

CU-Structural Soil® Patio Implementation at WSSI

Gainesville, Virginia

Presented by:

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Wetland Studies and Solutions, Inc.

Natural & Cultural Resources Consulting Firm:

- Founded in 1991
- Consulted on ±8,100 project sites encompassing ±306,000 acres
- 170 staff

Expertise:

- Environmental Science
- Environmental Engineering
- Regulatory and Permit Compliance
- Ecosystem Restoration
- Landscape Design
- Geographic Information Systems
- Surveying
- Archeology



Acquisition by The Davey Tree Expert Company:

- Founded in 1880
- Largest employee-owned service company in U.S.
- Expertise in tree protection, assessment, and analysis

Locations:

- Gainesville, VA
- Roanoke, VA
- Millersville, MD
- Richmond, VA

Why Did We Do This?

- Experimentation
- Innovation
- Office as living laboratory
- Marketing green technologies
- Walking the walk

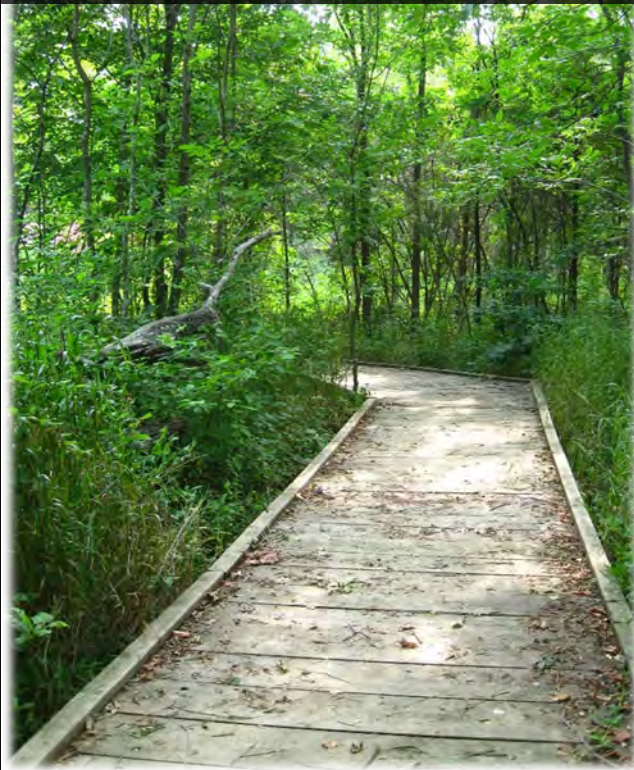
Virginia's First LEED® Gold-Certified Office



Why Did We Do This? – THE ENVIRONMENT

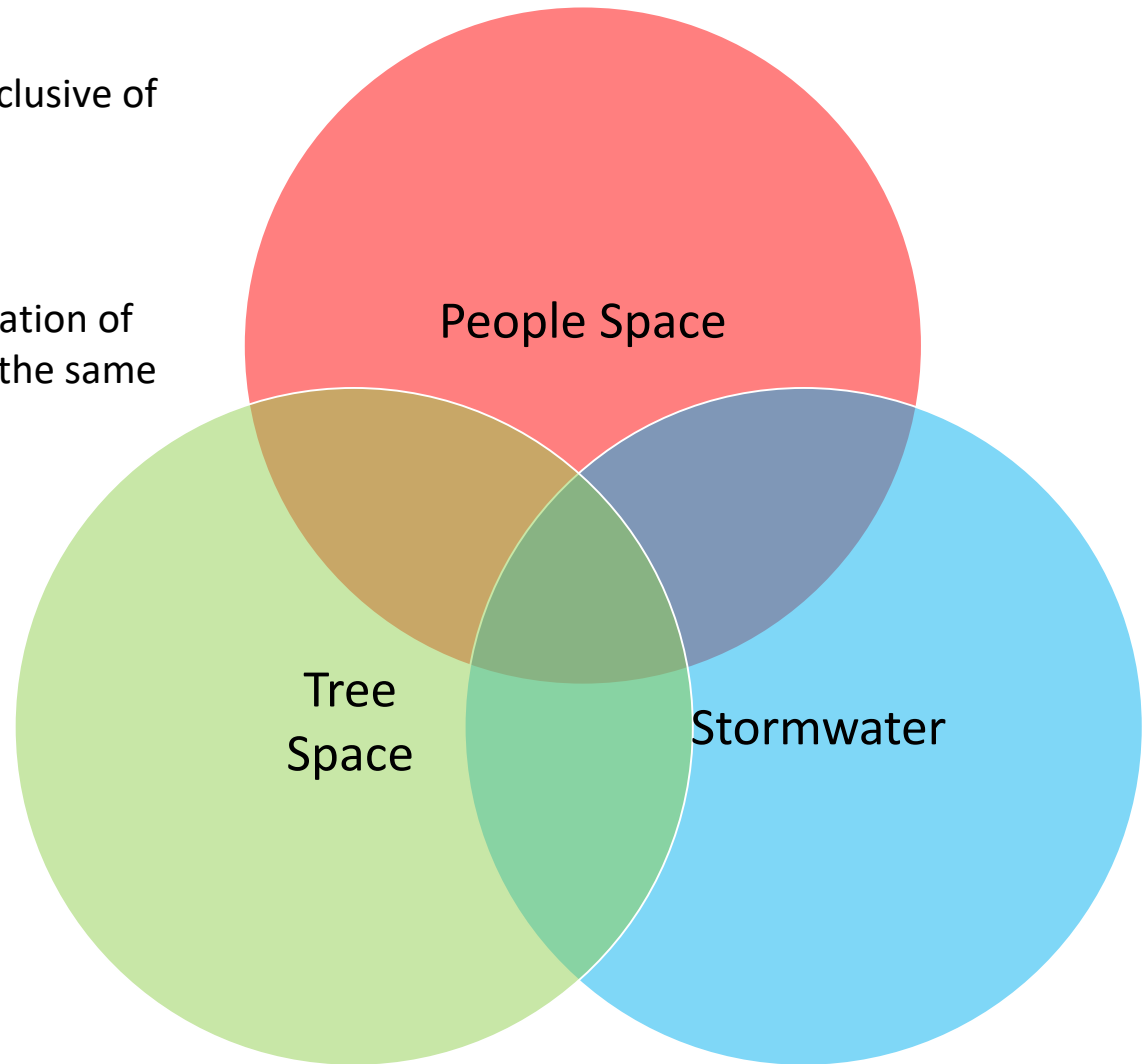


Why Did We Do This? — *THE PEOPLE*



Why Did We Do This?

- Space is limited in our urban areas
- Often times the use of space is exclusive of other uses, amenities, or benefits (Tree/hardscape conflicts)
- CU-Structural Soil® allows combination of multiple uses and benefits within the same space



Existing Conditions



Existing Conditions



Design: *CONCEPT*



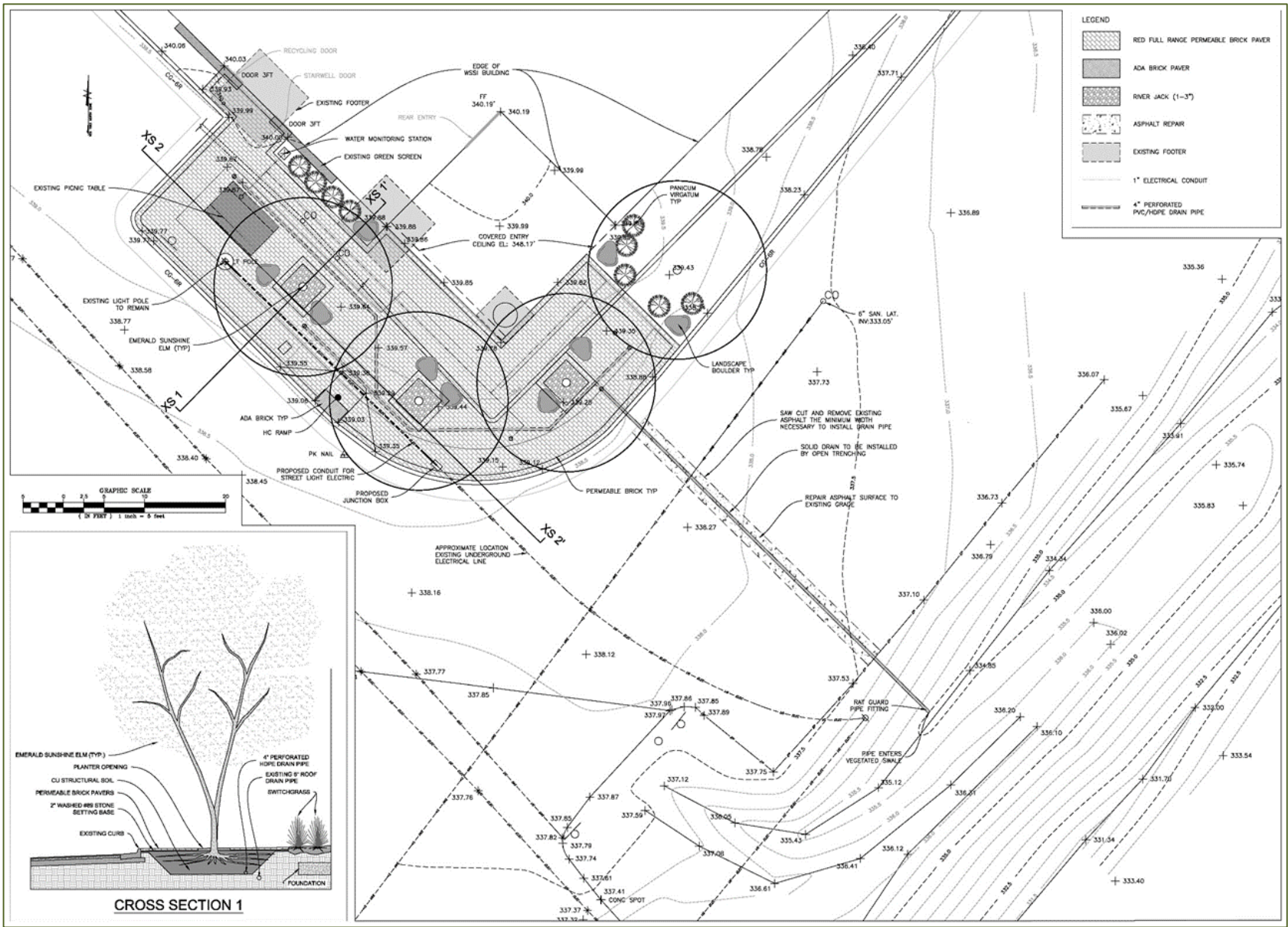
Design: *CONCEPT*



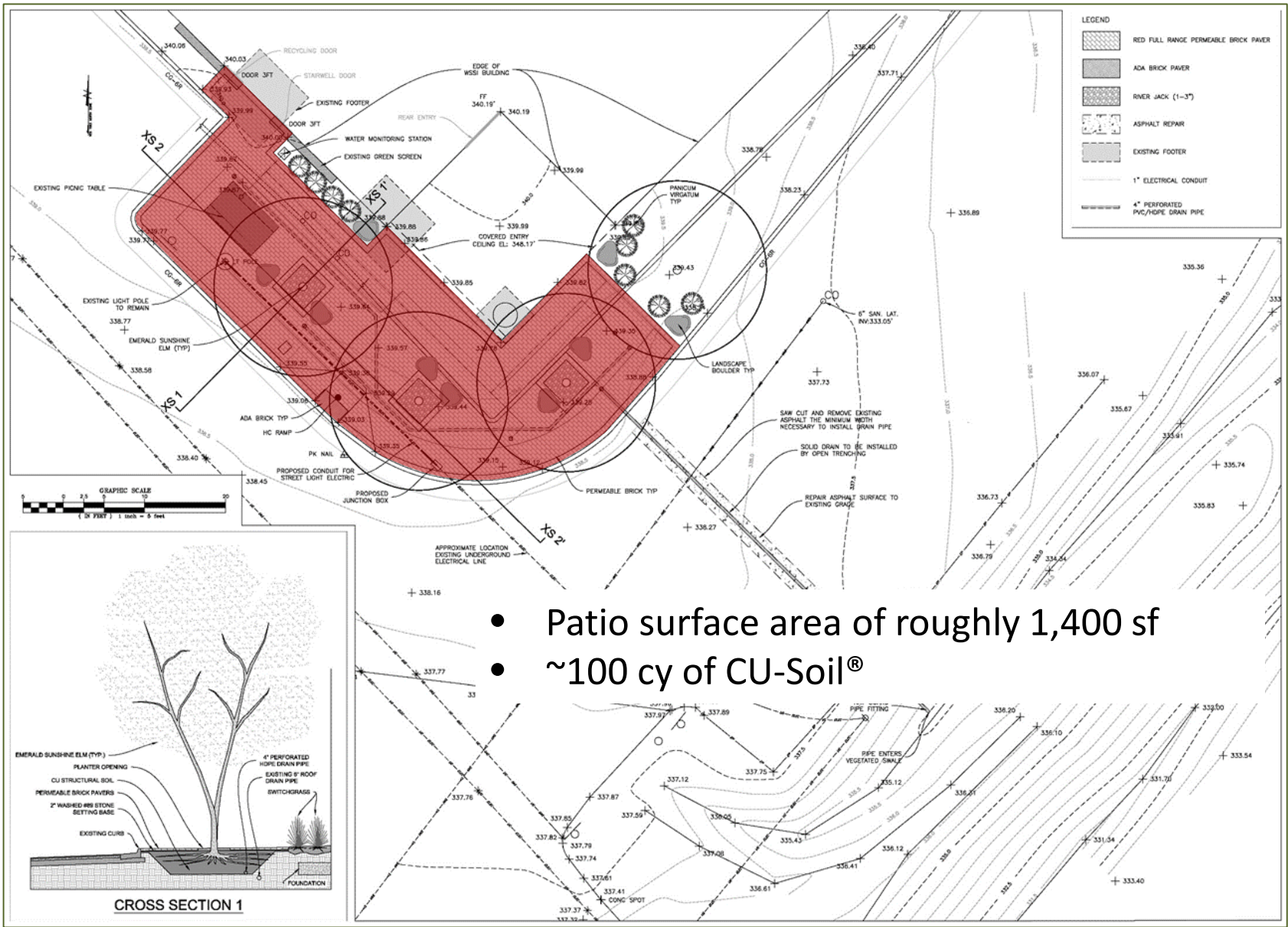
Design: *CONCEPT*



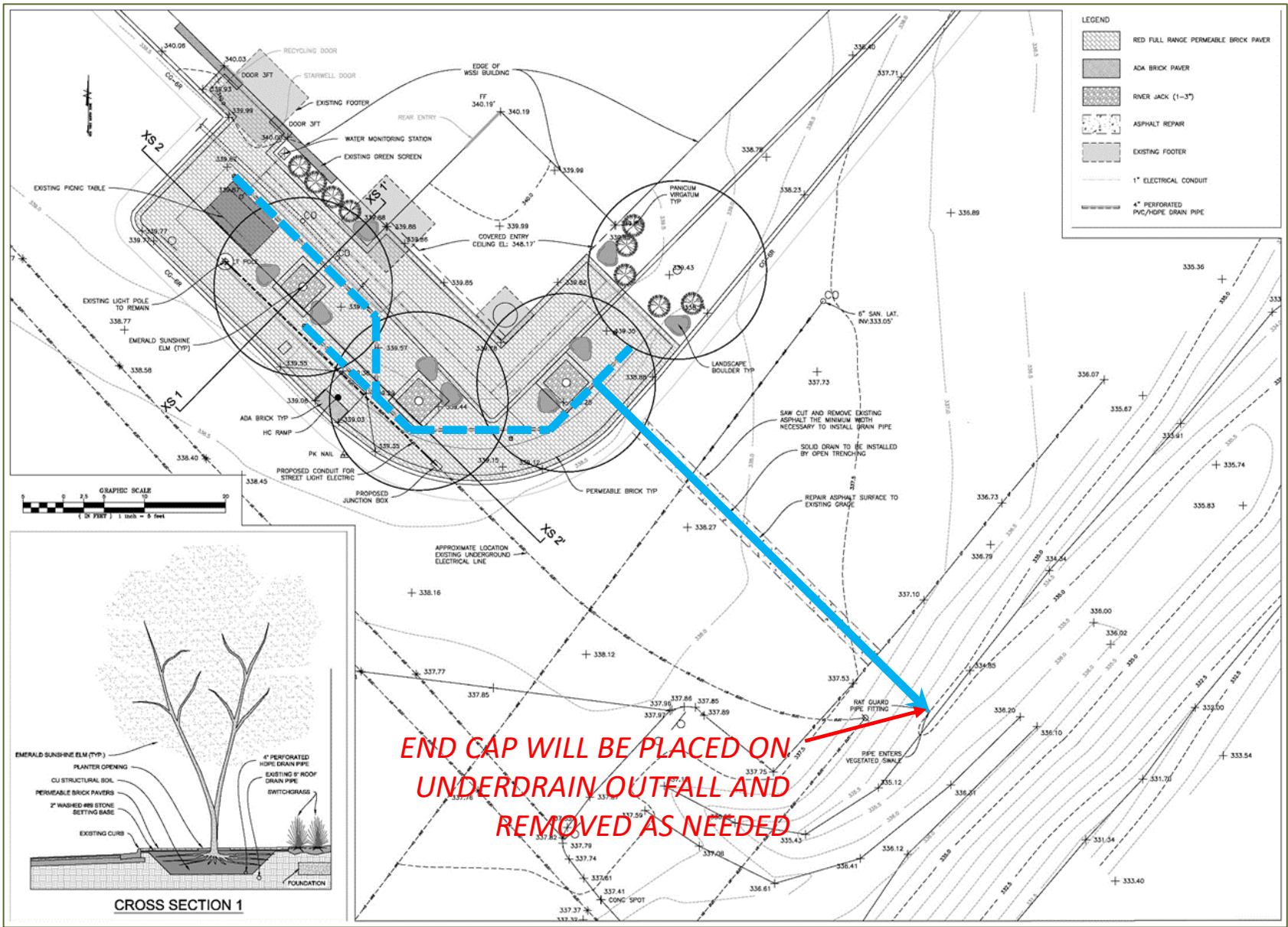
Design



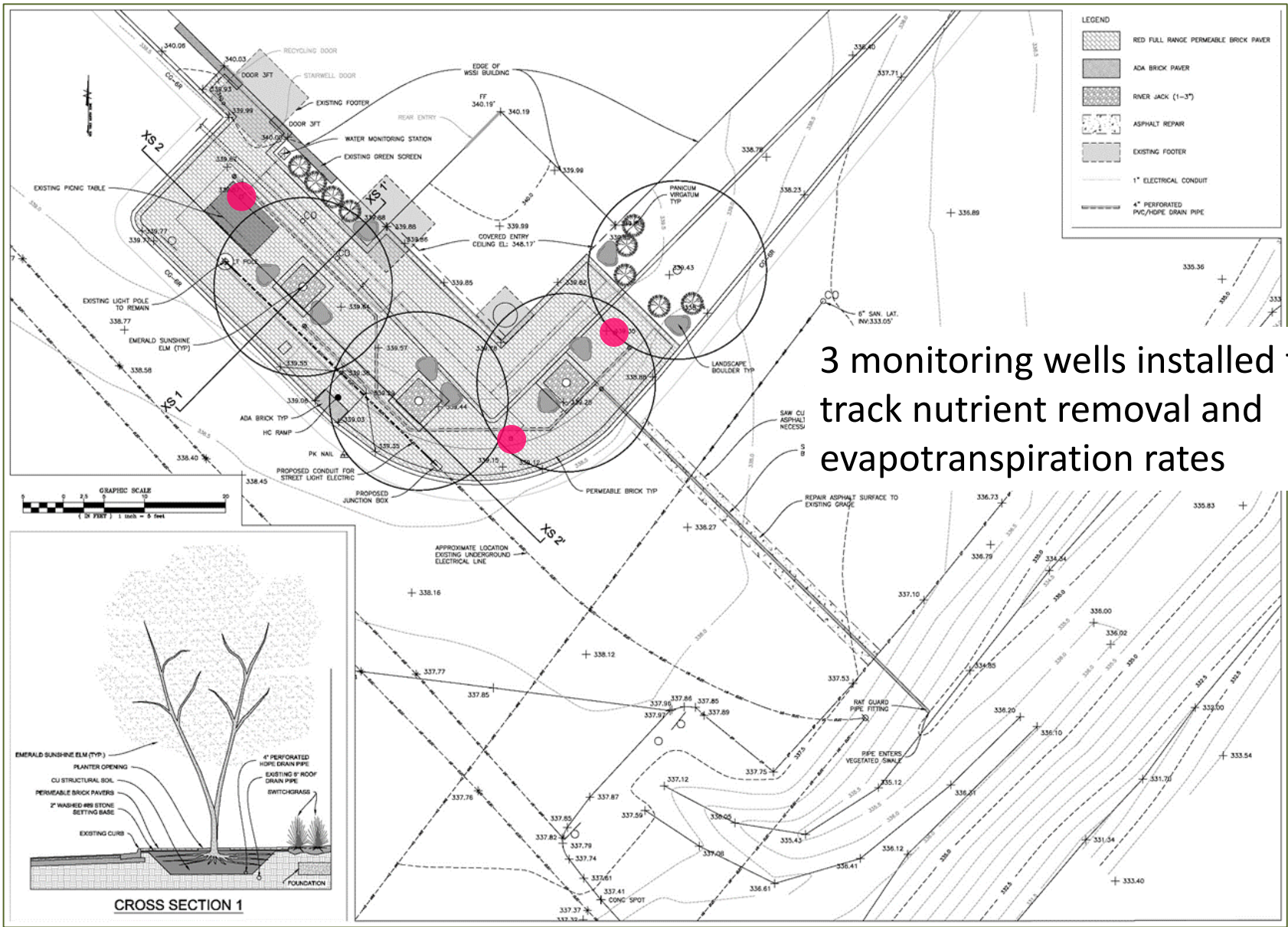
Design: PATIO AREA



Design: UNDERDRAIN NETWORK

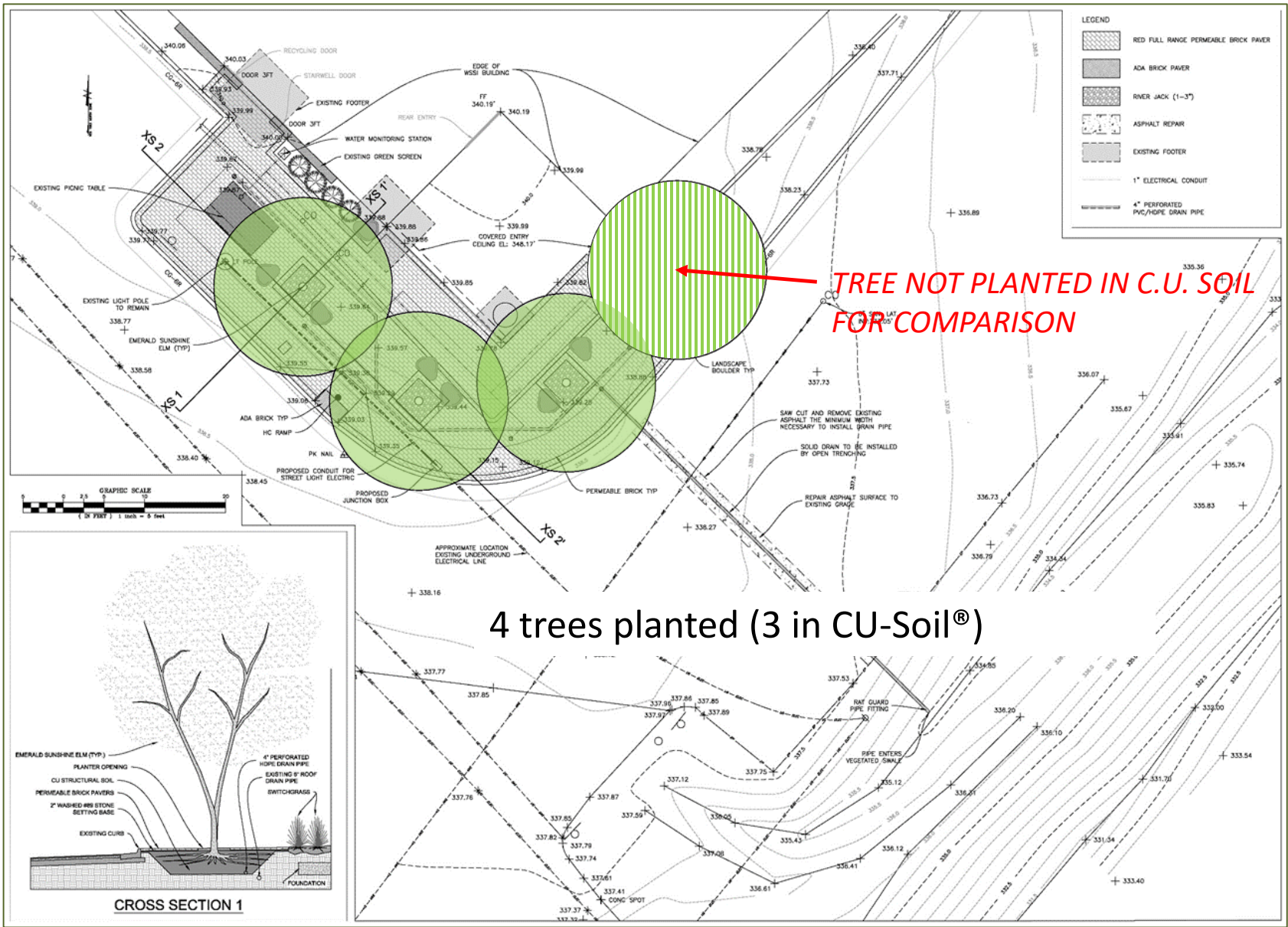


Design: MONITORING WELLS



3 monitoring wells installed to track nutrient removal and evapotranspiration rates

Design: TREE LOCATIONS



Design: *TREE SIZE DETERMINATION*

Tree size is based on several factors including:

- **AVAILABLE SOIL ROOTING VOLUME**
- **SPATIAL CONSTRAINTS**
- **USE OF SPACE**



Design: TREE SIZE DETERMINATION

AVAILABLE SOIL ROOTING VOLUME

- ~100 CY of CU-Structural Soil® were used (~2,700 CF)
- Plan to use 2 cubic feet of CU-Structural Soil® per square foot of desired crown projection

Lindsey, P. and N. Bassuk. "Redesigning the urban forest from the ground below: A new approach to specifying adequate soil volumes for street trees." *Arboricultural Journal* 16 (1992): 25-39.

- Sizing Breakdown:
 - Small Tree (~20 ft diameter) = ~620 cubic feet
 - Medium Tree (~30 ft diameter) = ~1450 cubic feet
 - Large Tree (~40 ft diameter) = ~2500 cubic feet

Design: *TREE SIZE DETERMINATION*

SPATIAL CONSTRAINTS

- Retrofit vs. New Construction
 - Work within the existing infrastructure
- Size and scale of building
 - Mature tree size should be appropriate for the location
- Green Roof and Solar Panels
 - Trees too tall could cast shade on rooftop elements



Design: *TREE SIZE DETERMINATION*

USE OF SPACE

- Distribute canopy coverage
- Create usable space for employees

Design: *TREE SELECTION*

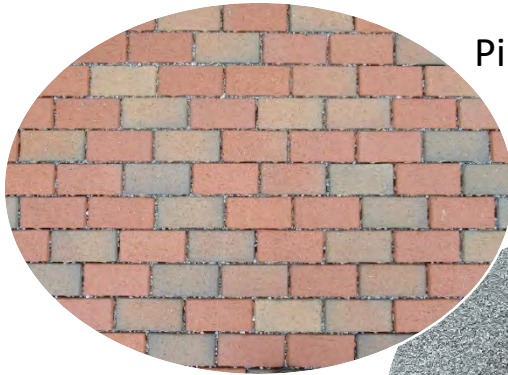
EMERALD SUNSHINE ELM

- 20'-25' spread and 35' height (small – medium size tree)
- Upright vase-shape
- High heat and drought tolerance
- High insect resistance
- High resistance to Dutch Elm Disease
- High tolerance of soil pH range
- Sizing Breakdown:
 - Small Tree (~20 ft diameter) = ~620 cubic feet
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WE ARE HERE
(~900 cf per tree)

Design: MATERIALS



Pine Hall – AquaPave permeable clay paver



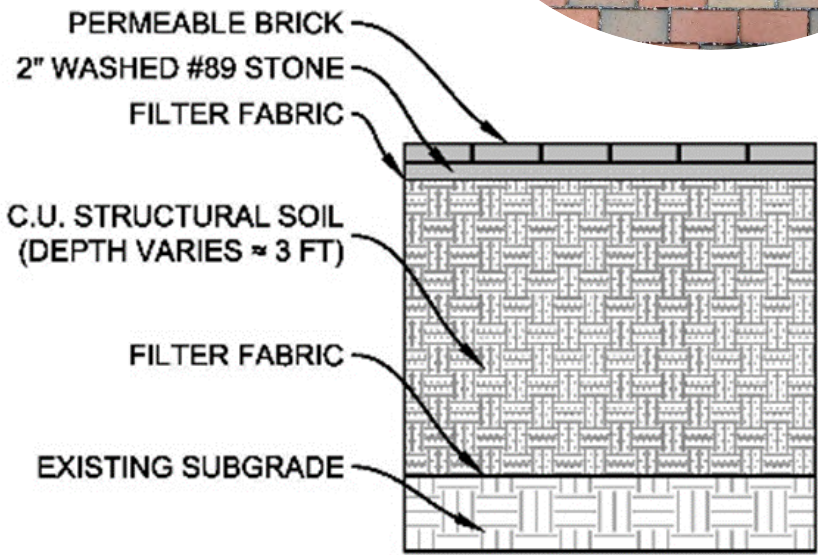
Washed #8 stone bedding



Non-woven filter fabric



C.U. Structural Soil



Construction: *EXOTIC VEGETATION REMOVAL*



Construction: *CONCRETE REMOVAL*



Construction: *EXCAVATION*



Construction: *DRAIN EXCAVATION*



Construction: *DRAIN INSTALLATION*



Construction: *UTILITY RELOCATION*



Construction: *UNDERDRAIN LAYOUT*



Construction: *FILTER FABRIC INSTALLATION*



Construction: *C.U. STRUCTURAL SOIL DELIVERY*



Construction: *C.U. STRUCTURAL SOIL DELIVERY*



Construction: *C.U. STRUCTURAL SOIL DELIVERY*



Construction: C.U. STRUCTURAL SOIL INSTALLATION



Construction: *COMPACTION OF 4"-6" SOIL LIFTS*



Construction: *FINAL LIFT AND COMPACTION*



Construction: *TREE INSTALLATION*



Construction: *TOP LAYER OF FILTER FABRIC*



Construction: *DRIP IRRIGATION INSTALLATION*



Construction: *BEDDING LAYER INSTALLATION*



Construction: *SETTING THE FINISHED ELEVATION*



Construction: *PAVER INSTALLATION*



Construction: *PAVER INSTALLATION*



Construction: *PAVER INSTALLATION*



Construction: COBBLE AND BOULDER PLACEMENT



Construction: *FINISHED!*

