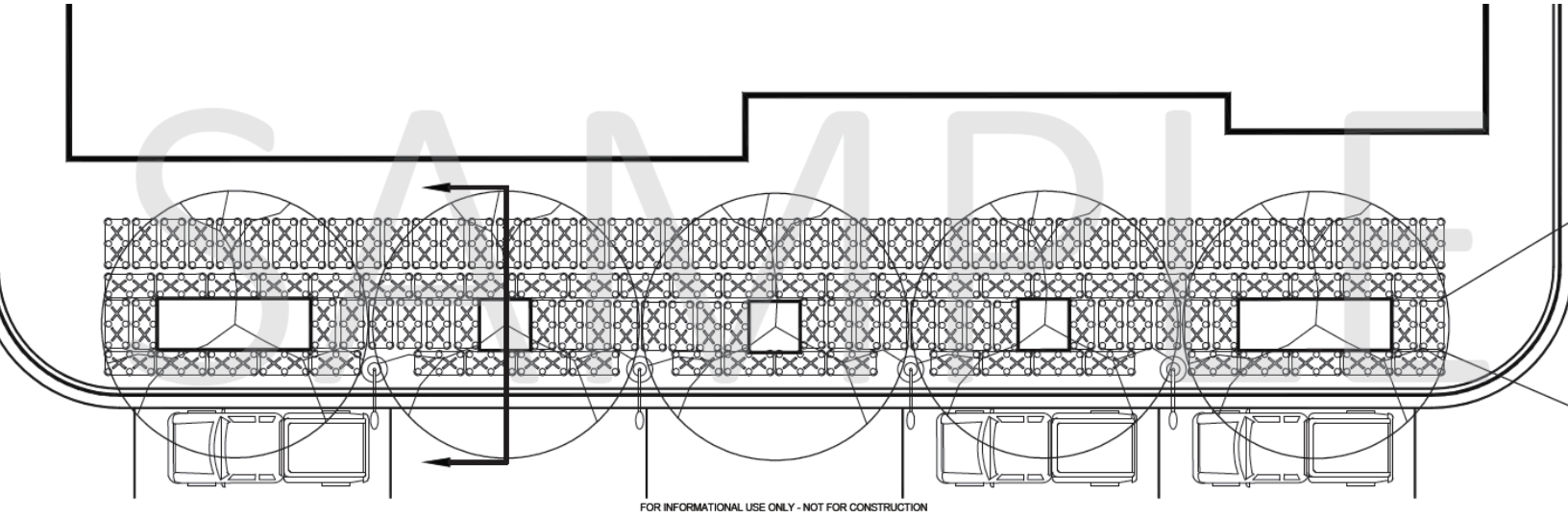


SAMPLE

Instructions for creating Silva Cell 2 layouts using AutoCAD

Part 1: Setup, layout information, and constraints

Part 2: Laying out Silva Cells around regular tree openings

Part 3: Laying out Silva Cells around irregular tree openings

deeproot

How to Create a Silva Cell 2 Layout in AutoCAD

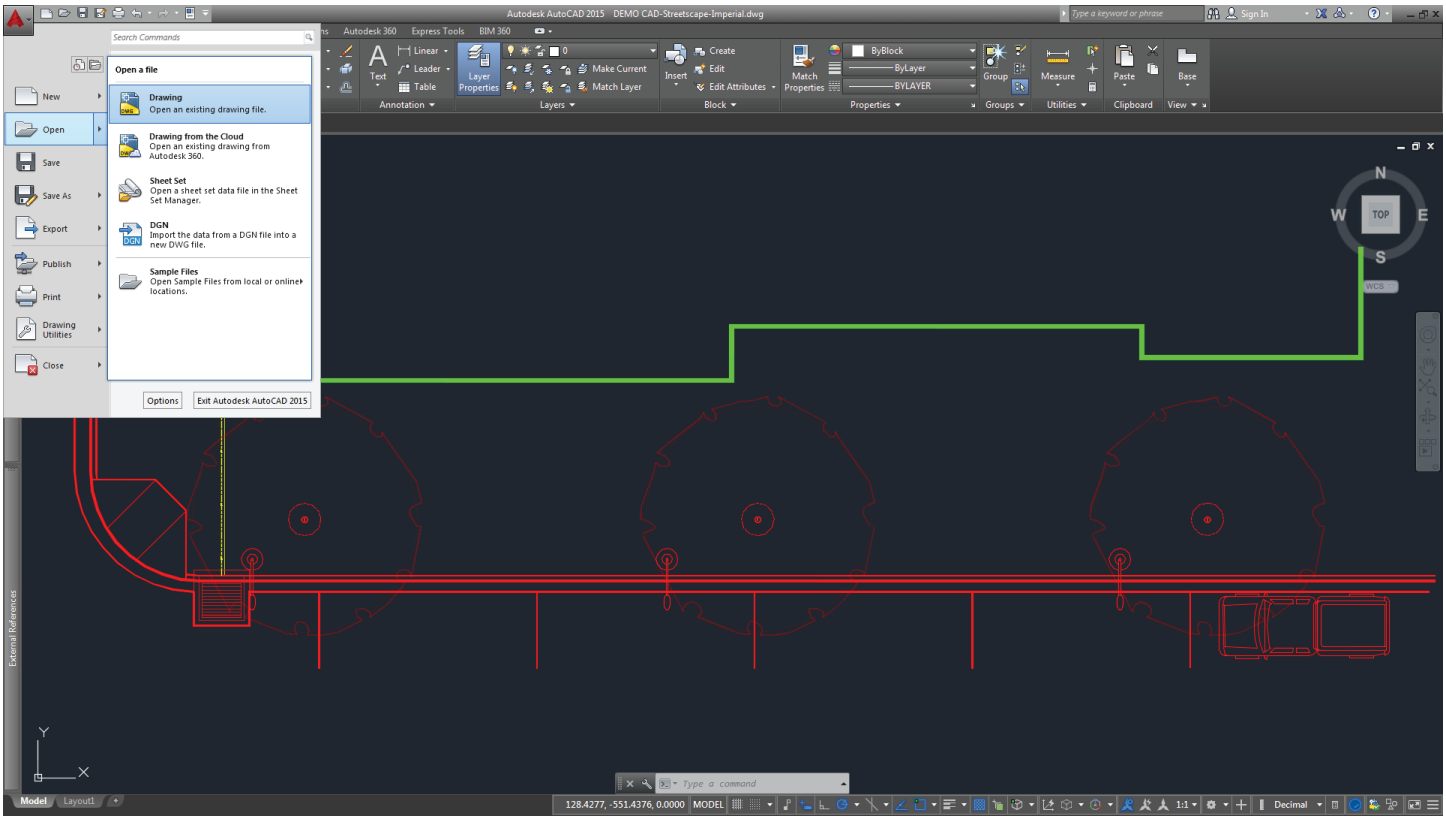
Note: We are assuming the user has prior CAD knowledge, and won't be going through the basics of set up. We are using AutoCAD 2015; please adjust for the version that you're running.

Part 1: Setup, Layout Information, and Constraints

1) Open the project CAD base file and define tree location(s)

Open the project CAD base plan that you will be using to produce the Silva Cell site design.This example depicts a streetscape, but the Silva Cell System can be used on other sites besides streetscapes, including plazas, parking areas, and more. Be sure that the base plan includes the location of the trees and the extents of the tree root package, if known.

FIGURE 1-1. Setting up CAD Base File.

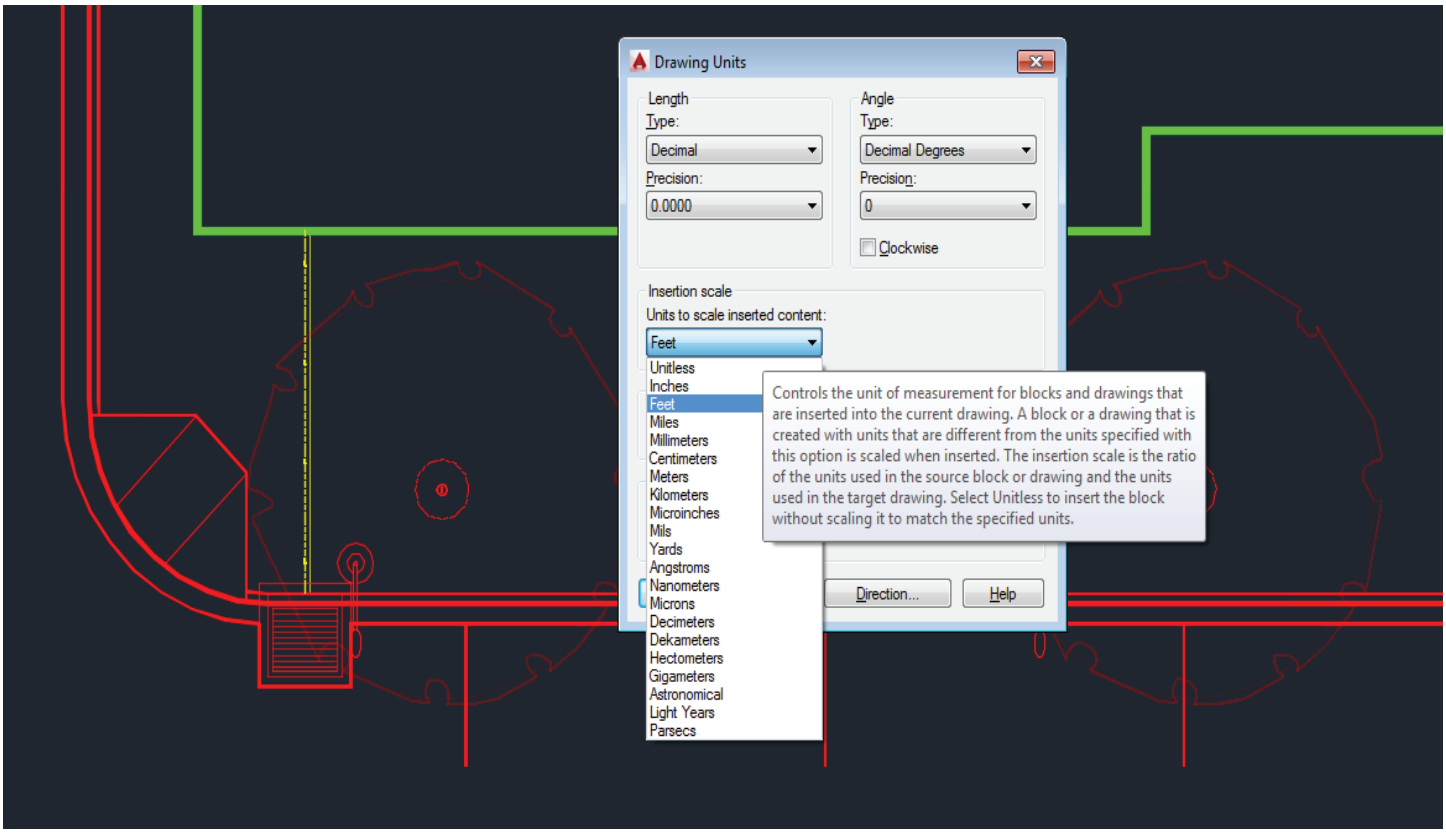


2_ Assign drawing units to CAD base

Ensure the correct drawing units are assigned to your base CAD file. This step is essential to ensure that the Silva Cell CAD block comes in to your drawing at the correct scale in Part 2 (see Figure 1-2).

Note: The Silva Cell CAD blocks are provided in decimal units - millimeters (mm), meters (m), feet (ft), and inches (in) – as well as architectural inches (in)

FIGURE 1-2. Assigning Drawing Units to CAD Base File.

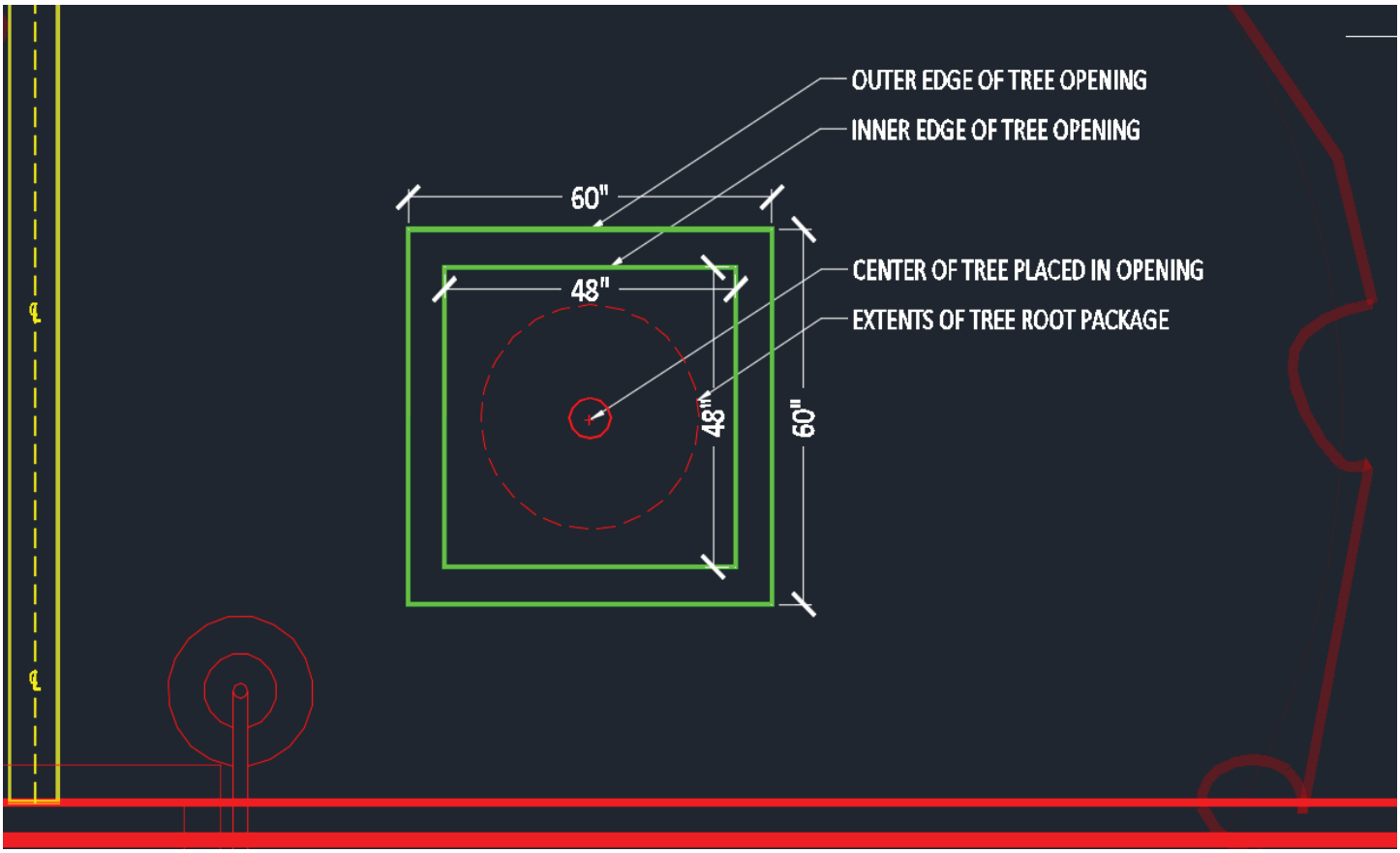


3) Define and locate the edges of all tree openings/planters

Locate and define both the inside and the outside edges of each tree opening on the plan (see Figure 1-3). It is critical that the tree opening is fully supported by Silva Cells, and by defining the inside and outside edges you will ensure full support of the entire opening.

The inner edge will be the starting point for laying out the Silva Cells in Part 2.

FIGURE 1-3. Locating the Inner and Outer Edges of the Tree Opening.

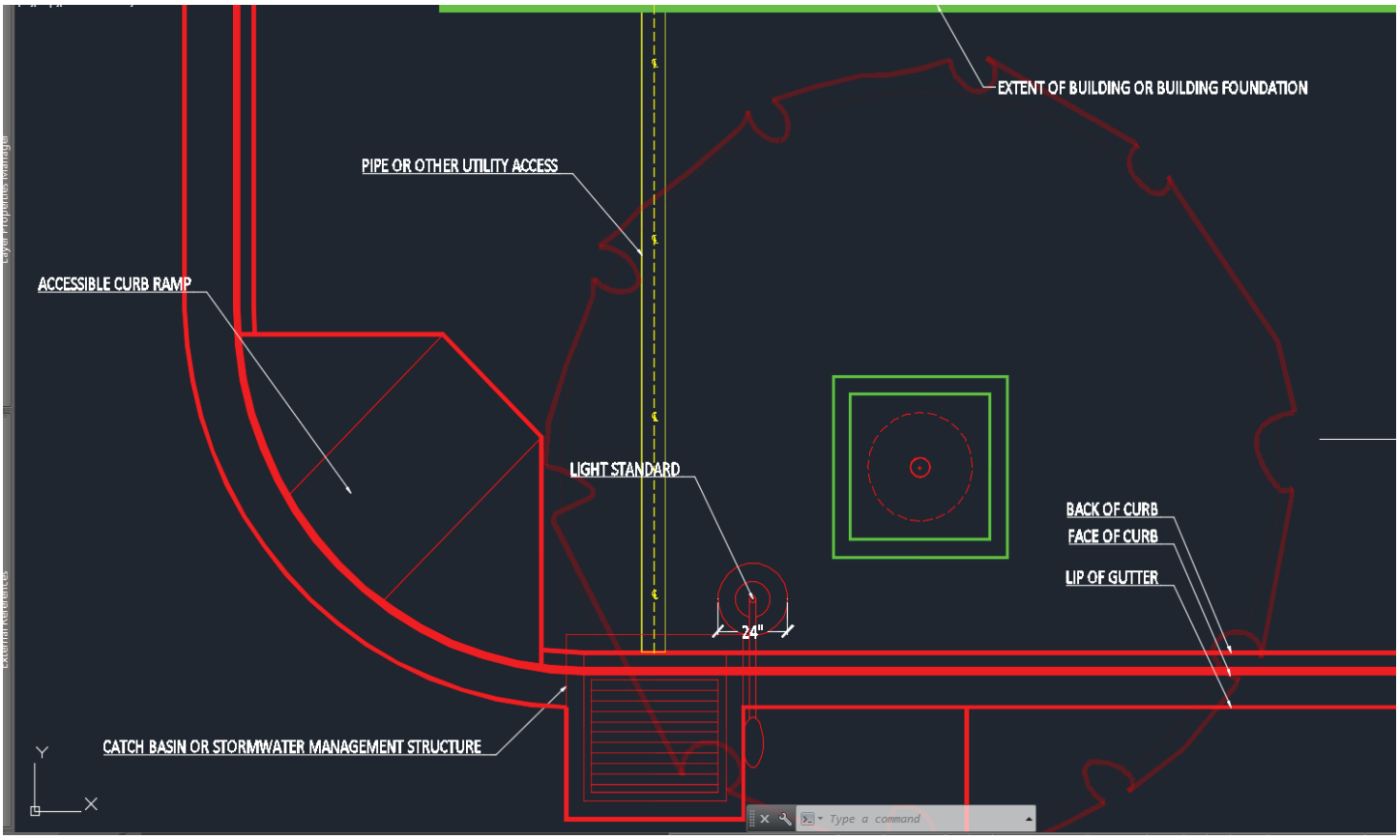


4) Identify all subsurface features located within the layout area

Determine what information about subsurface features you need to include in your base CAD drawing that could affect the location and depth of the Silva Cell layout. Figure 1-4 shows that the example CAD file contains some critical information about features that will need to be integrated into the layout or worked around when producing the Silva Cell layout.

Note: Because they are modular, independent stacks, Silva Cells can be laid out to accommodate many subsurface features.

FIGURE 1-4. Common subsurface features notes for Silva Cell consideration on the project site



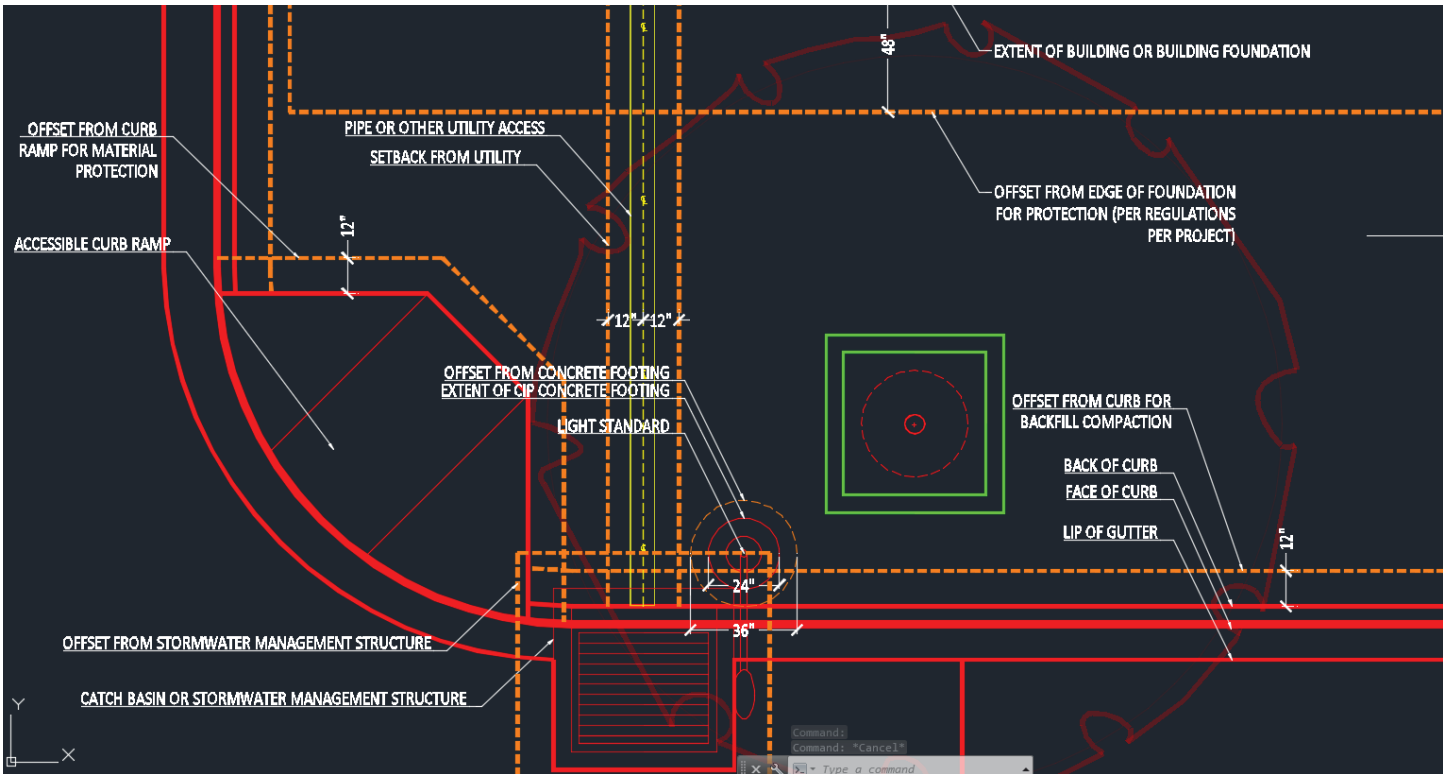
5) Define areas where Silva Cells *cannot* be located

Determine the location and extents of the site areas or features that cannot accommodate Silva Cells.

For example, your site may have accessibility ramps or other common features such as building foundations, catch basins, or utility vaults that need to be avoided when installing Silva Cells — and therefore must be delineated in your layout. Other common site features include required offsets or setback distances from utilities, curbs, pipes, or other features.

You will need to provide space between the back of the curb and the face of the Silva Cells for proper soil compaction around the system. As shown in Figure 1-5, DeepRoot recommends a minimum of 12” (300mm) for the compaction area. The orange lines shown in Figure 1-5 define the “No Silva Cell” locations. Try to integrate all of those constraints to delineate the area where we will actually be using Silva Cells.

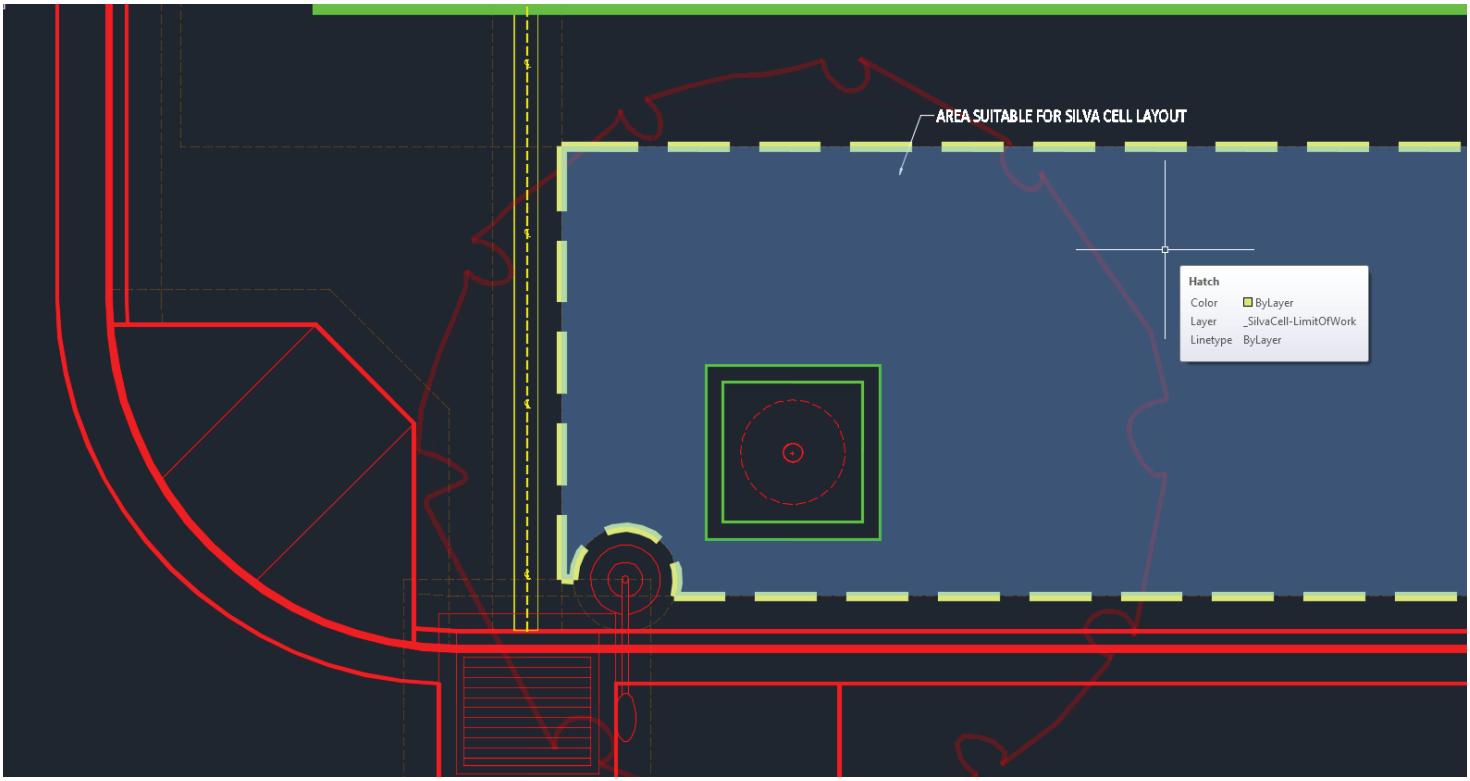
FIGURE 1-5. Delineating the locations of subsurface areas unsuitable for Silva Cells on the project site.



6) Define the areas where Silva Cells *can* be located

Now that the “No Work” areas have now been determined, what remains is the area(s) where Silva Cells *can* be located. The dashed area shown in Figure 1-6 indicates the areas on the site appropriate for Silva Cells.

FIGURE 1-6. Defining the area(s) suitable for Silva Cell layout on the project site.

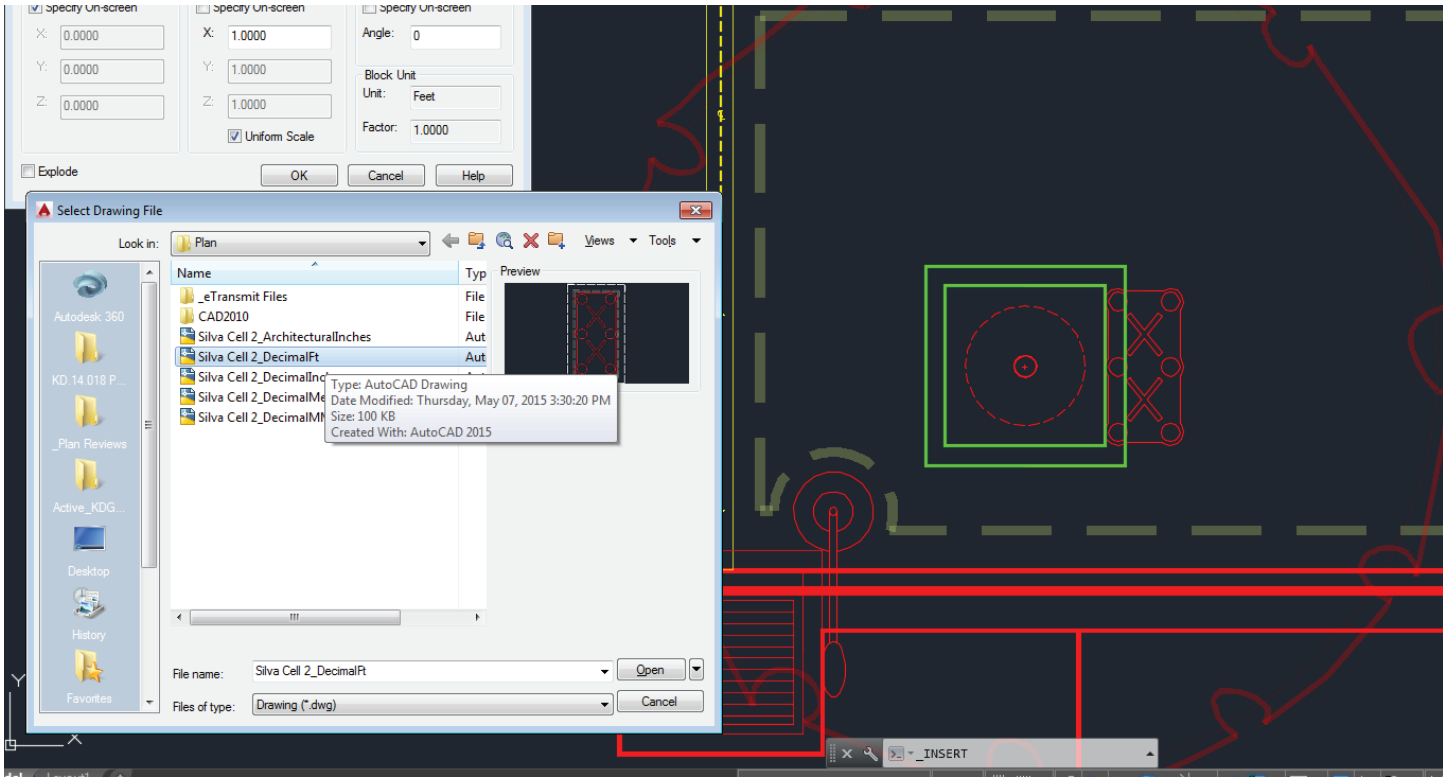


Part 2: Laying Out the Silva Cell System in Regular Tree Openings

1) Bring in the Silva Cell CAD block

These blocks are provided in a number of standard formats on the DeepRoot website. You assigned the project drawing units to your CAD file in Part 1.2. Using these assigned units as a reference, select and insert the correct Silva Cell block into your CAD file. If the assigned CAD drawing units and the selected Silva Cell block match, the Silva Cell block should come in at the correct scale.

FIGURE 2-1a. Insert the scaled CAD block in the project drawing.



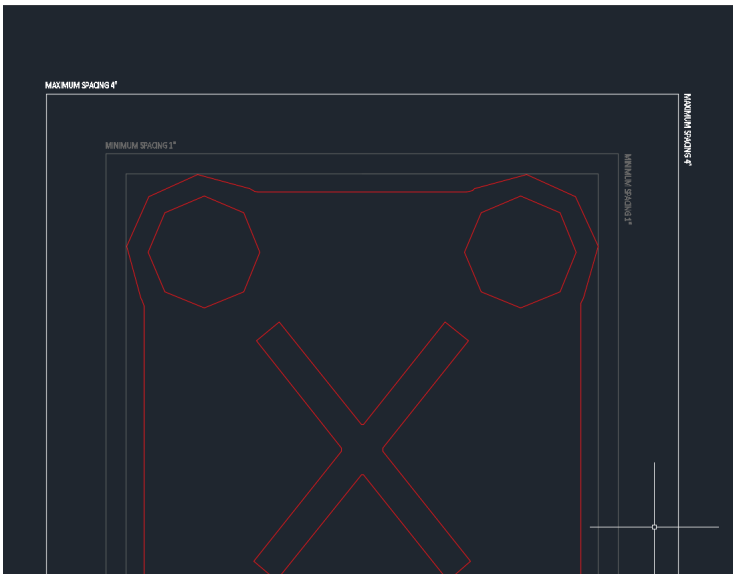


FIGURE 2-1b. Note the reference standard Silva Cells spacing lines on the scaled CAD block.

Note: In this example, we have the drawing units shown in decimal feet in Figure 2-1. The Silva Cell dimensions are shown on each of these blocks, with the extents of each Silva Cell outlined in red. DeepRoot recommends typical spacing of 1" – 6" (25 mm - 152 mm) between cells as measured at the base, as indicated in gray in the image to the left.

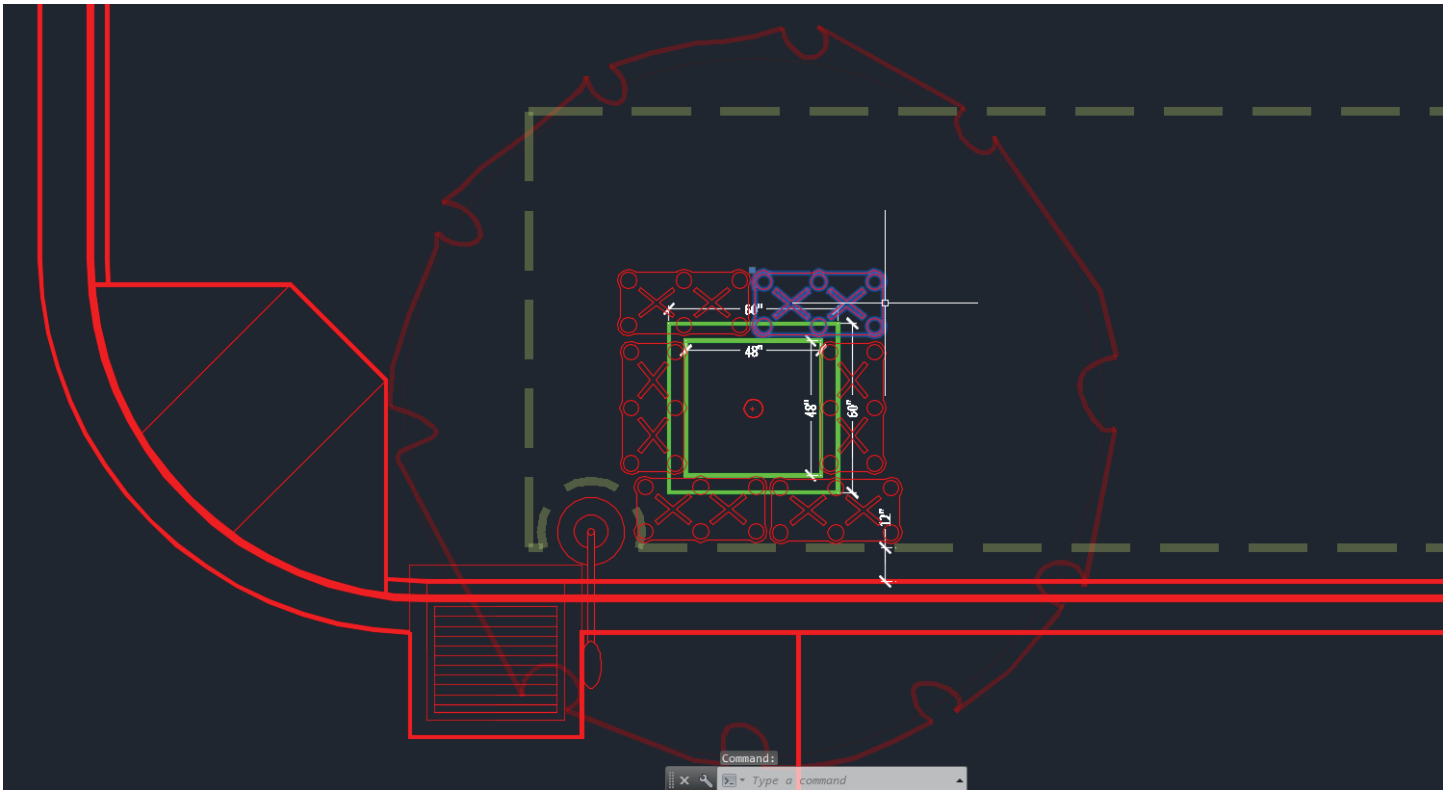
*Keep in mind that the blocks **should not** be right up against each other.*

2) Start the layout at the edge of the tree opening

Start your layout at the inside of the tree opening, and work outward from there. The Silva Cells need to align with the inner edge and completely support the entire tree opening.

Make sure that the tree opening is completely supported at the edge. The orientation of the Silva Cells does not matter, so adjust them as necessary to fit your tree opening and limit of work. If your planters have different dimensions than the ones depicted here, simply adjust the orientation and/or spacing of the cells to support that edge. For circular or irregular shaped planters, refer to Part 3.

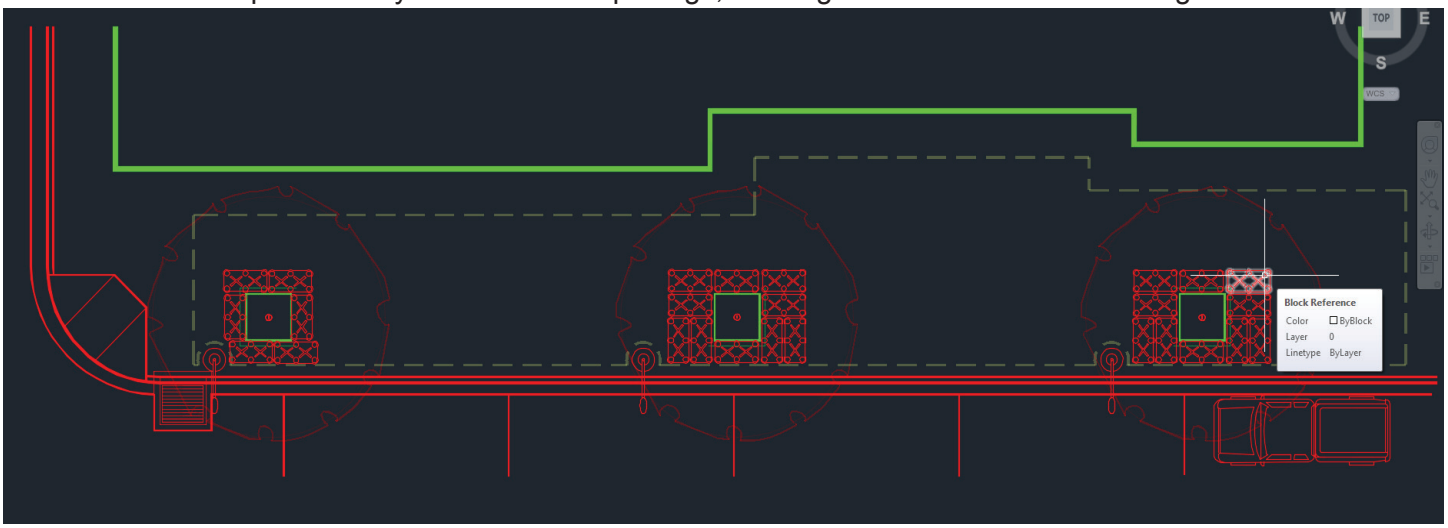
FIGURE 2-2. Layout the Silva Cells defined in Part 1-6, starting with supporting the tree opening inner edge.



3) Complete the Silva Cell layout for all tree openings

If your tree opening is typical and repeated in your site design, you can grab and copy the Silva Cell layout created for the first tree and apply it to other like tree openings. Fine-tune the layout as necessary to provide continuous support of the tree opening edges and work around the constraints in the Silva Cell layout area that you defined in Step 1-6.

FIGURE 2-3. Complete the layout for all tree openings, working outward from the inner edge.

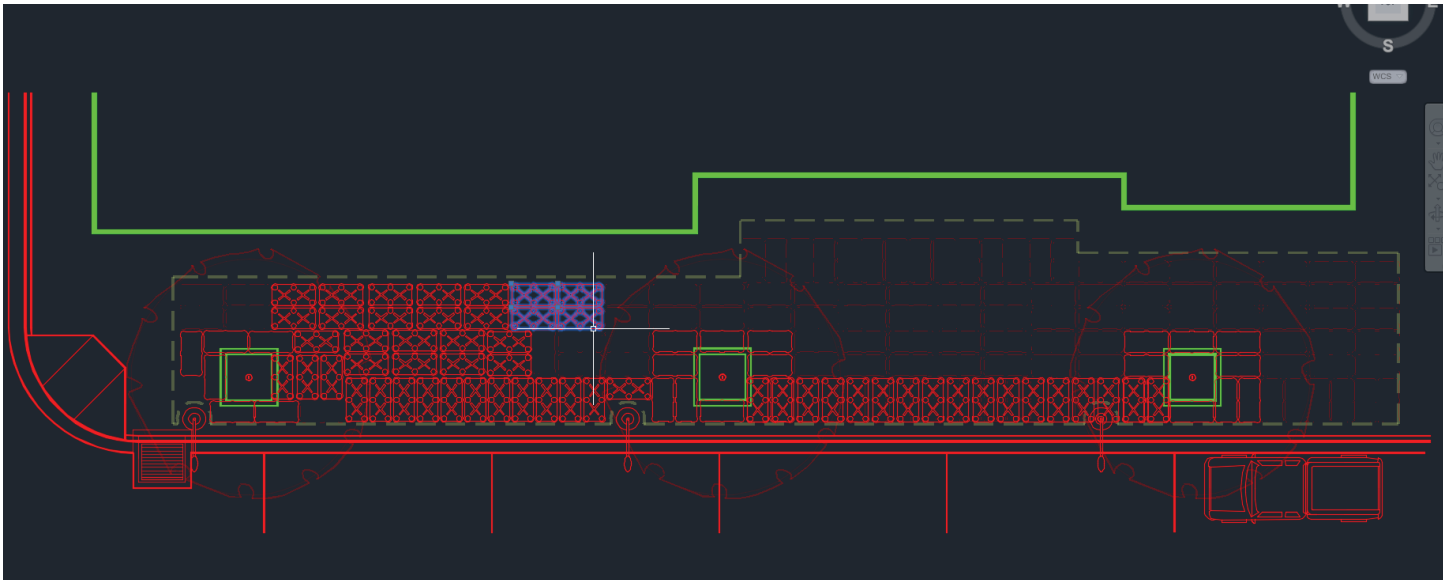


4) Infill Silva Cells between tree openings

Once the support of tree opening edges is established (Steps 2-2 and 2-3), work outward from the tree openings to the extents of the limits of work, maintaining the typical 1” - 6” (25 mm - 152 mm) spacing between adjacent Silva Cells. Where possible, we recommend connecting tree openings using Silva Cells. If the tree is adjacent to soil volumes such as lawns or parks, use Silva Cells to create an access channel for roots to grow from the tree opening to those areas.

Trees don’t care about the configuration of the Silva Cells; just the overall quantity and access to the available soil volume. Adjust the extents, locations, and quantities of Cells as necessary per your individual project design parameters and soil volume/stormwater management goals.

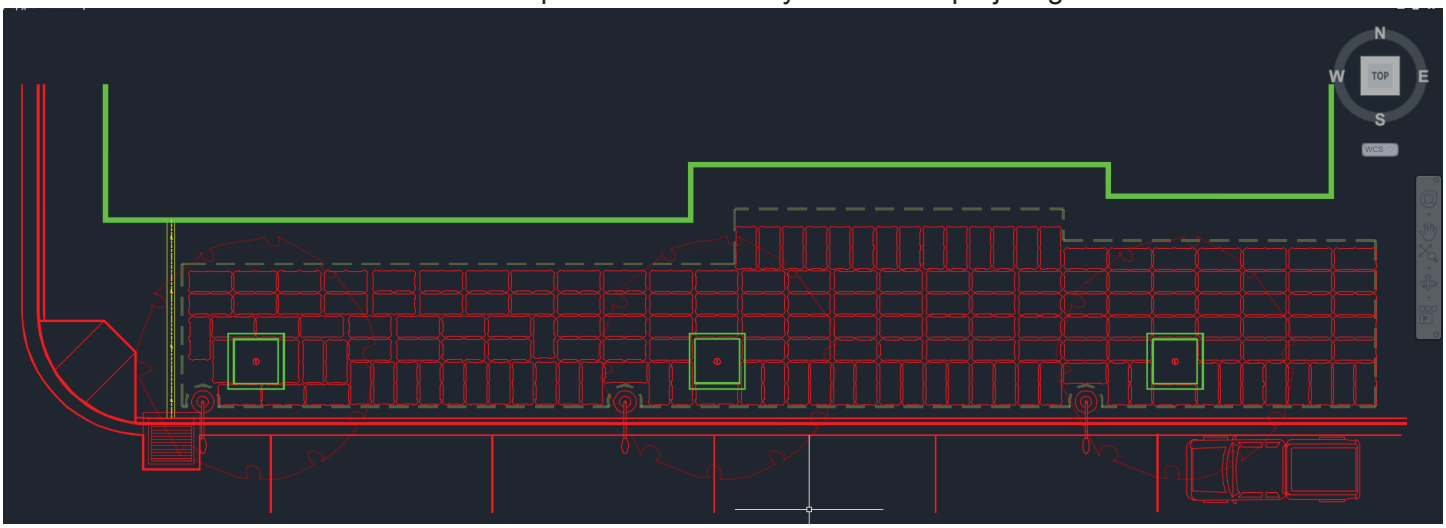
FIGURE 2-4. Infill Silva Cells between tree opening areas, making spacing adjustments as necessary.



5) Review the Silva Cell layout

Once the layout is completed, remove the bounding lines on the block that indicate the spacing, and the internal structural pieces such as the posts, in order to see how the layout is configured. Since you set up the constraints in Steps 1-4 and 1-5, you should be able to verify that the layout is located outside of those areas. Edit as necessary. After this review, you should be able to construct the layout as drawn and with minimal field adjustments.

FIGURE 2-5. Review and revise the completed Silva Cell layout to meet project goals.



Part 3: Laying Out Silva Cells in Irregular Tree Openings

When working on a layout that uses circular, diamond-shaped, or other irregular tree openings, the same steps in Parts 1 and 2 still apply – you will simply need to allow for some extension of the Silva Cells beyond the circular edge and into the planters. The steps to a successful layout for common irregular tree openings are below.

A. Circular Tree Openings

1) Start the layout at the edge of the tree opening

The Silva Cells will need to extend into the tree opening to completely support the inner edge.

Start your Silva Cell layout at the tree opening, rotating and adjusting the spacing of the Silva Cell blocks along the inner edge of the tree opening. It is usually easiest to work from this inner edge outwards in a more-or-less geometric pattern inscribed in the circular opening. This geometry allows you to maintain the standard 1” - 6” (25mm - 152mm) spacing between Silva Cells while minimizing their extensions into the tree opening.

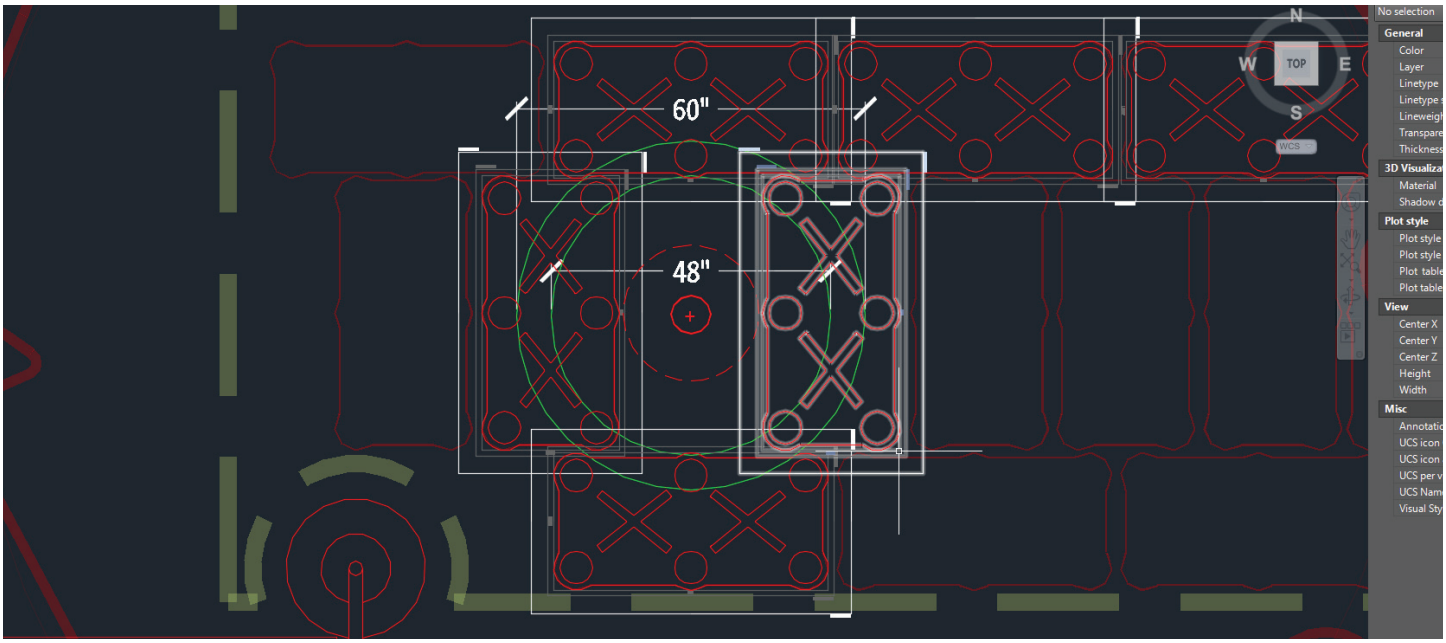
Note: There will be some necessary extension of the layout into the tree opening with circular planters. Try to keep that to a minimum by experimenting with various orientations and configurations. The larger the diameter of the planter, the less extension of the Silva Cells into the tree opening should be necessary. Be sure that the tree opening is completely supported at the edge. Again, the orientation of the Silva Cells do not matter, so adjust them as necessary to fit your tree opening and limits of work.

2) Work Silva Cells outward to connect tree openings

Once the support of tree opening edges is established (Step 3.1), work outward to the extents of the Limits of Work while maintaining the typical 1” - 6” (25mm - 152mm) spacing between adjacent Silva Cells. Adjust the extents, locations, and quantities of Silva Cells as necessary per project design parameters.

Note: Where possible, we recommend connecting tree openings using Silva Cells. If adjacent to soil volumes such as lawns or parks, use Silva Cells to create an access channel for roots to grow from the tree opening to those areas.

FIGURE 3-1. Laying out the Silva Cells for a circular tree opening.



B. Diamond-Shaped Tree Openings

1) Start the layout by supporting the edge of the tree opening

The only differenec between rectangular/square and diamond-shaped layouts is the orientation of the tree opening. The Silva Cell layout for a diamond-shaped tree opening will still need to completely support the tree opening edge.

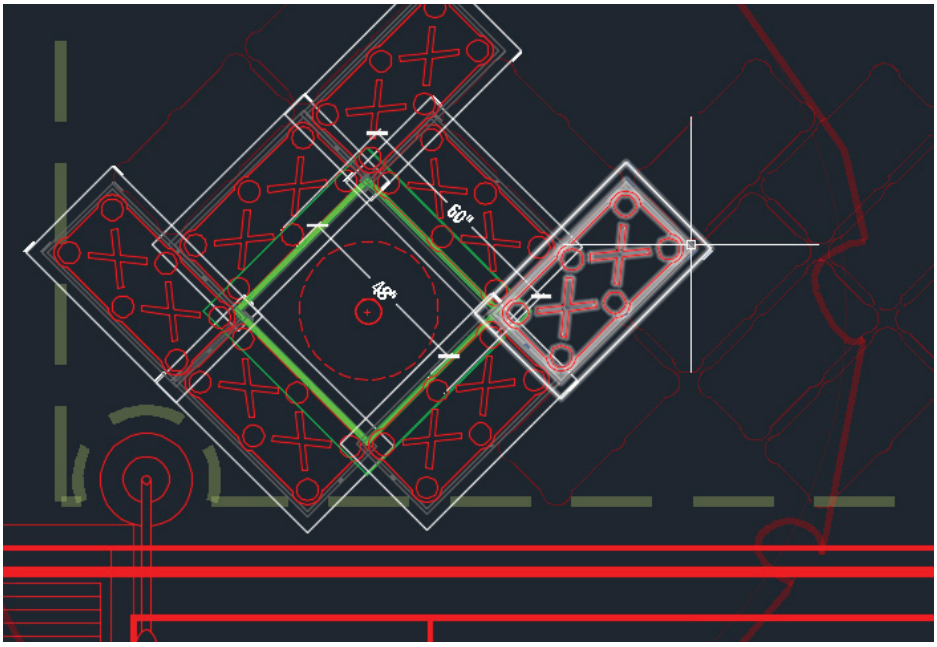
Start your Silva Cell layout at the tree opening, rotating and adjusting the spacing of the Silva Cell blocks along the inner edge of the tree opening. It is easiest to align the Silva Cell layout geometry with one edge of the tree opening. Work outwards from the inner edge of the tree opening in a more-or-less geometric pattern, sliding the Cells along the edge of the tree opening. Keeping a standard geometry will allow you to maintain the standard 1” - 6” (25mm - 152mm) spacing between Silva Cells while minimizing any extension into the tree opening.

2) Work Silva Cells outward to connect tree openings

Now that the support of tree opening edges has been establish (Step 3-1), you can complete the Silva Cell lay-out outward, potentially linking adjacent Silva Cell areas per site design, soil volume, and budget goals. Work outward from the tree openings to the extents of the Limits of Work while maintaining the typical 1” - 6” (25 mm - 152 mm) spacing between adjacent Silva Cells. Adjust the extents, locations, and quantities of Silva Cells as necessary per project design parameters.

Note: Where possible, we recommend connecting tree openings using Silva Cells. If adjacent to soil volumes such as lawns or parks, use Silva Cells to create an access channel for roots to grow from the tree opening to those areas.

FIGURE 3-2. Laying out the Silva Cells for a diamond-shaped tree opening.



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