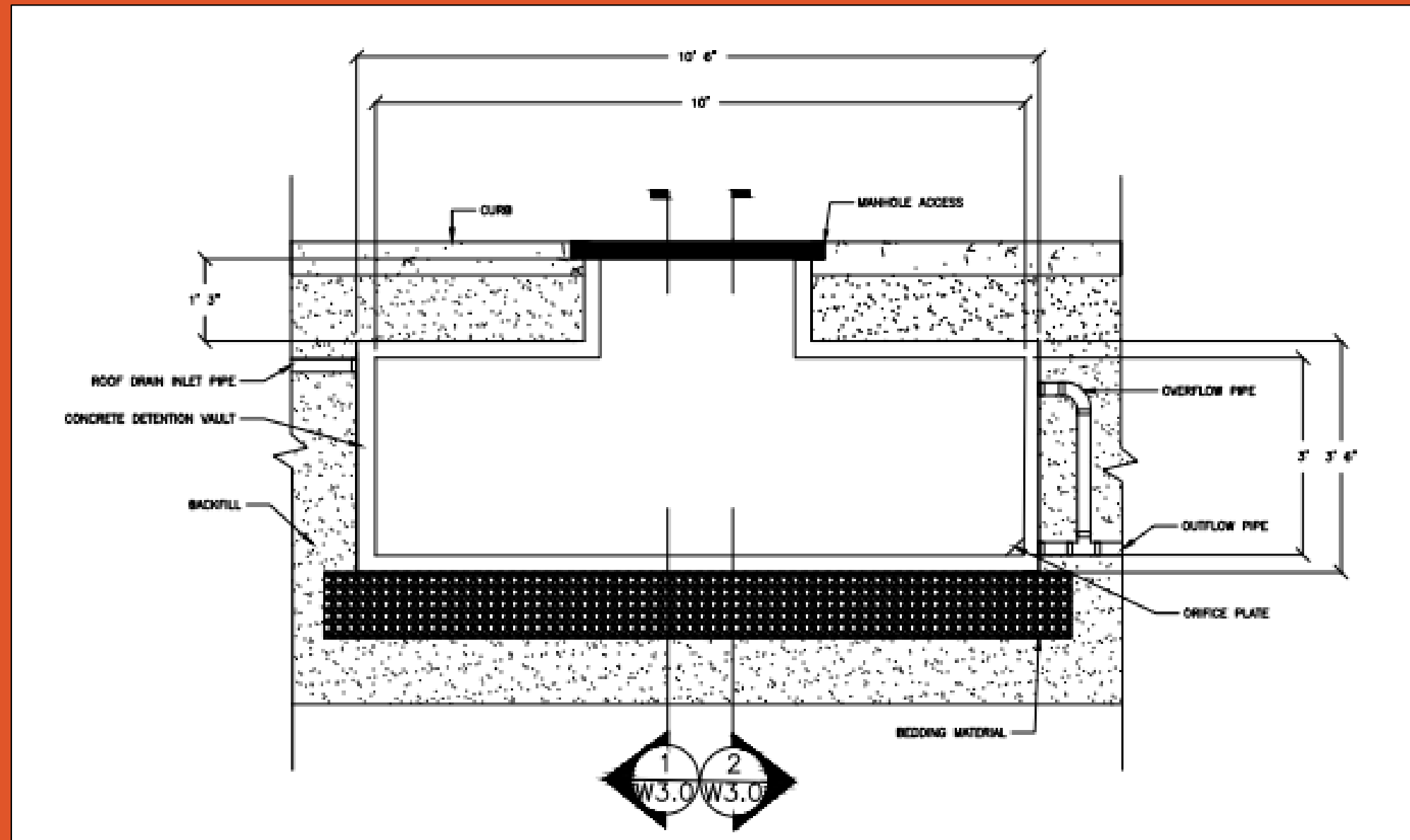


WATER RESOURCES

SUBGRADE DETENTION SYSTEM

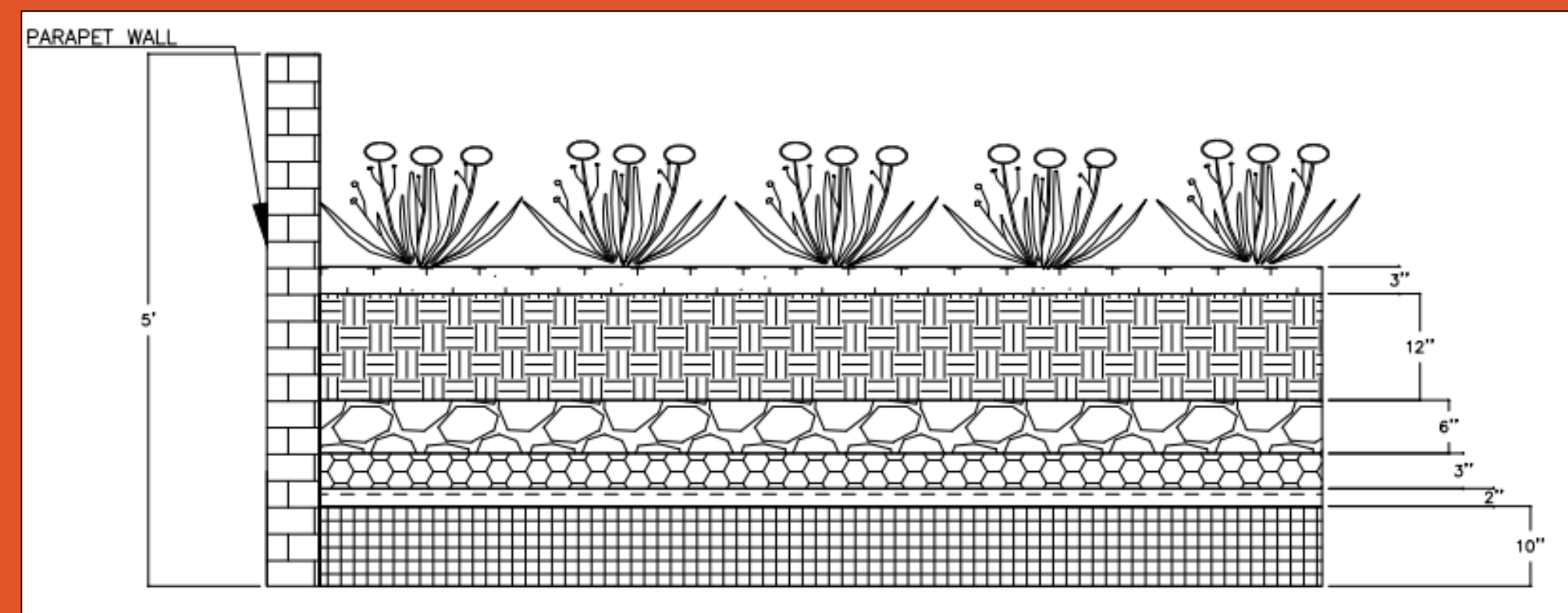
- Two subgrade concrete water detention vaults beneath the north and south curbs
- South vault size: 3ft x 3ft x 10ft
- North vault size: 3ft x 3ft x 7ft
- Connects into city storm system
- Roof drainage system will tie into respective vaults



Proposed Subgrade Detention System

GREEN ROOF SYSTEM

- Extensive green roof design. Will have a saturated load of 54 PSF and a dry load of 34 PSF
- Green roof system will take up 60% of total roof surface. Square footage of 10350 SF
- Roof nominal thickness is 10"
- Roof membrane consists of silty and loamy soil mix, water proofing fabrics, and retention boards



Proposed Green Roof System



OVERTON STREET DEVELOPMENT

PROJECT KEYNOTES

- All-new, 46,416 square-foot, three-story building complete with underground parking, rotating car storage, and a green roof
- Expands the adjacent Dovelewis Animal Hospital into the lower two floors, and rentable office space on the third floor
- Positioned between NW Pettygrove and NW Overton streets
- The 30,179 square foot animal hospital expansion fills the first two floors, while the third floor is 16,237 square feet of dedicated office space
- The 14,876 square foot underground parking garage contains two vertical car stackers to optimize capacity

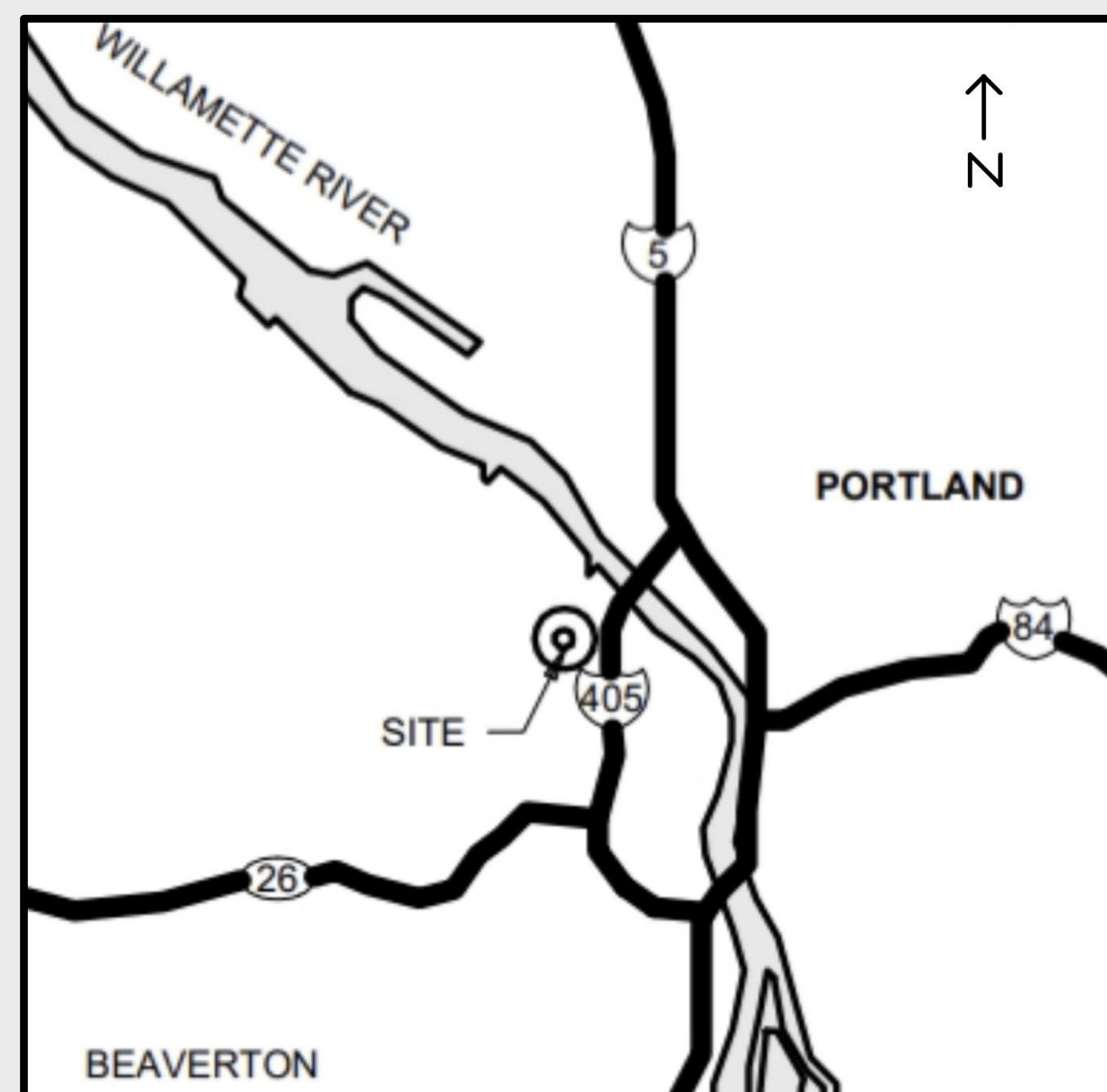


Building render of the Overton Street Development Project (render courtesy Mackenzie Engineering)

DESIGN OBJECTIVE

- Prioritized public safety, economy, environmental impact, and sustainability
- The water resource team analyzed and engineered solutions for efficient stormwater management, mitigation of water infiltration, and the interface with municipal systems
- The structural team engineered the building framing and lateral force-resisting system

SITE LOCATION

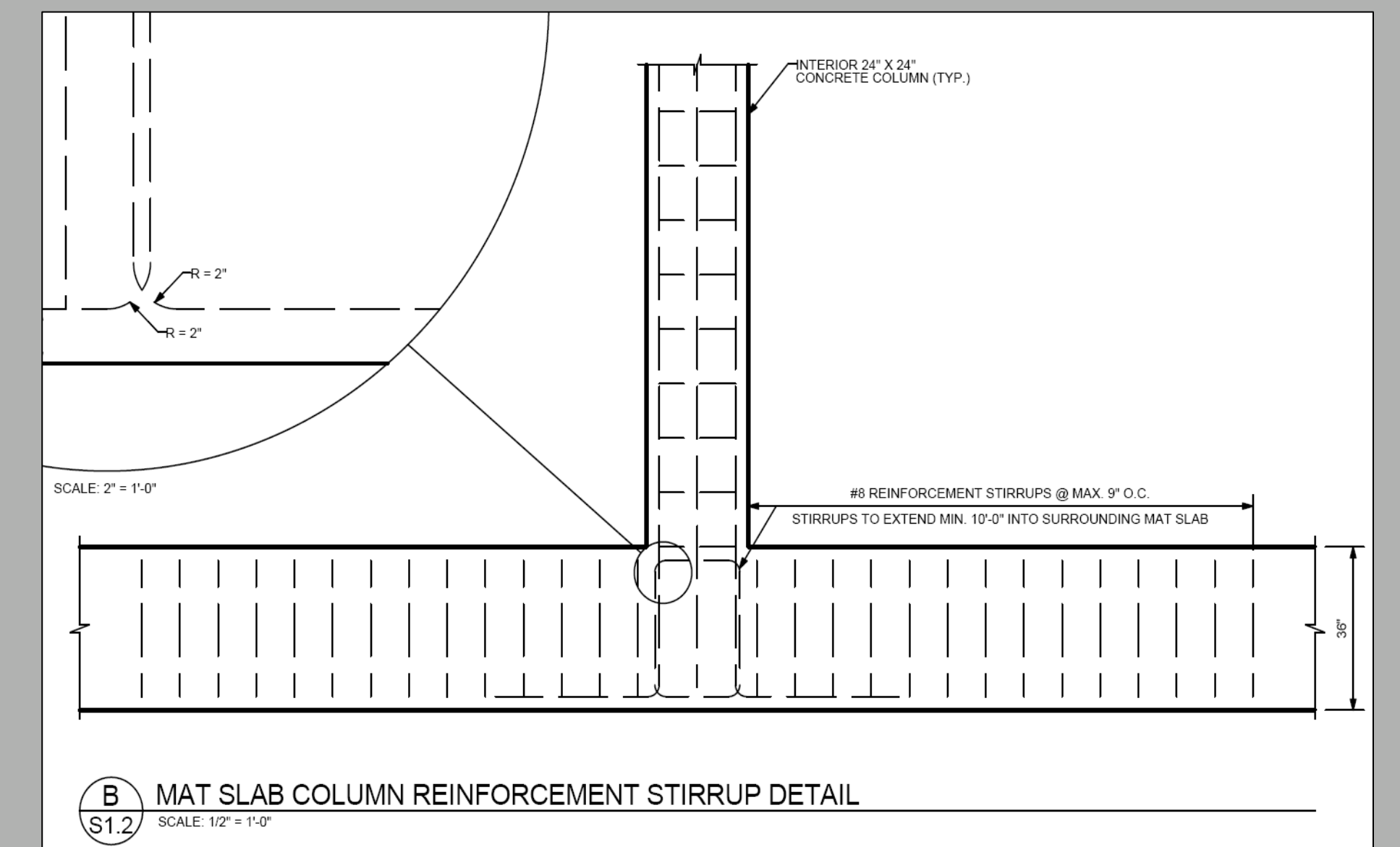


Map of site location within Portland (courtesy Mackenzie Engineering)

STRUCTURAL

FOUNDATION

- Mat-slab foundation designed to distribute building load over large area
- 1500 psf design soil-bearing pressure
- Engineered to resist column punch-through force through slab
- Stirrups placed orthogonally around column to satisfy shear demand



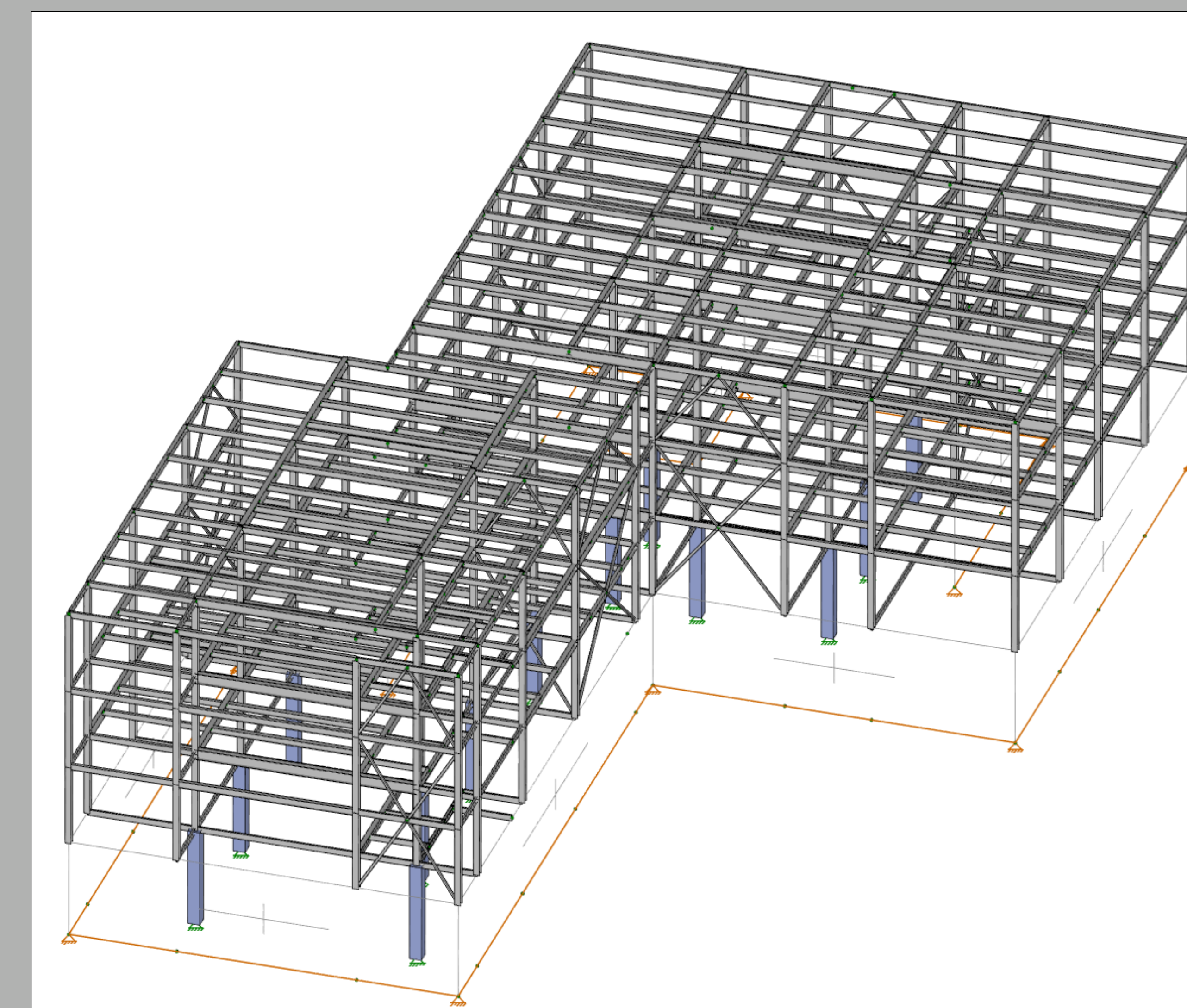
Mat slab column reinforcement stirrup detail

GRAVITY SYSTEM FRAMING

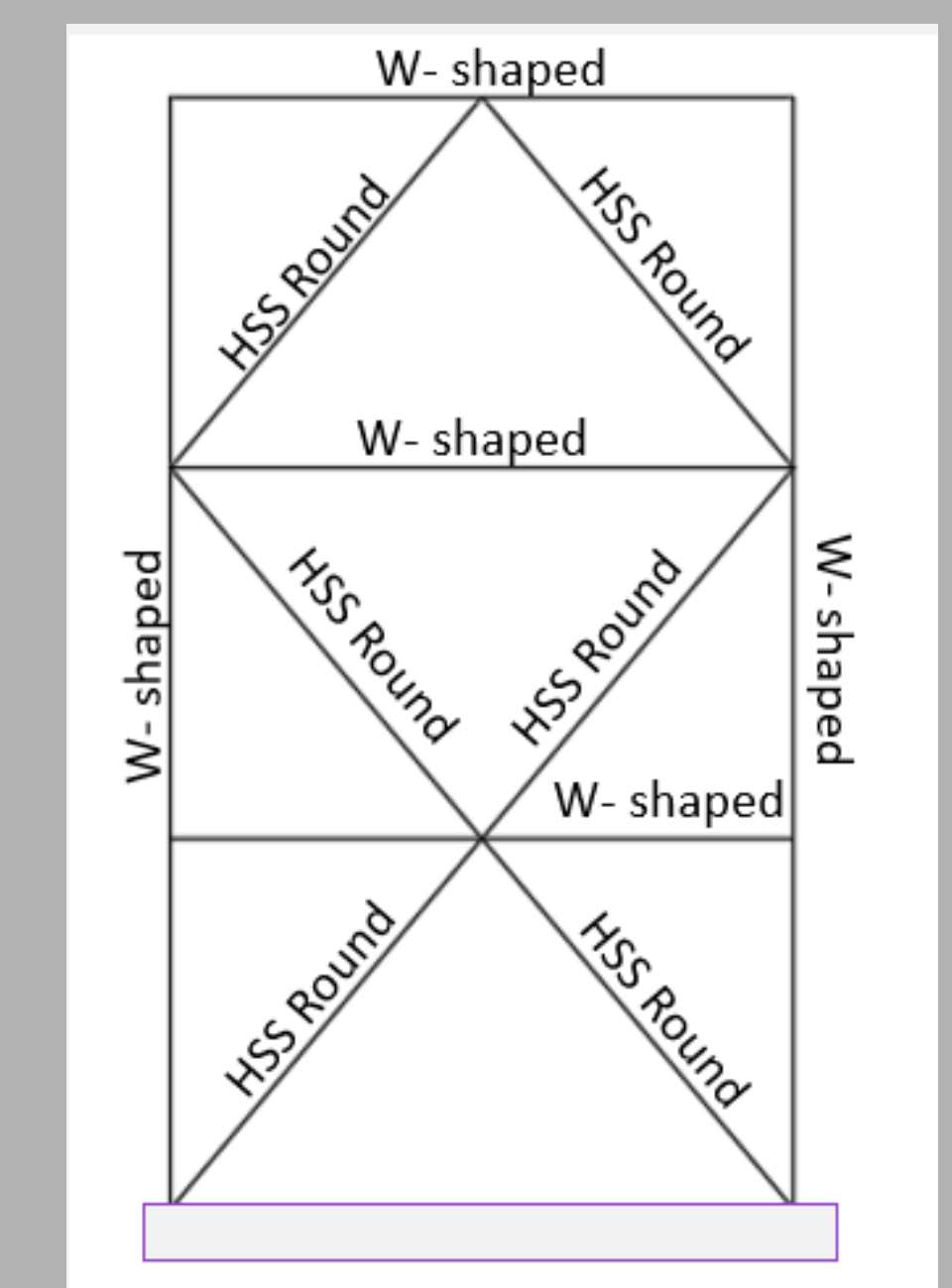
- Structural steel beams, girders, and columns
 - Low cost
 - Fast construction
 - Future cost savings with any modification and expansions
- Ground floor is a solid reinforced concrete slab supported by steel girders and concrete columns

LATERAL FORCE-RESISTING SYSTEM DESIGN

- Inverted V-braces, X-Braces, and multistory X-braces considered
- Braced frame W-shape and round hollow structural sections (HSS) considered
- Final selection is multistory X-bracing with round HSS



Structural steel design member gravity system



Proposed Brace Frame System