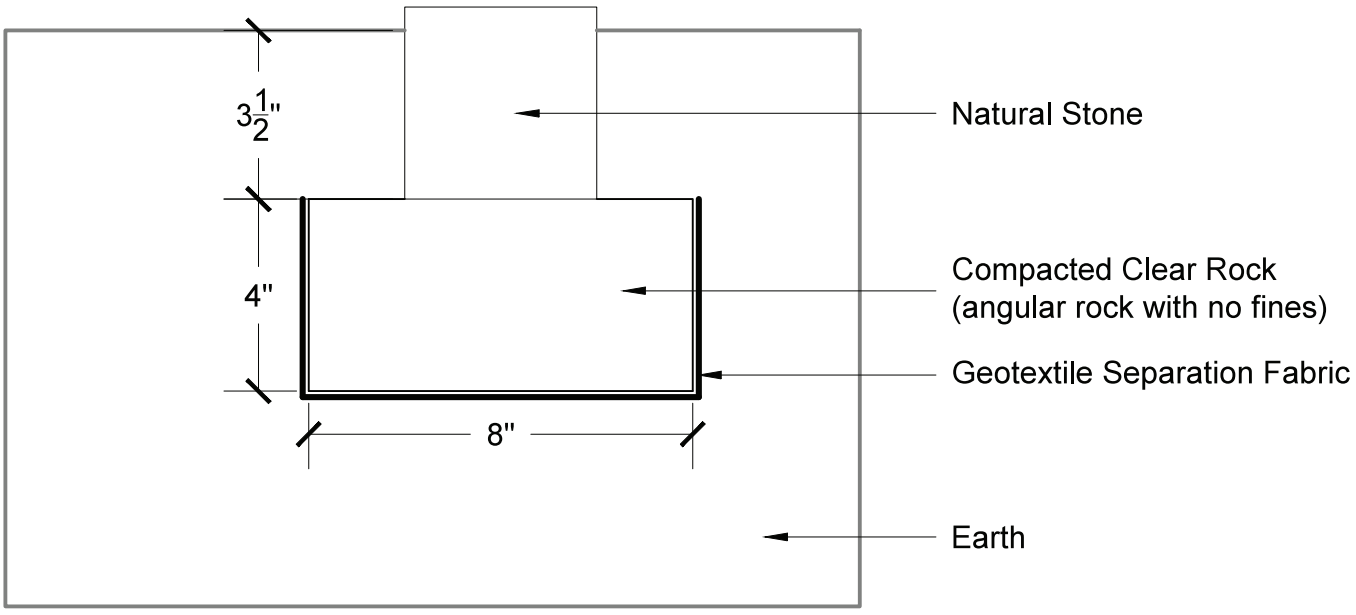
How to connect two pieces of vinyl edging together.



Scale 1″=1′

Tools needed for natural stone edging:

Marking paint
Edging shovel
String line
25 ft tape measure
2-3 lb hammer
5 lb dead blow
Wide blade chisel
8″x8″ hand tamper
Utility knife
Square shovel
Wheelbarrow



Scale 3″=1′

Locate utilities before any digging occurs.

Use the marking paint to make an outline of your landscaping bed.

Most natural stone edging or pre made concrete edging is 4 inches thick. I would recommend to bury at least 3 inches of the edging. If you would like to see the edging for a more decorative look; make the top about an inch above the grade. If you would like the edging to be flush with the grade and be able to drive the lawn mover right over it, make the top of the edging even with the grade. The choice of edging height on natural stone or pre-made concrete edging is based on what you think looks best.

After determining the height of the edging, dig along the painted line using the edging shovel. The trench should be 8 inches wide. It should be 4 inches deep plus the height of the portion of stone that gets buried (7-8 inches deep total).

Lay geotextile separation fabric along the trench. The fabric should cover the bottom and both sides of the trench. When cutting the excess fabric off, leave extra on the sides to help prevent spillage of clear rock later.

Next fill the trench with 4 inches of clear rock (angular rock with no fines) and tamp firm with hand tamper. The level of the rock will be fine tuned as you lay the edging pieces but a firm and solid base is important at this stage.

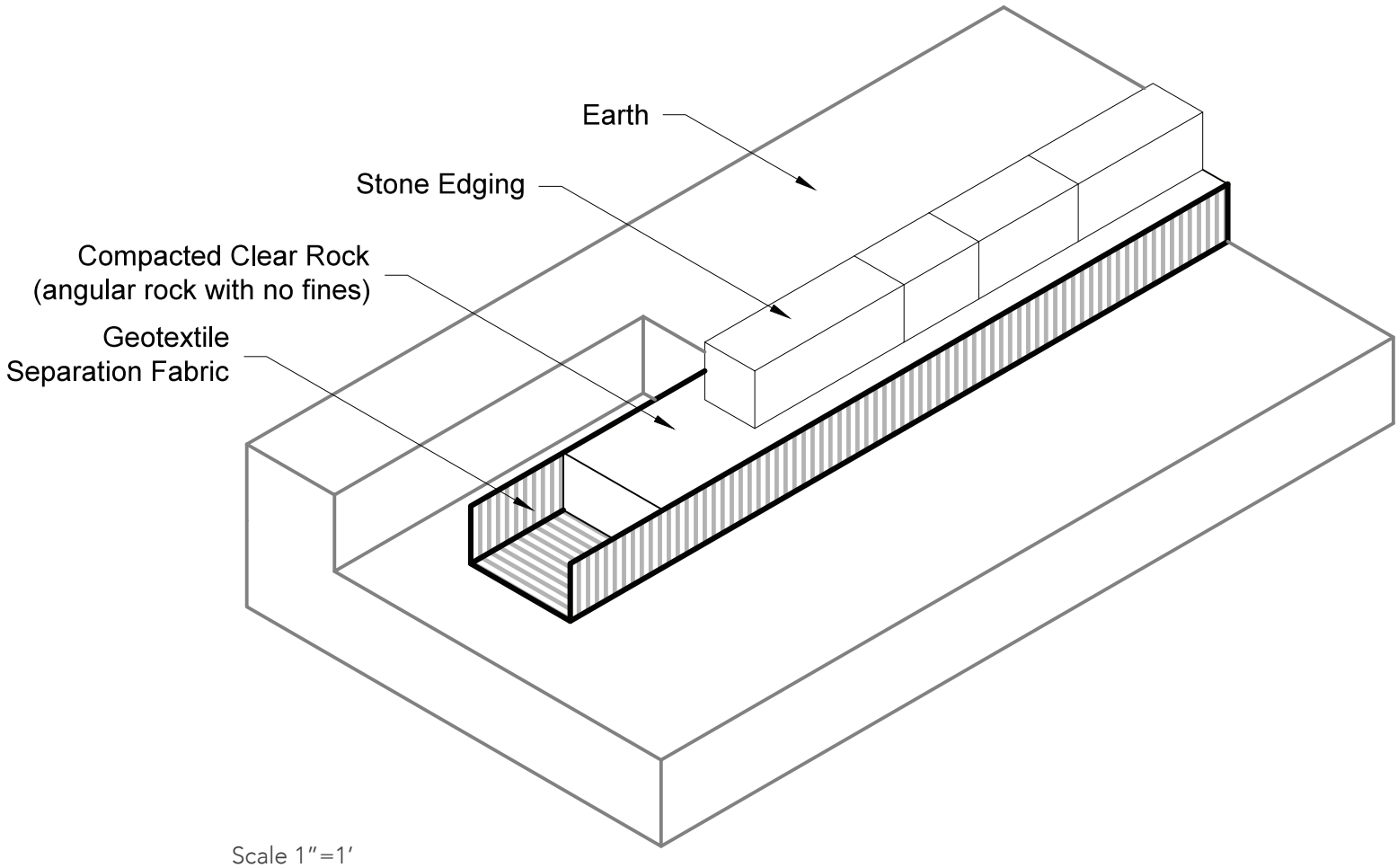
The geotextile fabric and 4 inches of clear rock help prevent grass roots from going under the edging into the planting bed.

Once the trench is filled with clear rock, start at one end and work your way in one direction around the planting bed. Laying a natural stone edging takes a lot of time and patience.

Lay a stone on the clear rock, make sure it is at the desired height and level with the grade. Use a string line if there is a long straight edge of stone. Lay one stone at a time and using the dead blow pound the stone into the clear rock so no future settling takes place. If the natural stone comes in various lengths, make sure to mix up the pieces when laying the edging. Use shorter pieces to make tight curves and longer pieces on longer curves or straight edges. The stone can be broken with the hammer and chisel to a specific length to fit up against a fixed object (house, driveway).

When all the stone edging is laid, it can be backfilled on both sides. On the inside of the planting bed, do not backfill all the way to the top of the stone, leave room to hold back the groundcover such as mulch or rock. On the grass side, backfill to desired height depending on how much stone you want to see.

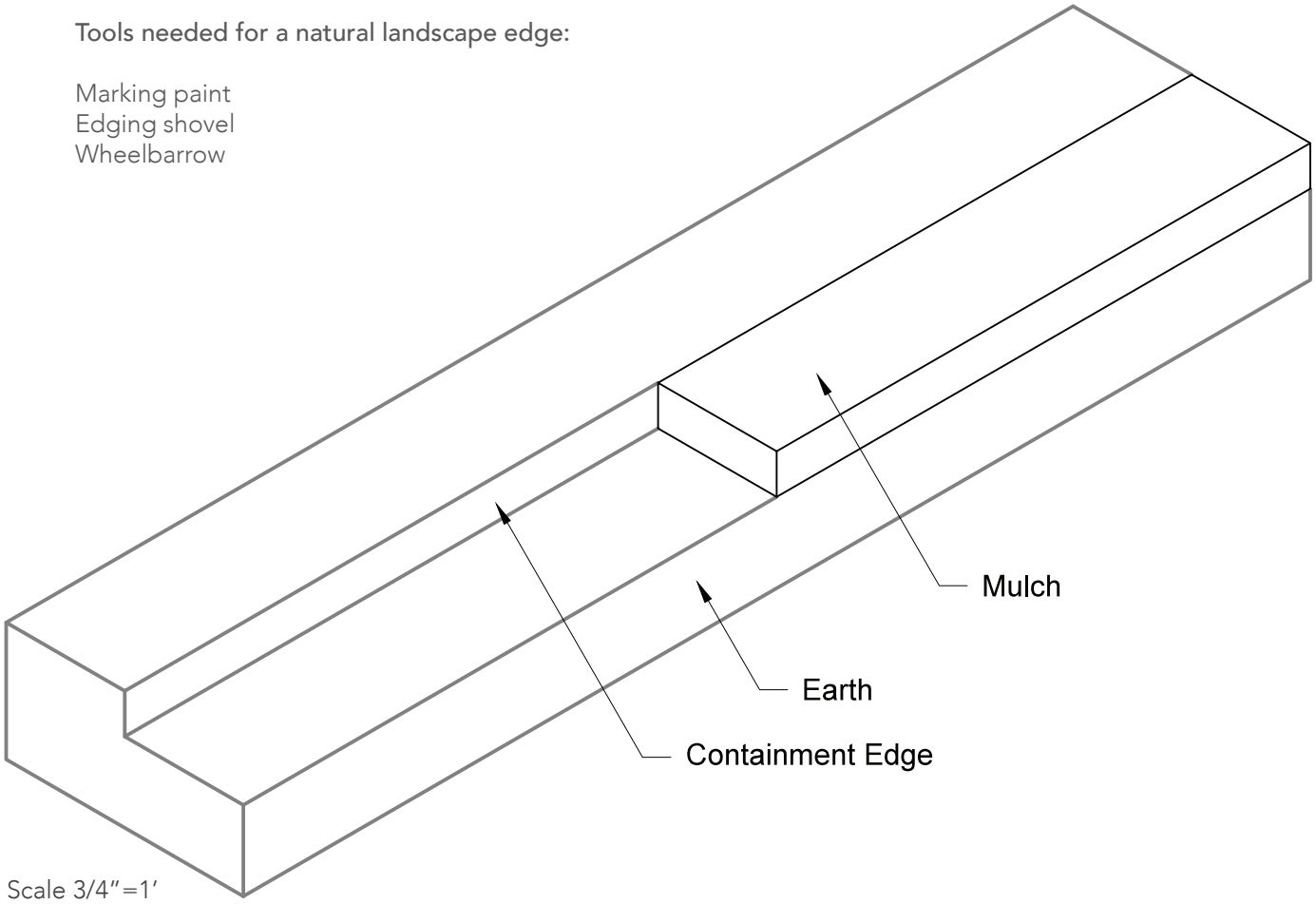
Seed or sod as needed.


Earth
Stone Edging
Compacted Clear Rock
(angular rock with no fines)
Geotextile
Separation Fabric

Scale 1″=1′

Tools needed for a natural landscape edge:

Marking paint
Edging shovel
Wheelbarrow



Scale 3/4″=1′

Locate utilities before any digging occurs.

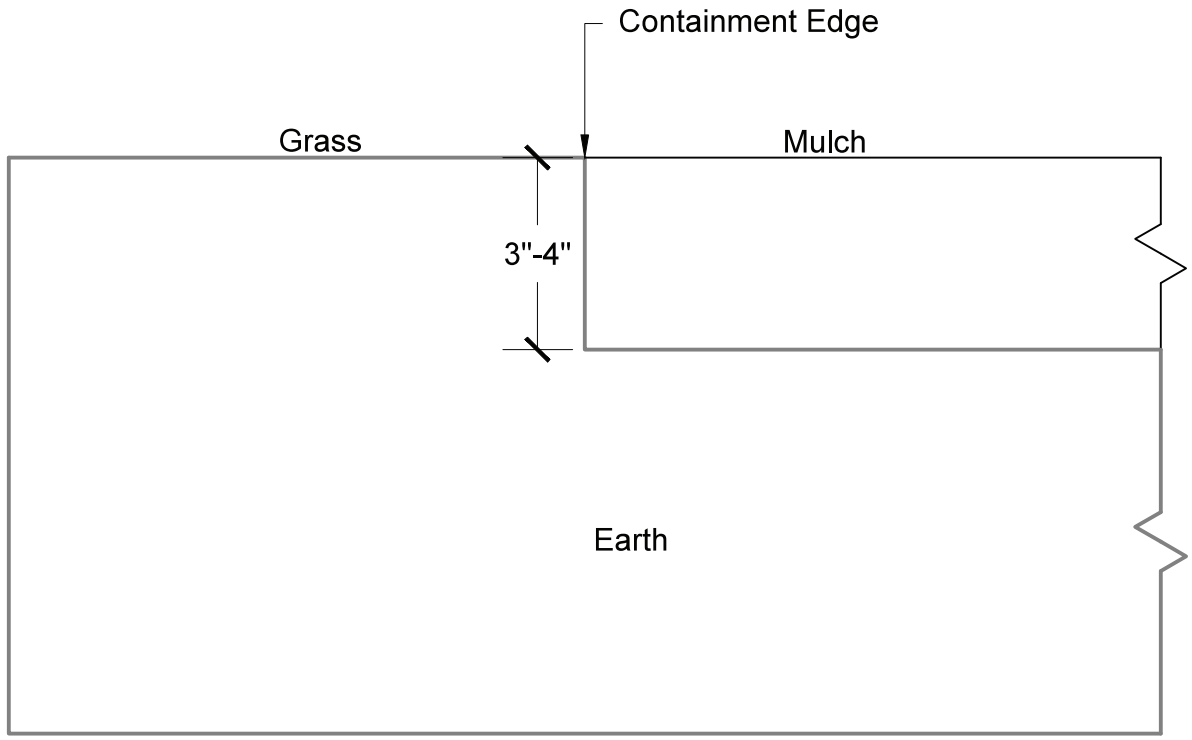
Natural landscape edging is commonly used around trees because typically edging around trees pops up and becomes uneven from the tree roots. A natural edge is only recommended for use with a mulch planting bed.

Use the marking paint to make an outline of your landscaping bed.

Following the painted line, dig a 3-4 inch deep vertical containment edge with the edging shovel. This edge will contain the mulch in the planting bed. The depth of the containment edge can vary depending on near by roots. Depending on the size and location of the tree roots, they may be cut or left in place and worked around.

Remove the sod from inside the planting bed; this is important so grass does not grow inside the planting bed in the future.

Once the edging line is made and the sod is removed from the planting bed fill in the planting bed with mulch. Keep a clean edge along the containment edge. Stepping on the mulch along the edge can pack it down and help lock it together.

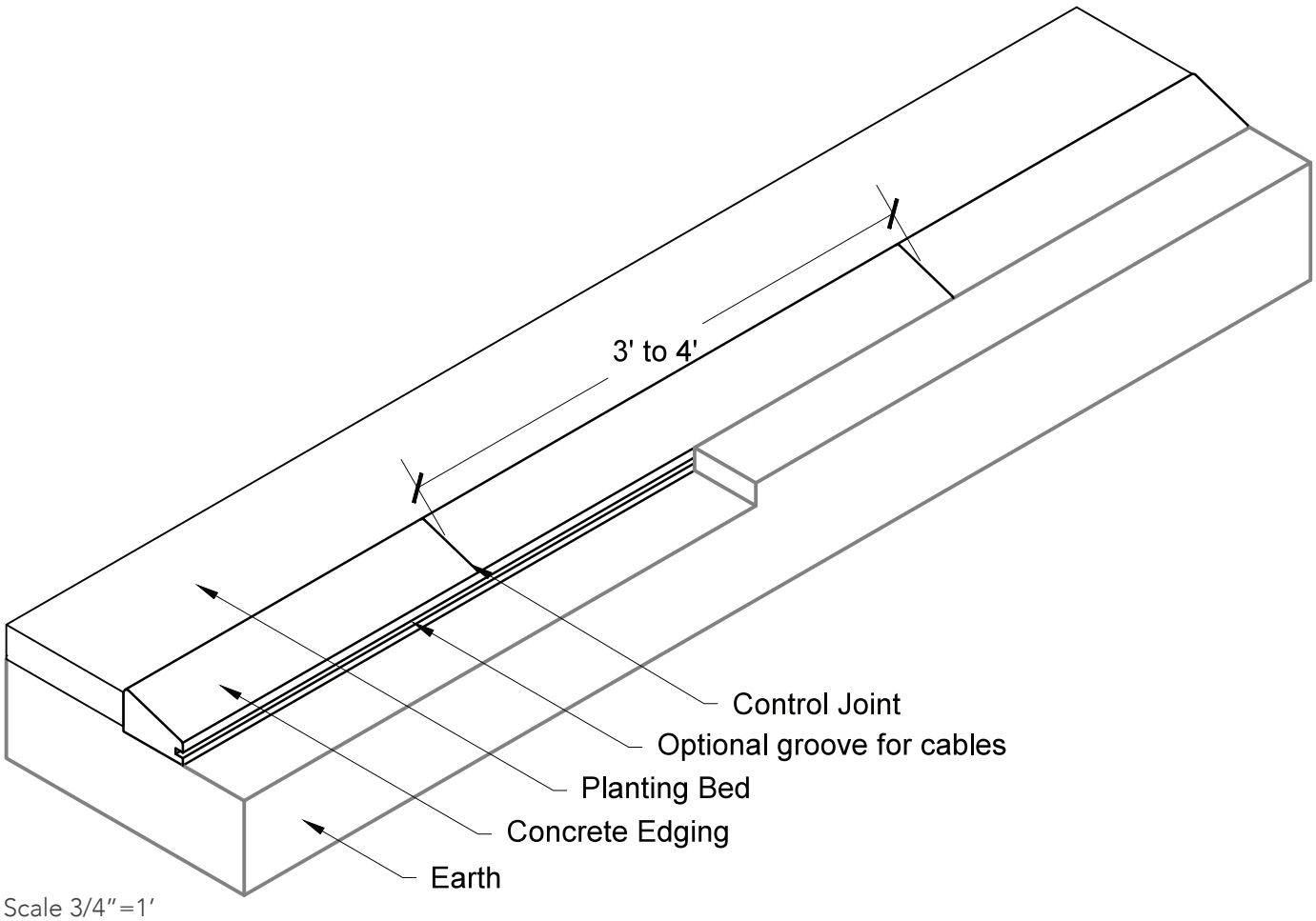


Scale 3″=1′

E d g i n g

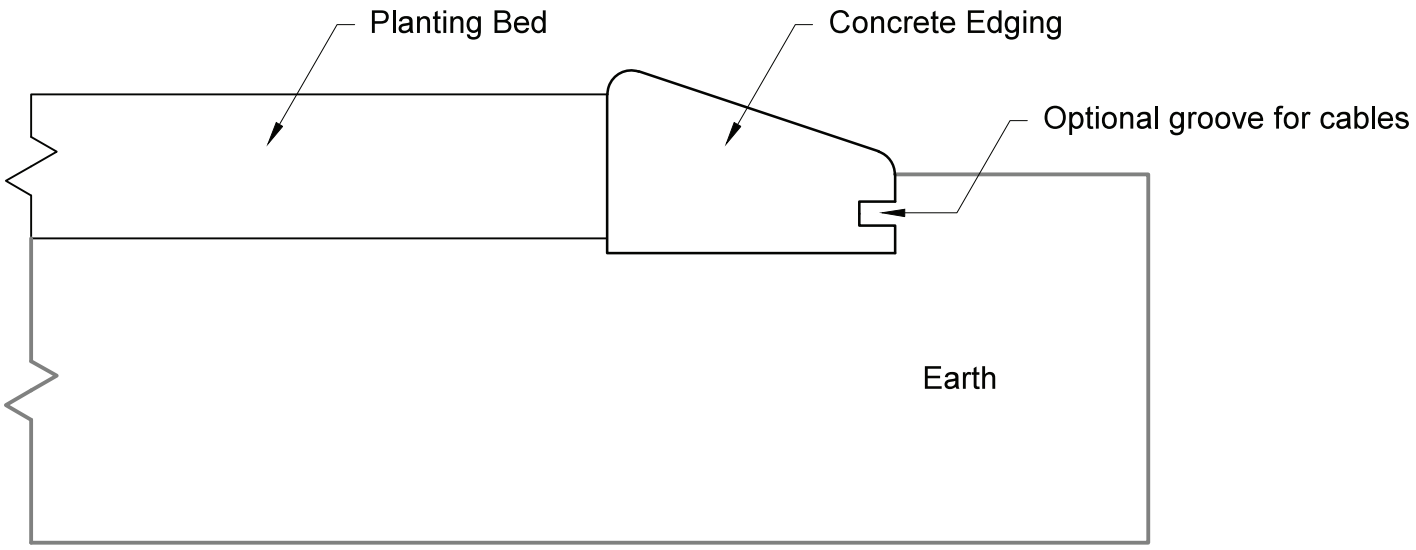
R i g e d

Vinyl | Natural Stone | Natural Edge

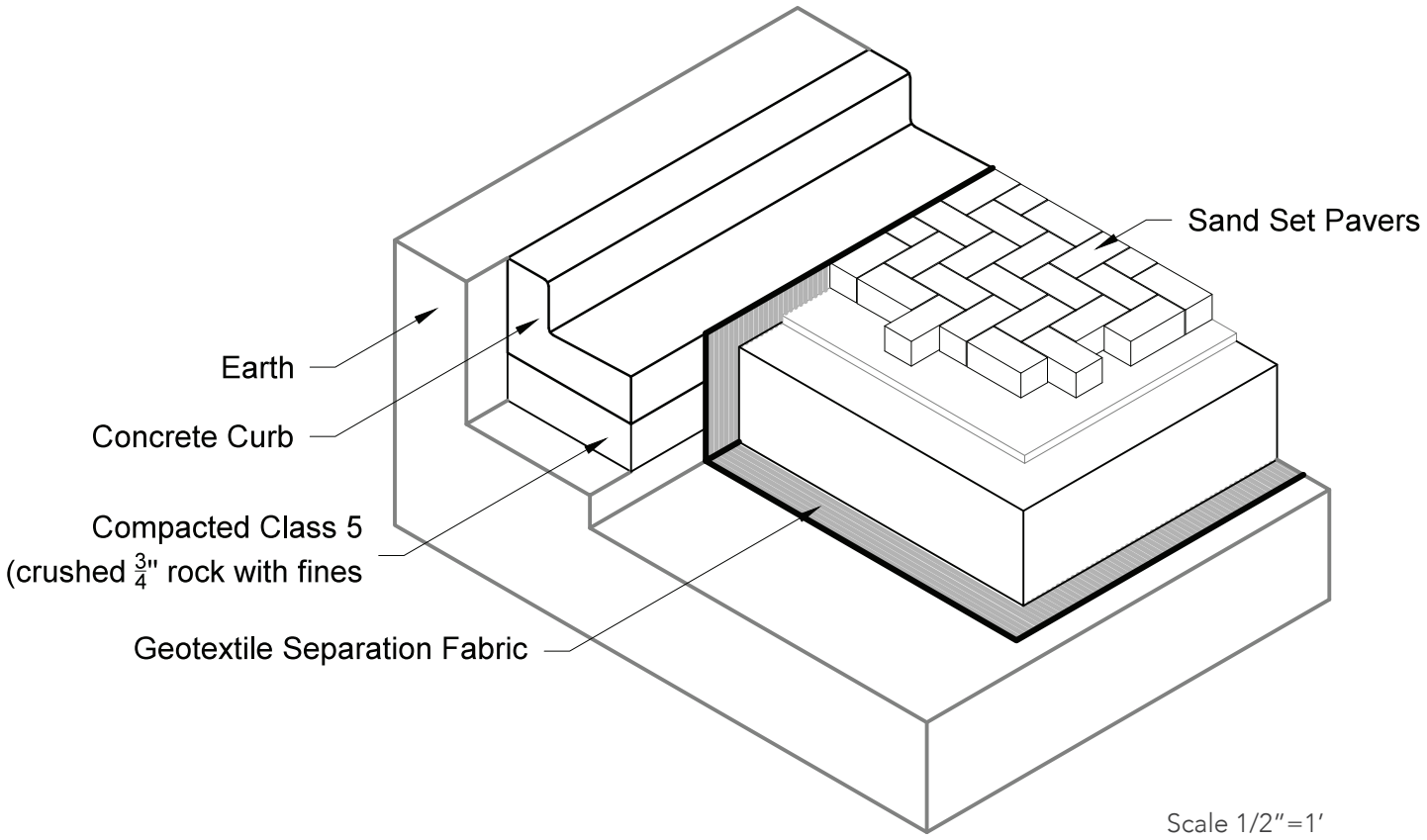


Scale 3/4″=1′

Concrete landscape edging requires a special machine, tools and skills. For the best results, I would recommend calling a contractor if you would like concrete edging installed in your landscape. Concrete edging does not disturb the existing landscape, which is why is it so popular. The edging can be made in many shapes, colors, textures, and finishes. A groove can also be cut into the edging so cables, wires, or fiber optics can be hidden inside and out of the way. Hiding wires and cables for landscape lighting in the concrete edging can prevent future cuts of the wire when digging in the surrounding area.



Scale 3″=1′

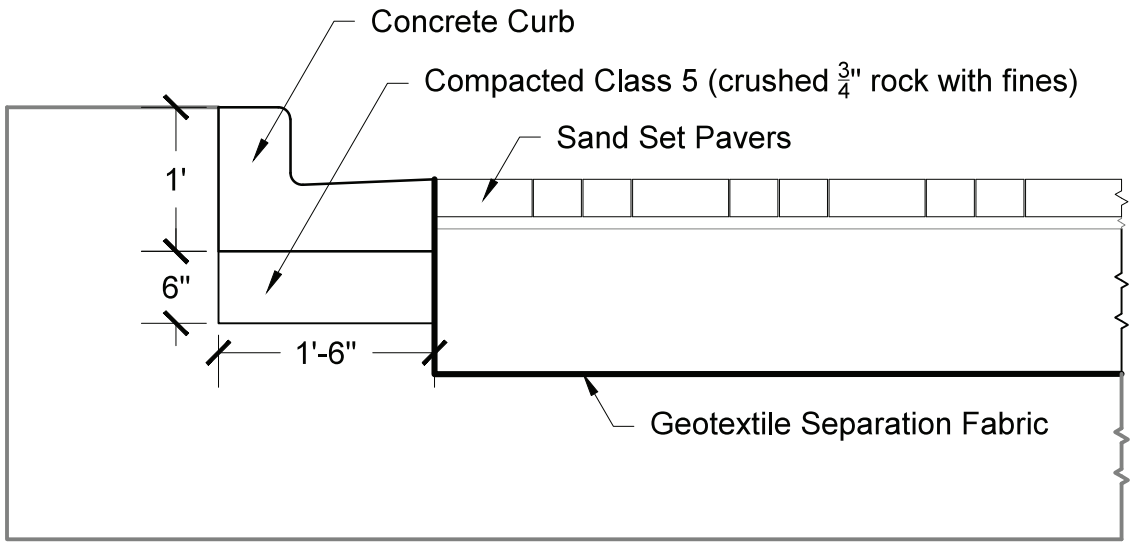

Sand Set Pavers
Earth
Concrete Curb
Compacted Class 5
(crushed ¾" rock with fines
Geotextile Separation Fabric

Scale 1/2″=1′

Concrete Curb

Curbs and gutters need to be installed with a curb machine. It is recommended to call a contractor to consult about the services required. Curbs have many different functions. They separate the road from the roadside, and discourage drivers from driving on the sidewalk or on lawns. Curbs also direct runoff water to gutters.

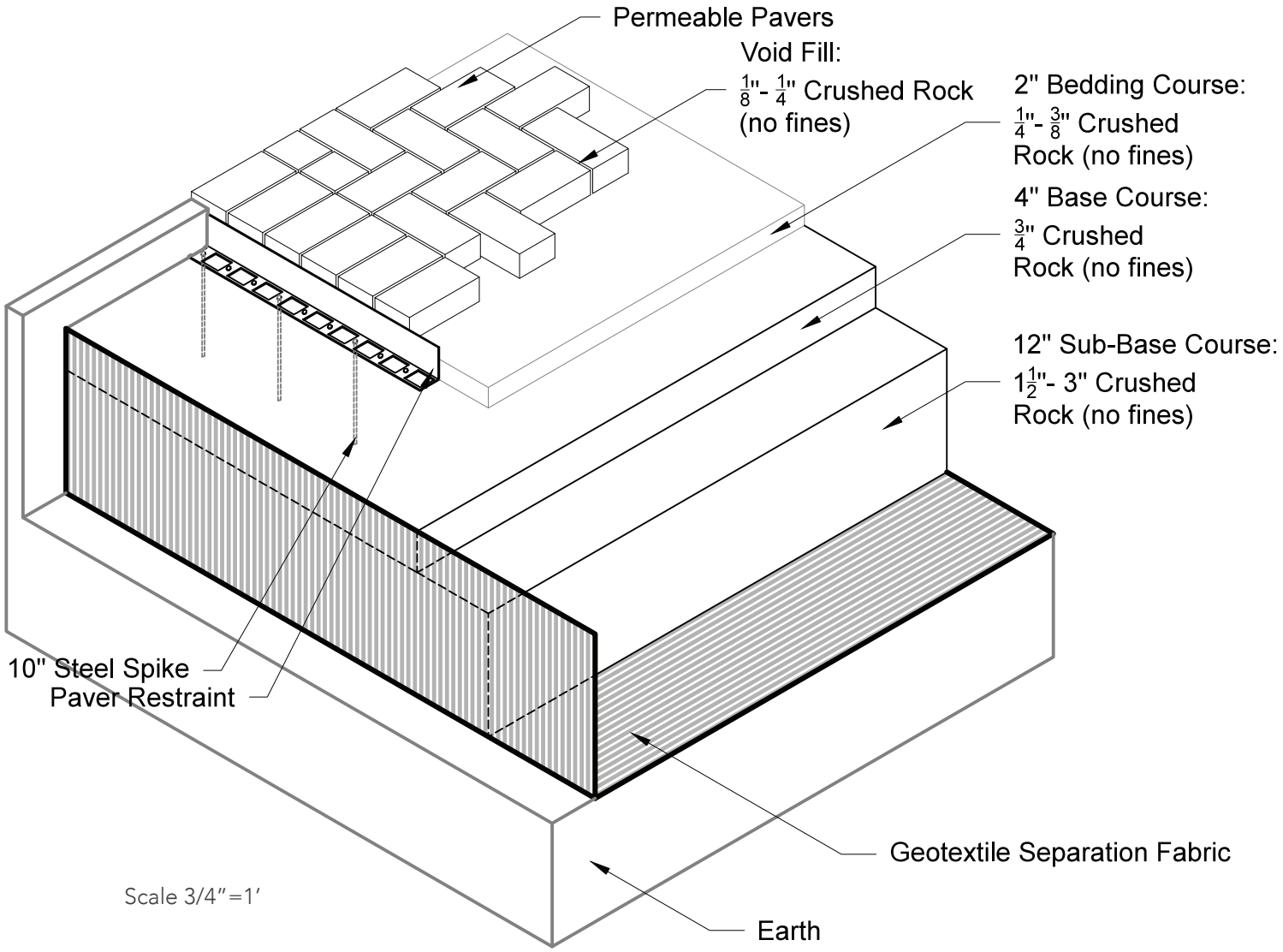
In a residential setting, there is typically curbing along the road in front of the house. The driveway and lawn connect to the curbing. The detail drawn on this page shows how a curb and sand set paver driveway should connect. The transition from the concrete curb to the concrete pavers takes the most abuse from traffic. Adding a geotextile separation fabric under the concrete pavers and vertically in between the curb and pavers strengthen this weak zone. Because the soils under curbs are usually not compacted, undermining of the paver sub base is the number one cause of failure in this area. Geotextile separation fabric eliminates any possible undermining. The geotextile fabric also helps hold the weight transfer from the curb to the pavers. When laying the fabric out, leave plenty overhanging on the top edge. After completion of the project, the remaining fabric can be cut with a utility knife or burned with a butane torch.



Scale 3/4″=1′

S u s t a i n a b l e

Sustainable landscapes are responsive to the environment. They contribute to health communities and a healthy environment. Sustainable landscapes sequester carbon, clean the air and water, increase energy efficiency, restore habitats, and create value through significant economic, social and, environmental benefits.



Scale 3/4"=1'

Tools needed for permeable paver installation:

Marking paint
Transit
Wide blade chisel
3-5 lb hammer
Masons string (twine)
Stiff bristle street broom
3-5 lb mallet
2" diameter screed guides (pipe, wood, etc.)
Sand screed board 6-8' Length of a 2"x 4" or 2"x 6"
3hp to 5hp plate compactor (not a jumping jack)
Masonry saw with diamond blade or a paver splitter
Small pry bar
4 ft Level
Speed square
Wheelbarrow
Trowel
Flat shovel
Marking crayon or red pencil
Hard tooth garden rake
Chalk line
25 ft tape measure

Determine where the paver patio is going to go and use the marking paint to layout the shape of the paved area.

Locate utilities before any digging occurs.

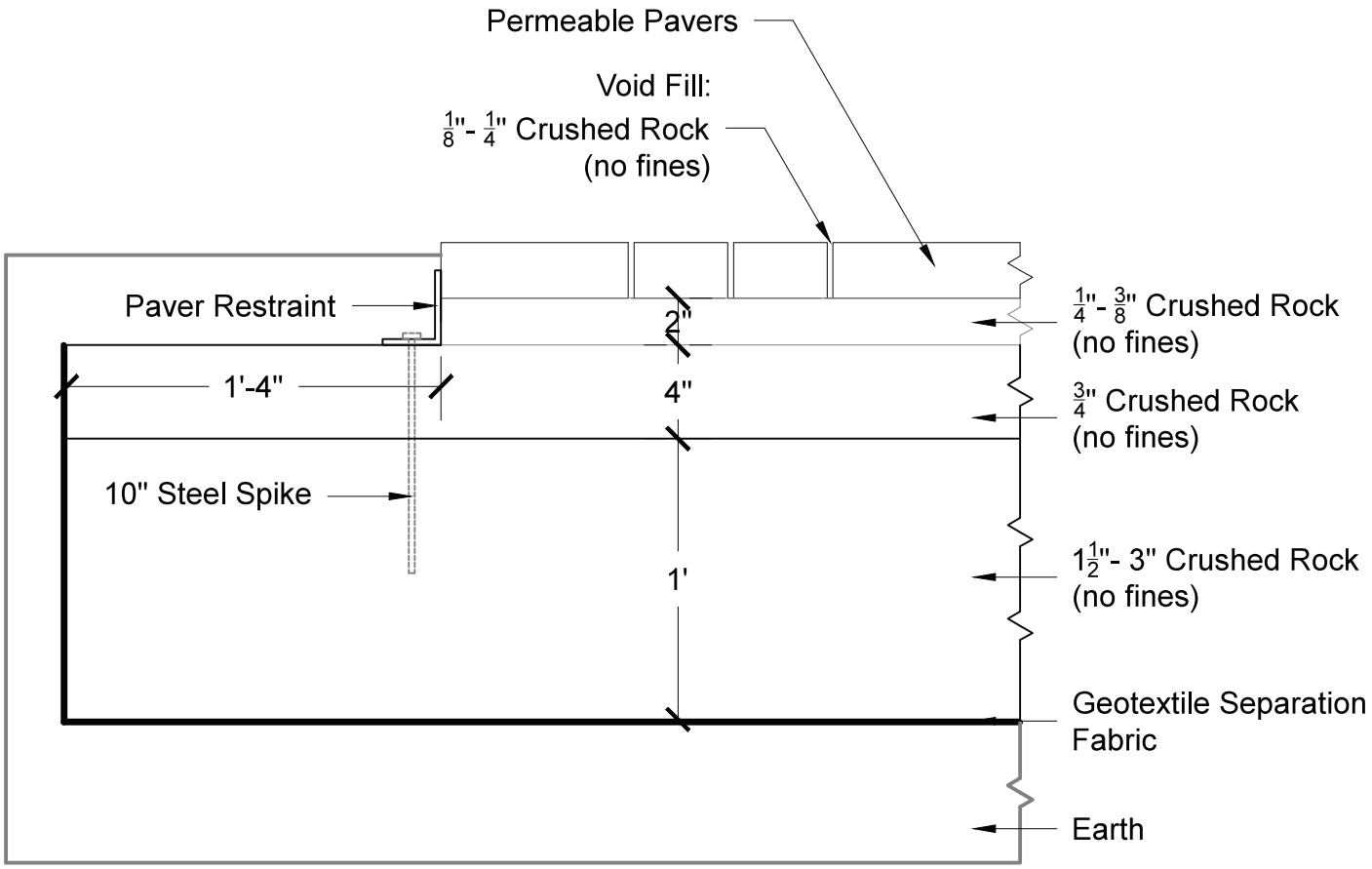
If hand digging, make sure to use a square shovel to keep the soil firm at the bottom. To determine the depth you need to excavate, take 12" of sub-base material, plus 4" of base course material, plus 2" of a bedding course, plus the thickness of the pavers you are using (typically 2-3/8" in a residential setting) totaling 20-3/8". The pavers should be .5" above finished ground height to allow for settling and tamping in later stages. You also need to over excavate an extra 16" past your painted guideline.

The use of a transit can help to make sure you have a level hole dug.

Once excavation is complete, inspect the hole for large boulders and organic material, remove if any and replace with clean fill and compact with plate compactor.

Geotextile separation fabric should be laid down in the hole and cover the entire bottom and go up along the sides to keep the sub-base and base courses contained and not contaminated with soil. The fabric should be overlapped by 12" and there should be no wrinkles in the fabric.

For the sub-base course, clear rock (1½"- 3" angular rock with no fines) should be brought in and tamped with two passes in 2"- 4" increments depending of the size of your tamper. Repeat this step until you have 12" of a solid base. If there is any unevenness in the base, use the hard tooth garden rake to try evening out the area.


Permeable Pavers
Void Fill:
1/8"- 1/4" Crushed Rock
(no fines)
Paver Restraint
1'-4"
10" Steel Spike
2"
4"
1'
1/4"- 3/8" Crushed Rock
(no fines)
3/4" Crushed Rock
(no fines)
1 1/2"- 3" Crushed Rock
(no fines)
Geotextile Separation
Fabric
Earth

Scale 1-1/2″=1′

For the base course, clear rock (3/4" angular rock with no fines) should be brought in and tamped with two passes in 2"- 4" increments depending of the size of your tamper. Repeat this step until you have 4" of a solid base. If there is any unevenness in the base, use the hard tooth garden rake to try evening out the area.

Next take your screed guides and place them on the bedding course 4'- 6' apart and parallel to each other. Make sure they are level to each other but slope the direction you want the water to run that does not filtrate through. The slope should be .5%-2% for adequate water drainage. Using a few shovels of 1/4"-3/8" clear rock, make sure the screed guides are firmly in place and will not move (usually one shovel on each end of the screed guide is sufficient). Shovel the 1/4"-3/8" clear rock in between the screed guides and use the screed board to level the 1/4"-3/8" clear rock between the screed guides. Do not worry about any voids the guides or board cause, you will fill them with ¼"-3/8" clear rock and a smooth with a trowel as you lay the pavers.

Start laying pavers from a permanent edge such as a driveway or house (NOTE: it is okay if the height of the pavers are less than 1/2" higher than the permanent edge, they will be tamped and settled into place later making the transition perfect). Work in rows and lightly lay the paver onto the 1/4"- 3/8" clear rock. Make sure they are in a straight line; you can use the chalk line to help with this or use the small pry bar to correct this. The joints between the pavers should be between 1/8"- 1/4" depending on the pavers being used.

Gaps greater than 3/8" need to be filled with a cut paver. Mark a paver with a crayon or red pencil and cut using a masonry saw with a diamond blade or a paver splitter. If using a masonry saw, the pavers may be wet or dry cut.

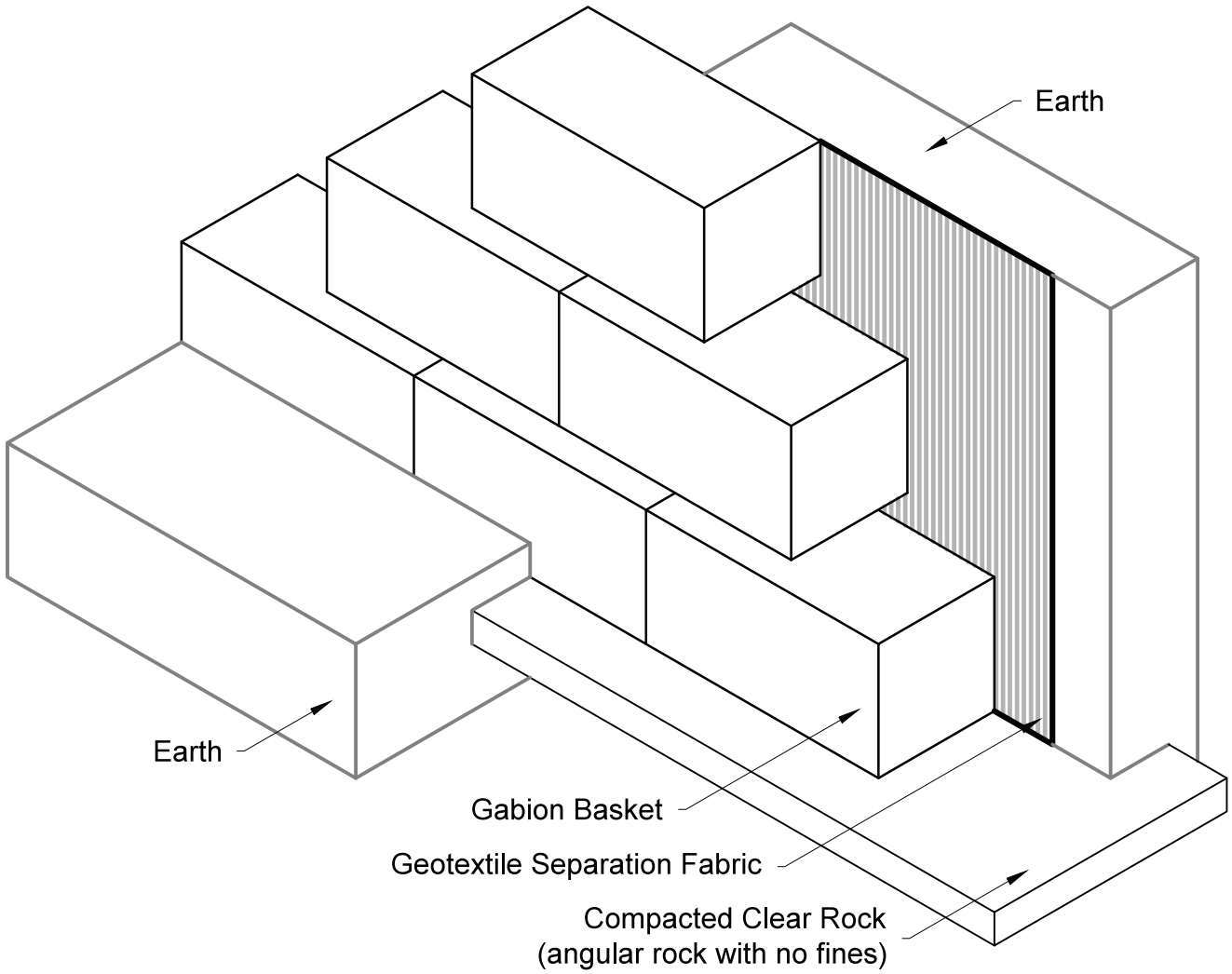
Install paver restraint edging along the edge of the pavers. The paver edging should sit on the base course so remove any spillage of the bedding course if necessary. With the paving restraint firmly against the pavers, drive 10" steel spikes into the paver restraint. On straight paver edges, the spikes need to be put in every third hole. On a curved paver edge, spikes need to be in every other hole.

Once all the paver restraints are installed, use the vibratory plate compactor to tamp the pavers into place. The pavers will settle up to 1/4". Make two passes with the vibratory plate compactor.

Use 1/8"- 1/4" clear rock to sweep into the paver joints, alternate between sweeping and tamping to work the clear rock into all the joints completely.

Sweep off all excess crushed rock.

Backfill edges with topsoil and seed or sod the area.


Earth
Earth
Gabion Basket
Geotextile Separation Fabric
Compacted Clear Rock
(angular rock with no fines)

Scale 3/8″=1′

Tools needed for gabion basket retaining wall installation:

Marking paint
Transit
Utility knife
Masons string (twine)
3-5 lb dead blow
Hard tooth garden rake
25 ft tape measure
4 ft Level
2 ft Level
Wire cutter
Wheelbarrow
Square shovel
3hp to 5hp plate compactor (not a jumping jack)

Locate utilities before any digging occurs.

Paint a line where the gabion wall will be located.

If the wall will be on a hill or slope, the placement of the wall will determine how much soil will need to be brought in or removed.

The trench will be double the width of the gabion baskets and a minimum of 6 inches deep plus an additional 1 inch for each 1 foot of wall height for the amount of buried block that is needed.

Next fill the trench with clear rock (angular rock with no fines) and compact the rock in 2 - 4 inch lifts with two passes until there is a minimum 6 inch solid base, use the transit to make sure the rock is spread level and use the hard tooth garden rake to adjust the rock if needed.

Lie out the entire first course of baskets and lash them together with cross wires. Cross wires help the baskets hold their shape when filled with material.

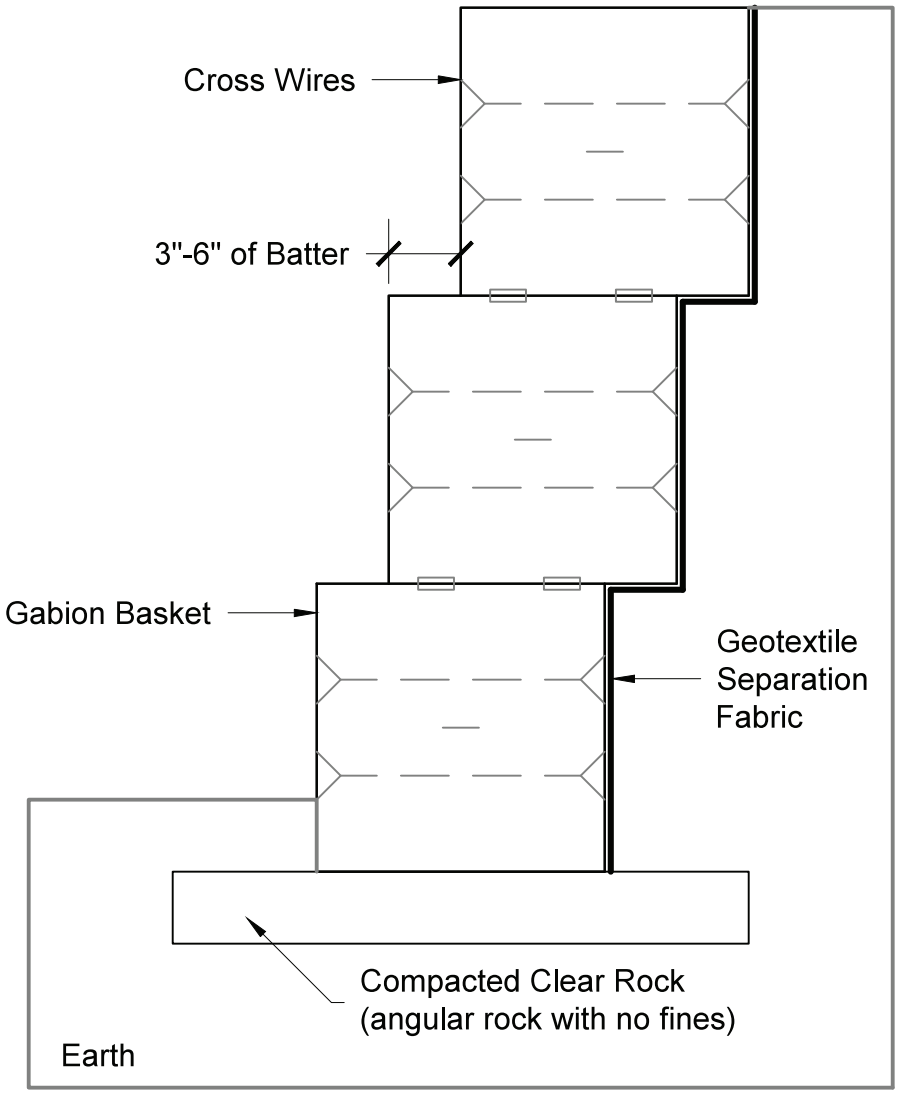
Then fill the baskets with desired material, the smallest of the material should be 1.5 times bigger than the holes in the baskets to prevent the material from falling out.

Close the lids on the baskets and tie closed with wire.

Lay geotextile separation fabric along the back of the baskets and backfill with native soil.

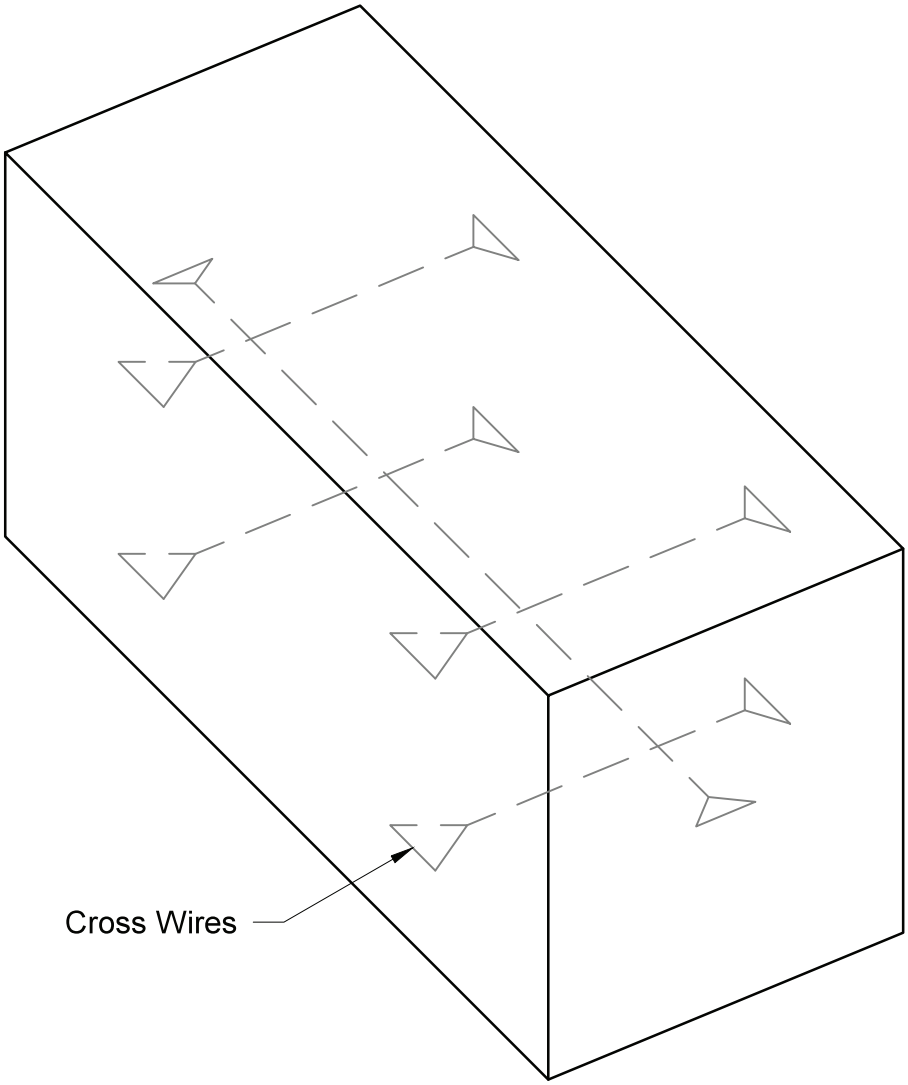
Repeat stacking baskets, filling with material, and backfilling until the desired height or manufactures maximum height has been reached. Keep in mind there should be 3”- 6” of batter when stacking the baskets.

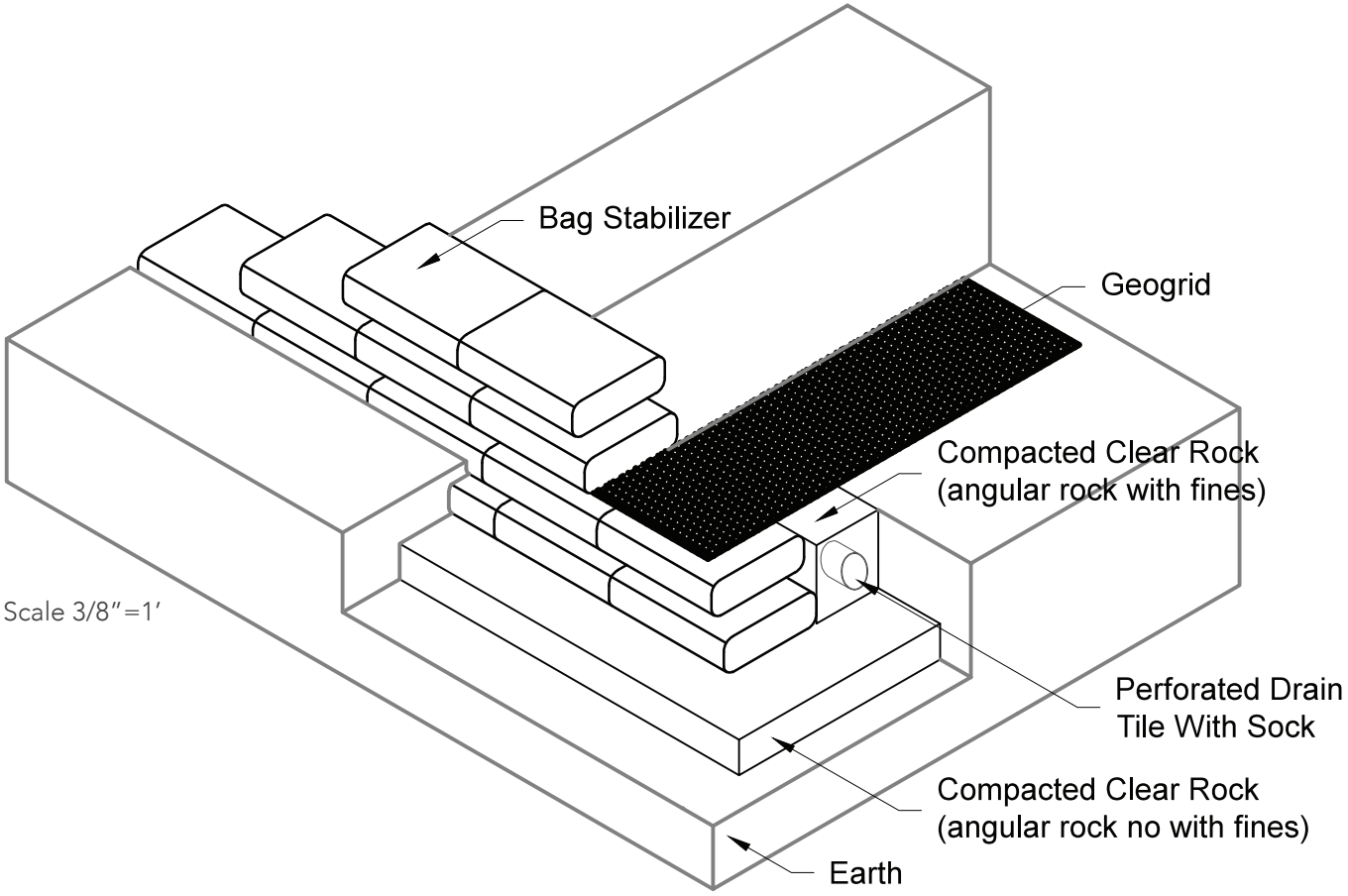
Seed, sod or plant the top and bottom of the wall as desired.


Cross Wires
3"-6" of Batter
Gabion Basket
Geotextile
Separation
Fabric
Compacted Clear Rock
(angular rock with no fines)
Earth

Scale 3/4"=1'

Cross-wires are used to retain the essential box-shape of the gabion baskets. This involves lashing a length of tie wire to opposite faces of the basket; front-to-back and side-to-side. One or two cross-wires per face might be used depending on the application, a typical installation would see two cross-wires front-to back at one-third and two-thirds basket height, and one cross-wire side-to-side at half basket height.




Bag Stabilizer
Geogrid
Compacted Clear Rock
(angular rock with fines)
Perforated Drain
Tile With Sock
Compacted Clear Rock
(angular rock no with fines)
Earth

Scale 3/8″=1′

Tools needed for a vegetative retaining wall installation:

Marking paint
Transit
Utility knife
3-5 lb hammer
Hard tooth garden rake
25 ft tape measure
4 ft Level
Wheelbarrow
Square shovel
3hp to 5hp plate compactor (not a jumping jack)

Locate utilities before any digging occurs.

Paint a line where the vegetative wall will be located.

If the wall will be on a hill or slope, the placement of the wall will determine how much soil will need to be brought in or removed.

The trench will be double the width of the vegetative bags and a minimum of 6 inches deep plus an additional 1 inch for each 1 foot of wall height for the amount of buried block that is needed.

Next fill the trench with clear rock (angular rock with no fines) and compact the rock in 2- 4" lifts with two passes until there is a minimum 6" solid base, use the transit to make sure the rock is spread level and use the hard tooth garden rake to adjust the rock if needed.

Set the first course ensuring all bags are level and the faces all line up. The bags should be side by side so they are touching and slightly overlapping. Install two steel spikes per bag. Spikes should be pushed half way into the bag so the remaining half is pushed into the next course. Backfill with native soil.

Drain tile is required if the wall is over 4' tall or if there is poor drainage on the site. Place the drain tile at the lowest possible point and directly behind the first course of bags. Vent the drain tile to daylight every 50'. Make sure the drain tile is sloped so water runs towards the daylight.

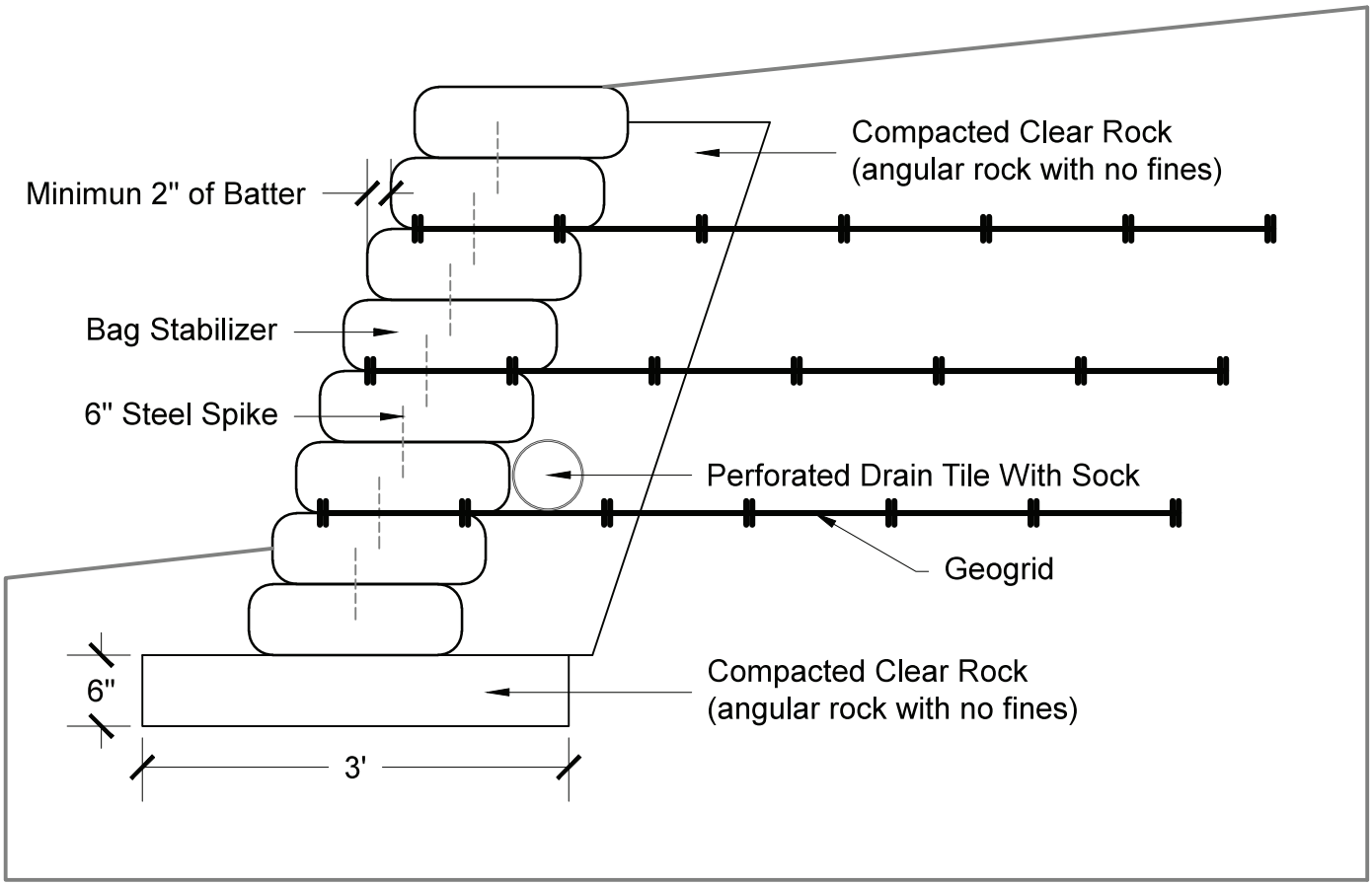
Install the next course by offsetting the seams of the first course by half a bag. There should be a minimum of 2" of batter per course. Repeat spike and bag installation while backfilling until geogrid is required. Geogrid should be a minimum length of .7 percent of the height of the wall, and should be placed every 2 feet or 3 courses.

Place geogrid on top of bag and lay next course to hold the geogrid in place. Pull the geogrid tight and backfill and compact the soil.

Continue to stack the bags with spikes, backfilling, and adding geogrid when necessary until desired height is reached.

Plant the face of the bags with native plants, seeds, and sod.

Seed, sod or plant the top and bottom of the wall as desired.


Compacted Clear Rock
(angular rock with no fines)
Minimun 2" of Batter
Bag Stabilizer
6" Steel Spike
Perforated Drain Tile With Sock
Geogrid
6"
Compacted Clear Rock
(angular rock with no fines)
3'

Scale 3/4″=1′