

**Landscape Construction Methods & Materials**

Arch X 472.14A

Terri Larronde  
 UCLA Extension  
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 Instructor: Patrick Reynolds

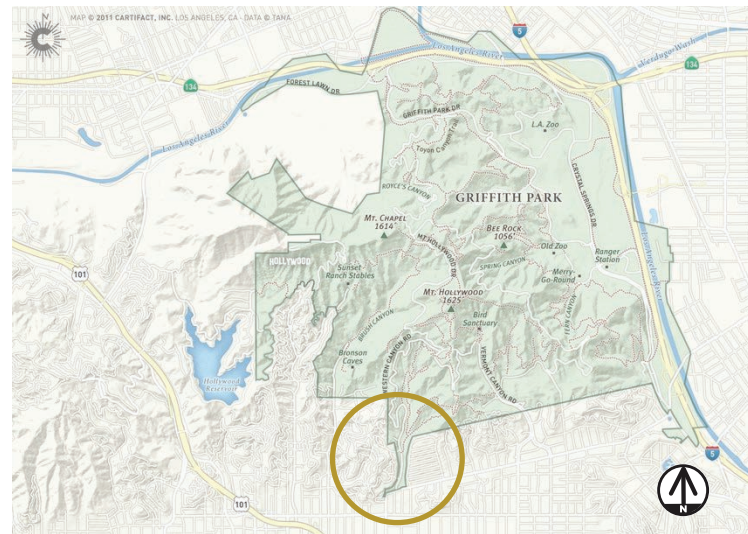
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# 1 Watershed Structure Site Study Ferndell Nature Area/Griffith Park

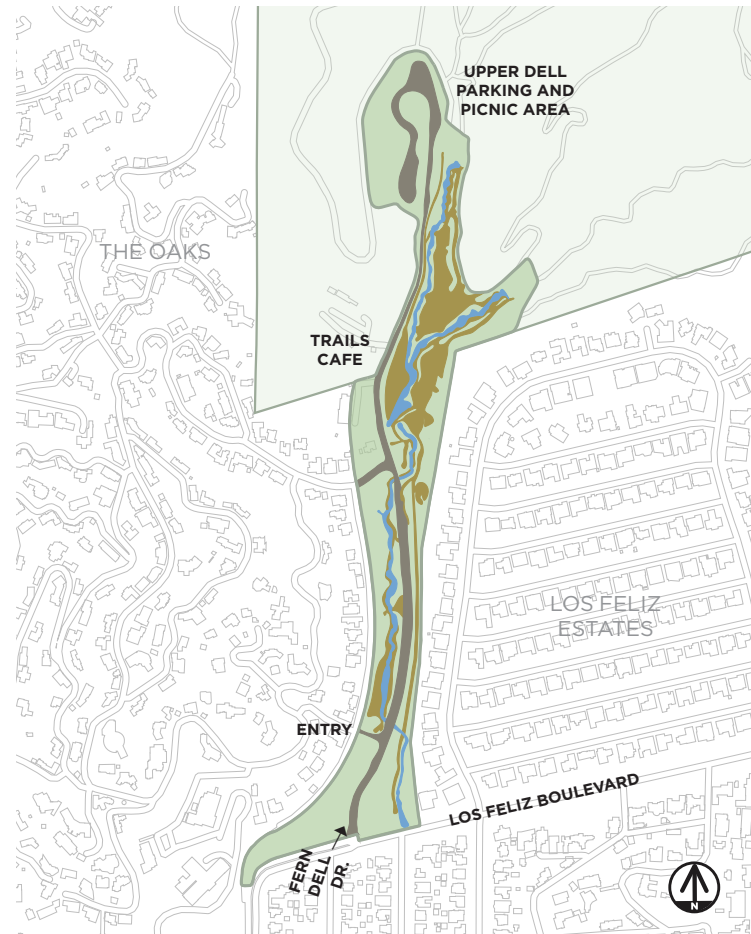
At the southwest border of the Hollywood Hills and Los Feliz neighborhoods is an enchanting, tree-shaded half-mile trail of Griffith Park that meanders along a trickling stream dotted with ponds. This verdant paradox in the city of Los Angeles has an appropriately puzzling name: **Ferndell Nature Museum**. There is no proper museum building. The collection of plants and animals living there IS the museum.

The history of this 20-acre Griffith Park canyon area and what became “Ferndell” or “Fern Dell” includes the natural spring that feeds the stream, a village site of the native Tongva/Gabrielino people, planting of much of the canyon’s greenery in the early 1910s, development of the trails and bridges by the Civilian Conservation Corps in the 1930s, disrepair in the 1980s, and refurbishment and restoration (in stages) up until today. This human history complements



Ferndell’s unique biological composition: it hosts a diverse flora and fauna that, much like nature elsewhere in developed Los Angeles, is a mosaic of native and introduced species.

Modern Ferndell dates back to 1914, when the city’s parks department began planting a rustic fern garden in this corner of Griffith Park. The land had only recently been turned over to the city, and park planners envisioned a lush, tropical forest fed by irrigation for the entire park. Ferndell was created as a demonstration of what the new parkland could look like with a reliable water source. Wells were dug nearby to supplement the water supply, dams were built to create pools, and rustic bridges and planting beds were constructed in the Picturesque style popular with landscape architects at the time. Besides the dozens of species of fern that give the garden its name, there is also a dense canopy of elephant ear plants, coast live oak, sycamores, California bay, and coastal redwoods, with ivy growing over much of it.

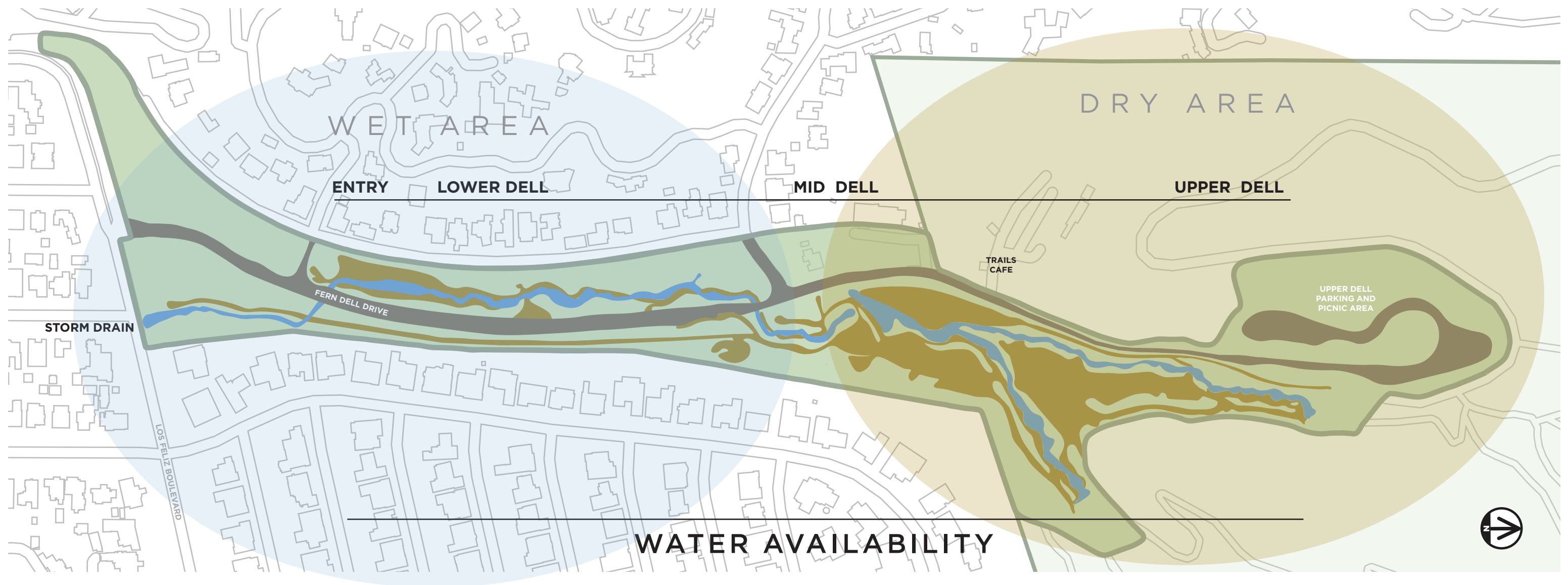


The foliage of Ferndell is so dense that it practically creates its own ecosystem. Where the rest of Griffith Park is sparsely vegetated and heavily exposed to the sun, Ferndell’s tree canopy and running water keeps it cool even on hot days. For the visitor, this makes it a wonderful respite from the heat. For the garden’s resident wildlife, the pools, stream and fauna make for a tranquil home. Within the ponds you will likely see goldfish, koi, and mosquito fish, and maybe the occasional turtle, frog, or crayfish. Dragonflies and butterflies are very common, and you’ll likely hear the rustle of lizards or squirrels in the bushes and the sound of woodpeckers in the trees above.

Ferndell owes its current appearance to the Civilian Conservation Corps (CCC), a New Deal program that employed hundreds of thousands during the Great Depression with conservation jobs. Using style guides created by the National Park Service, the Corpsmen constructed the irregular stonework, faux-log railings, and additional water features, paths, and bridges, extending Ferndell to the north end of the canyon. The work is exemplary, and aside from some occasional restorations, Ferndell has largely remained the same since.



*Ferndell in the 1930s/40s, following the CCC project. (Photos courtesy of Los Angeles Public Library)*



**LOWER DELL**

Originally an ancient drainage channel that coursed down Mt. Hollywood, now a single winding stream that is narrow, moist and heavily shaded, this area was developed in 1910 to counter the only formal entry to Griffith Park on the San Fernando Valley side. In the 1920s the stream side fernery was introduced. The focus back then was always on the lower, well-watered ravine to become a natural garden showcasing a representaiton of *Pteridophyta*. The earliest photo from 1928 shows the site's allure. Under a canopy of Sycamores and alders, Tasmanian tree ferns jostle with the brighter green Australian tree ferns. Sword ferns, maidenhair ferns, and Pacific chain ferns share the edge of the decomposed granite walks with iris species, baby tears and other introduced plantings. Enchancing the exotic effect were rough cut rock walls with log copings, stumps for seating and edging and wood bridge railings.

**UPPER DELL**

This area is dry, open and spreading with two diverging tributaries. Two creeks embrace a spacious picnic ground with a packed earth surface and scattered trees. At the eastern end the views open to include the high ridges and Griffith Observatory. This area has often been targeted for improvement, especially during the 1930's when there was excess federal spending. But, extreme climate prohibited any progress. Through the years flooding followed drought. The CCC and WPA documents make reference to water control: waste ways, spillways, flumes, check dams and sanitary sewers. Exacerbating the risk of floods was the scourge of fire. In 1933, 42 relief workers were killed and the Western and Vermont Canyons were denuded. Two years later an unseasonal downpour hit these same canyons and workers rushed to build 50-60 check dams to prevent landslides. Despite this drama, this flood control work was essential to Fern Dell's long term existence.



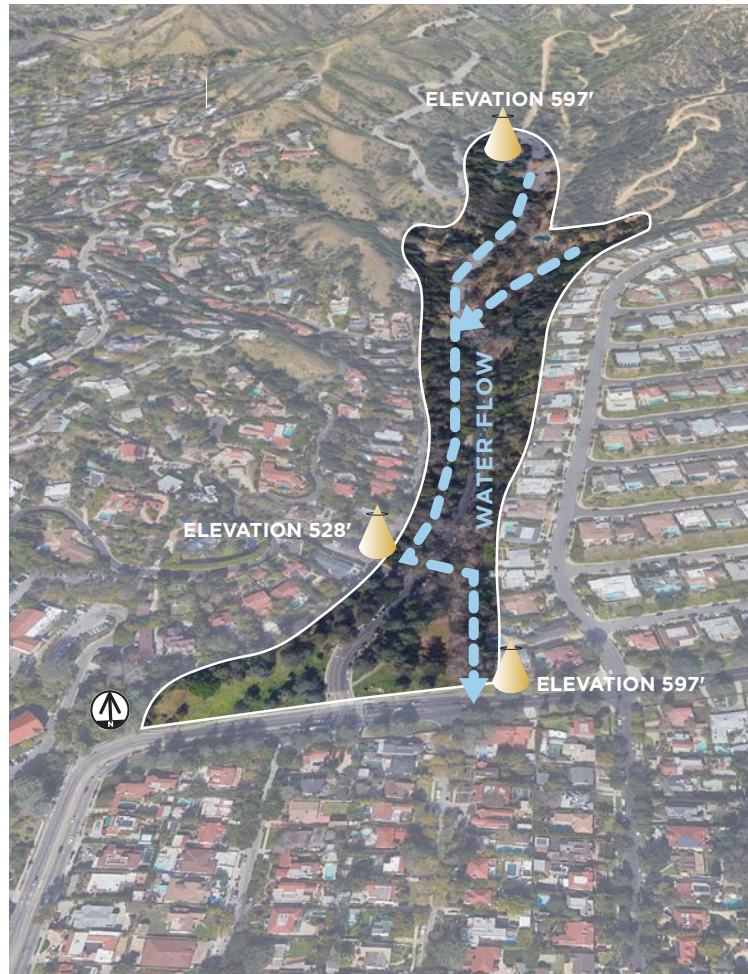
wet → wet/dry → dry



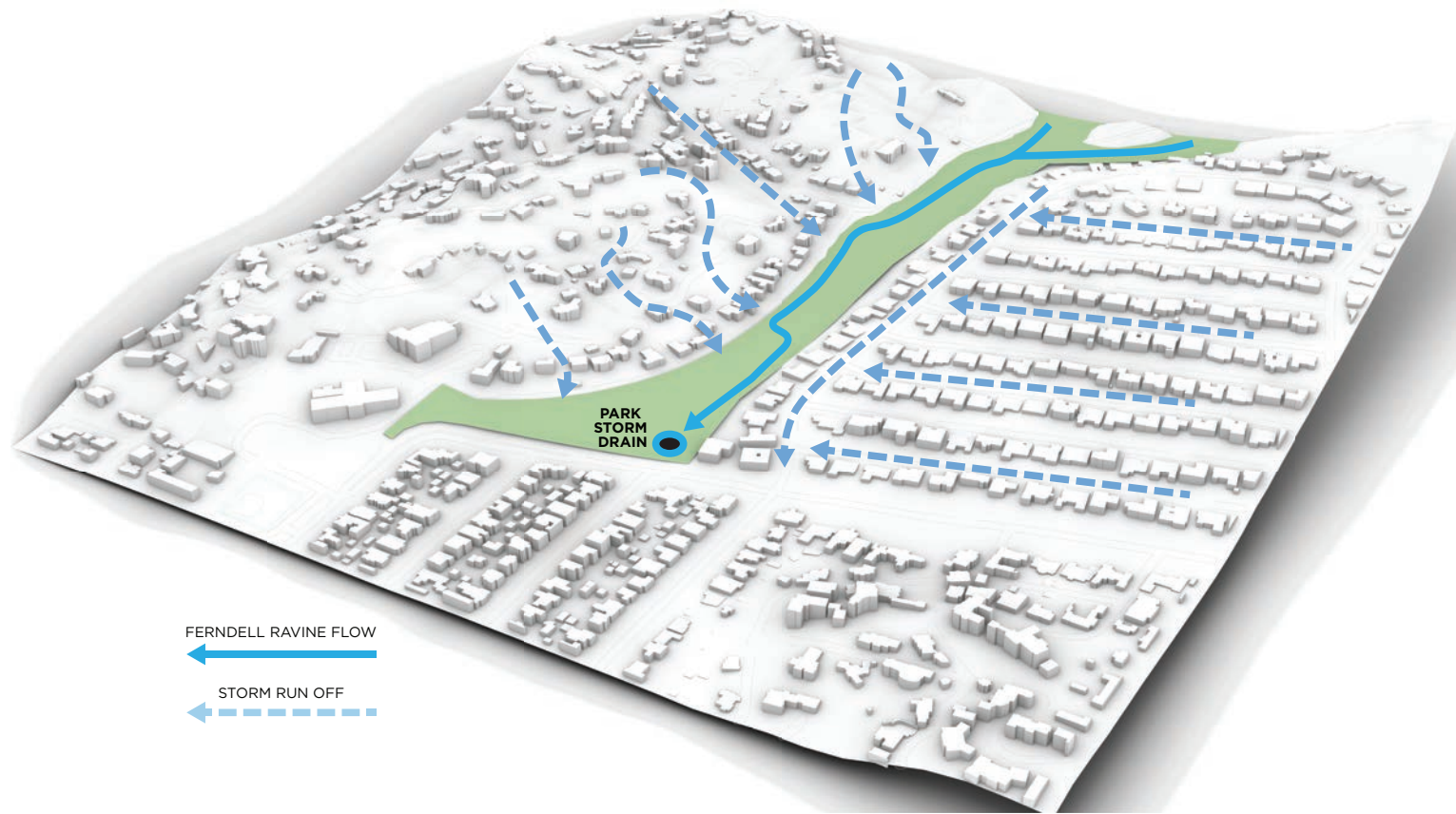
ENTRY LOWER FERNDELL

MIDDLE FERN DELL

UPPER FERN DELL



Elevation change water flow



Hard surface run-off water flow. Run-off from the site drains to the Ballona Creek watershed.



Existing storm drain at Los Feliz Blvd.



Crumbling infrastructure



Dry waterfalls, broken stone walls

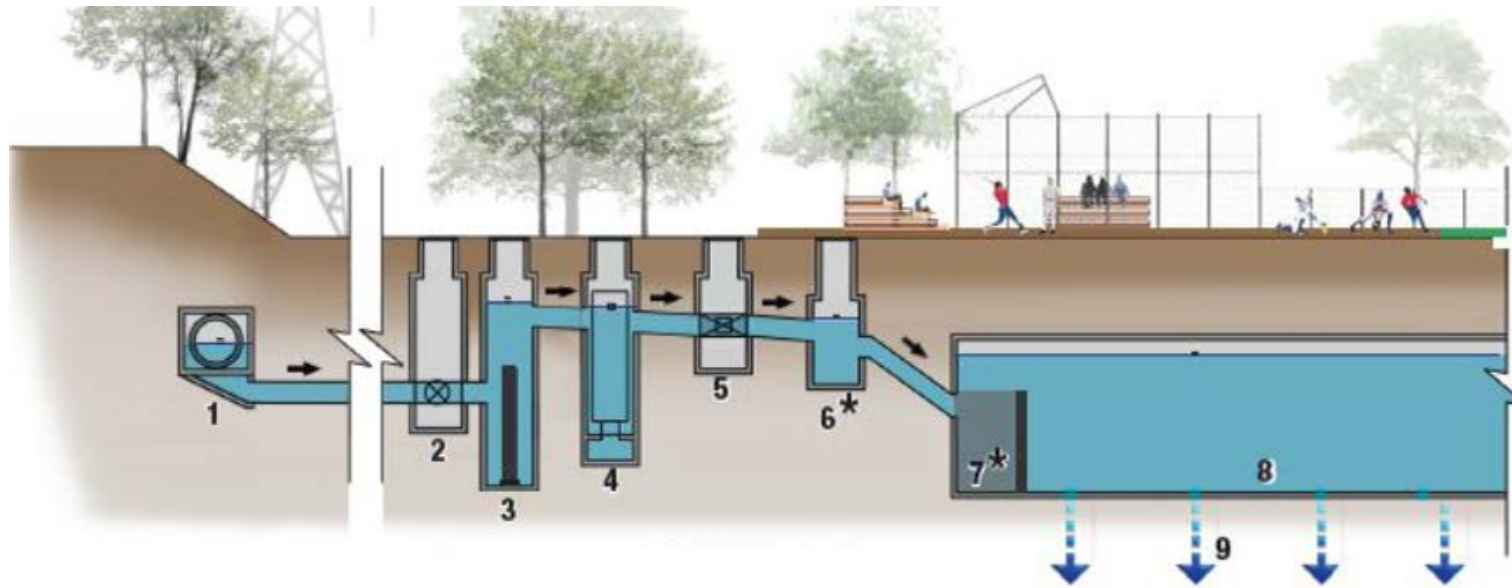


Broken fencing

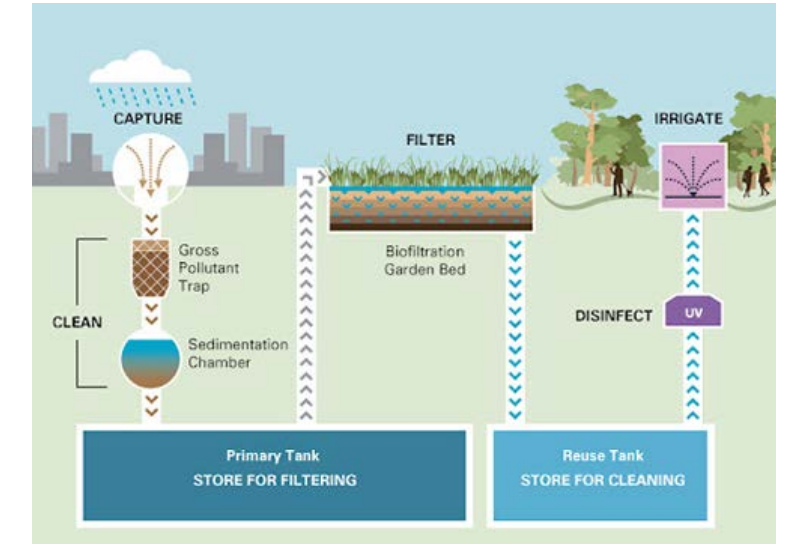


Ineffective and unattractive fencing

### Stormwater Capture Program



- 1 RCP Diversion Structure
- 2 Actuated Valve Vault
- 3 Pump
- 4 Hydrodynamic Sperator
- 5 Flow Measuring Device
- 6 Sedimentation Basin\*
- 7 Initial Containment/Settling Area\*
- 8 Undergrpound Infiltration Basin
- 9 Groundwater Infiltration/Recharge

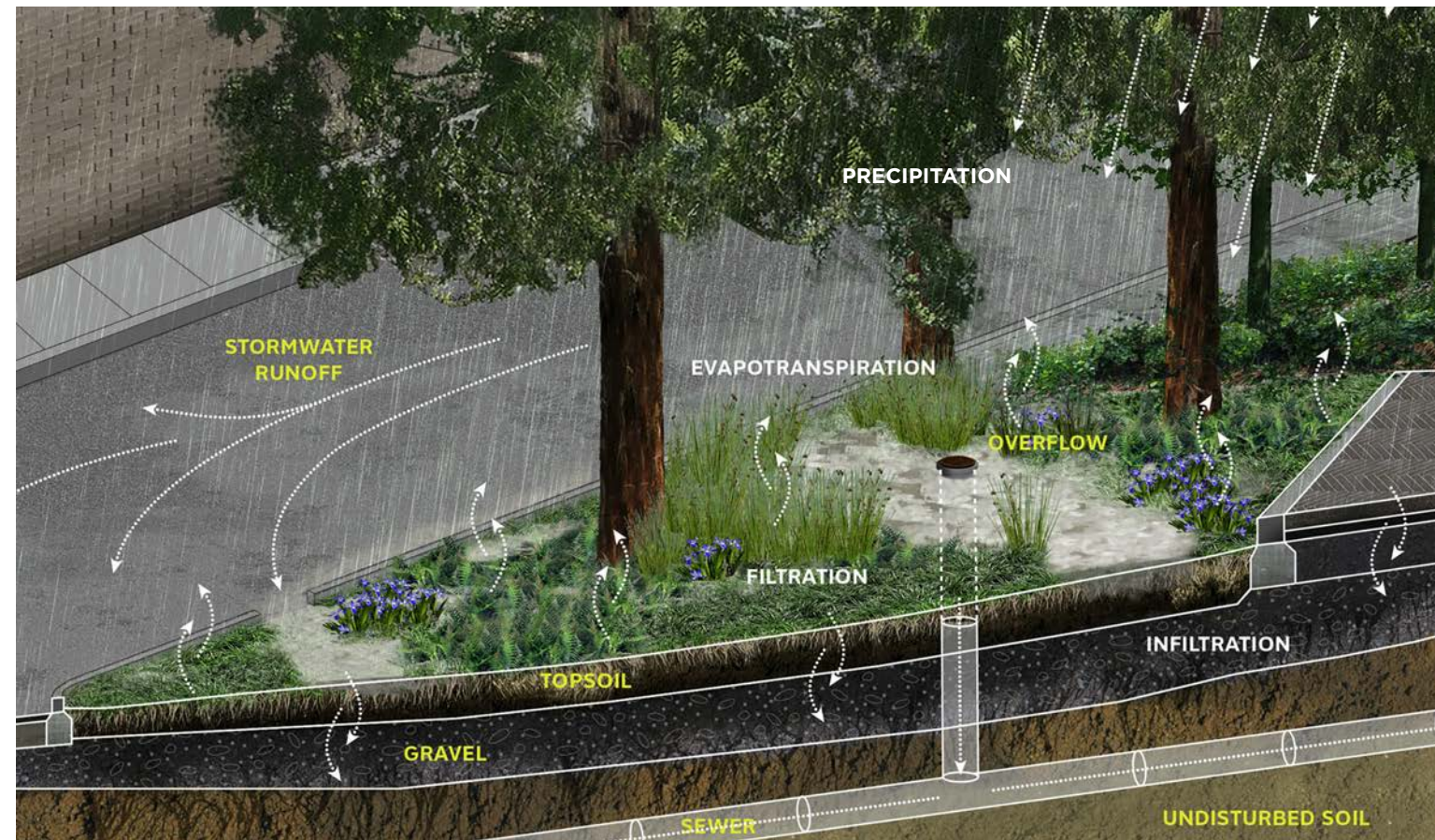


Stormwater capture for irrigation includes trapping pollutants and cleaning through sedimentation and biofiltration.

A public meeting was held in the summer of 2020 to explain the upcoming stormwater capture projects planned many Los Angeles parks. The purpose of these projects is to capture stormwater run off to increase water supply and improve water quality with the objective of helping Los Angeles source 70% of its water locally. Additional

benefits include mitigating local flooding, expanding sports fields , installing permeable parking lots and playgrounds, job creation and environmental education and awareness. The DWP plans to take advantage of local parks to collect the stormwater and allow it to recharge the groundwater.

### Vault-style Hydrodynamic Separator



Stormwater Capture Systems will help mitigate the overburdened combined sewer system in the watersheds. Stormwater currently enters the system through traditional drain inlets (catch basins). The site itself is currently constructed of impermeable pavement and onsite tree health varies in condition. Stormwater runoff from the surrounding neighborhood road network around the park contains multiple pollutants such as sediments, metals, and oils lifted during rain events. The proposed project will reduce the quantity of the stormwater entering the combined sewer system and improve the quality of the runoff through bioremediation.



A vault-style hydrodynamic separator for treating stormwater runoff. This system combines swirl concentration and flow controls into a single unit for removing fine particles and other pollutants. It utilizes a four stage chamber design (swirl, floatables, flow control, and outlet chambers) with a special baffle and weir design to effectively remove sediment, litter, debris and hydrocarbons.

These systems maintain a shallow profile – typically one meter below invert – making the system ideal for applications with high groundwater, bedrock or utility conflicts, allows for removal of particles down to 50 µm in size.

Upper Dell Stormwater Drain Program Details



Upper Dell Existing catch basin at top of slope. (upper Dell) Cement is cracked with sprinkler pipes are wrapped around it, some non-functional.



Wide area of parking lot that is cracked and full of hazardous crevices. Should be replaced with permeable paving when pipes are put in for transfer of water from slope to cistern. Water flows into dumpsters.



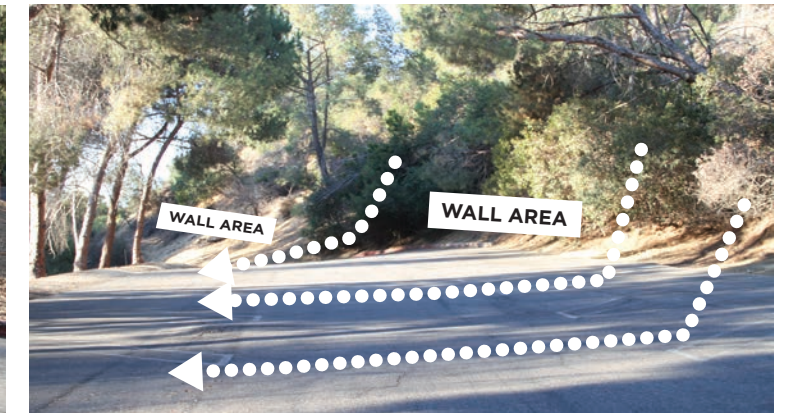
Highest elevation parking terrace. Should be outfitted with drains in permeable paving for feeding into lower elevation cistern.



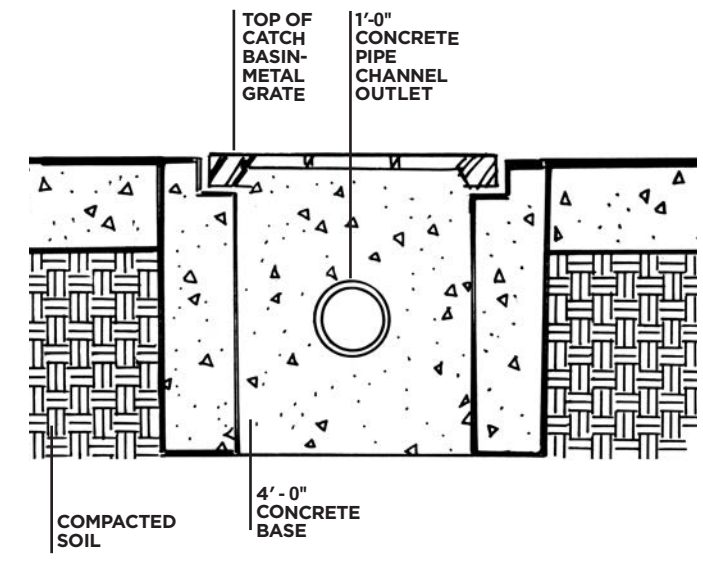
Concrete pipe from under the street going into the catch basin. Basin is full of sediment and rocks.



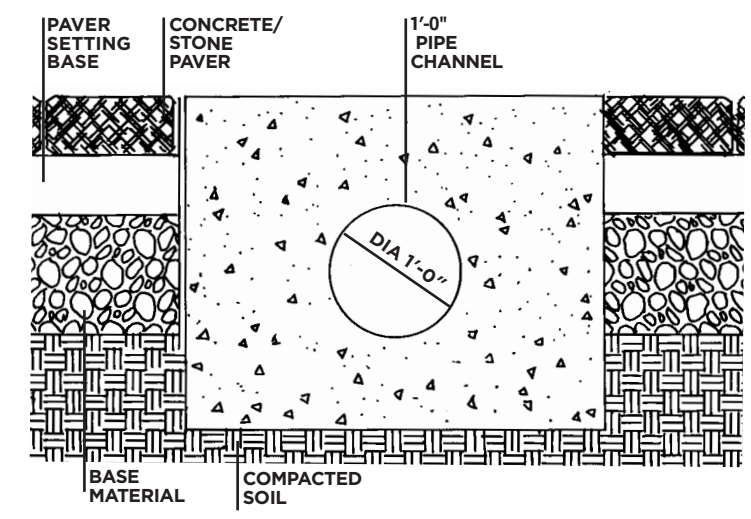
Slope of parking lot above cistern area showing elevation for water flow. Asphalt should be replaced with permeable paving. This water flows right into the dumpster area above.



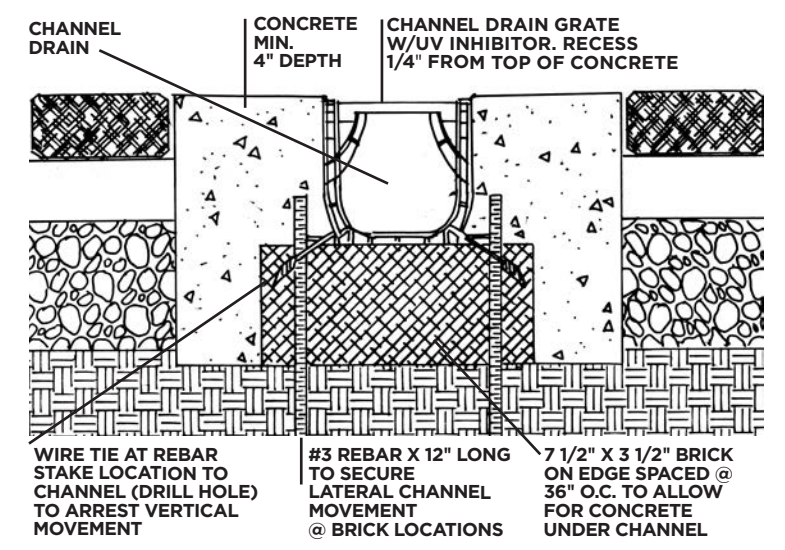
Sloped parking showing hillside on perimeter with no storm drainage or barrier edging for water retention or storm water channeling.



CONCRETE CATCH BASIN



PIPE CHANNEL  
LIGHT VEHICULAR TRAFFIC INSTALLATION (PAVERS)



CHANNEL DRAIN  
LIGHT VEHICULAR TRAFFIC INSTALLATION (PAVERS)





**UPPER DELL DRAIN SYSTEM  
SITE PLAN**

WESTERN CANYON ROAD

CATCH BASIN AT STREET LEVEL

FORESTED OAKS AND SYCAMORES

PROPOSED MORE NATURAL BIOSWALE  
WITH SIDE TRENCHES AND PATHWAYS

PICNIC AREA

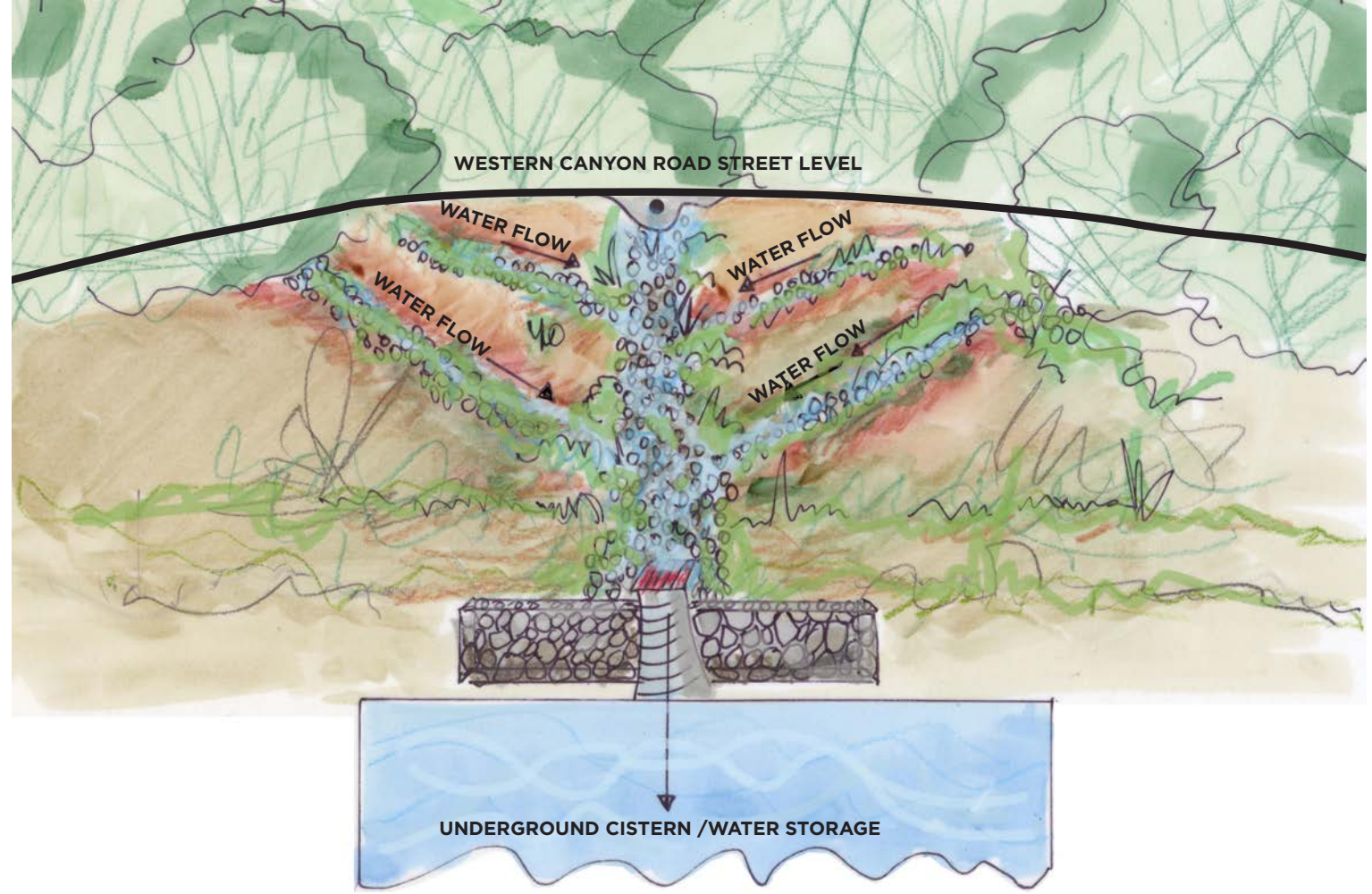
GABION WALLS

DRAIN to UNDERGROUND CISTERN

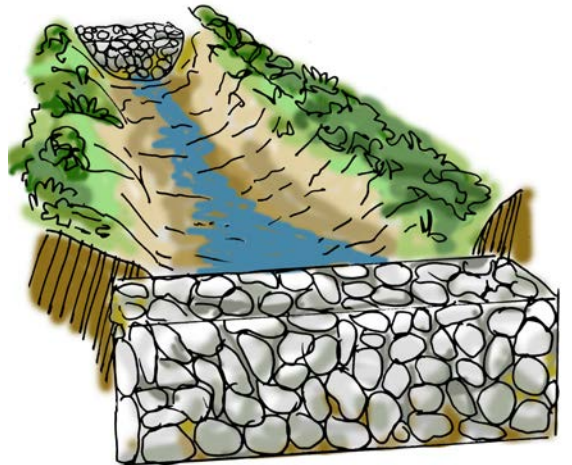
HIGHEST ELEVATION PARKING AREA



**CURRENT STATE OF EXISTING DRAIN SYSTEM**  
 Located at the top of the highest parking area in the Upper Dell, this drain system is inadequate at best. The catch basins are full of soil and plant debris, the walls are crumbling and insecure. If it does drain, it flows into the parking lot to the east, which then flows into the man-made catch basins that mimic a creek bed above the playground.

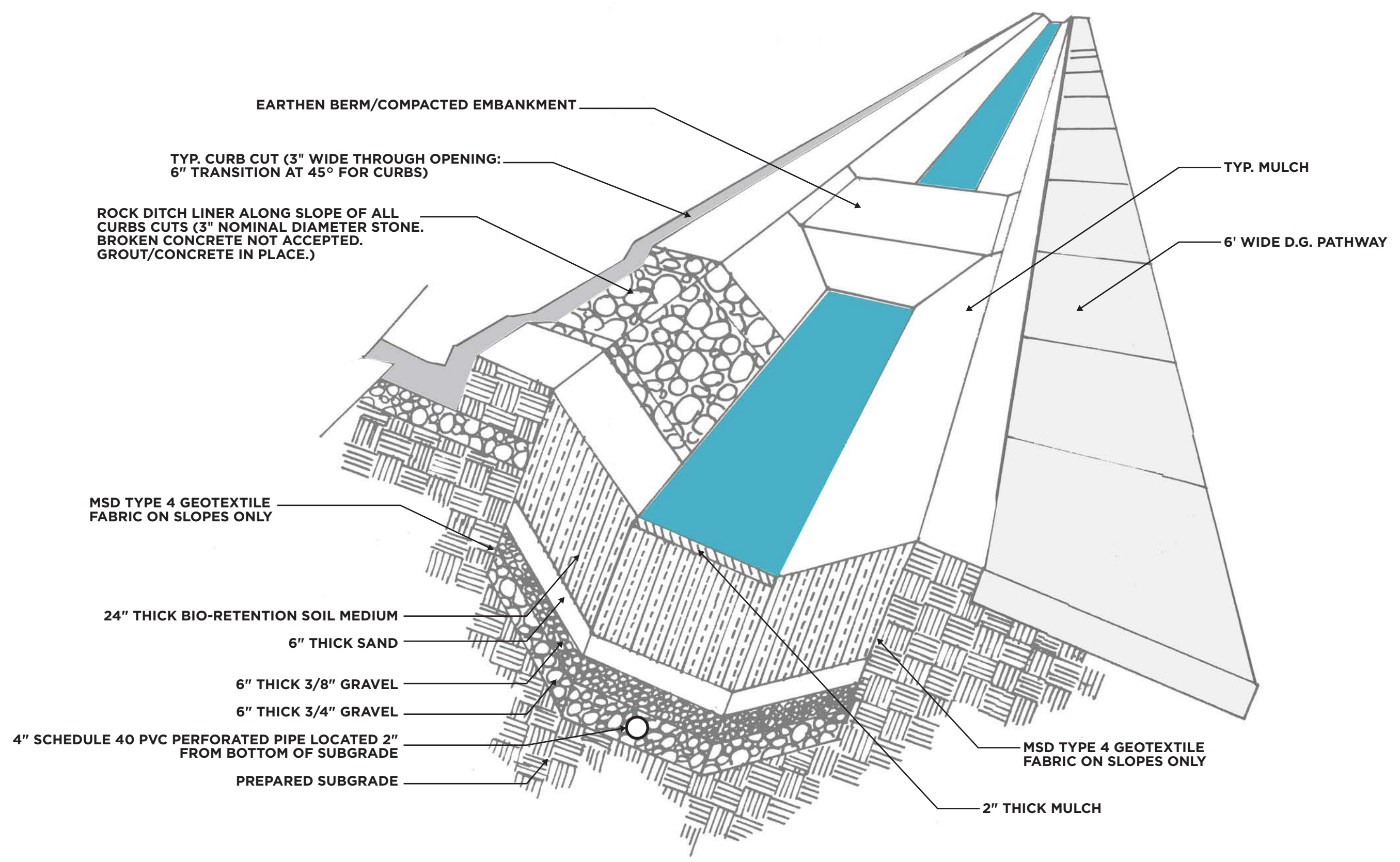


**PROPOSED REDESIGN OF DRAIN SYSTEM**  
 First, complete excavation.  
 The concept is to make this area more natural, and more sustainable.  
 Re-grade to make 4 Berms (2 on each side) that flow into a new central down sloping Bioswale that is lined with river rock and follows the style of the CCC-man-made boulders throughout the Dell.  
 Plantings of shrubs and California natives would provide habitat and nutrients to the soil, encouraging improved soil composition and facilitate the decomposing of a more diverse plant material.  
 A main drain at the parking lot edge would push the water below the surface to underground cisterns located in the parking lot under the permeable pavers.



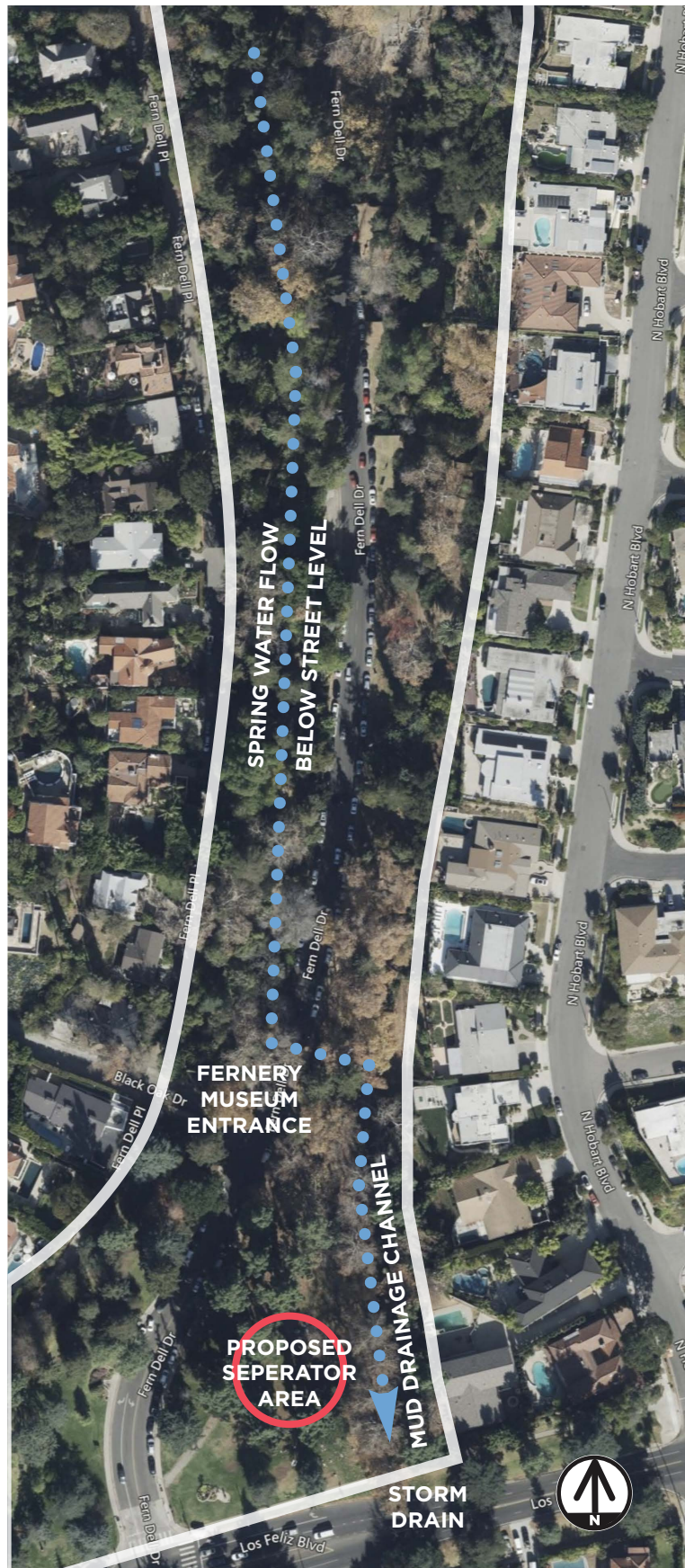
**GABIONS** could be embedded in the excavated trenches for the new bioswales, at the ends, to supply stability and drainage, if needed.  
 They could also be installed at the edges of the slopes and where the parking lot pavers start, to slow any storm flows from overwhelming the parking lots and direct the water toward the new drains, which direct the water into the underground cisterns.





**TYPICAL SECTION OF A BIORETENTION AREA**  
GRADED FILTER SECTION SHOWN TO BE USED IN BIORETENTION AREAS FOR MEDIUM AND BEHIND PATHWAYS

Lower Dell Stormwater Drain Program Details



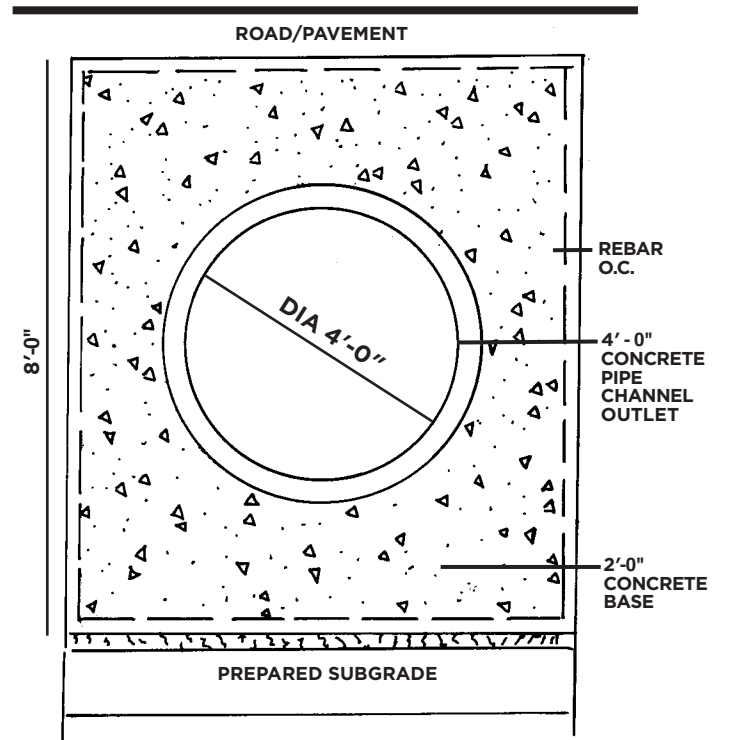
**CURRENT STATE OF EXISTING DRAIN SYSTEM**  
 Located at the bottom of the Dell, this area is very wet. The water from the Fernery area (supplied by a mineral spring) flows downhill, through the below-street-level garden area. The water crosses under Fern Dell Drive in a drain channel and flows south along the edge of the park into a storm drain at Los Feliz Blvd.



**PROPOSED REDESIGN OF DRAIN SYSTEM**  
 It has been proposed by Friends of Griffith Park that to rehabilitate Fern Dell and improve water quality discharged to Ballona Creek, that a stormwater diversion from the existing storm drain, capturing run-off from the creek and local neighborhoods be implemented. Using a hydrodynamic seperator, stored underground, the water would be filtered and stored for park irrigation usage, and to clean the water of sediment and replenish the Fernery area in dry seasons.

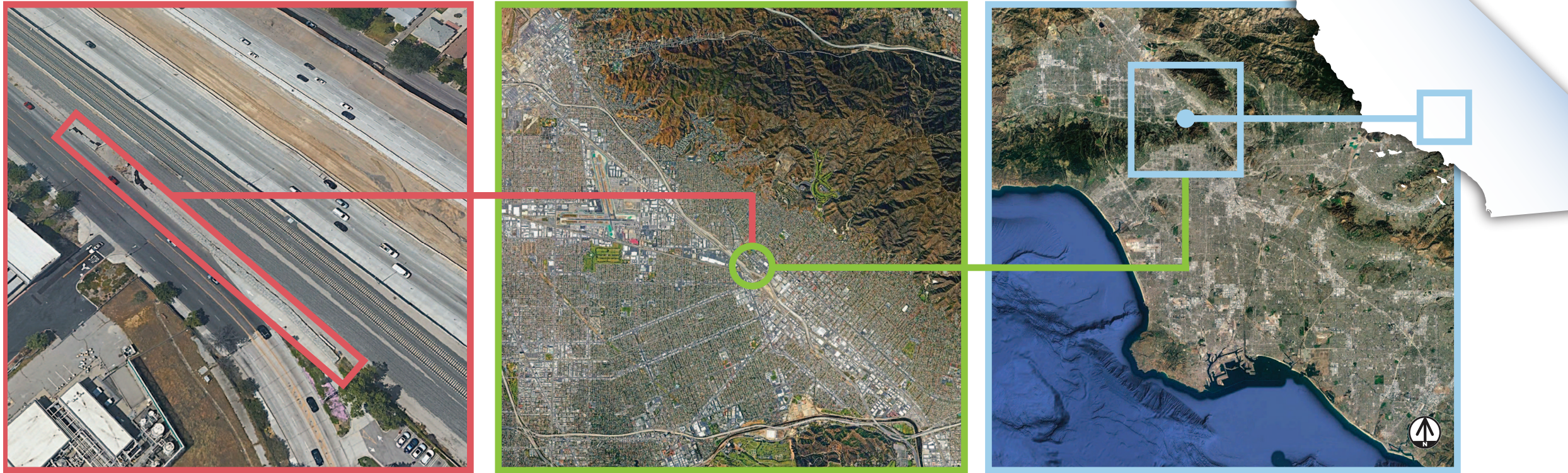


Lower Dell Existing storm drain at Los Feliz Blvd. Channel needs sediment clean-out. Cement is cracked and decomposing.



BEDDING CONSTRUCTION FOR STORM DRAINAGE PIPE

### Gabion Retaining Wall Site Location



The **Gabion Retaining Wall** is located at the north end of the Burbank Animal Shelter property, near the Empire Shopping Center, just southeast of the Burbank Airport. The wall was constructed as part of the improvements to the controversial “5-Point” traffic intersection at Victory and Burbank Blvd. near the Burbank Blvd. offramp off the I-5.

This project started in 2014, and is still on-going. The wall supports the embankment shoulder of the Metro/Amtrak/Freight train tracks, and is 1/10th of a mile from the actual tracks, and 2/10 of a mile from the southbound lane of the I-5.

The wall is 7' high, 36" wide and 8/10 of a mile in length. The rocks are encased in 36" square heavy wire cubes, with a 1' ‘cap’ wire basket at the top. The cubes are wired together for stability, and stacked end to end.





The Gabion retaining wall borders an outlet/merging road from the Animal Shelter onto Victory Blvd. It is supporting the bank of earth that juts up to the train tracks and the I-5 freeway to the east, about 8-9/10 of a mile away.



Corner detail showing the 36" wire cube cage with an additional 1' cap section at the top



Detail of how the wire cubes are attached together.



Top of the wall, (2) 36" cube cages wide, with the geotextile fabric against the slope. Top of gabions are sloped away from the street traffic. A channel has been created for drainage away from the street, and down towards the plantings and trees of the Animal Shelter property.



Detail of corner on the slope side. Most gabion retaining walls don't need concrete foundations. Depending on the wall height, a 2" to 4" layer of compacted 1" road base, crushed from either blue metal or basalt rock is all that is required for most gabion walls.



Detail of geotextile filter fabric at the base. Geotextile filter fabric stops fine silts and clay migrating into the wall. The filter fabric ensures the gabion remains free draining, and eliminates hydro-static pressure behind the retaining wall.



36" square detail. Possible design pattern opportunity?

## Gabion & Reno Mattress Retaining Wall Construction Details

### Using Gabion Baskets and Reno Mattresses

- Gabion baskets keep the landscape from shifting and settling or washing or blowing away
- Economical and environmentally friendly
- Have been in use for thousands of years
- Double twisted hexagonal wire gabions and reno mattresses have been used for channel linings, river bank restoration, soil retention, slope stabilization, and other applications successfully throughout the world for over 100 years
- Gabions and reno mattresses last approximately 60 years with little to low maintenance as long as quality materials are used, with thoughtful project planning
- You must use 3-4 mm galvanized wire or in heavy water or UV exposure areas, 3.7mm PVC-coated double twist woven wire is a proven solution
- Baskets are rectangular or cubed shaped, reno mattresses are flat, but both are similar in construction.
- For retaining walls and slope protection, gabion baskets are generally installed vertically and stepped into a slope
- For stream beds, stream banks, runoff channels and slopes, reno mattresses can be installed flat and up to 45 degrees.
- Before installing gabion baskets or reno mattresses, the base should be properly graded and compacted. Install appropriate geotextile, then install the assembled gabion basket or mattress according to manufacturer's specifications.
- Lay in fill in the baskets, such as 4-6-inch blasted stone or local washed and graded stone. After filling, wire lace basket and mattress covers closed, ready for use, or as a base for more baskets.



Gabion baskets with geotextile attached, ready for stone placement.



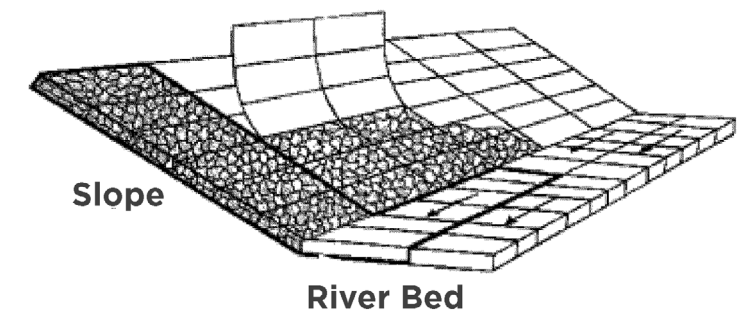
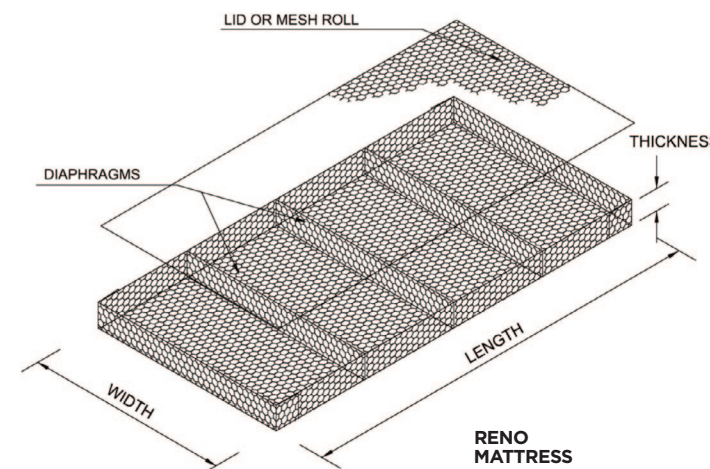
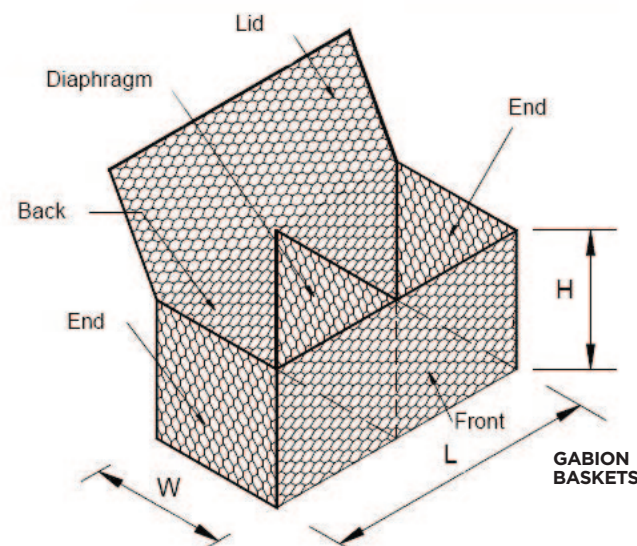
Filling the mattresses with stone.



Mattresses lining the waterway, creating a sloped terrace.

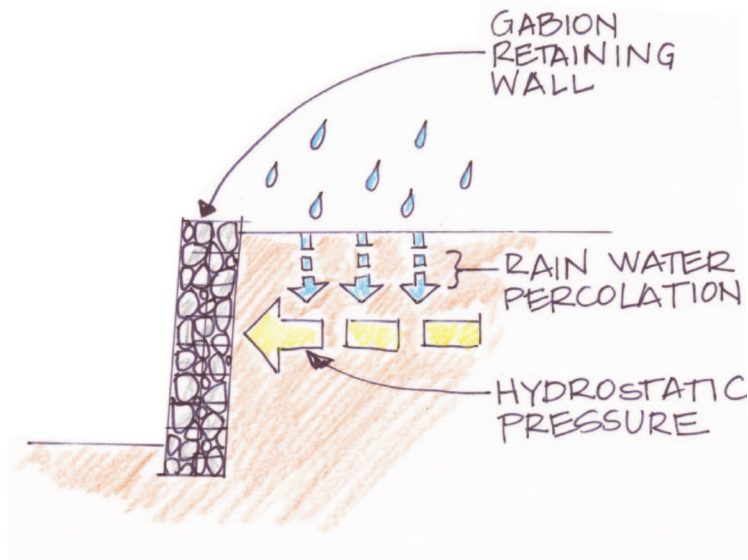


Gabion at top, and mattresses lining the waterway, at the waterway edge.

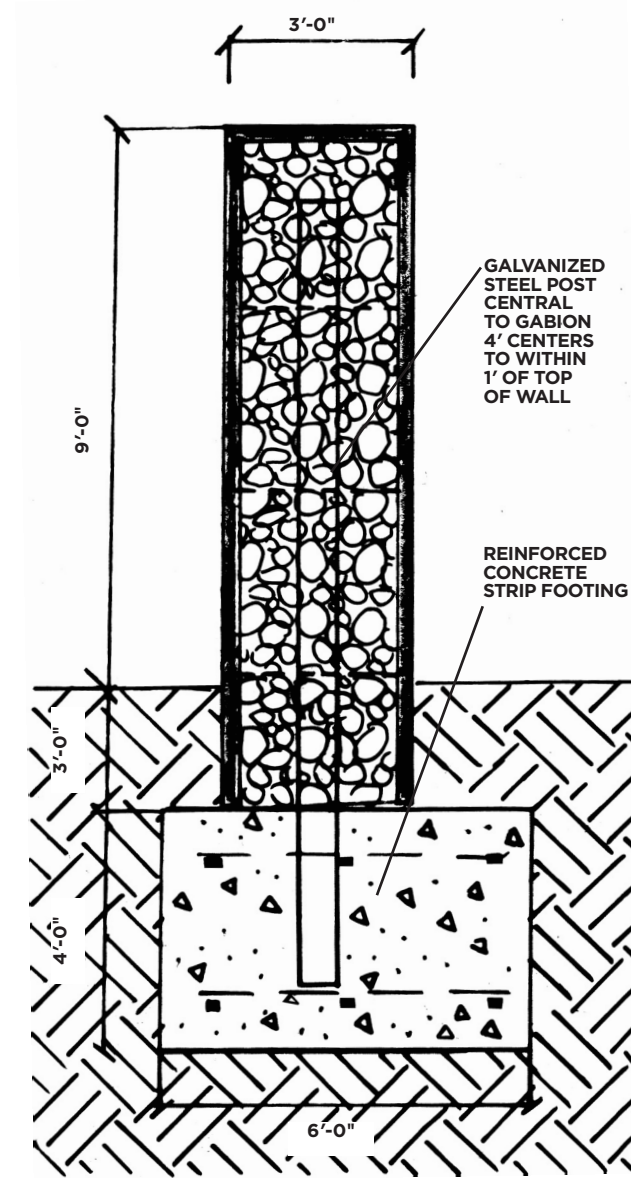


RENO MATTRESS SLOPE AND RIVER BED PLACEMENT

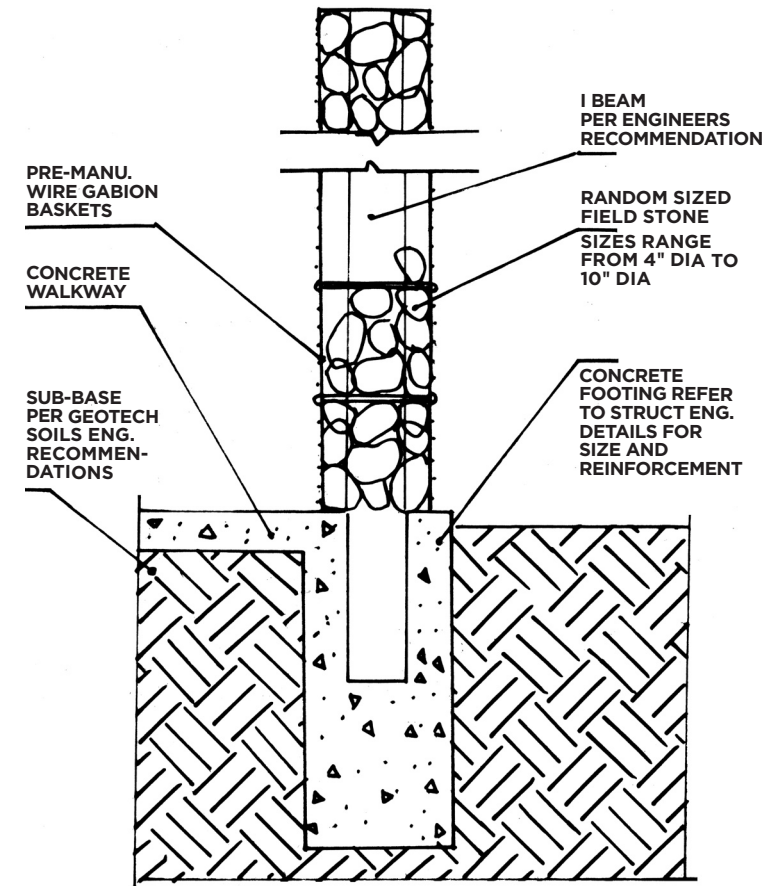
Gabion Retaining Wall Details



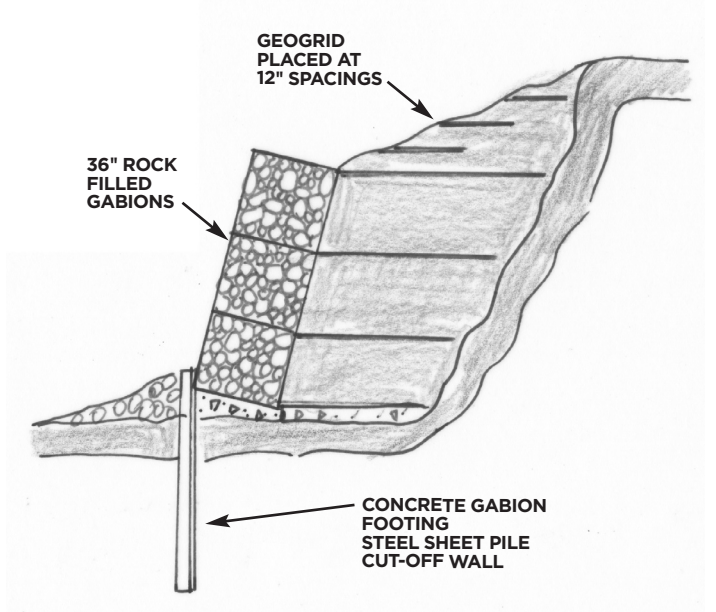
**GABION WALL DRAINAGE**  
THE DESIGN OF THE DRAINAGE SYSTEM IS JUST AS IMPORTANT AS THE DESIGN OF THE RETAINING WALL



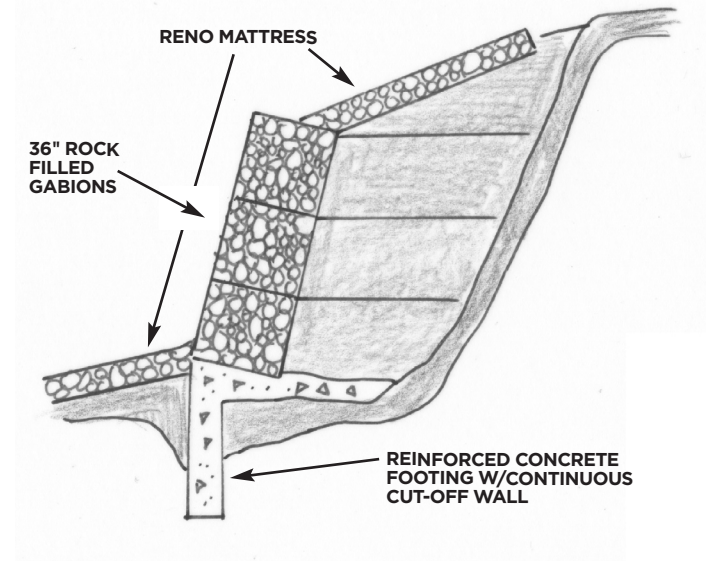
**GABION ENTRY WALL**  
SIDE SECTION



**GABION WALL FOOTING WITH I-BEAM**  
SIDE SECTION

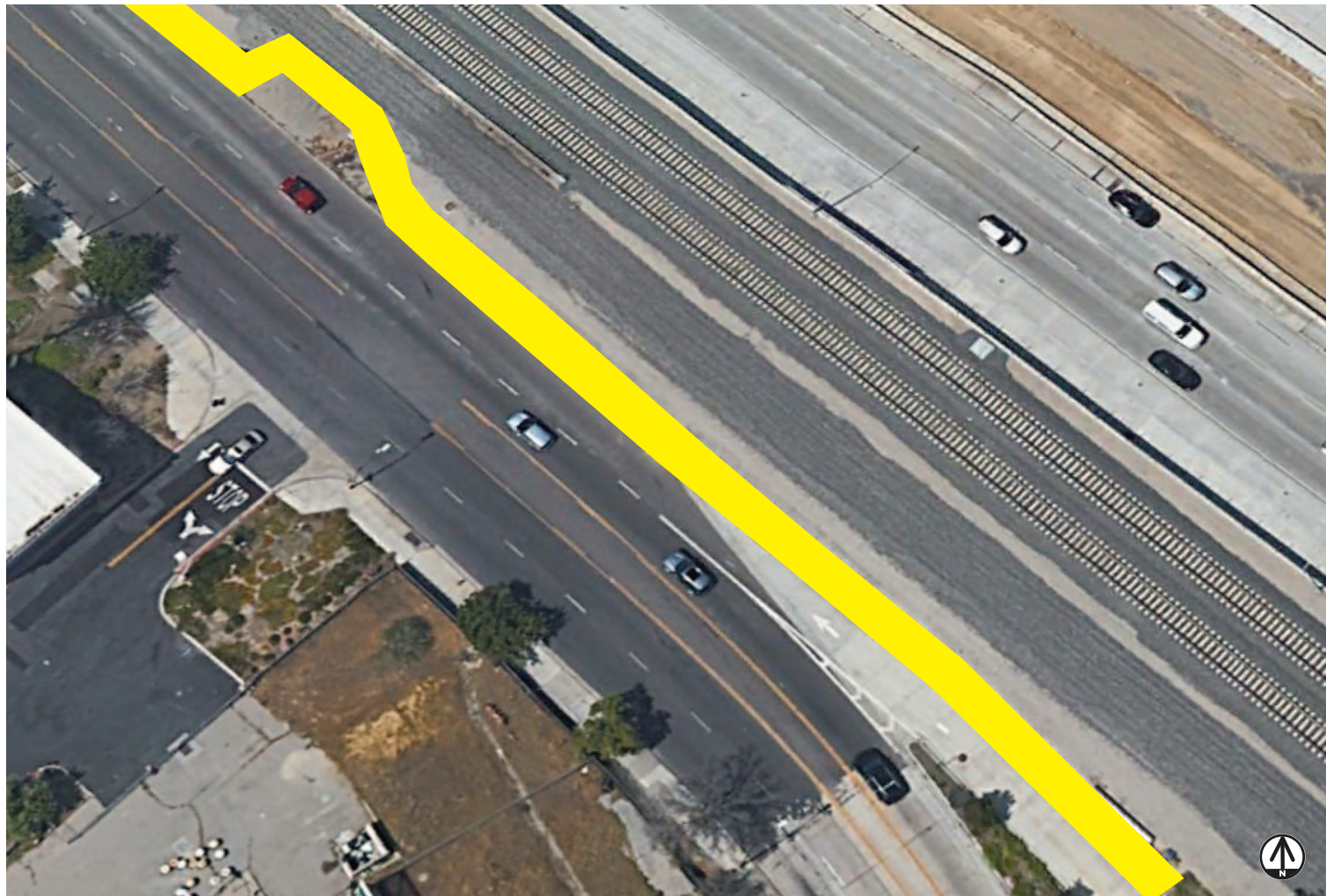


**GABIONS and RENO MATTRESS WITH SPECIFIC FOOTINGS**  
SIDE SECTION

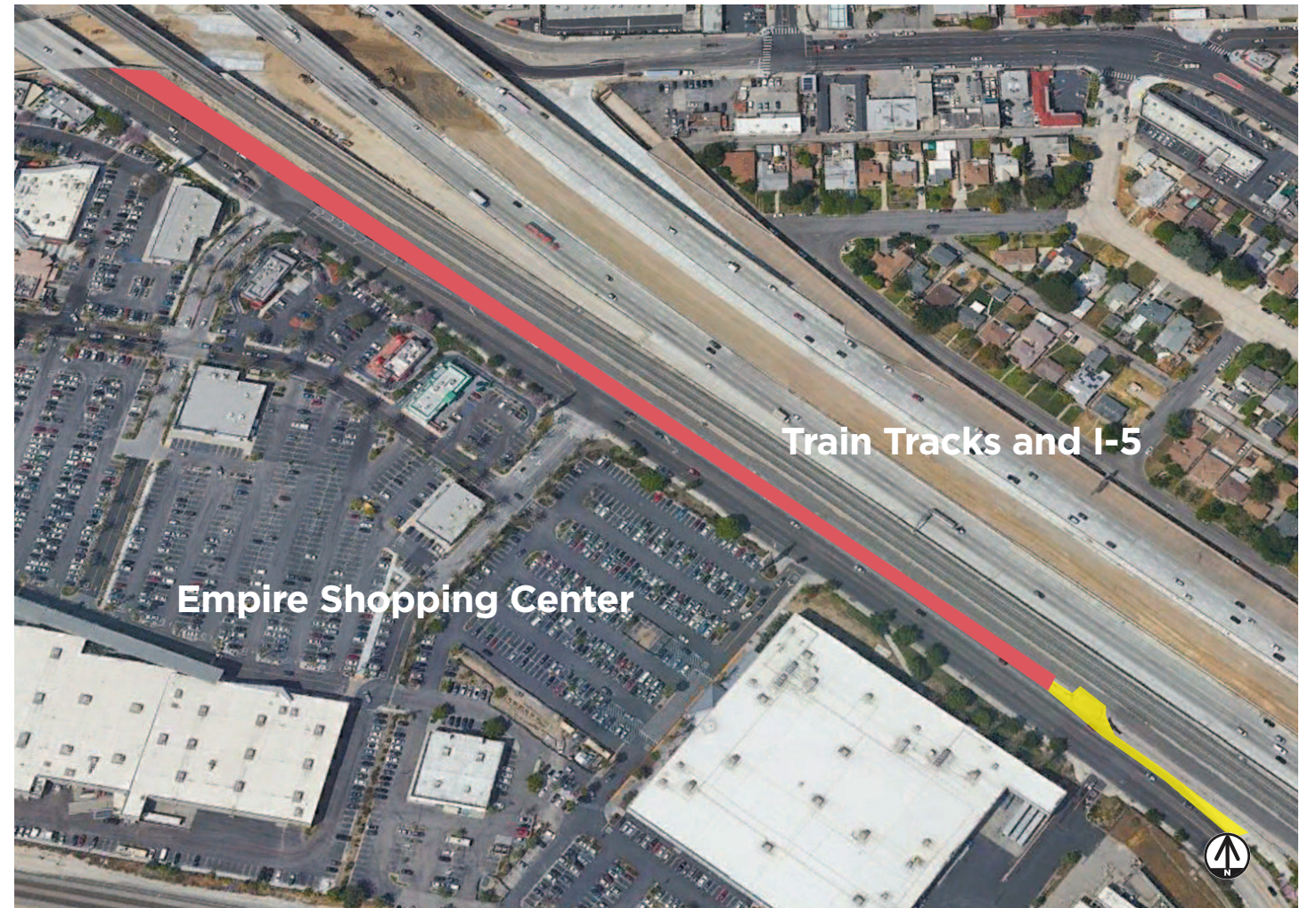




### Gabion Retainer Wall Design Research



Existing area of gabion fence



Additional area that could be incorporated into the design



Site Location



Victory Blvd. to the west of the I-5 and train tracks.

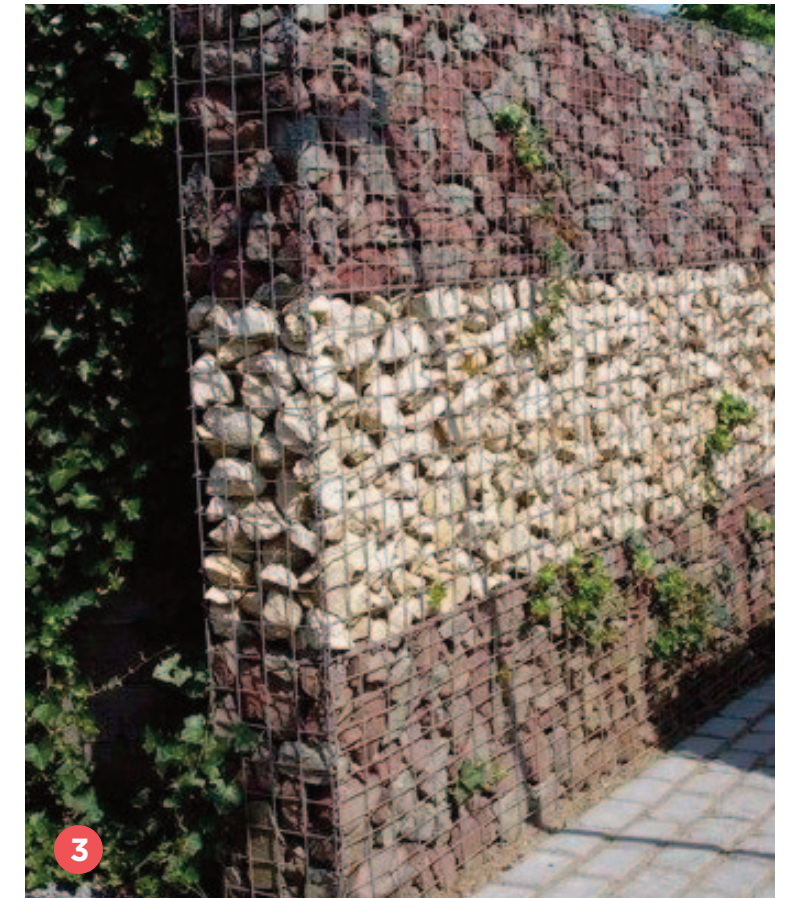
Gabion Wall Concepts:  
Dog Park and Picnic Area



1



2



3



**My concept for this area** would be to incorporate a picnic/eating area for nearby office, hotel, shopping center workers and a dog run/dog park.

Since the Animal Shelter is so close, it would be nice to have a nearby dog park to complement the shelter. Shelter employees could use the area to exercise kenneled dogs, Newly adopted animals could get nice exercise before the ride to their new homes. Dog owners that live near the area, but perhaps don't have a large yard would have an exercise area. And, travelers on Interstate 5 could have a nice park to stop and use before continuing their trips north or south. It would also encourage people at Empire Center to not leave a dog in a hot car when shopping. Services such as dog sitting and dog washing could be offered.

Since restaurants discourage people from eating food that they have brought from home, the park would have picnic areas for workers to enjoy on their breaks. It is right across from the Empire Center and various hotels and office buildings for easy access of the employees that work nearby.

**Gabion walls** could be used to provide fencing from the park to separate the access to the busy street traffic on Victory Blvd. The narrow wall (3) above would be ideal because the property is so narrow already, it would take up less space.

Seating (2) could be designed into a gabion wall along the street on the park side, again, taking up less room on the narrow park corridor.

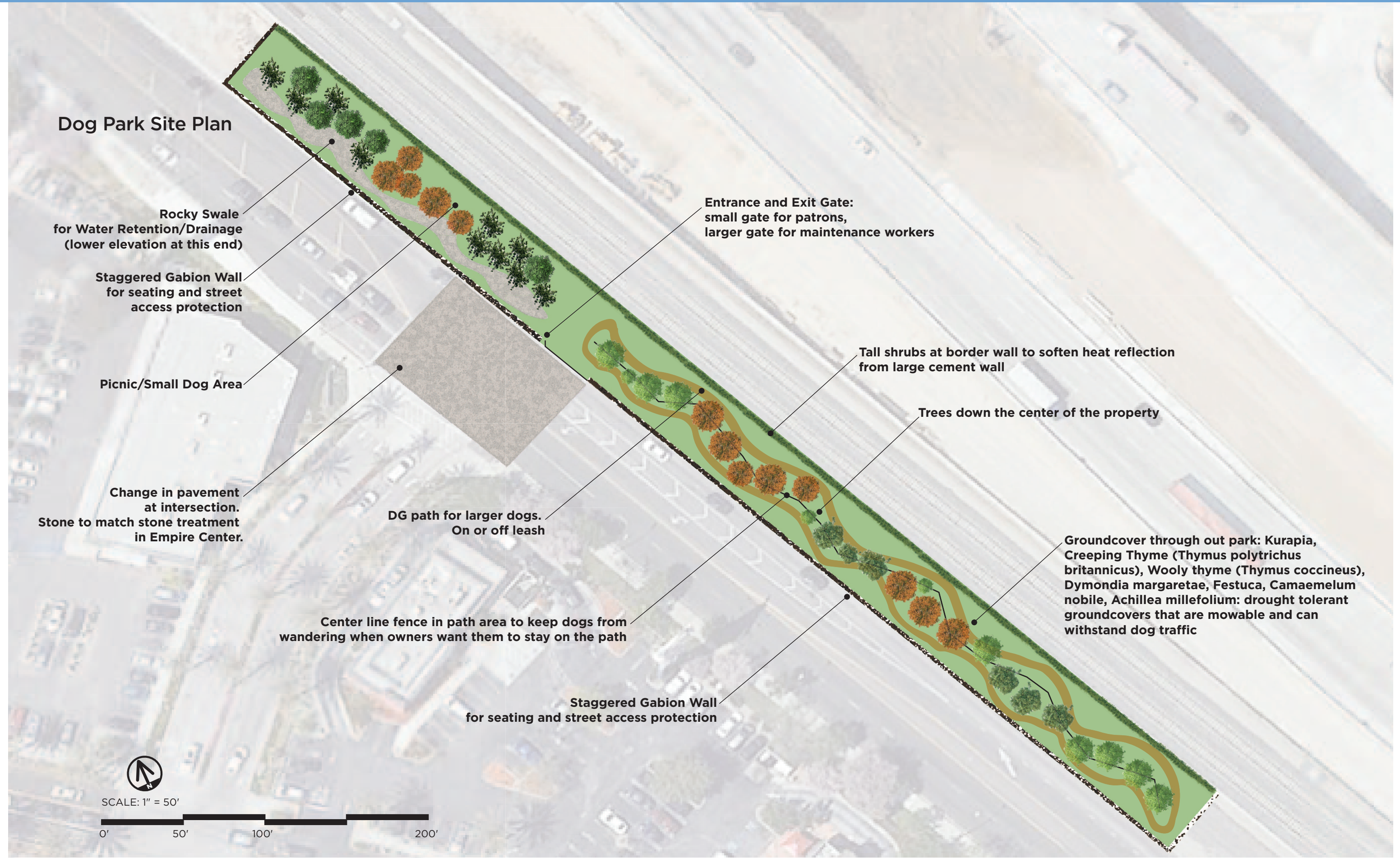
To soften the gabion walls where more height is needed, to keep dogs from escaping, an incorporation of bamboo or wood slat fencing could be installed at the top section (1).

Towards the northern end of the park, the elevation is at the lowest. A rocky swale would be built to capture any excess water and encourage storage underground.

Large trees would be planted down the middle for shade and seasonal color. Easy maintenance ground cover would be used to keep the area less dusty and cool. Larger shrubs would be planted at the freeway/rail line side to absorb reflective heat from the monolith cement walls.

**Since a Gabion wall design** was established previously, at the south end, repeating the design element in this park would give a cohesive look to the area. Using the same stone, or integrating contrasting stone would make a more interesting ambiance than just a plain iron or chain link fence.

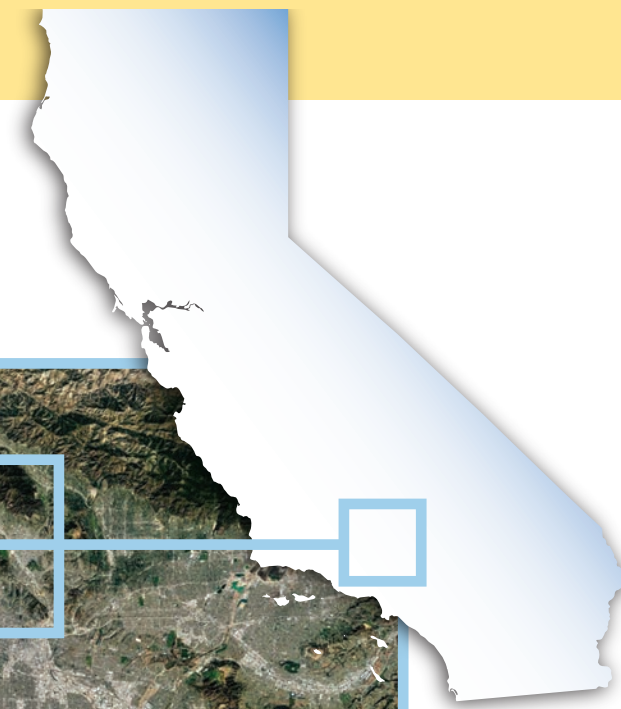
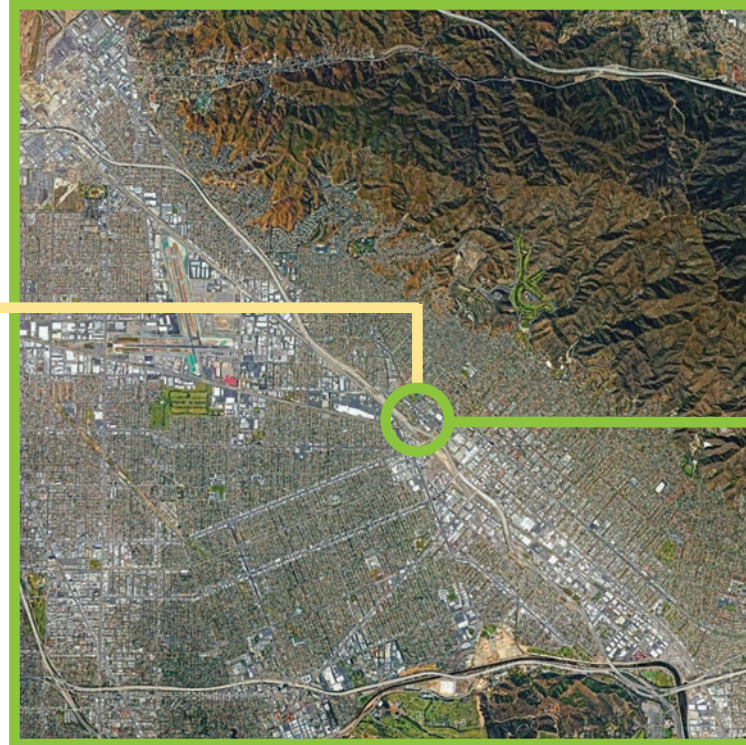
Using the same stone work surfacing that is used inside the Empire center, at the perimeter of the park or the main intersection near the entrance would delineate the areas, yet bring a coalescence to the design elements.



Dog Park Design Detail: Picnic Area



### Parking Lot Surfaces Location



Ground broke for the construction of the **The Burbank Empire Center** open-air retail and office center in early 2001 with the first stores opening in October 2001. The 103-acre site, located on Empire Avenue and Victory Place west of the Golden State Freeway and near the airport, was previously the location of Lockheed and where the company manufactured airplanes from 1921 to 1991.

Getting the site rebuilt was a challenge in itself, one that took several years. When Lockheed closed the plant in 1990 it advertised the land for sale, as is. But hazardous gaseous organic compounds underground had contaminated the soil to the point where it was designated a Superfund clean-up site.

Los Angeles-based Zelman Development Co. purchased the site in 2000 for around \$70 million. As part of the agreement, Lockheed carried out extensive soil vapor removal on the site. The resulting outdoor shopping center's buildings hark back to Lockheed's glory days by resembling manufacturing plants. Outdoor signs feature a replica of a Lockheed aircraft, while the mall design brings to mind an airport, complete with a miniature control tower. Iowa-based Principal Life Insurance Co. purchased the shopping area in 2006 for \$160 million.





Flat granite paving stones, light gray and medium gray, leading to the center of the store facades with minimal shade structures, no seating.



Flat granite paving stones, bordering ADA ramp, with expansion joints. 3' x 4' detectable warning surfacellanding in yellow at low point.



Flat interlocking granite paving stones



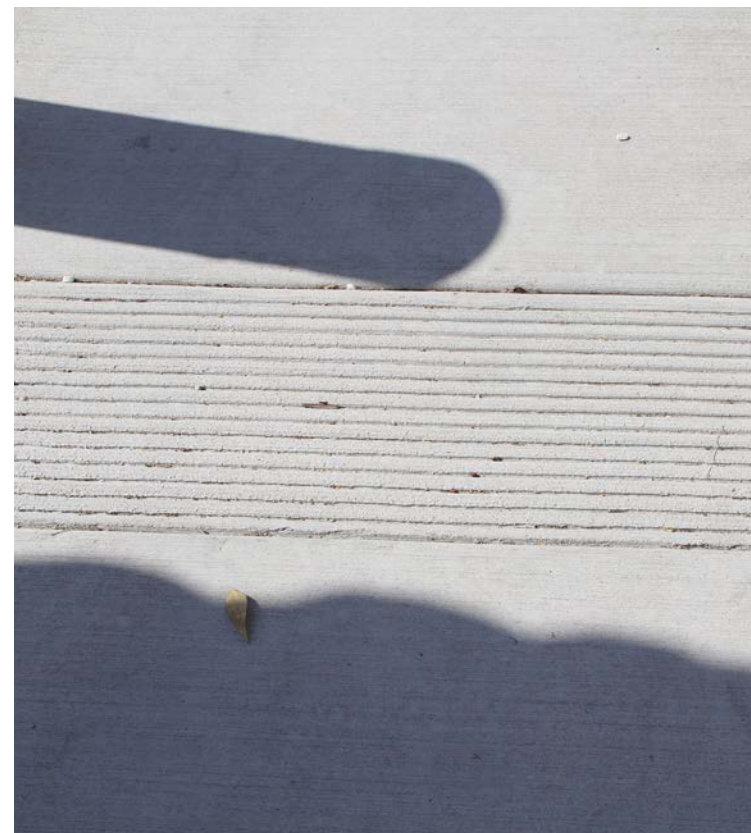
Interlocking paving stone with beveled edge. Near curb, has border detail.



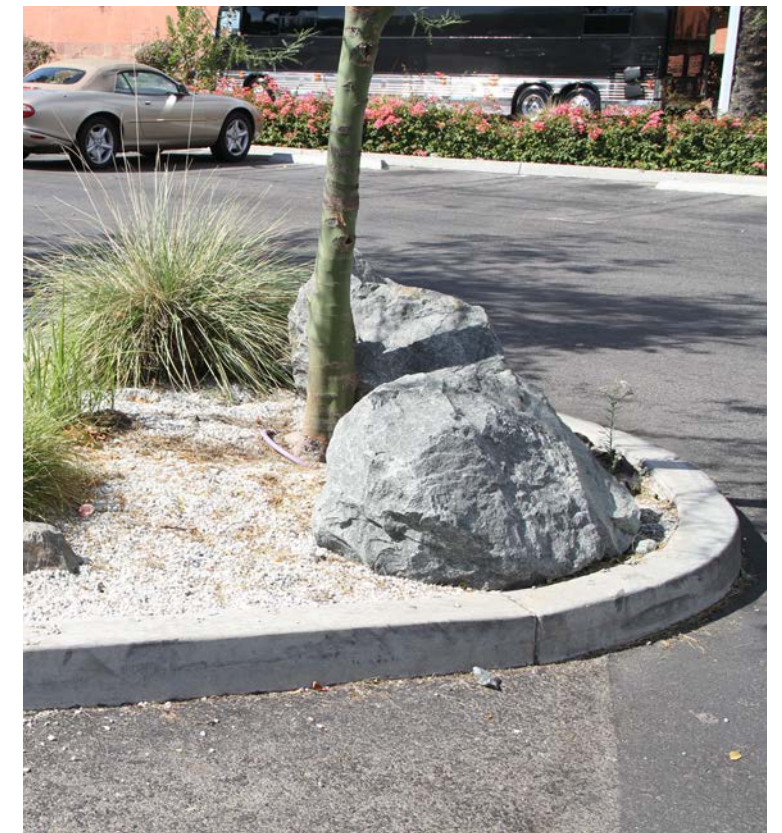
Asphalt area with parking stripes and blocks, near curbed planters



Interlocking paving stone with beveled edge, delineating intersection

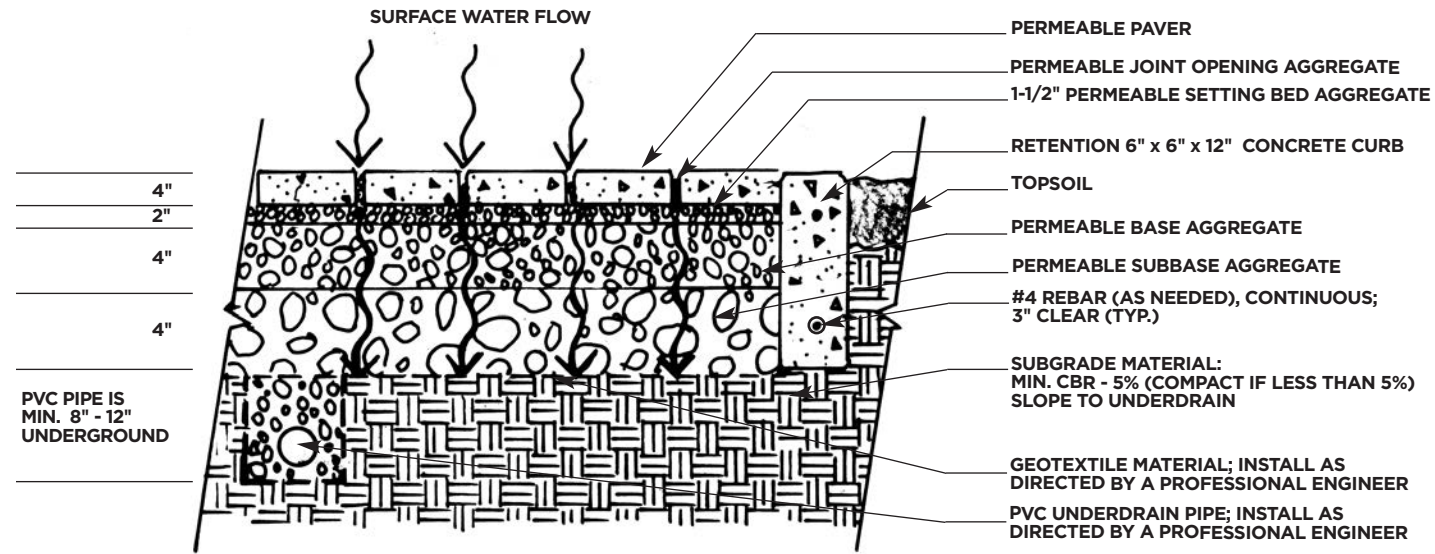


Concrete on ramp is scored to slow wheelchairs and to alert the sight-impaired, to indicate the slope is starting.



Asphalt parking area butting up to planter curbing, no distinguishable gutter.

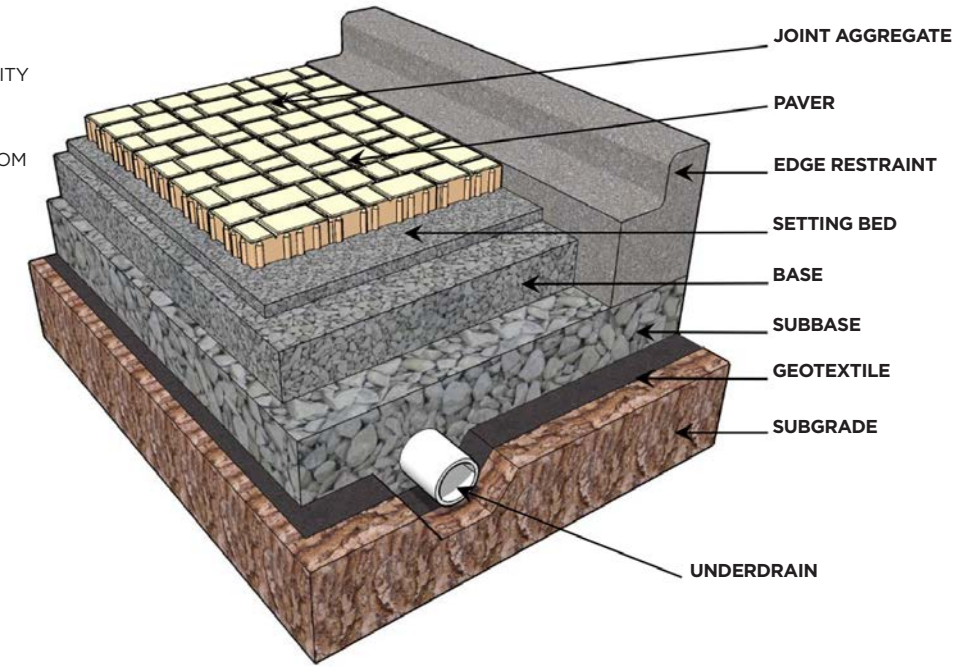
### Parking Lot Surface Details



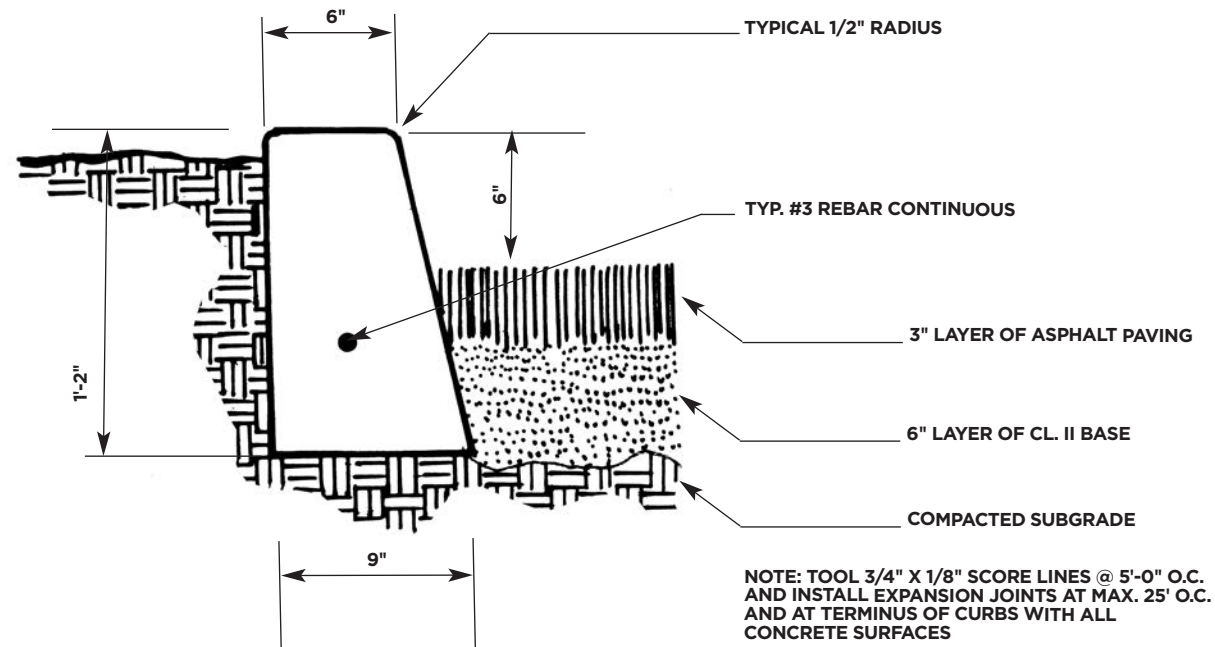
**PERMEABLE SYSTEM INSTALLATION**  
SIDE SECTION

**CRUSHED AGGREGATE:**  
ENSURES VOID STRUCTURE AND PROVIDES LONG TERM PERMEABILITY

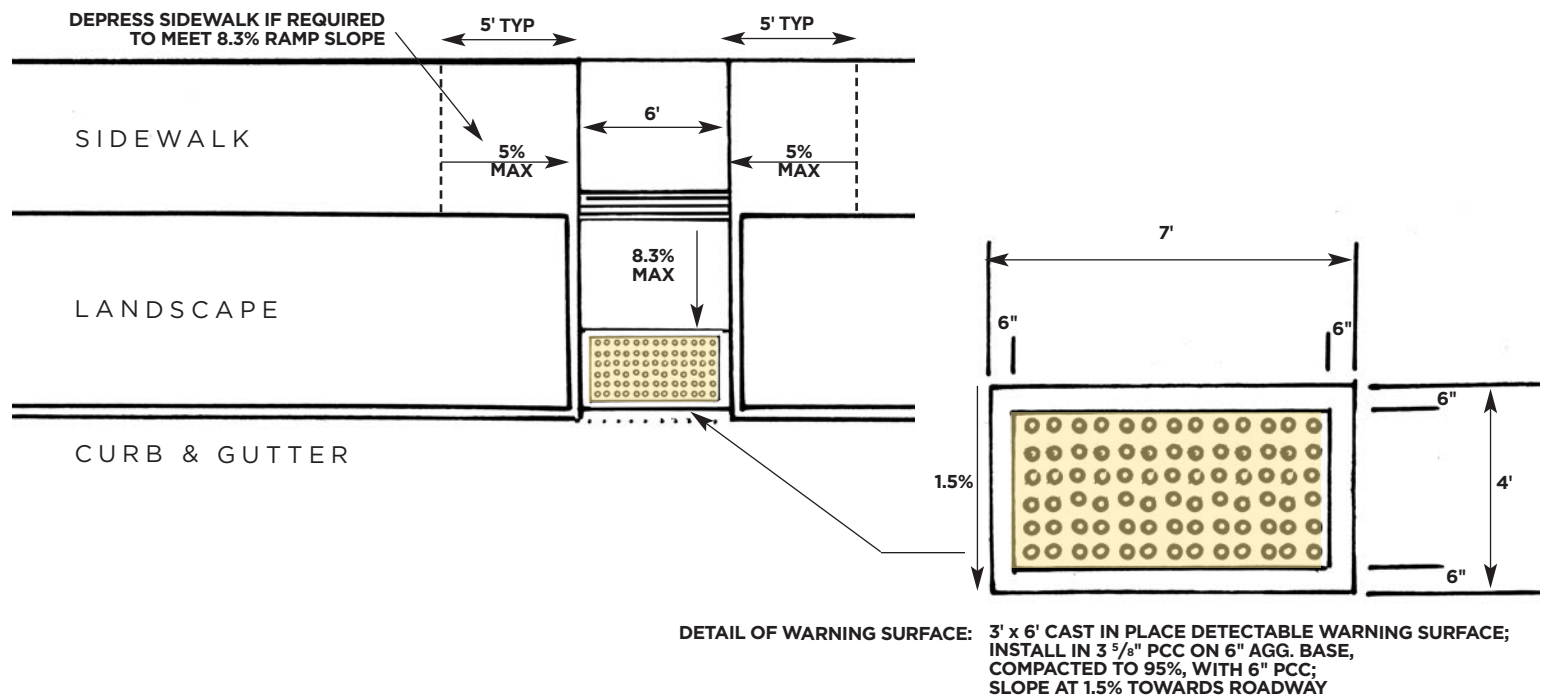
**GEOTEXTILE:**  
PREVENT MIGRATION OF FINES FROM SUBGRADE OR EXCAVATION INTO THE PAVEMENT STRUCTURE.



**9 COMPONENTS FOR A SUCCESSFUL PERMEABLE PAVER SYSTEM**  
AXO



**CONCRETE CURB AT ASPHALT**  
SIDE SECTION



**DETECTABLE WARNING SURFACE INSTALLATION**  
AT AC PEDESTRIAN LANDINGS



Areas of permeable and/or distinct paving now . . .



Areas in red show where unique paving stones and unique concrete treatments occur now on the property, installed in late 2017. Remaining areas are asphalt.

### Site Plan Redesign



Pedestrian bridges over busy thoroughfare

Some strip centers are swales that drain toward the low point at Victory Blvd.

Diagonal pathways in concrete. Most lead from signature store to signature store.

Perimeter space planted with more trees and groundcover

Center of strips have a green row of groundcovers, plantings and trees with sporadic benches for shade seating

Green parking strips of permeable paving (that land under the parked cars)

Typ. Bermed amorphous mini-parks to separate some sections of the lot, and at some perimeters to protect from high traffic areas.

SCALE: 1" = 275'

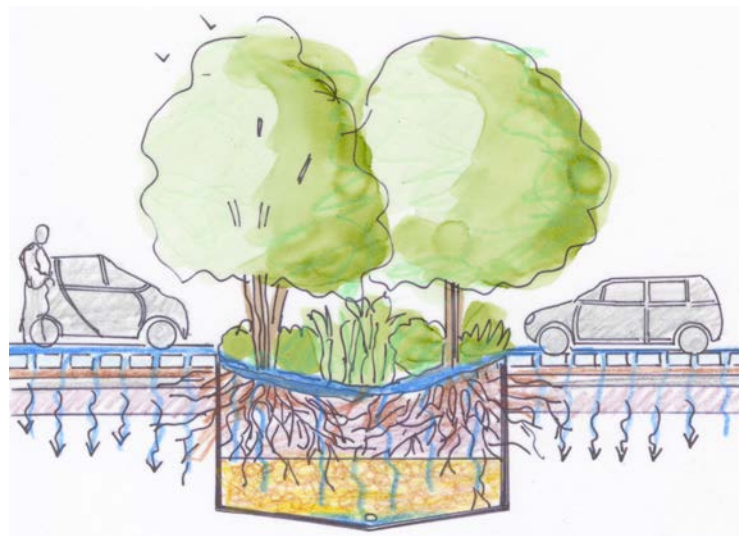
0' 275' 550' 825' 1100'



### Parking Lot Surface Redesign Options



*Green parking strips (that land under the parked car) and divider walkways with trees and plantings.*



*Center swales with permeable concrete pavers would absorb water runoff.*

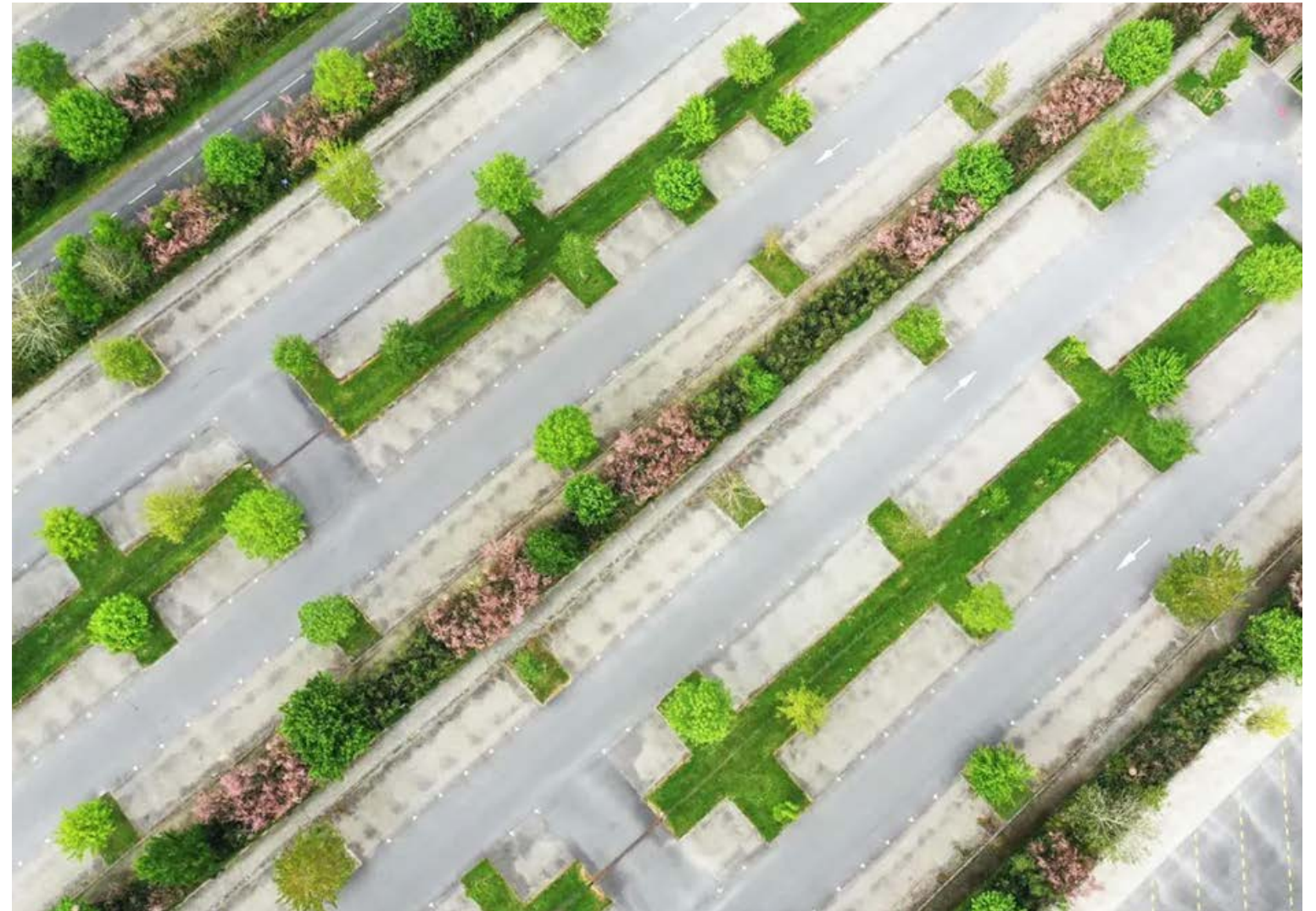


*Curbing with planters and trees that absorb heat and water.*



*Center swale with permeable paving for water retention, and shaded bench seating.*

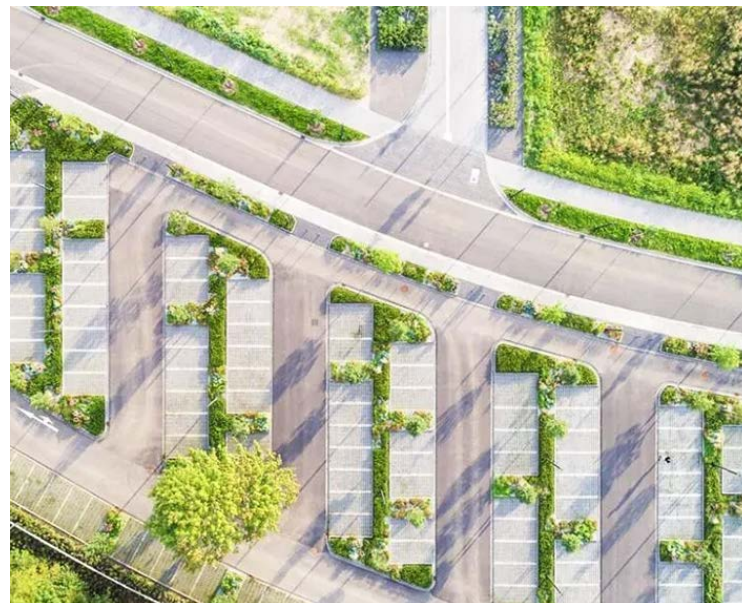
## Parking Lot Surface Design Concepts

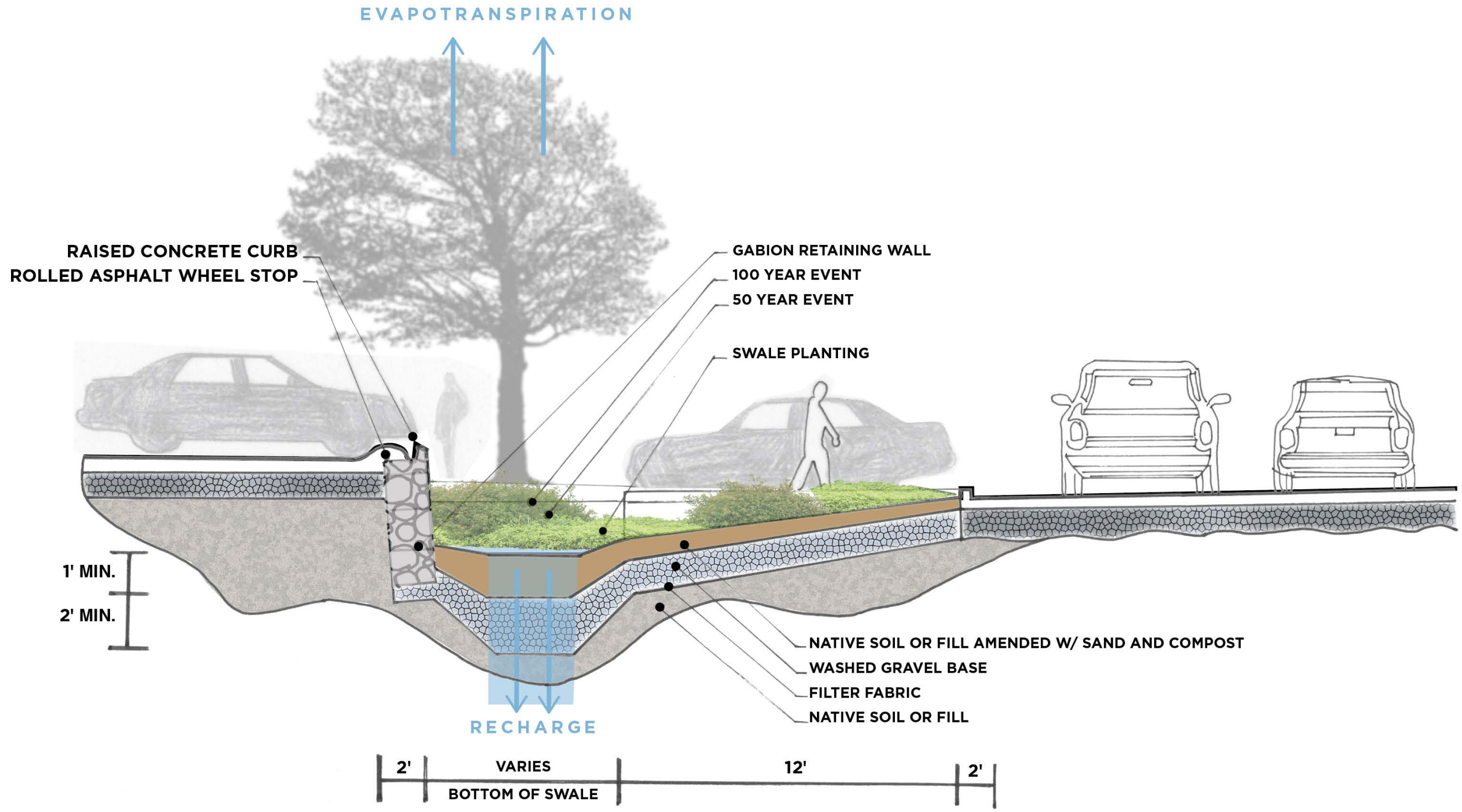


*Various concepts to show asphalt alternatives and planting areas for walkways between car aisles and throughways.*

### Recommendations for improvements to parking lots:

- **Trees:** Make parking lots tree friendly.
- **Shade:** Establish performance measures for shading a certain area percentage attained after so many years.
- **Appropriate greening choices:** establish a recommended plant list for parking lots.
- **Bio-retention:** Promote bio-retention in parking areas where appropriate of rain gardens and depressed tree islands.
- **Environmentally friendly pavements:** Promote their use and flexibility in design of various areas.
- Insure zoning ordinance amendments have **green site sustainable requirements** and **parking design guidelines**.





PARKING LOT SWALE DETAIL

## Empire Center: A Superfund Site

Much of the ground-water contamination at the Empire Center Superfund site consisted of just one chemical — a solvent called *perchloroethylene* — which filtered down through the dirt under the Calabasas-based firm’s legendary **Skunk Works** research site in Burbank. The Skunk Works site was the birthplace of many a Lockheed triumph, from U-2 spy planes to the arrowhead-shaped Stealth fighter.

Both Lockheed and Burbank city officials discovered that the duration and cost of the cleanup was a far cry from what they anticipated.

Lockheed determined that the cost of cleaning the water and soil would hit \$300 million over the first decade of cleanup — probably twice the value of Lockheed’s land in Burbank. As the years passed, Burbank officials watching the cleanup grew increasingly glum. The city expected a tax windfall from a speedy sale of Lockheed’s property and the construction of a shopping mall and offices there, but those hopes waned.

Lockheed told shareholders that the sale of its vacated properties in Burbank would pay for moving the Skunk Works operation and even result in a profit. Instead, in 1990, Lockheed still owned nearly 300 acres of unused land around Burbank Airport, the value of which continually plummeted.

Lockheed was the largest landowner of dozens of Burbank-area firms targeted by the U.S. Environmental Protection Agency in the cleanup of the ground-water lake that lies 150 feet under the San Fernando Valley floor, and Lockheed has assumed most of the burden of the cleanup in Burbank under the federal **Superfund** law. (The company did file a lawsuit alleging pollution by certain neighboring firms in an attempt to recoup some of its costs.)

**Lockheed’s cleanup effort consisted of two parts.** The first was to clean the ground water. For that, the company built a water-treatment plant off Hollywood Way. It was to start sucking up water, stripping it of perchloroethylene and other toxins, and put it back in the ground. Lockheed had agreed to operate the plant until the year 2000, but restoring the purity of the ground water here will require decades of treatment, the EPA said.

The second part of the cleanup dealt with tainted soil. The target area was a 103-acre swatch along Empire Avenue where solvents have penetrated deep into the ground. Lockheed toppled millions of square feet of buildings, which in itself required a large-scale asbestos cleanup.

Lockheed proposed building a plant on the Empire Avenue property that would vacuum gases from the soil through underground pipes, sucking them through huge canisters of toxin-cleansing carbon. This proposal was met with heated opposition from Burbank residents, because a small amount of perchloroethylene would be released into the air. The opposition delayed approval by local air-quality officials and sent Lockheed back to the drawing board to come up with a proposal that would produce fewer emissions.



This slow process was a big disappointment for Burbank officials. At first, Burbank calculated that the sale and redevelopment of Lockheed’s land into office parks and shopping malls would instantly quadruple the city’s property-tax base. Lockheed had been paying low taxes on its Burbank properties

because it acquired many of them in the 1930s and was shielded from tax hikes by Proposition 13.

In 1995, Lockheed finally made progress. It settled with the EPA to assume some cleanup costs sooner than many other companies, and Lockheed didn’t scrimp on the ground-water cleanup.

However, after Lockheed demolished buildings on the Empire Avenue site, the company’s investigators discovered that it was more polluted than anyone originally suspected. Hundreds of holes dug on the cleared site revealed that solvents — *perchloroethylene* and *trichloroethylene* — had penetrated the soil at least 130 feet and were trickling into the ground water below.

Early estimates by the EPA put the cost of the Superfund cleanup, chiefly for ground water, at about \$69 million. Then, it cost Lockheed \$175 million to clean the ground water around Burbank and another \$115 million for the clearing of buildings and future soil treatment on the Empire Avenue site. The goal of these efforts was the restoration of the vast drinking water reservoir deep beneath the Valley floor.

In 1995, only about 30 of the 90 drinking water wells that tap the Valley’s underground lake were free of toxic chemicals. Much of the water for drinking was brought in from elsewhere, and some of the water under the Valley had to be treated before it could be used.

For a long time Lockheed dipped machine parts into tanks of perchloroethylene and other toxins to clean them in Burbank. Lockheed estimated that 75,000 gallons of the solvent got into the ground under the manufacturing plants that once stood on Empire Avenue. The company had no specific explanation for what went awry.



“Accidents happen,” said Philbrick, the real estate manager.

As for the long-term costs of the Skunk Works cleanup, it will take Lockheed years to fully tally it up.

***A recent Lockheed brochure proclaims:  
“All of us are environmentalists.  
All of us are concerned about the earth.”***

The company pursued a controversial plan to bill part of the cleanup to the Pentagon through charges in future defense contracts. Lockheed also looked to insurance to help defray the cleanup costs, with other polluters forced to pay a share.

Meanwhile, with the entrepreneurial verve that analysts say characterizes the Skunk Works culture, Lockheed has drawn attention as a strong competitor in the emerging market for environmental services and equipment.

The company’s **Environmental Systems and Technologies unit** in Houston, which is managing the Burbank cleanup, has **won big government contracts** since its start in the late ’90s.

The unit played a key role in helping Lockheed land a \$5 billion management contract at the Department of Energy’s 890-acre Idaho National Engineering Laboratory. This nuclear research lab was being converted into an environmental-technology research center for the private sector but first has to clean up the toxic waste generated by its past defense work.

Lockheed also won a \$179-million contract to clean nuclear waste stashed in cardboard boxes at the same Idaho site.

These contracts probably have little direct relation to the situation at the Skunk Works, which is not a nuclear site. But they hint at a *promising future* for Lockheed in the cleanup business.

This started the company on building an image as a competitive force in the environmental industry. A recent Lockheed brochure proclaims: “All of us are environmentalists. All of us are concerned about the earth.”

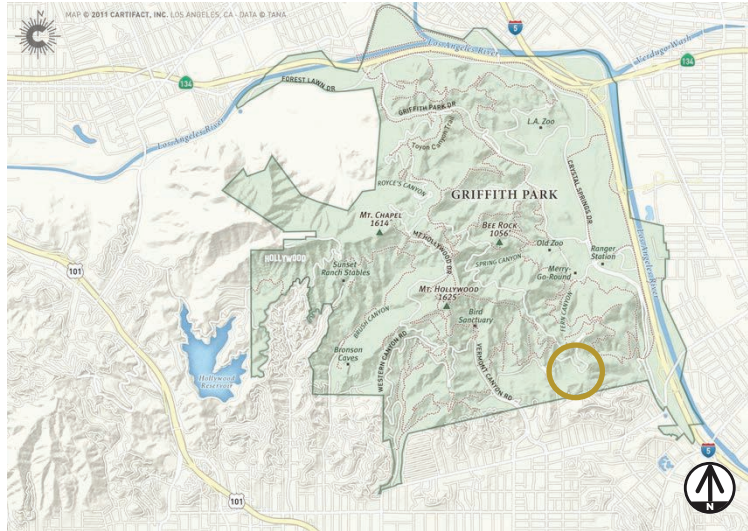
In 1994, Lockheed selected Chicago-based Homart Development Company as the developer of a retail center on a former Lockheed P-38 Lightning production facility near the Burbank Airport. A year later, Lockheed merged with Martin Marietta to

become Lockheed Martin Corp. Lockheed always maintained the site was never a health risk to the community. The site is now the location of Burbank Empire Center.

Four developers competed to be selected to build the \$300 million outdoor mall on the site. In 1999, Lockheed picked Los Angeles-based Zelman Cos. from among other contenders to create the retail-office complex on a 103-acre site. Zelman purchased the land in 2000 for around \$70 million.

Ground broke for the construction of the Burbank Empire Center open-air retail and office center in early 2001 with the first stores opening in October 2001. The resulting outdoor shopping center’s buildings hark back to Lockheed’s glory days by resembling manufacturing plants. Each of the outdoor signs features a replica of a Lockheed aircraft, while the mall design brings to mind an airport, complete with a miniature control tower.

Stairway Location



At the southeastern side of Griffith Park, at the old abandoned Commonwealth Nursery site, there is a resurgence of the neglected space. It is now in use by **City Plants**, a city of Los Angeles and DWP non-profit organization that's mission is to coordinate tree planting and care throughout Los Angeles. Also rehabilitating the space is a collaboration among the Los Angeles Parks Foundation, the Dept. of Recreation and Parks, and The Nature Conservancy — the **Commonwealth Nursery Demonstration Garden**. This nursery garden affords a much-needed opportunity to demonstrate sustainable landscaping in keeping with environmental best practices and the Urban Wilderness Identity of Griffith Park. Growing California natives from seeds and cuttings from the park and Los Angeles River areas, propagation and maintenance is done by volunteers under the guidance of a project manager from LAPF.

The area's infrastructure is almost as it was in the 1970s when the nursery lost its funding due to Proposition 13. The City of LA uses the area as a Park and Rec machinery yard and city workers hang out there between assignments.

Since new activity has brought more people to the site, some of the crumbling infrastructure has been looked at as hazardous. It is not open to the public now, but someday it might be an education center for children and adults to learn about ecology, a conduit for a greener Los Angeles.



*The steps to no where. Hand carved granite steps, built sometime in the 1930s, used to lead to the upper greenhouses at the east side, top of the slope. Obviously not to today's code, with no handrails.*



*Cracked and crumbling at the top.*



*An example of one of the abandoned greenhouses.*

## Stairway Research: The Olive Grove at Barnsdall Park

There are examples around the City of Los Angeles of rehabilitated legacy parks. One such success is Barnsdall Park.

In 1993, the Department of Recreation and Parks and the Department of Cultural Affairs, put forth a competitive RFP for the Master Plan for Barnsdall Park. Twenty-eight teams competed, only one was led by a Landscape Architect. After a rigorous process of research, intense community engagement and vetting, the team selected — led by Peter Walker William Johnson Landscape Architects, Lehrer Architects as Urban Designer, Brenda Levin and Associates as Historical Report consultants, and Kathryn Smith as Architectural Historian — produced the Barnsdall Park Master Plan which laid out the restoration and dramatic enhancement of the Park and its reconnection to the City.

The moniker of “Parkmaking in the City, Citymaking with the Park” drove the Masterplan.

With funding for the Masterplan and site reconstruction coming from the 6 years-long construction of the Metrorail subway line (which goes under the northerly edge of the Park) the landscape was reconstructed and restored.

The Olive Grove occupying the north slope was rebuilt and restored, as was the Pine Tree bosque, which once again effectively doubled the perceived height of the Hill. The great lawn was rebuilt and restored, and the driveway was minimally improved.

*“The Los Angeles Parks Foundation is committed to restoring our city’s urban forest through tree-plantings and restoration projects. We are honored to work with the Barnsdall Art Park Foundation and the City of Los Angeles at this significant historic site and beloved community park.*

— CAROLYN RAMSAY,  
EXECUTIVE DIRECTOR, LOS ANGELES PARKS FOUNDATION



Steps and handrails (to code) at Barnsdall Park. Newly constructed (1995).



Barnsdall Park, 1947 © hollywoodphotographs.com Stephen & Christy McAvoy Family Trust



The Olive Grove, Barnsdall Park, 1929.  
Courtesy of the Adelbert Bartlett Papers. Library Special Collections,  
Charles E. Young Research Library, UCLA.



Olive Grove assessment, 2021



< Seedlings from olive trees planted in the 1890s



### Griffith Park Site Conditions and Stair Models



Site where improvement is needed. Greenhouse at top, steps at the right. Olive and oak trees hanging on in the eroding slope area.



Slope area looking north, along rarely used access road. Access to greenhouse area can also be met from the top of this road.



Flat area at top of slope (behind abandoned greenhouses) where future building and greenhouses could be constructed.



Stair model. Right side, original. Left side, improvement with a handrail in concrete to the side of the original granite that could be implemented to the existing stairs that preservationists do not want to remove or tamper with in any way.

## Stairway Redesign

My concept for the improvement of access at this area of Griffith Park would be to construct a handicap-accessible ramp walkway next to the “untouchable” legacy stairs.

This area is prone to erosion and this structure could help maintain and improve the slope. Using cultured stone that mimics (if possible) the stone in the area would be preferable, but actual stone from the LA River would also be available.

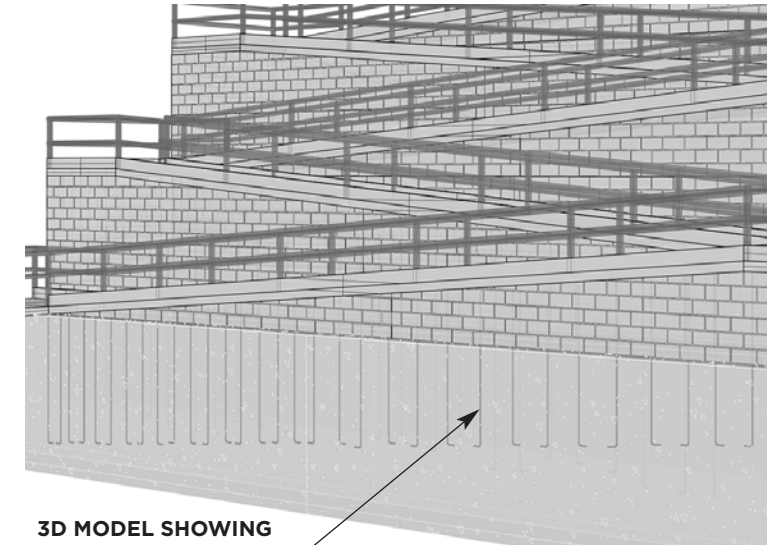
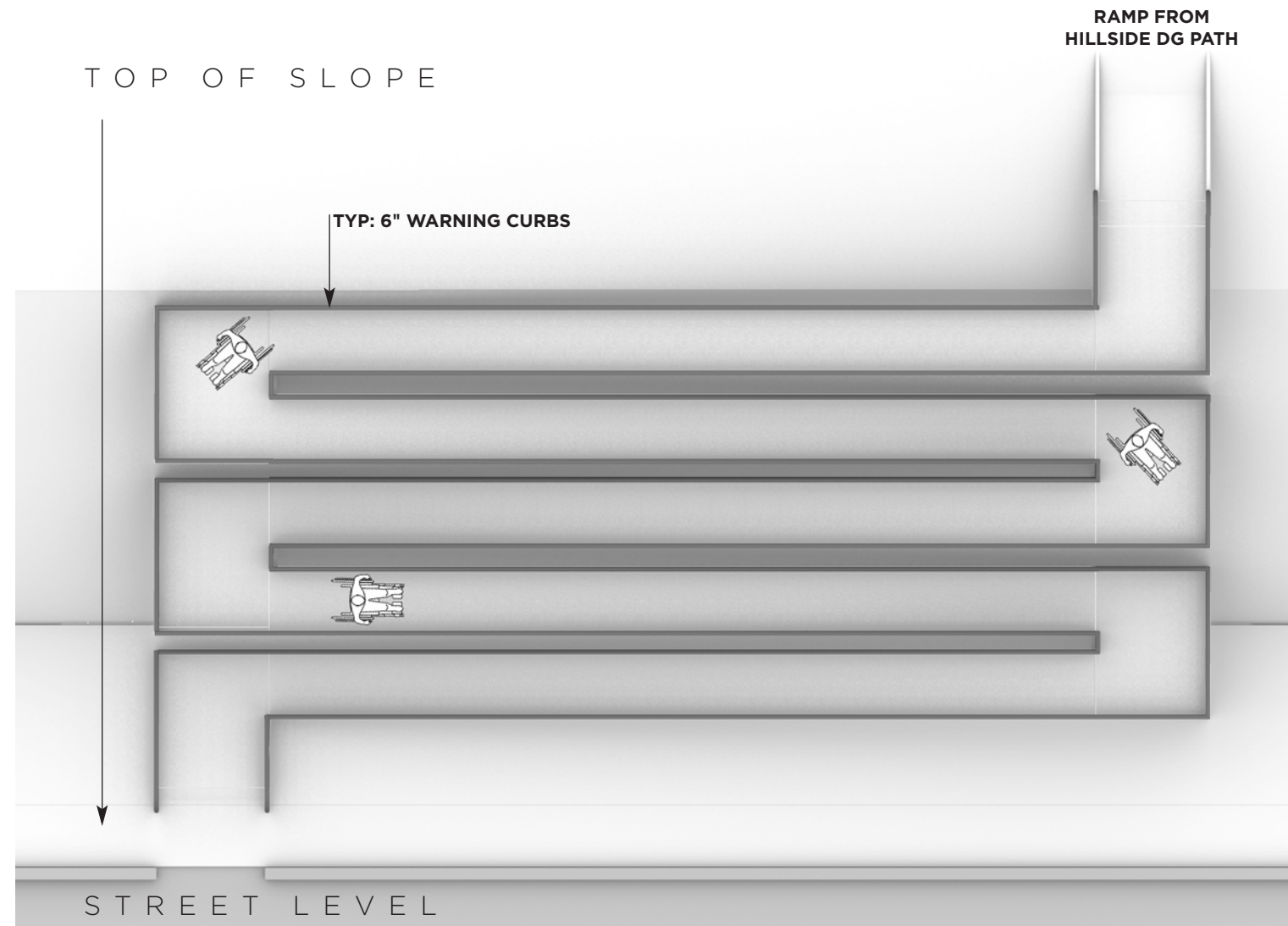
The stairs that are there could remain, incorporating the handrail improvement, or not. The current “vibe” of the participants in the nurseries there is to leave them alone. But they are rather treacherous and might have to be improved upon and at least maintained in a better way for safety concerns.

If the roadway in this area turns into a traffic conduit, the entrance/exit of this ramp structure should turn away from the roadway and finish parallel to the roadway.

### Specifications:

- The ramps are 36' in length and they rise 3' (1:12)
- The ramp width is 36"
- The turnaround areas are 5' x 6.5'
- There is an 18" gap between the ramps to allow for extra turnaround room at the ends
- The warning curbs are 6" high because of the drop-off being more than 4" on the street-facing side
- The walkways are concrete, color to match existing concrete in this area of the park
- The railings are a smooth, matte steel

## Plan View

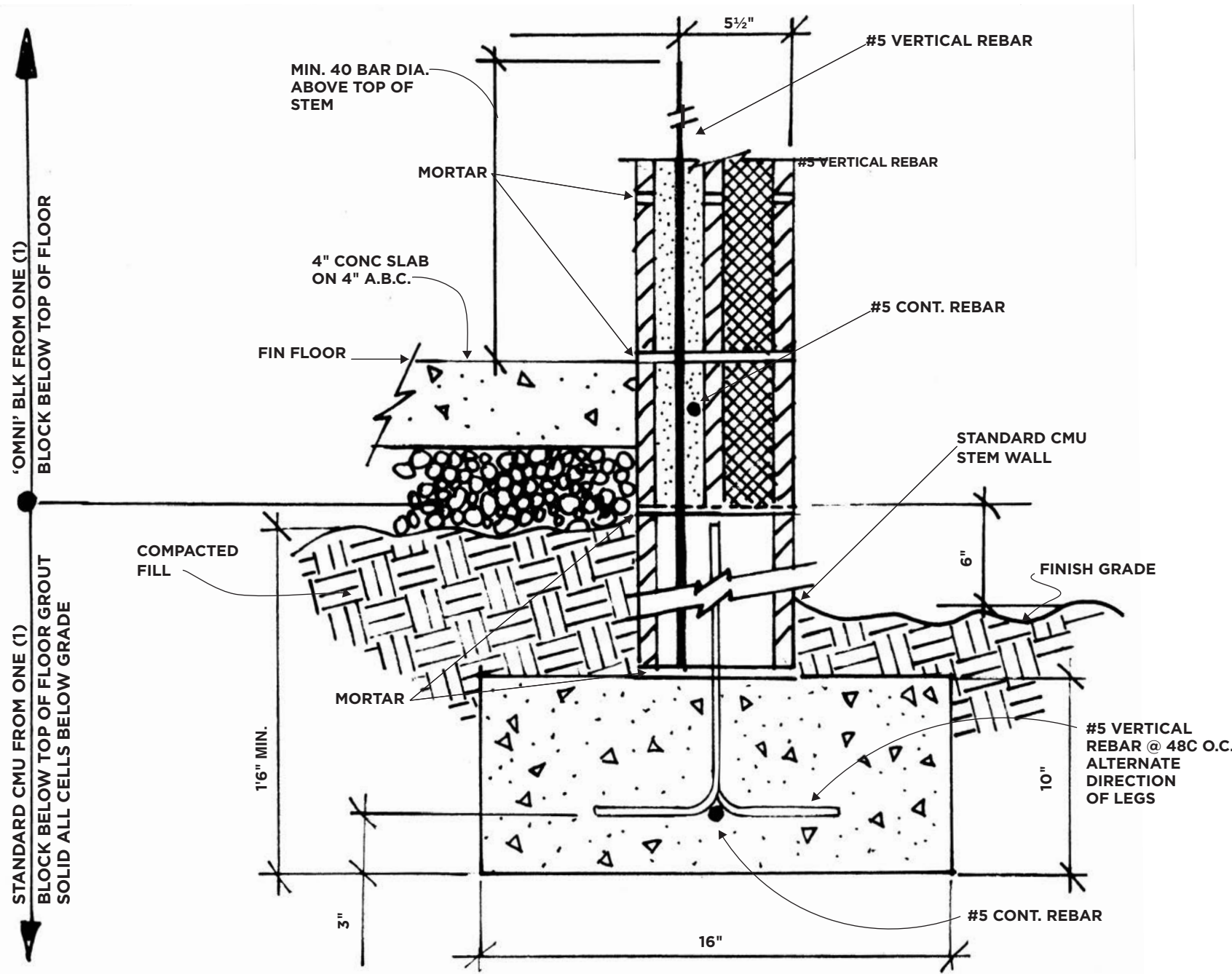


3D MODEL SHOWING REBAR IN CONCRETE FOOTINGS

## INSPIRATION IMAGES

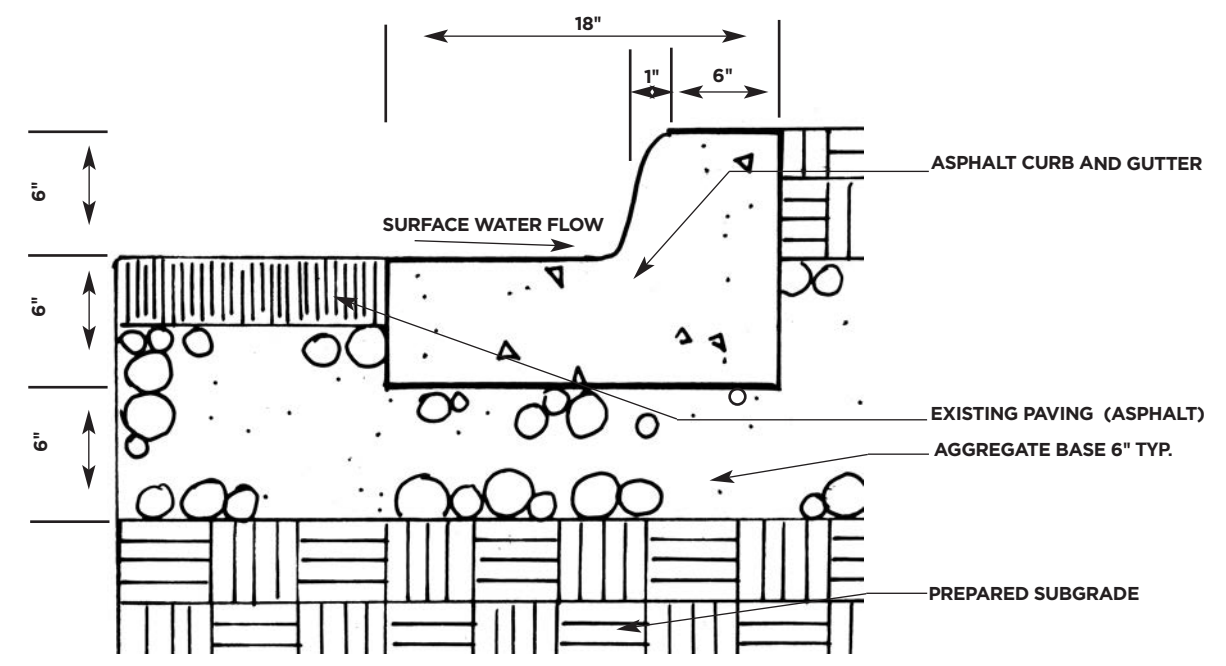


STAIR and RAMP Details

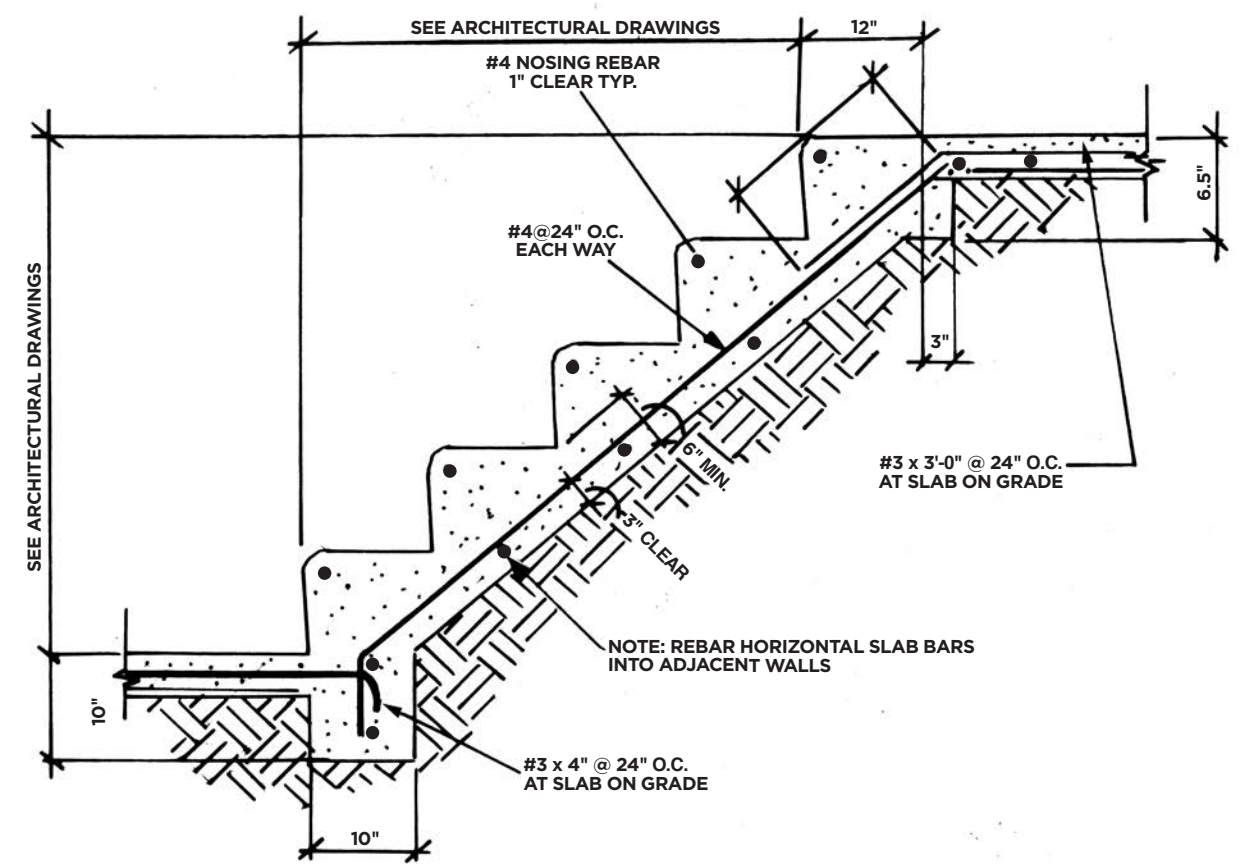


FOOTINGS: ALL BEARING FOOTINGS SHALL BEAR @ 18" (MIN) BELOW TOP OF UNDISTURBED SOIL or TOP OF ENGINEER-CERTIFIED COMPACTED SOIL

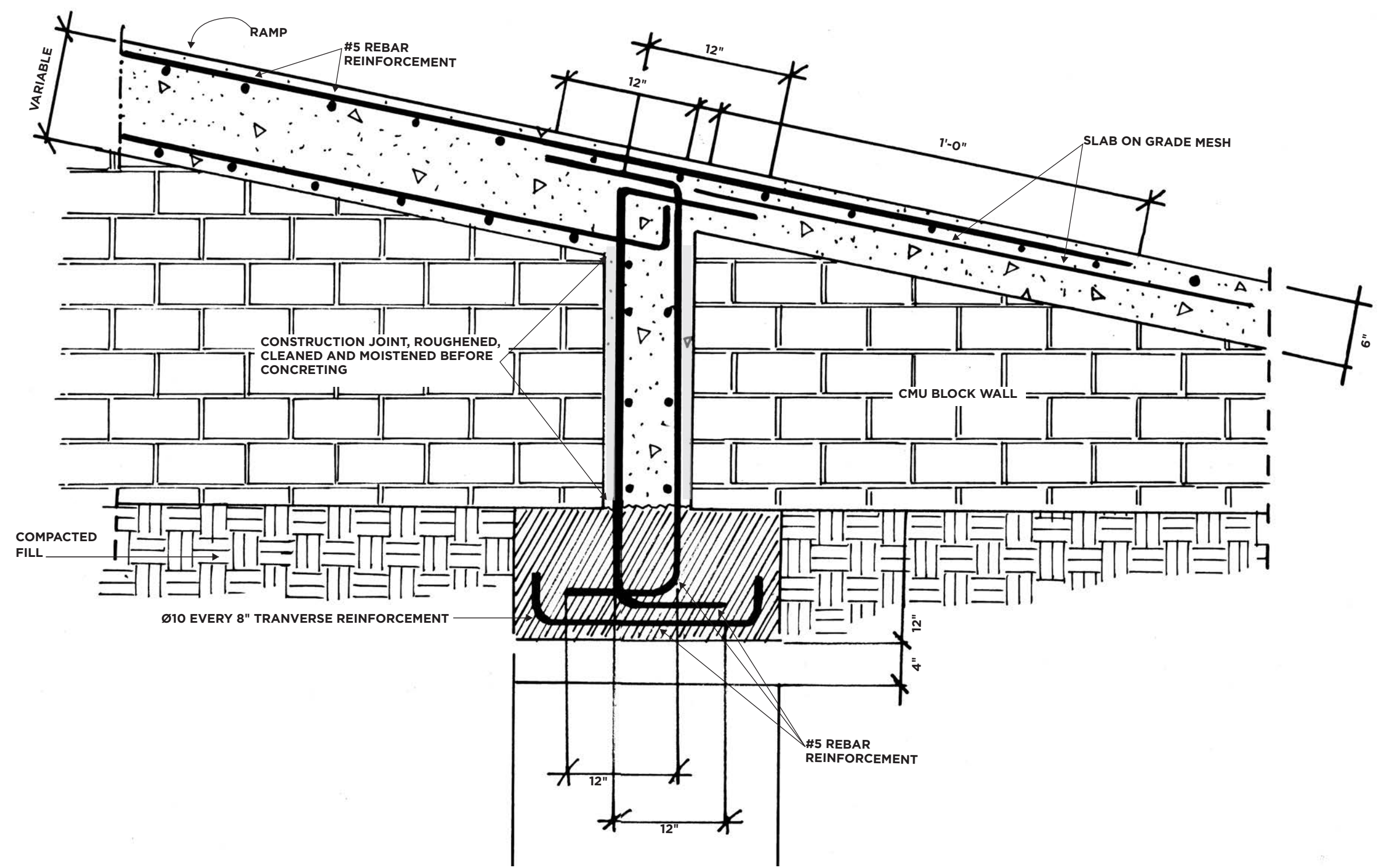
EXTERIOR WALL FOOTING - CMU STEM  
SIDE SECTION • NTS



ASPHALT CURBING  
SIDE SECTION

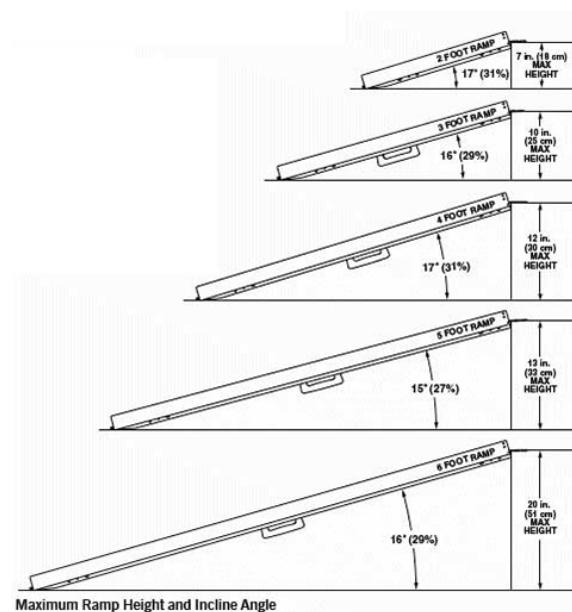
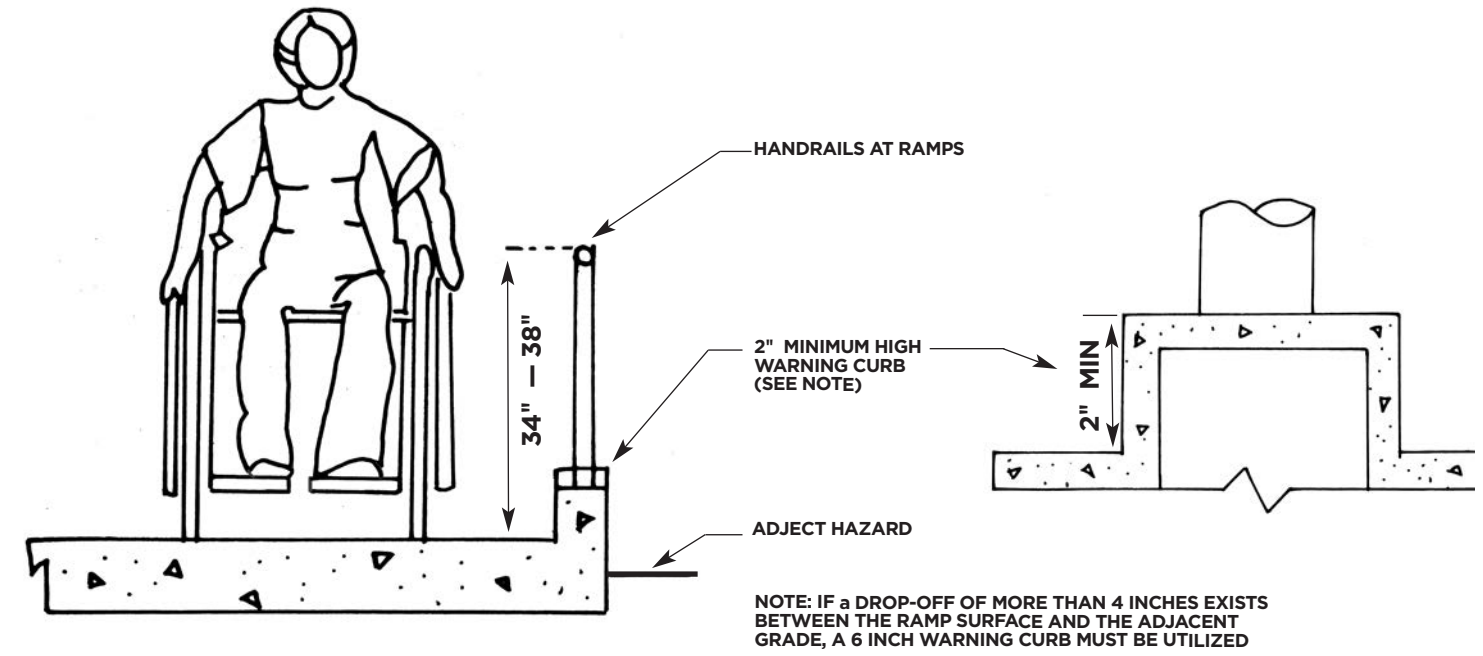
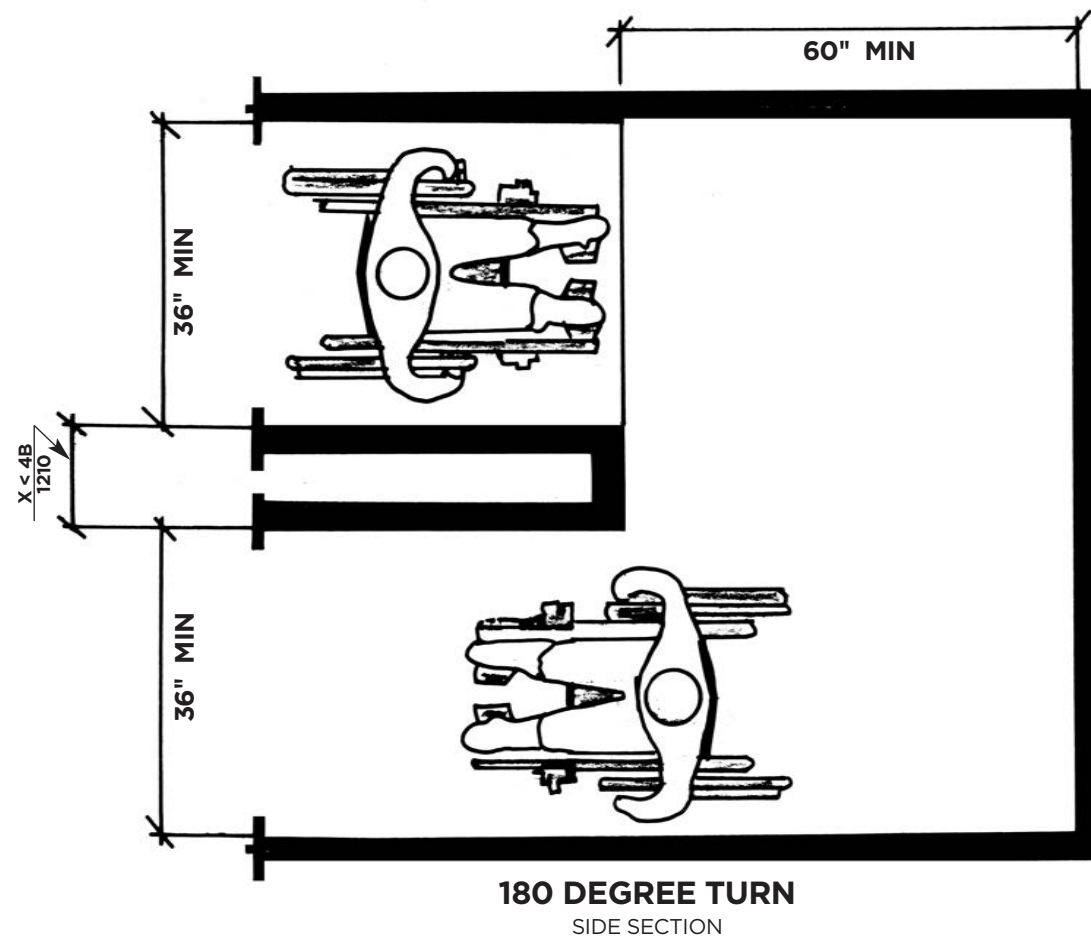


CONCRETE STAIRS ON GRADE  
NTS

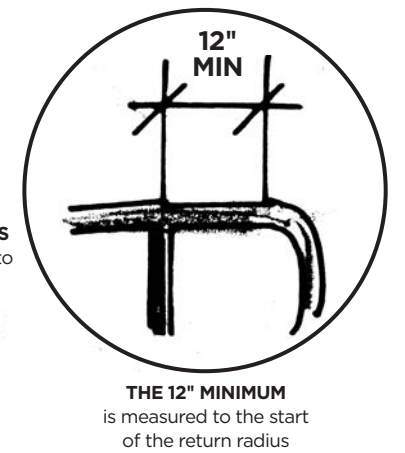
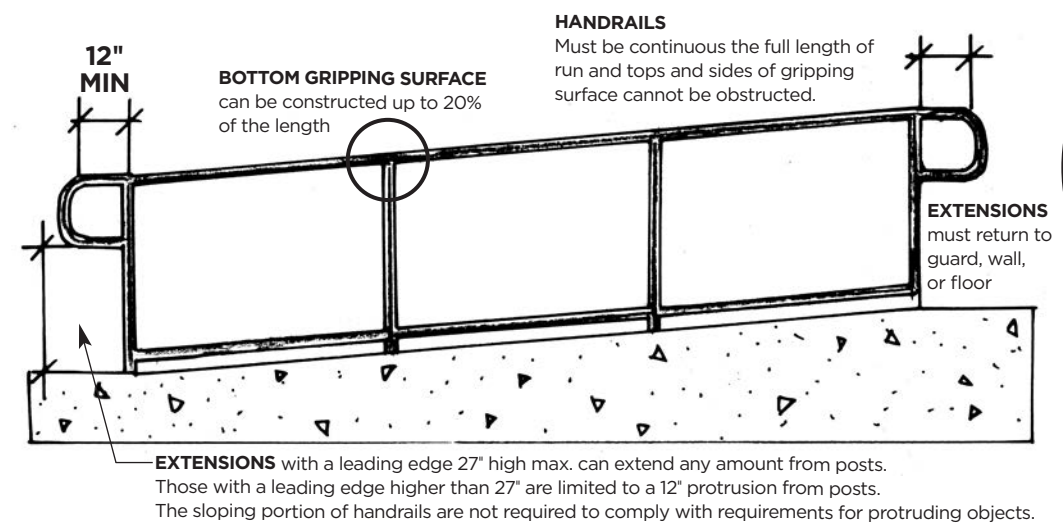


START OF A RAMP OVER CONCRETE WALL SUPPORTED BY A STRIP FOOTING

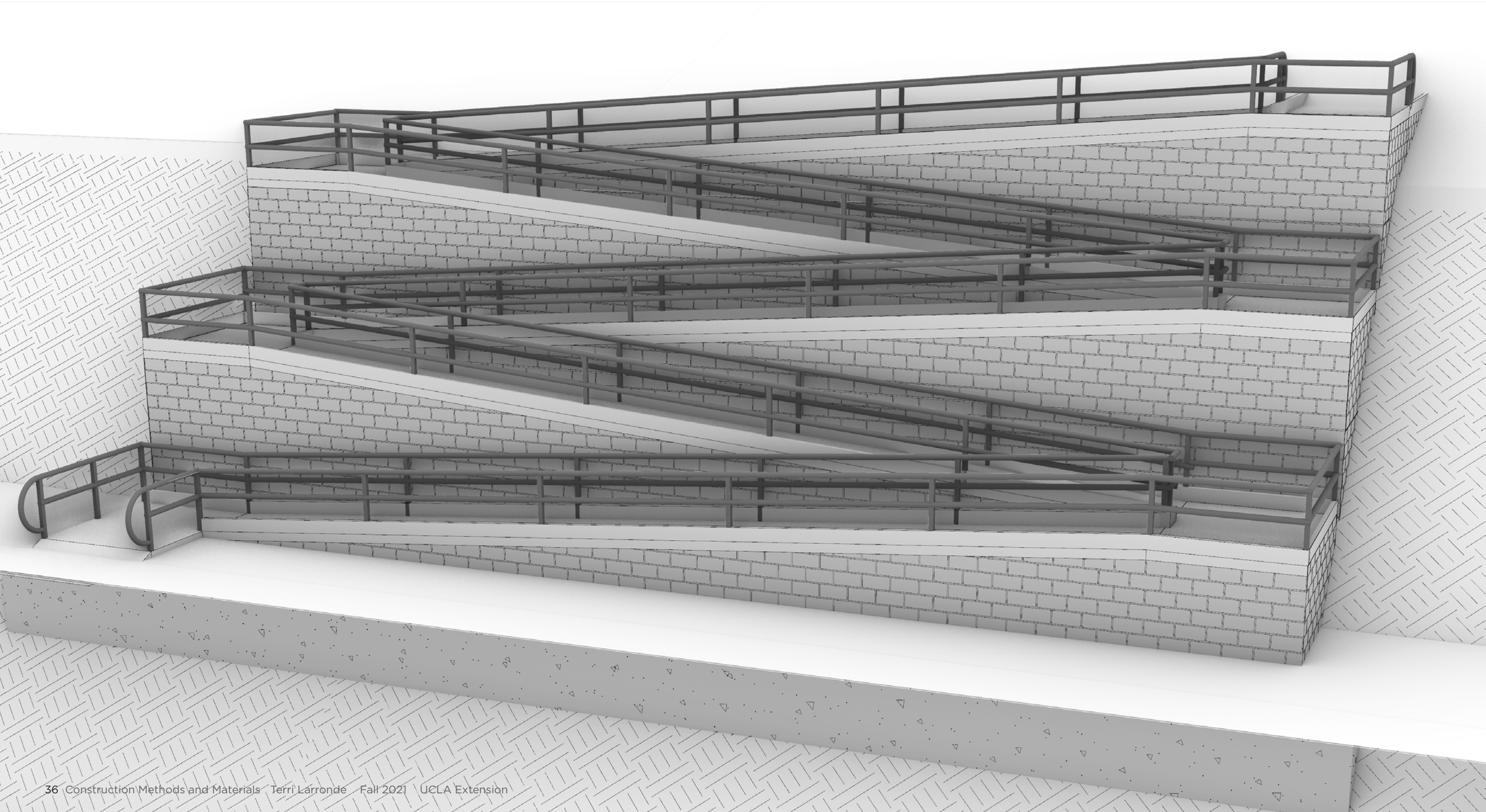
Ramp Details

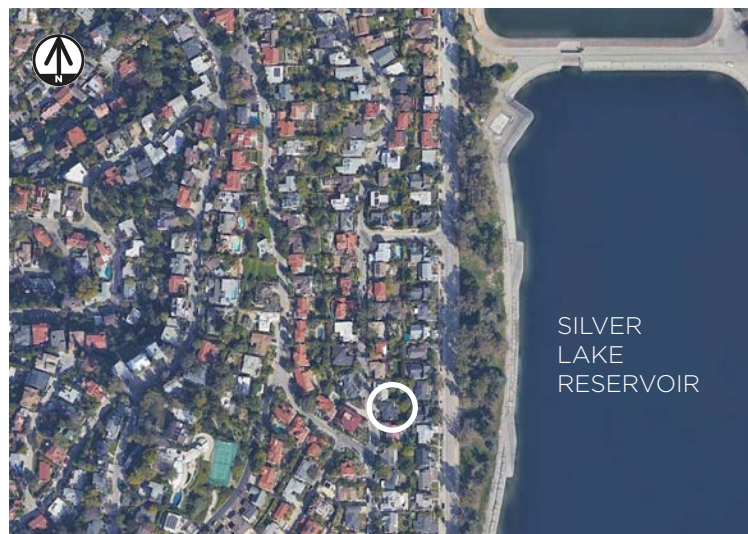


**EXTENSIONS** 12" long minimum in the same direction of travel are required at the top and bottom of runs (except for inside rail of switchback ramps) to provide support before entering or exiting ramps.



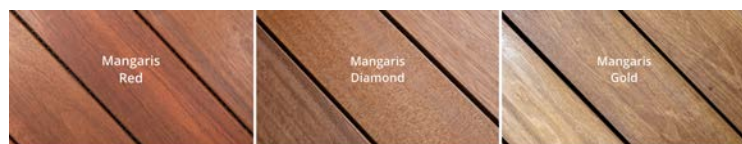
### Ramp Redesign 3D Perspective





Taking advantage of the view of the reservoir **this second-story deck** at a residence in the Silver Lake area is only accessible through the inside of the house. The homeowners have discussed having a circular staircase installed from the side down to the backyard because a traditional straight staircase would be prohibitive because of the height and the actual depth of the backyard. (By the time you climbed down the stairs you would be at the back fence.)

The deck is made with Mangaris wood. Mangaris is actually a brand name and not a species of wood. Commonly sold under names such as Red Balau and Kayu Batu, Mangaris comes from the species Shorea or Balau in Southeast Asia. It's an extremely hard and dense wood that's well-known for its deep red shade with traces of brown. Its grain, durability, hardness, and color is very similar to Mahogany, making it a popular choice for decking material.



**Support details**

The deck is supported by (2) 15' 6" x 8" vertical squared tubed steel posts that are supported in the ground by 6' deep concrete columns that were constructed with Sonoco concrete forms. (Sonoco forms are a proprietary fiber form. They come in various sizes from 6" to 60".) This buried post and footing solution leaves a striation on the sides of the concrete similar to any wood form for concrete.

The posts are anchored by a metal post connector (12" x 16") that is bolted into the concrete and epoxy-glued on the sides. The homeowner has painted it green.



*The deck (approx. 31' x 17' includes a shade cover and railings).*



*Full view of vertical 15' beam support*



*Vertical beam support in concrete column, centered in metal post connector, bolted and epoxy-glued onto concrete*



*I-beam and vertical beam connection, bolted*



*Painted iron I-beam with 4x10 treated Douglas Fir support beam on top.*



*Joists connected to the ledger with metal joist hangers. The other metal objects are hidden deck fasteners, which are attached from above.*



*Galvanized steel joist hangers attached to ledger board*

The top of the support beam connects to the iron 8" x 8" I-beam. The I-beam runs the length of the deck, 31'. There is a 4" x 10" pressure-treated Douglas Fir beam on top of the I-beam to support the joists. It's purpose is to level the deck, separate or 'flash' the deck framing and protect the framing from moisture. This beam may also help to absorb some of the vibration vs. just having the the rigid I-beam.

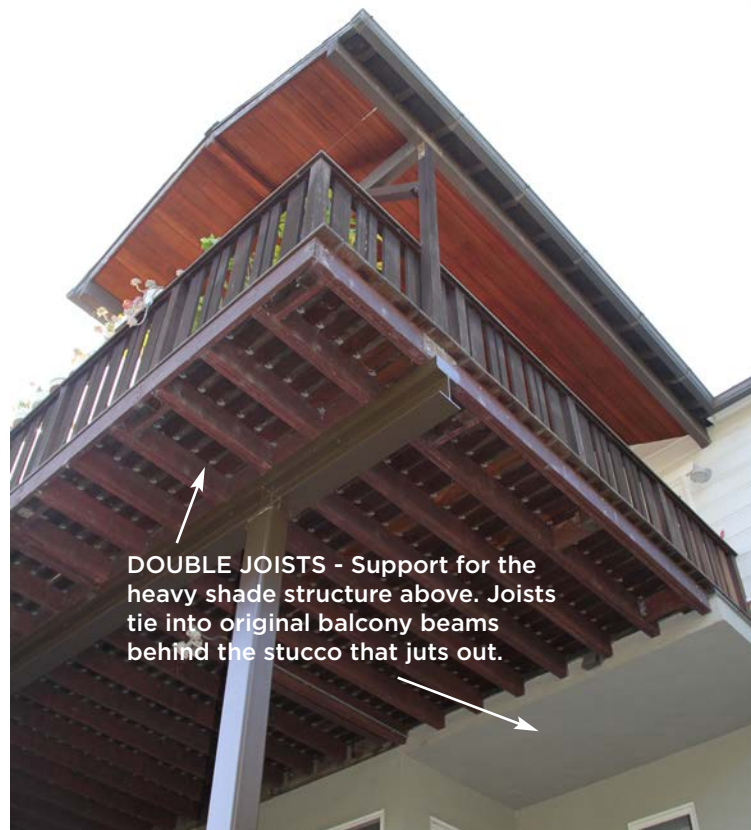
**Under the deck details**

The 16" O.C. pressure-treated Douglas Fir joists (2" x 6") are attached to the 3" x 10" pressure-treated Douglas Fir ledger board which is bolted into the house stucco and the house framing. It is suspected there was an original balcony in this area before the previous deck was built.

The joists are doubled up under the Shade Cover area. With their attachment into the stucco and balcony/house support, and with the I-beam, there is plenty of support for the heavy roofed shade structure above.



*Single joists (attached to ledger) and double joists attached to balcony supports that are original to the house.*



*Shade cover corner with extra support.*



*Screws at post base put in at 45 degree angle.*



**Deck details**

This deck is extremely well-made and constructed with expert detailing.



1"x 6" Mangaris decking



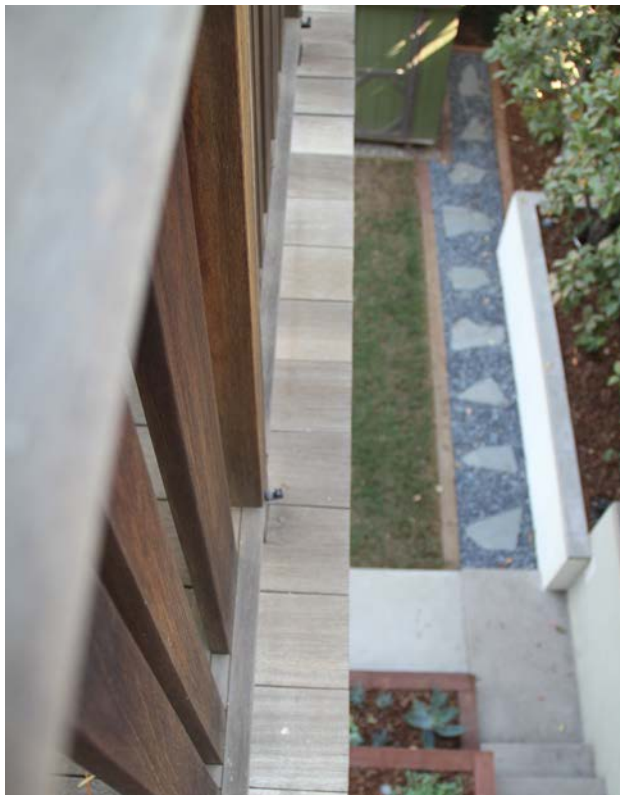
Toe-nailed top of handrail



Mitered corner with sunken screws and tapered plugs



The deck takes full advantage of the view of Silver Lake



5" overhang outside of railing posts



Balusters and top hand rail



Slotted post where base rail connects

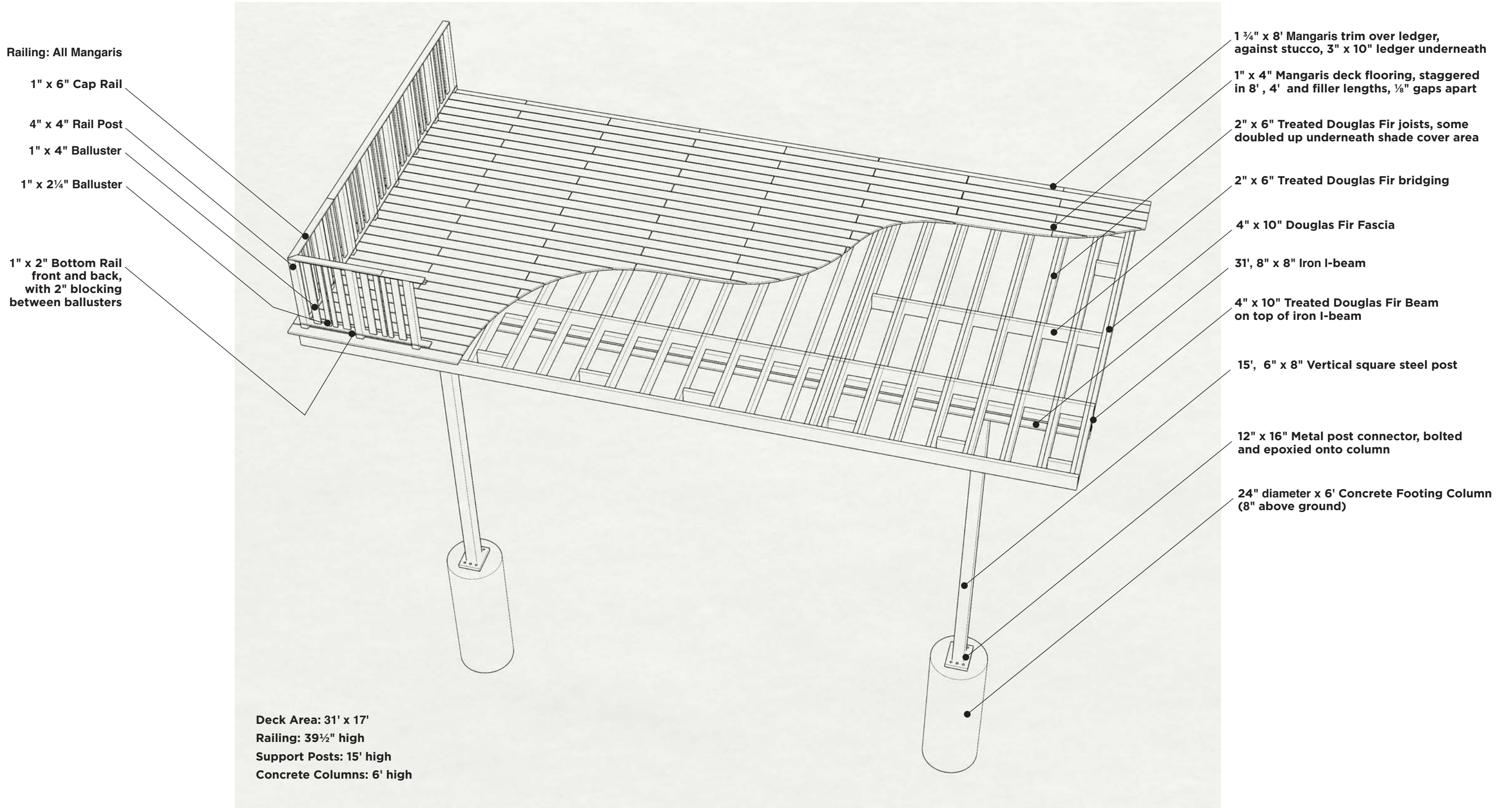


Railing at top of slotted post



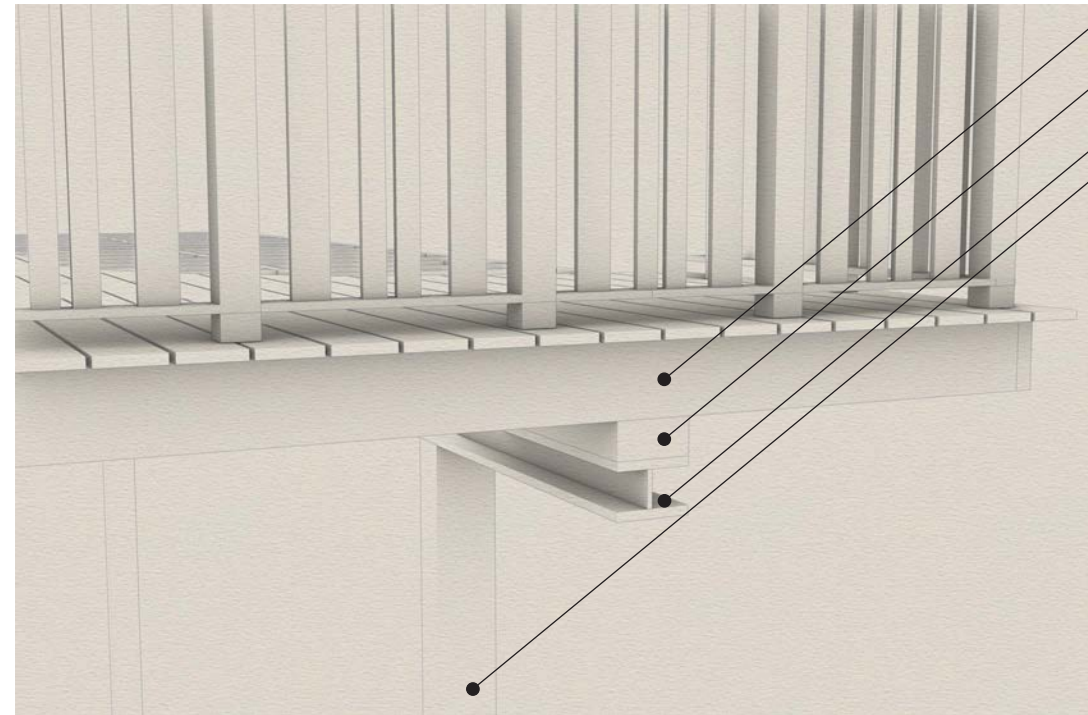
Blocking at base rail where balusters attach

Deck Details



### Deck Details

#### SUPPORT POST AND BEAMS



- 4" x 10" Douglas Fir Fascia Beam
- 4" x 10" Treated Douglas Fir Beam on top of iron I-beam
- 31, 8" x 8" Iron I-beam
- 15', 6" x 8" Vertical square steel post

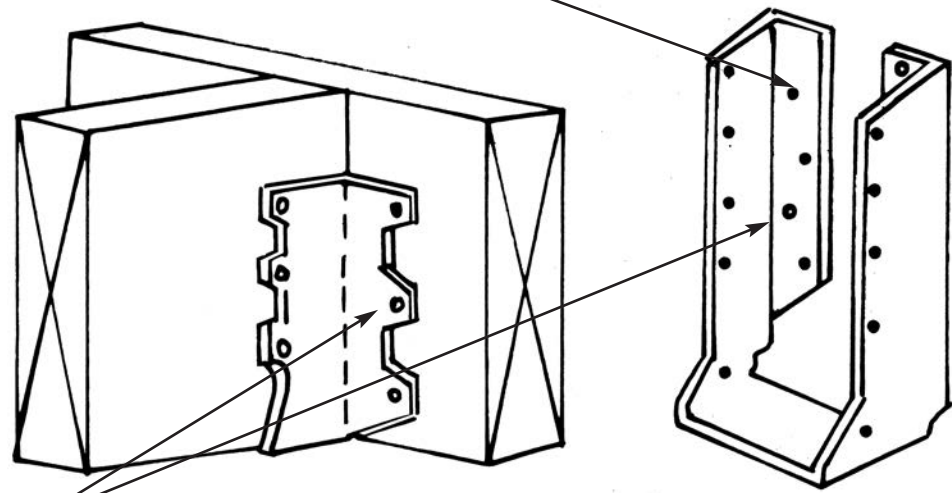
#### RAILING AND FLOORING ALL MANGARIS

- 1" x 6" Cap Rail
- 4" x 4" Rail Post
- 1" x 2¼" Balluster
- 1" x 4" Balluster
- 1" x 2" Bottom Rail front and back, with 2" blocking between ballusters, 3" gap between all but the center balluster, 1" gap between center ballusters
- 1" x 4" staggered in 8', 4' and filler lengths, 1/8" gaps apart



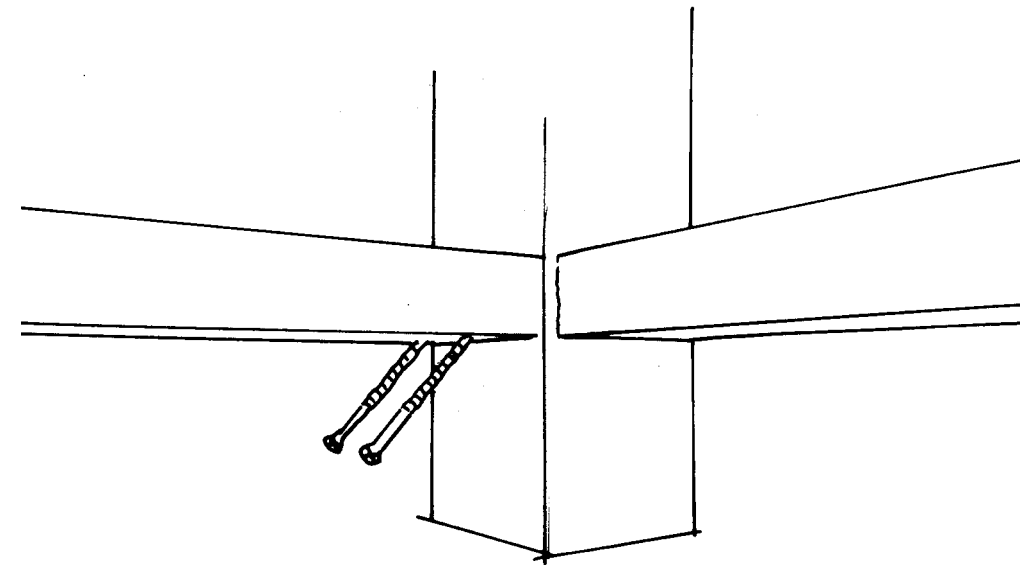
Deck Details

Joist hanger with inside flanges



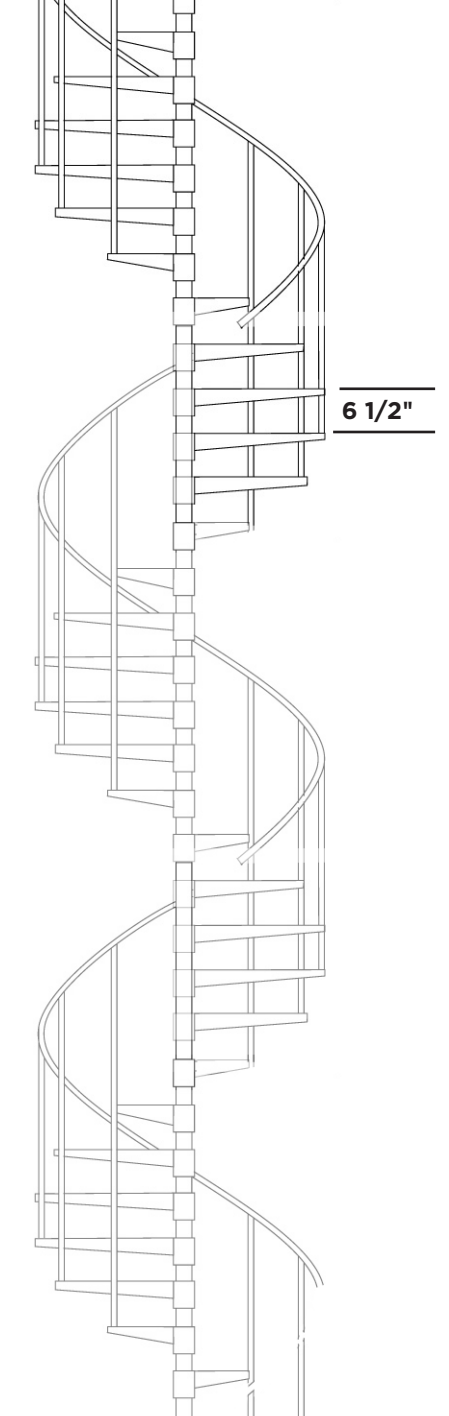
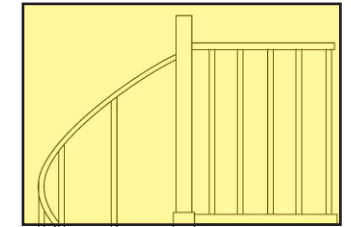
Fasteners to ledger board or flush beam shall be hanger manufacturer's recommendation screws

**JOIST HANGERS**  
GALVANIZED METAL



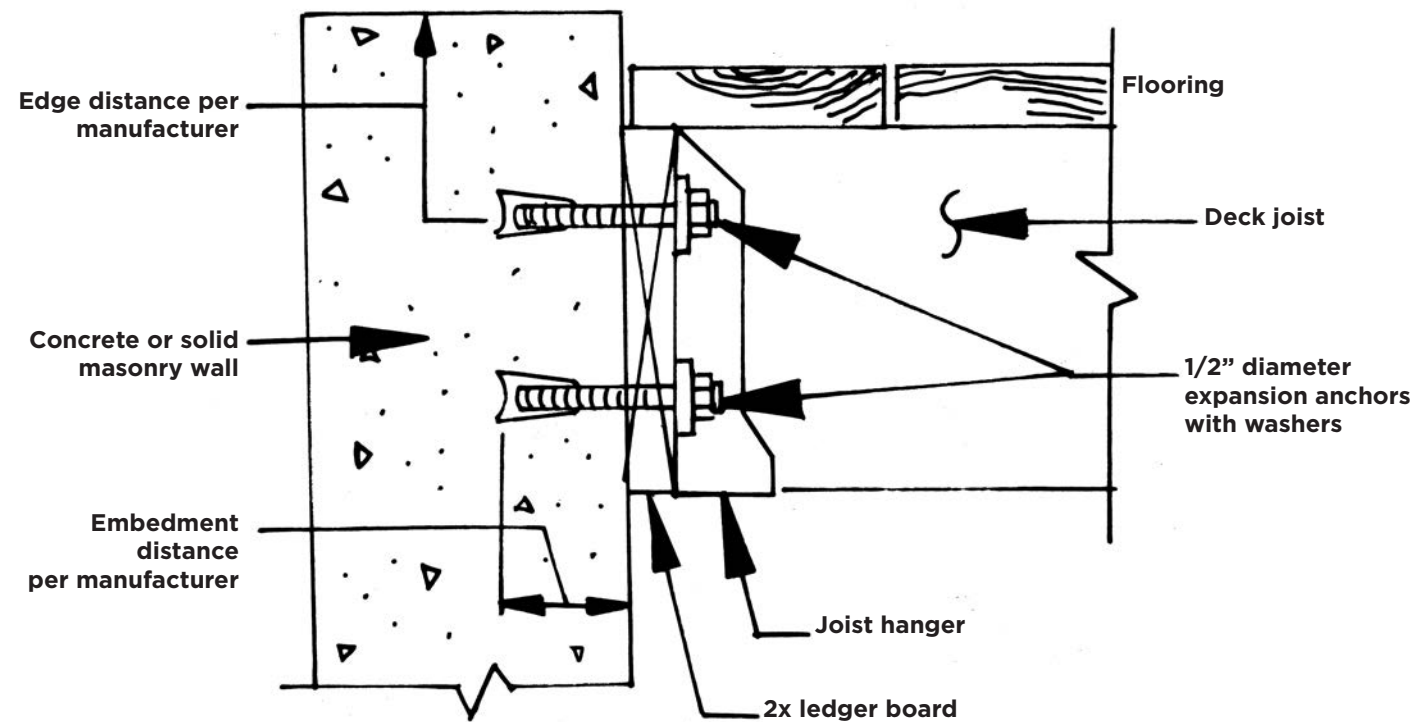
**TOENAIL SCREWS at 45° ON POST BASE**  
WITH POCKET HOLES THEY ARE 35% STRONGER

6' WIDE AREA PER MANU. SPECS



**CIRCULAR STAIRCASE**

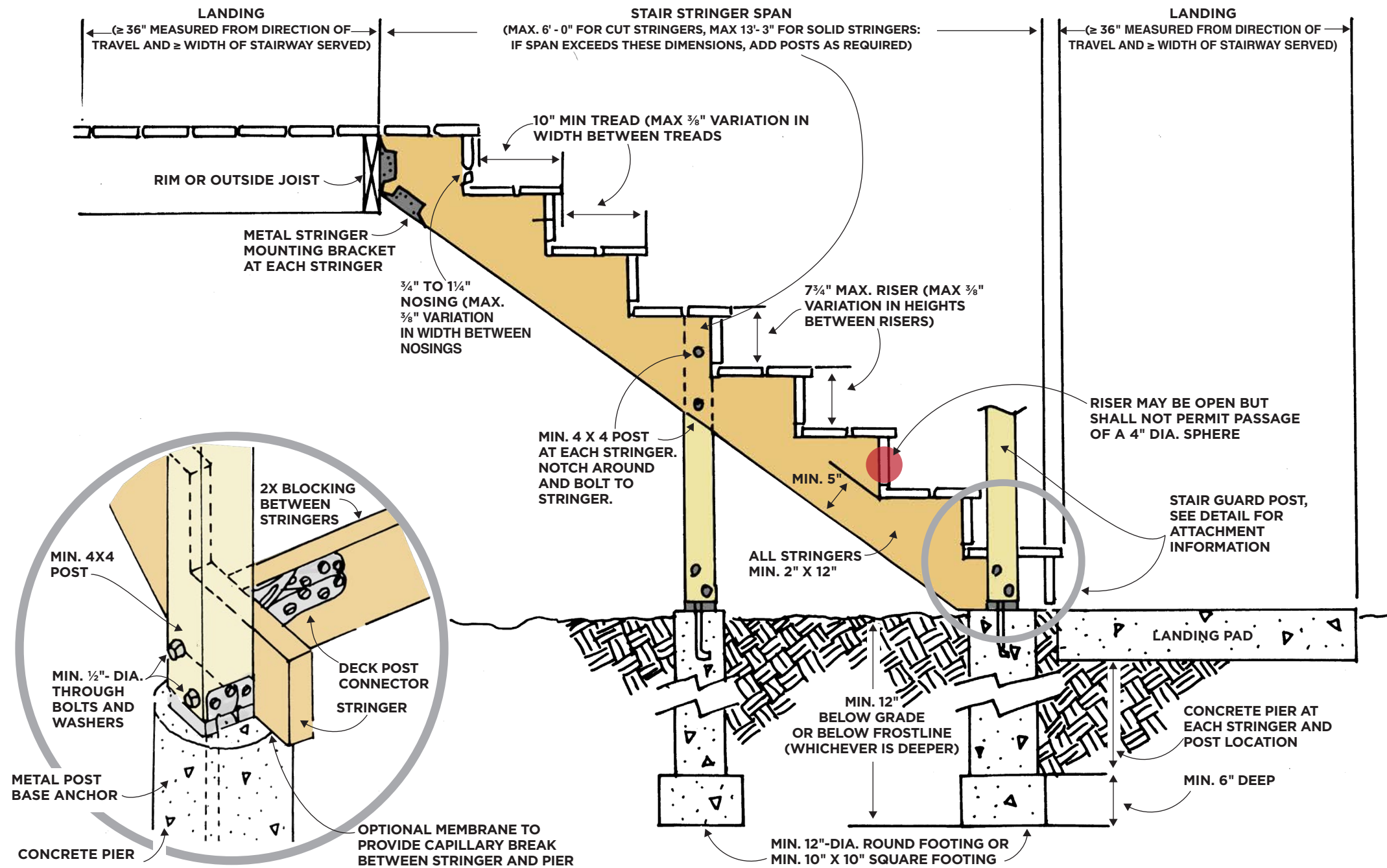
16 FEET TALL FROM TOP STEP TO GROUND  
TOP AND BOTTOM FOOTPRINT IS 5 SQUARE FEET



**LEDGER BOARD-TO-SOLID FOUNDATION ATTACHMENT**

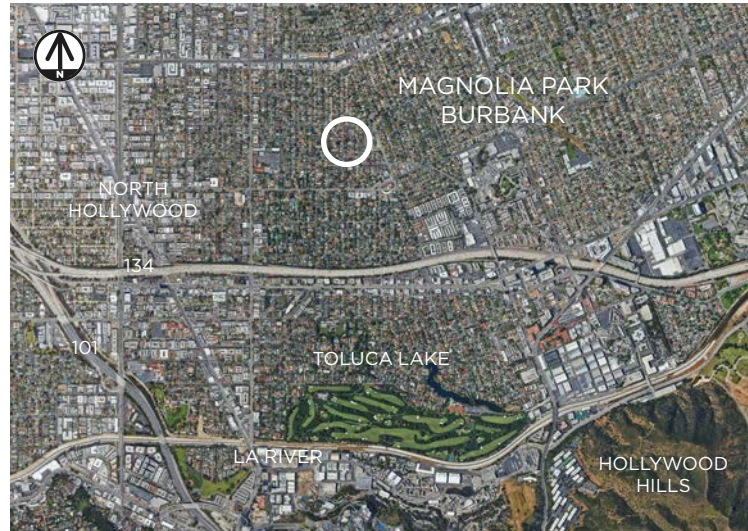


Deck Details



**DECK STAIR REQUIREMENTS**  
WITH STRINGER, BRACKET AND POST DETAIL

## Shade Structure Location and History



Built in 2000, this Burbank **shade structure** was custom built to camouflage an area in the yard under a 100-year old ash (*Fraxinus ornus*) tree. The area was very shady and neglected. There was a patio directly behind the garage that was demolished to put in a vegetable garden because that area had more sun exposure. This new patio was built to replace that. The ash tree succumbed to the ash borer in 2017, and has since been replaced with a very fast growing California sycamore.

The structure is made entirely in redwood. It has been stained with a solid colored white stain (Cabot) and chaulked before staining. Termites have been a minor problem, mainly on wood that gets hit by errant sprinklers.

The structure is 11 feet wide, 22 feet long and 9'4" feet high at the apex on the middle. The brick bases are 21" x 21" x 24" high and the wood columns are 5' high.

Electrical runs in 4 of the columns, 2 lights inside the structure and 2 lights outside the structure (over the walkway). One light switch controls them all. A two-outlet plug is in one of the back columns.



*Shade structure built next to 100-year old Ash tree. Squirrel is much younger.*



Side view



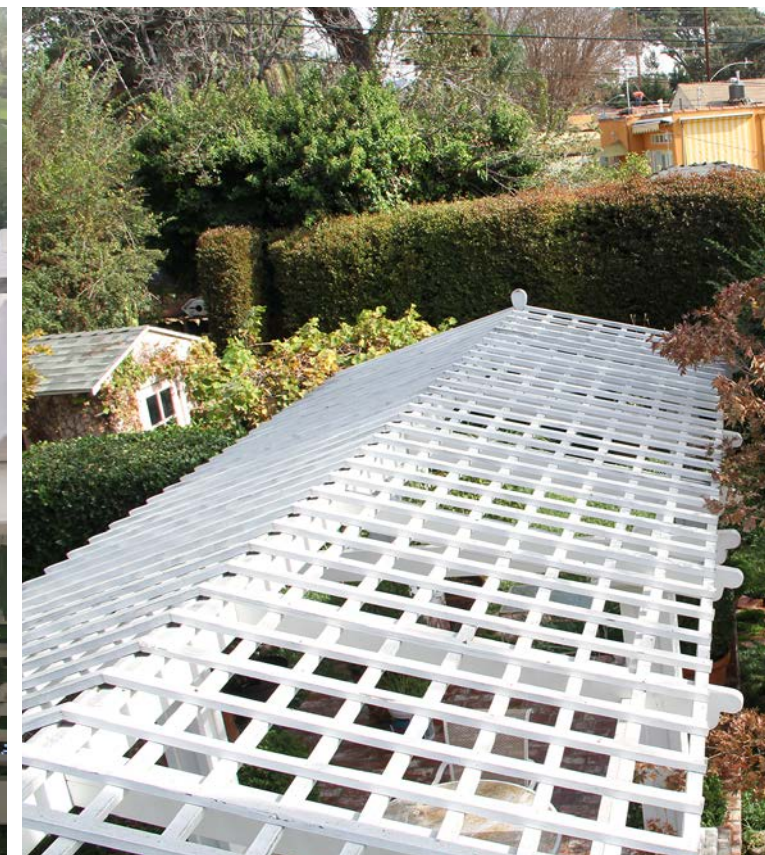
Apex detail 6" high



Column with walkway light



Side column detail



Top of roof detail, 1" x 2" slats



Inside roof detail



Column base detail

### Shade Structure Analysis and Details



Main support beam extension: 12" Zig Zag Plate Tie. On both sides, least obtrusive hardware selection to join the beams.



Top column: Flat area does not drain well



Joist to rafter: Toenailed notch has warped



Wood splitting, stain chipping on top



Base of column: Termite damage



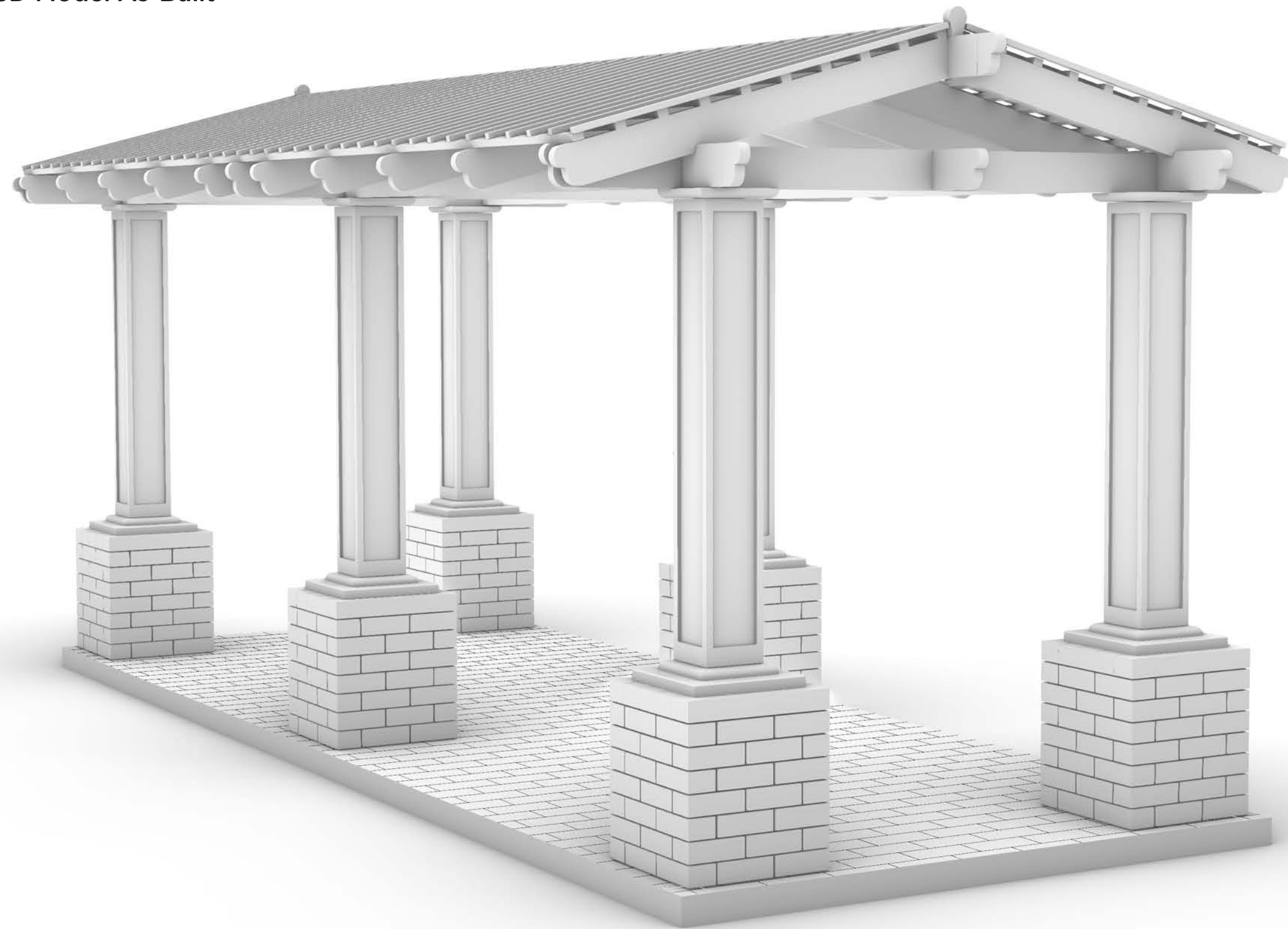
Base of column: Dry rot, water damage



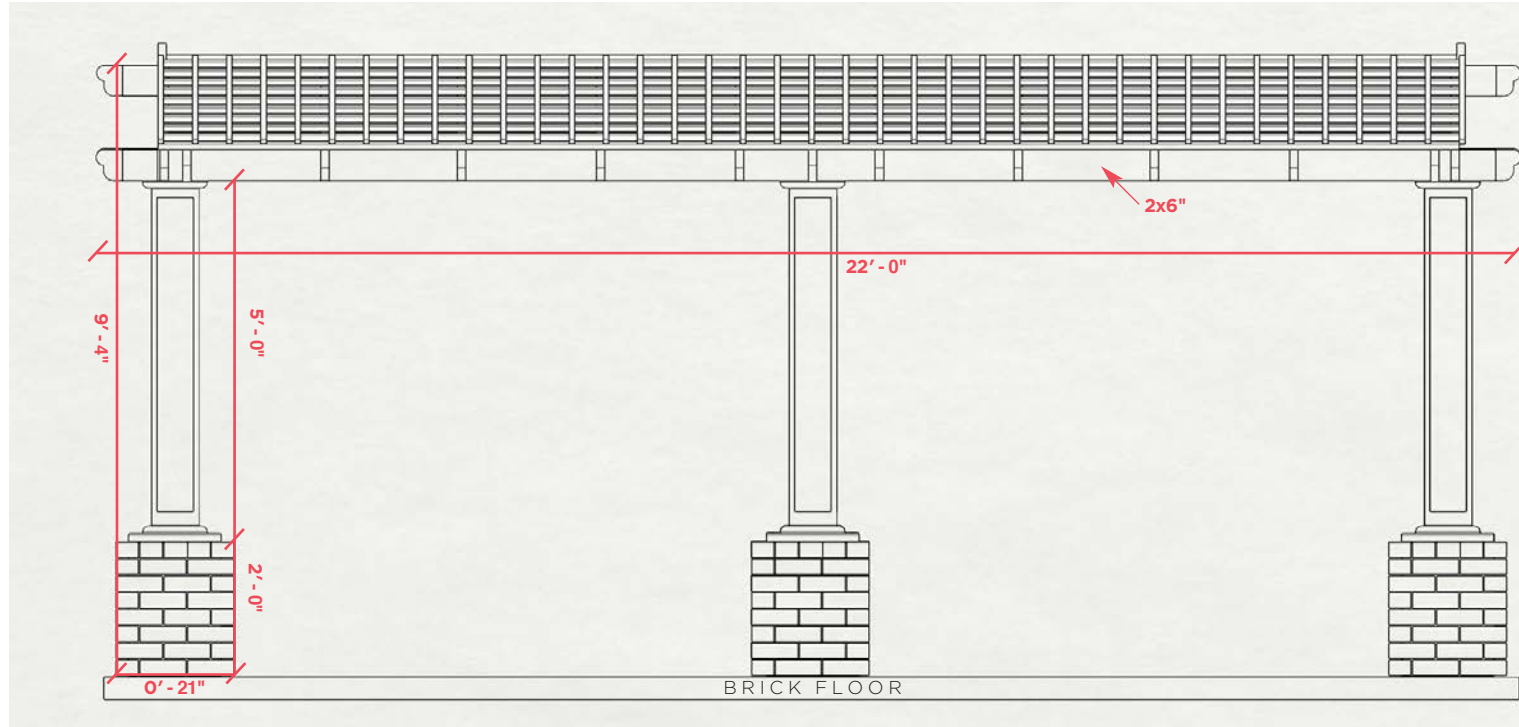
Base of column: extreme water damage



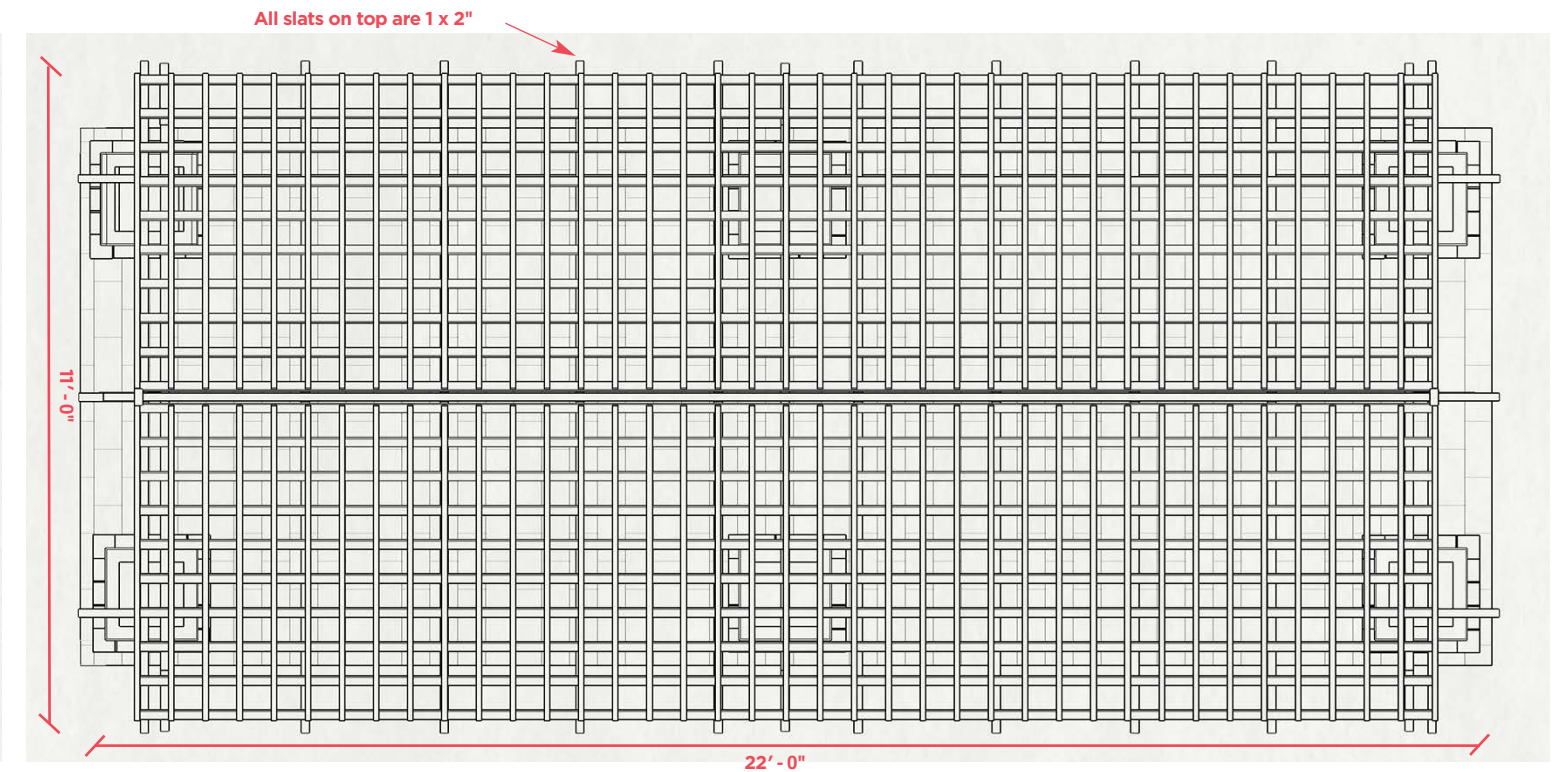
Shade Structure 3D Model As-Built



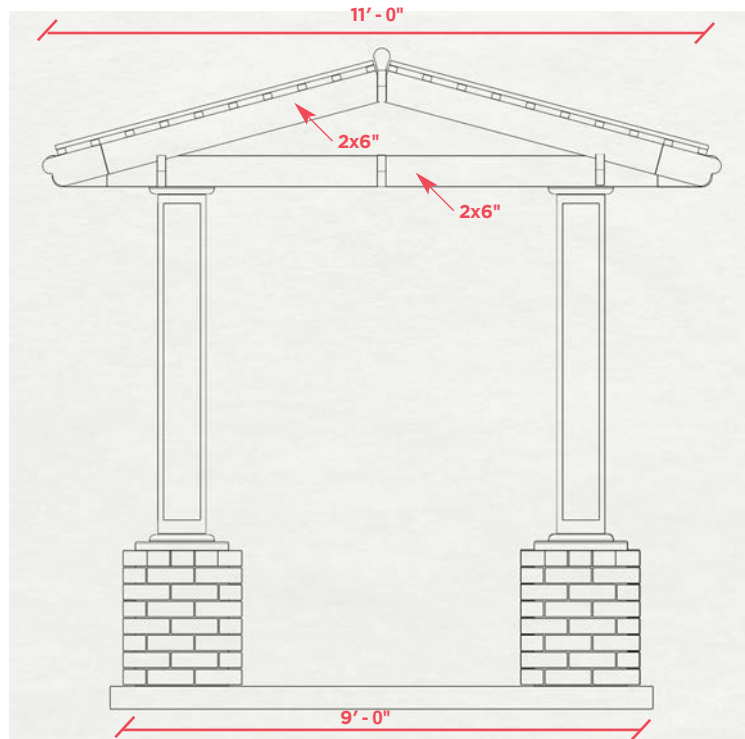
Shade Structure Details



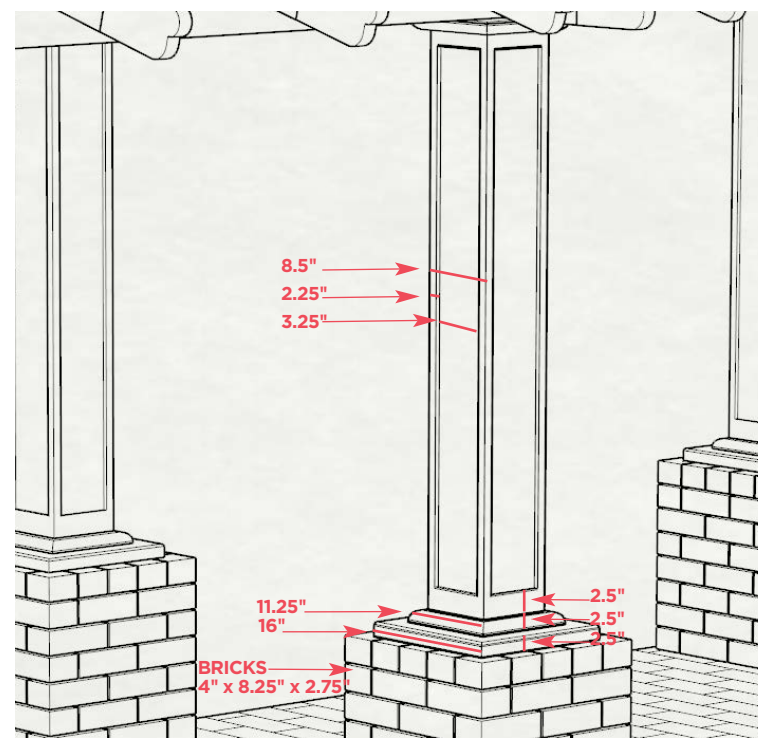
SIDE VIEW



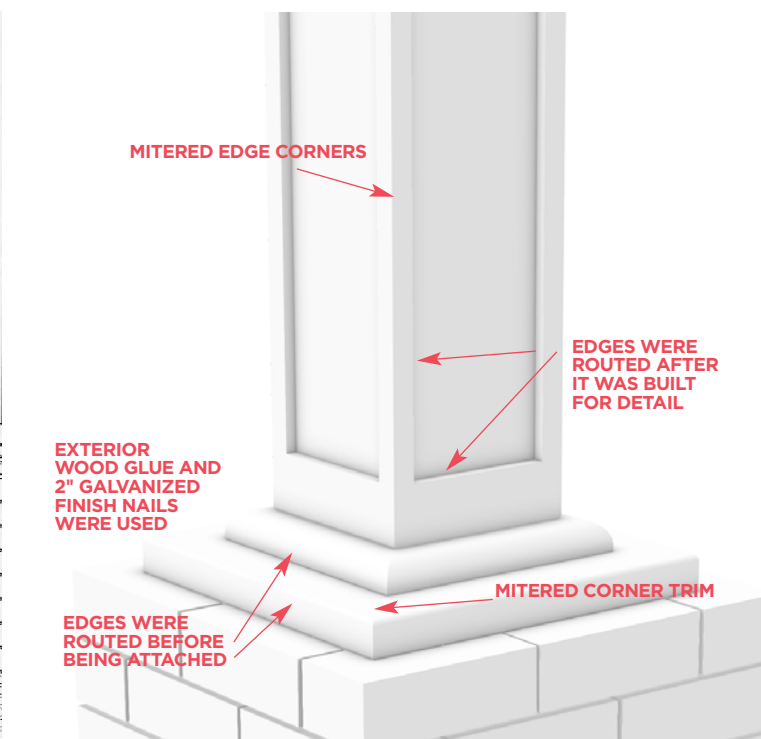
TOP VIEW



FRONT VIEW



COLUMN VIEW



TRIM DETAIL

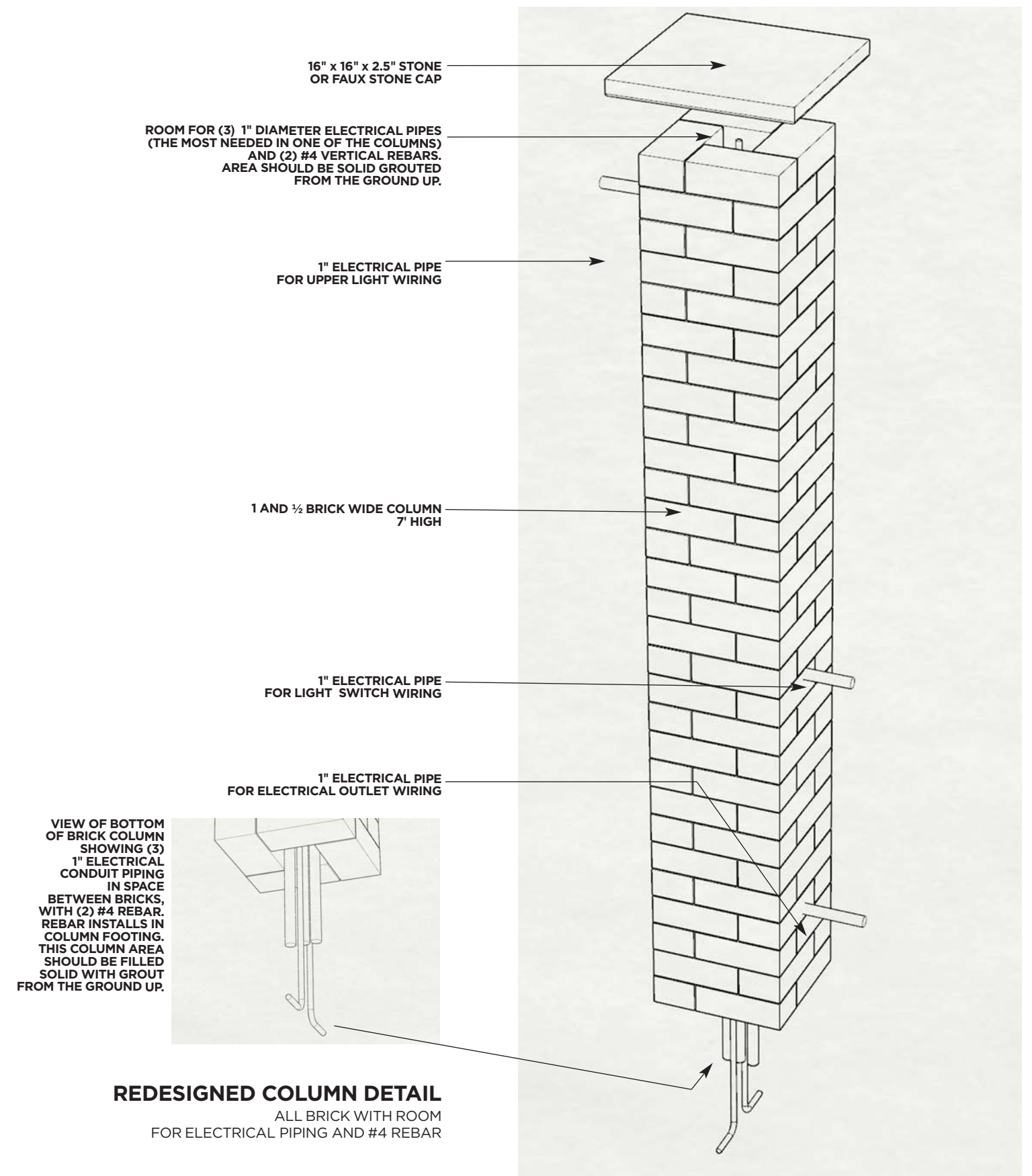
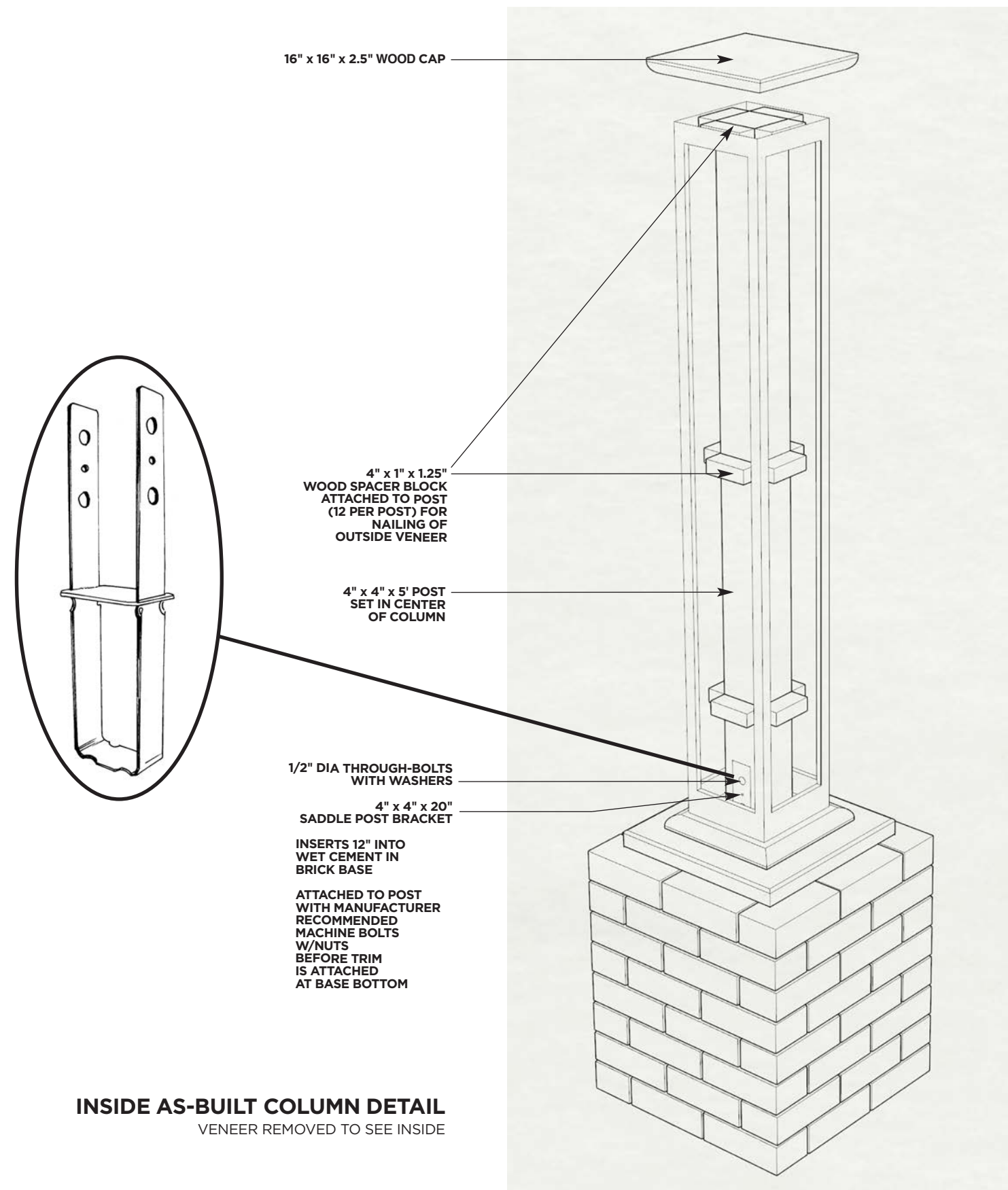
**Materials used**

- All wood is redwood
- Galvanized 15 gauge x 2½" finish nails were used
- All nails were counter set with a counter sink tool (different sizes for different diameters)
- Nails were toenailed from the rafter to the main beam with a nail gun, counter sunk, then wood puttied
- Minimum of metal hardware was used for anesthetic

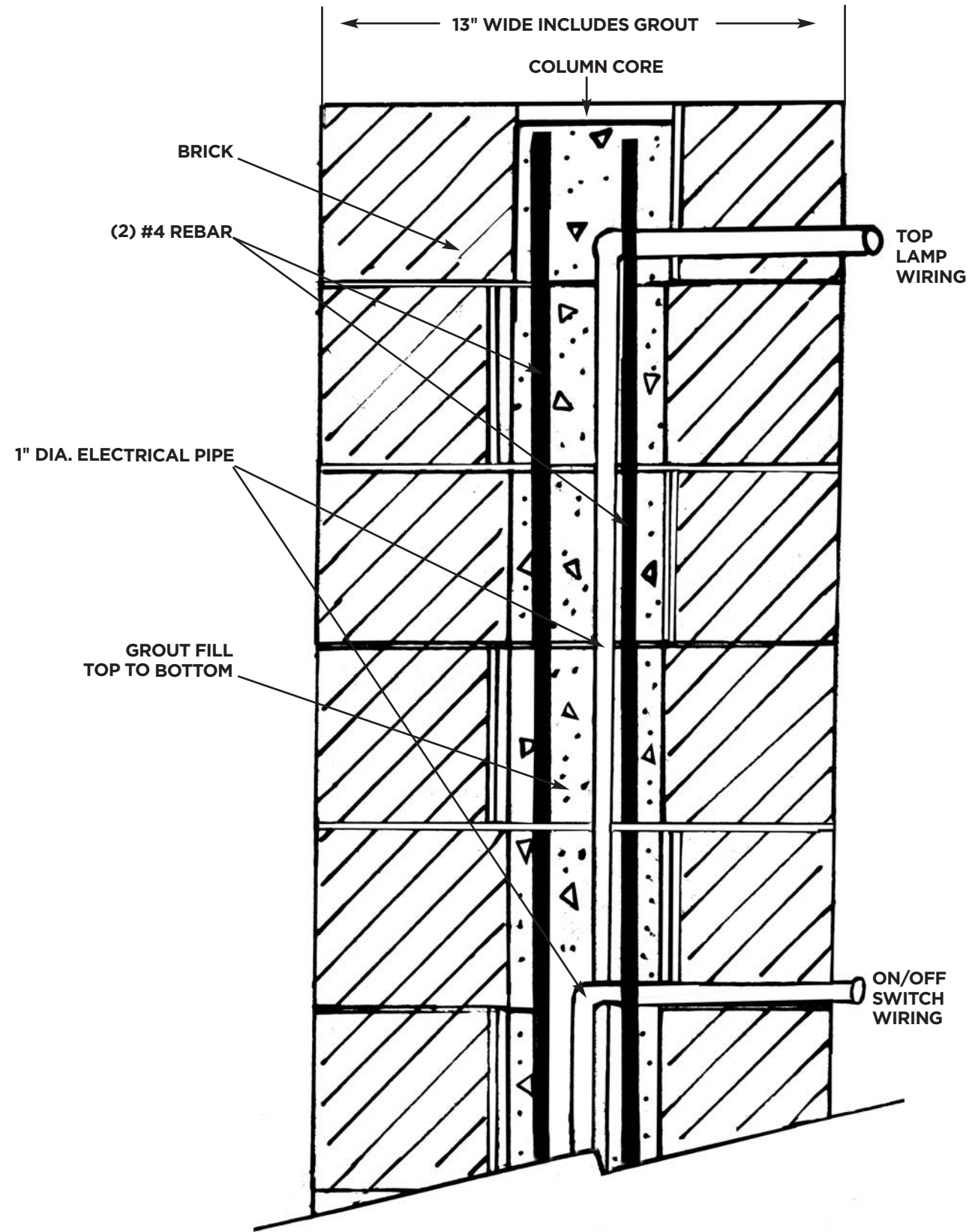
**Lumber**

- (6) 8.5" square x 5' high columns with 2¼" trim at top and bottom
- (16) 2" x 6" rafters, 36" O.C.
- (3) 2" x 6" beams. 3 @ 7'8" plus 3 @ 11'; middle beam attached with a zig zag plate tie, side beams rest on columns at juncture.
- (96) 1" x 2", 7.5" O.C. slats. 78 @ 4' 11" with mitered-end for width, 18 @ 4' 11" which join 18 @ 6'9" for length
- (36) 6" x 6" double-curved end caps
- (2) 6" x 5" oval finials

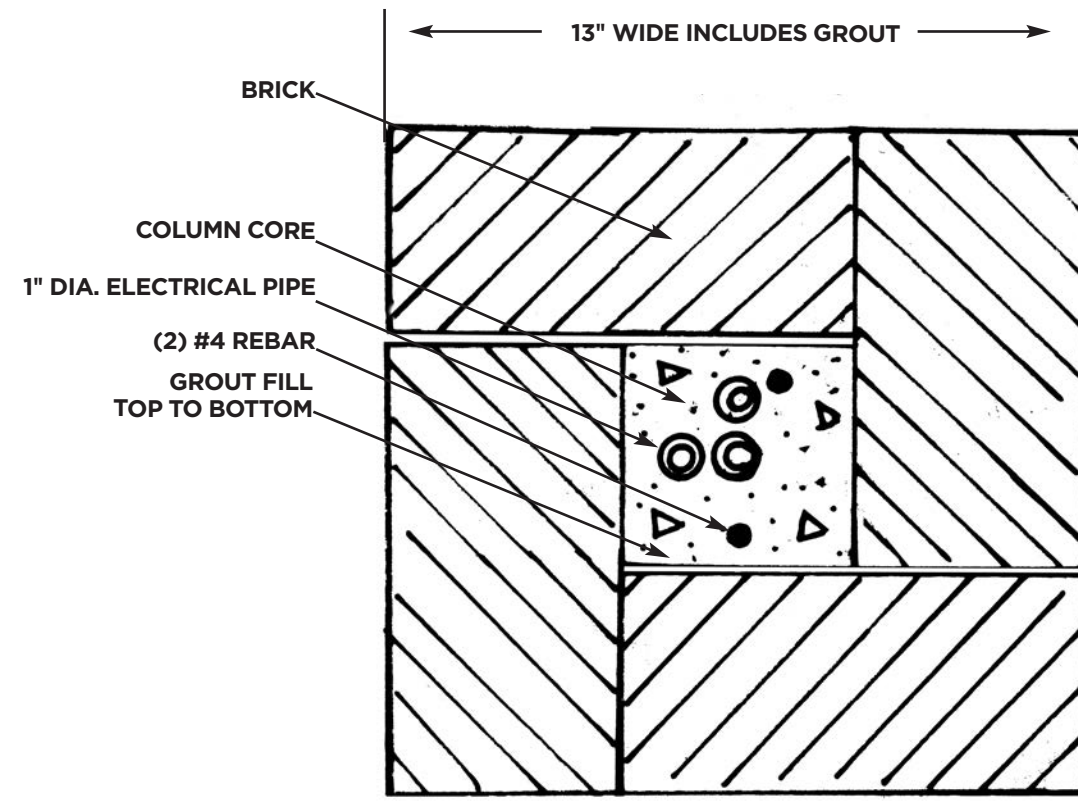
Shade Structure Construction Details



### Shade Structure Construction Details

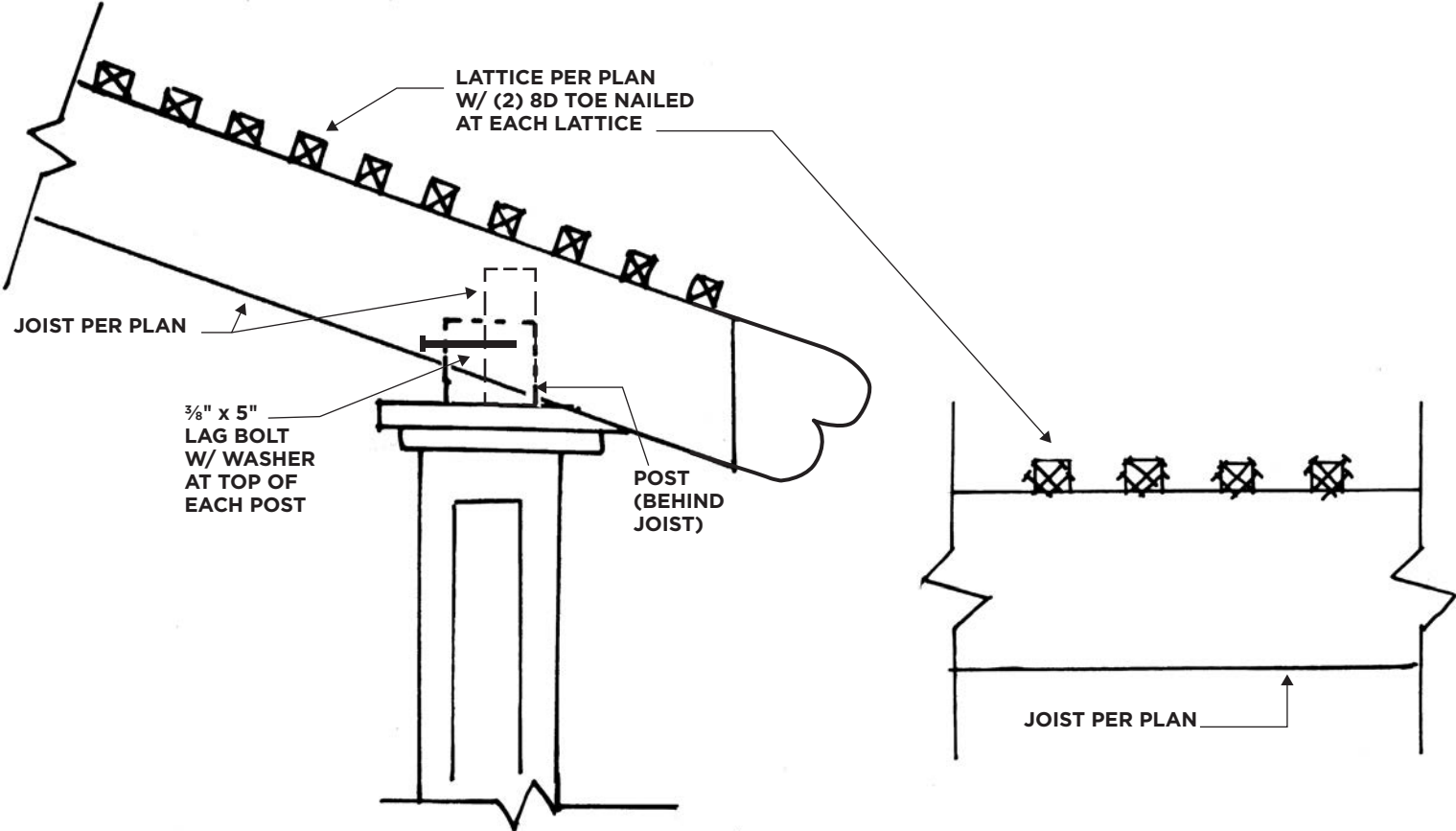


**REDESIGNED COLUMN DETAIL**  
LONGITUDINAL SECTION



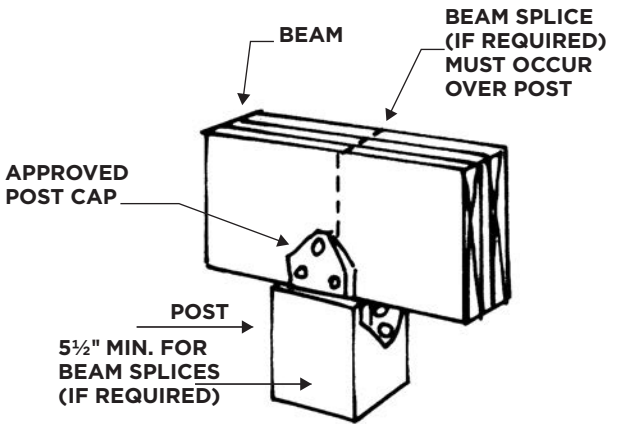
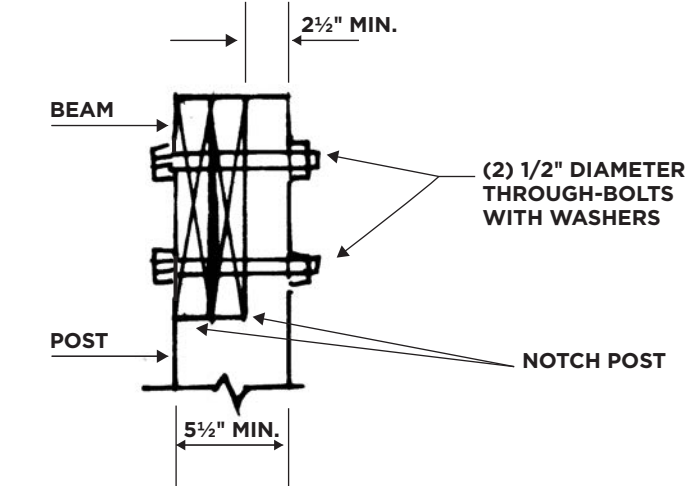
**REDESIGNED COLUMN DETAIL**  
COLUMN CROSS SECTION

Shade Structure Construction Details



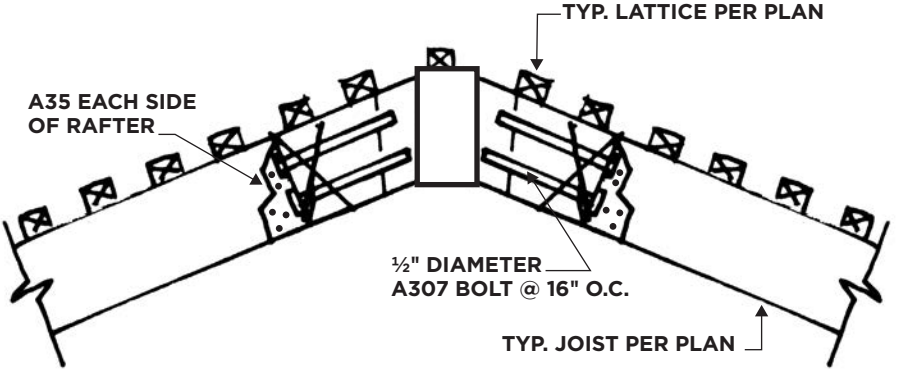
POST and LATTICE CONNECTION

NTS



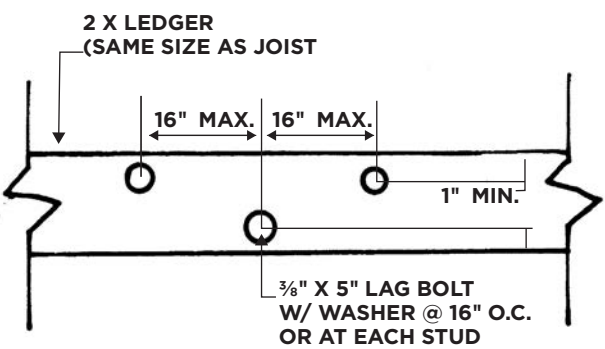
POST BEAM CONNECTION

NTS

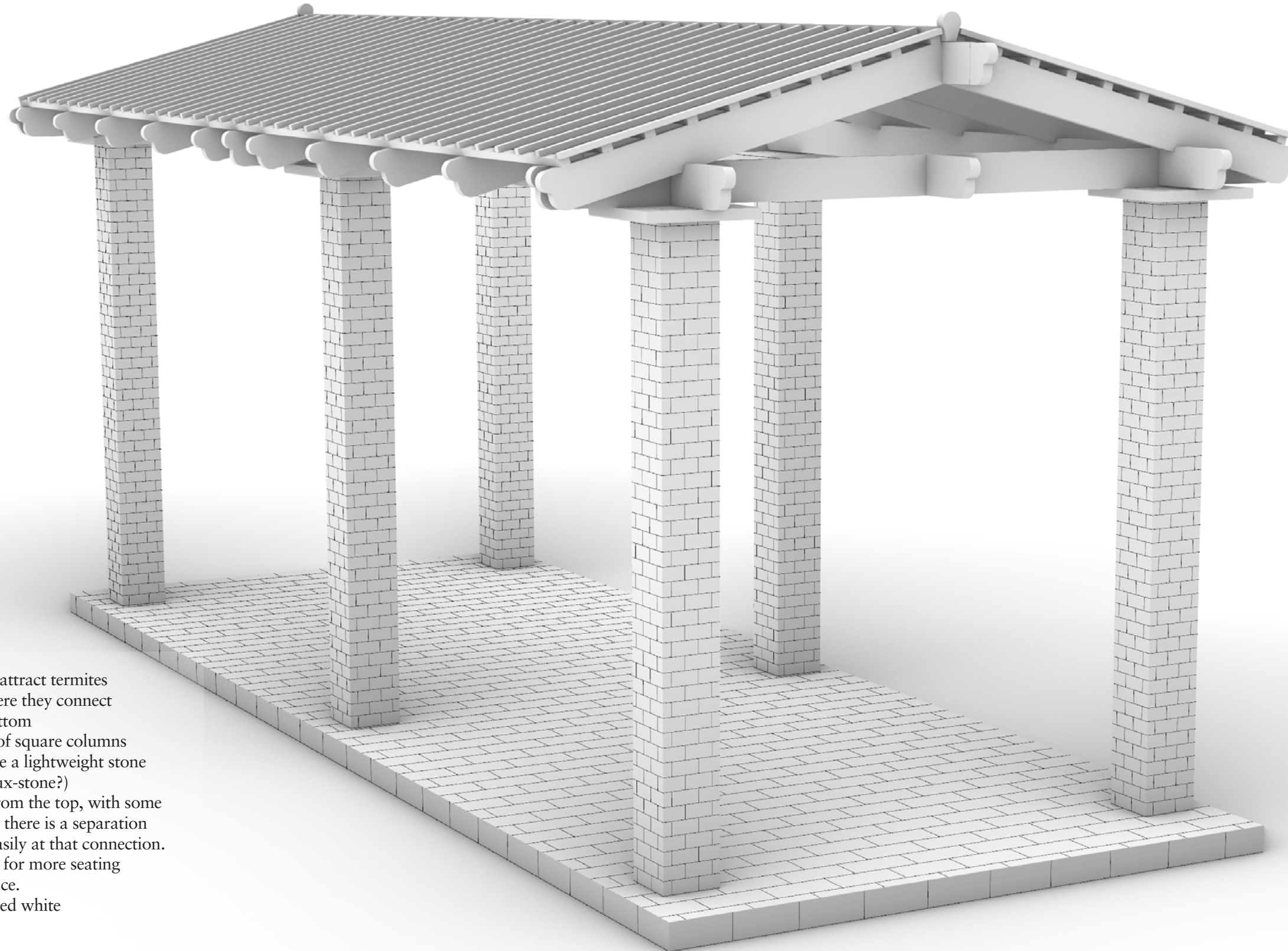


CENTER BEAM CONNECTION

NTS



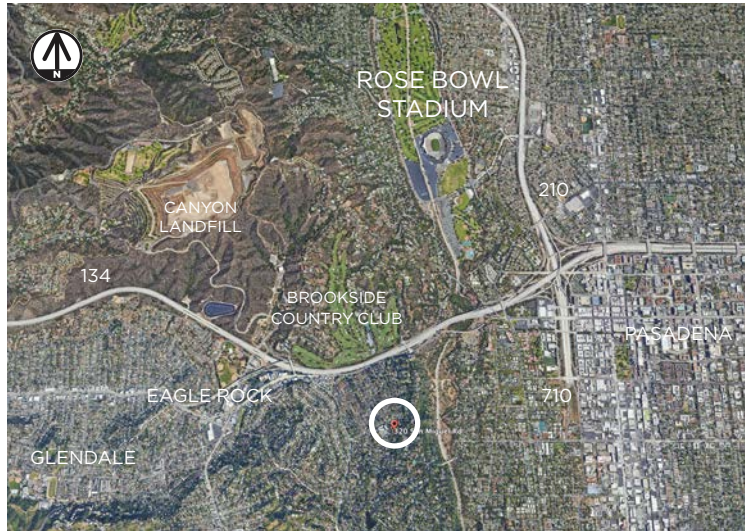
## 3D Model Shade Structure Design Improvements



### Design Improvements

- Get rid of wood columns that attract termites and hold water at top and where they connect to the brick columns at the bottom
- Use only 1½ bricks for width of square columns
- Plate at top of column could be a lightweight stone or water resistant material (faux-stone?)
- Roofing would be separated from the top, with some sort of shim (metal? stone?) so there is a separation allowing water to evaporate easily at that connection.
- This solution would also allow for more seating and table area on the floor space.
- Wood roofing, Redwood, stained white

## Pool Location, History and Details



Built in 1951, this mid-century modern home in the San Rafael district of Pasadena has been expertly designed and lovingly maintained. A major renovation, addition of living room and a master suite, happened in 1964. **The pool and koi pond were added in 2005.** All construction has been very cognizant of the mid-century style, very straight edge, smooth, square and sleek.

The pool is 10 feet wide, 40 feet long and a maximum 6 feet deep. Two-thirds of the pool are under 5' deep, qualifying it as technically as a 'lap pool'. The corners at the bottom edge are very square with a 2.5' radius. The pool has steps that are also bench seating along the 40' north side. The surface is gunnite and the pool is edged in a 8" x 8" glass tile. There is no coping, just a squared off edge, flat to the tile, 4" deep, that incorporates the walkway edges around the pool. Those walkways are an important design element, with the expansion joints lining up perfectly in the modular design. The walkway concrete has a rough salted finish. Rivers of black Mexican beach stone accent in 4.5" gaps along the 40' side. This area is permeable and allows water to drain before it hits the house, if there is an overflow. There are also drilled holes in the concrete around the perimeter of the pool area for a child proof fence, but they have been filled with plastic plugs for aesthetics since a protective fence is not needed. (No children have access.)

The chlorination system is a saltwater conversion system. A generator converts salt into chlorine. This is gentler on skin and eyes, and the water feels almost like soft water. The chemistry to keep the water balanced is less complicated, but the system does require weekly maintenance.



*The mid-century modern lap pool in Pasadena was built in 2005.*

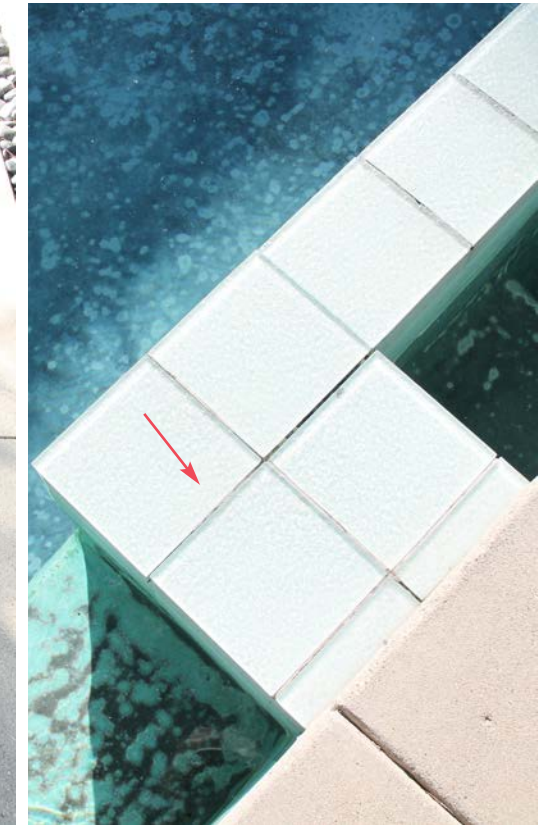
The pool has a waterfall feature on the south side at the deep end. Water flows over the 7" top edge of the planter down the 29" planter wall. This shrubwall area has large globe accent lighting that lines up with the waterfall, providing extra shimmer at night when the water is flowing. There are also lights inside of the pool, spaced symmetrically on the long side.



Waterfall incorporated into the planter wall. Accent lights above reflect more modern touches.



Ribbons of beach stone, 4.5" wide



Glass tile, 8" x 8", around spa edge



Skimmer in deep end. Small outlet, to the right, is a drain that goes straight to the street if it rains and the water in the pool overflows.



Two drains in deep end for safety, with pool sweep



Covers for fence holes, expansion joint, walkway drain cover



The spa is 5' x 12', with a 41" water depth. It has bench seating around the long side and both short sides. The pool and spa use the same heater, but they cannot be used at the same time. The owners have the heat for the pool set on a timer specific to the season, and they can manually re-set it for spa use about an hour in advance.

The spa has slightly adjustable directional hydrotherapy jets and its own lights.

The pool controller is inside the house for easy access to lights, jets, heat and status of working equipment.



Spa showing edge with overflow notch in tile edging



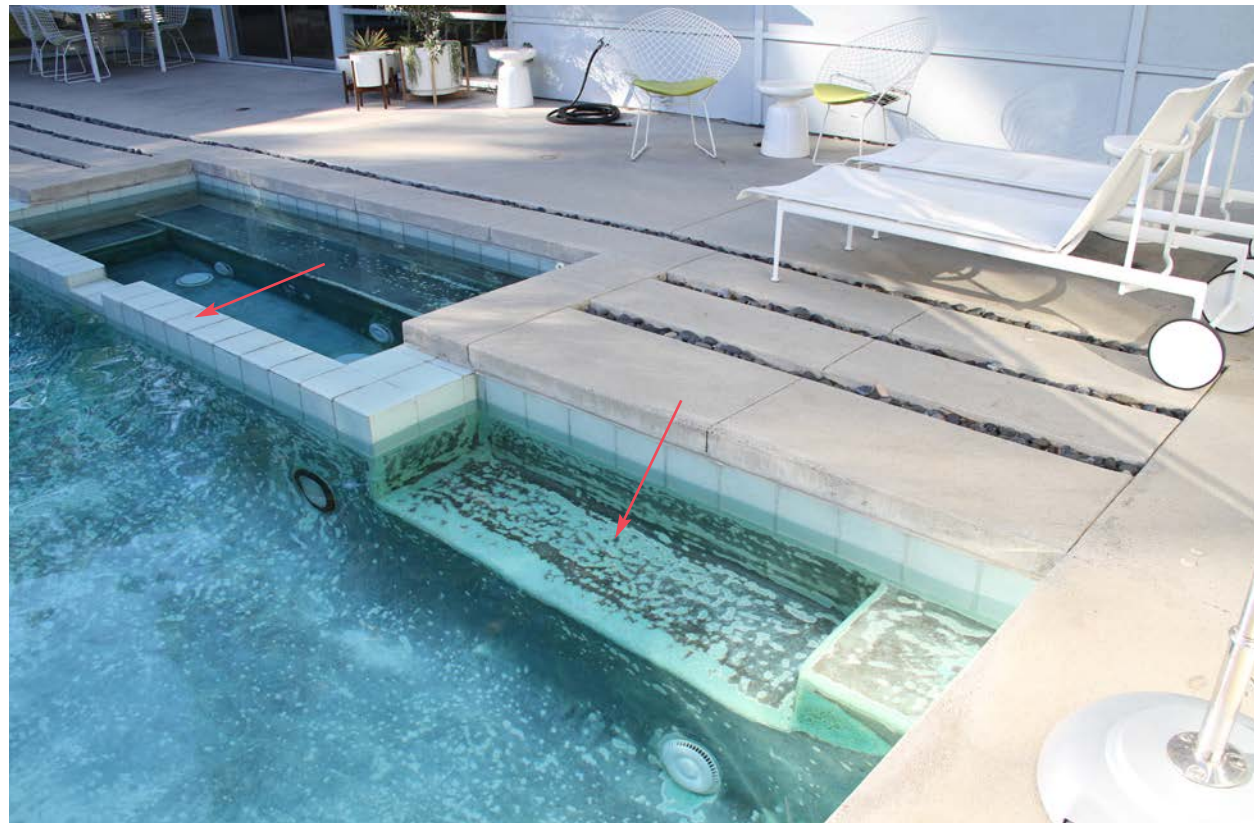
Outflow from filter equipment in shallow end



Water flow filter sensor



Pool controller inside the house



Spa with bench seating, trimmed in glass tile. Shallow end step is also bench seating.



Stainless steel showing saltwater pitting



Pool lights on at dusk

**Saltwater chlorination system**

The benefits of salt systems in pools are the convenience and the constant delivery of pure chlorine-based sanitizer. The reduction of irritating chloramines versus traditional chlorinating methods and the “softening” effect of electrolysis reducing dissolved alkali minerals in the water are also perceived as benefits. For some people that have sensitivities to chlorine, these systems may be less offensive. Salt water pools are cheaper to maintain throughout the year, since salt is significantly cheaper than the commercial chlorines.

Disadvantages are the initial cost of the system, maintenance, and the cost of replacement cells. Salt is corrosive and will damage some metals and some improperly-sealed stone. However, as the ideal saline concentration of a salt-chlorinated pool is very low, damage usually occurs due to improperly-maintained pool chemistry or improper maintenance of the electrolytic cell. Pool equipment manufacturers typically will not warrant stainless steel products damaged by saline pools. Calcium and other alkali precipitate buildup will occur naturally on the cathode plate, and sometimes in the pool itself, known as “scaling”. Regular maintenance of the cell is necessary; failure to do so will reduce the effectiveness of the cell.

It’s a myth that a saltwater pool does not use chlorine to purify the water. It absolutely does! The difference is that you are essentially making the chlorine on site rather than adding chlorine tablets. This means that your saltwater pool will have considerably less chlorine and chlorine levels will be stable rather than fluctuating.

Saltwater pools should actually have no detectable odor at all, and if there's a chlorine smell it means there's an imbalance. Somebody with a very sensitive nose may pick up on it, but one of the advantages of a saltwater pool is avoiding that extreme chlorine stench.



Fence that camouflages the pool equipment



Pool equipment



More equipment



Flow detector valve



Control panel

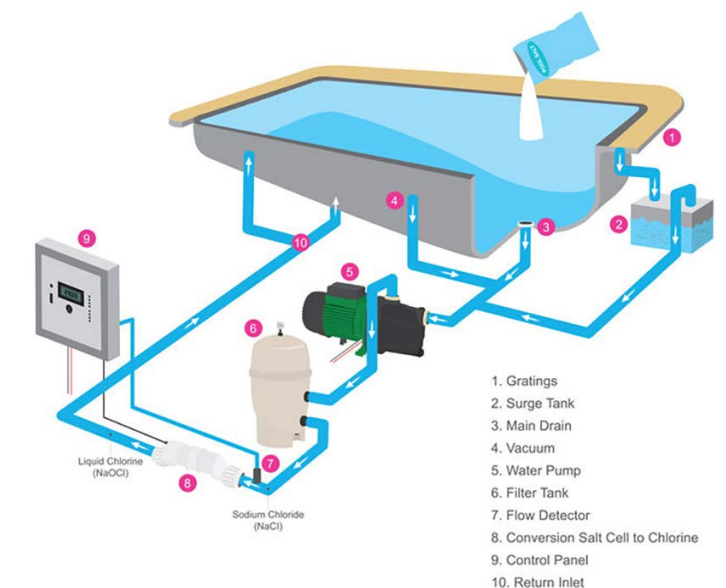


Conversion salt cell to chlorine

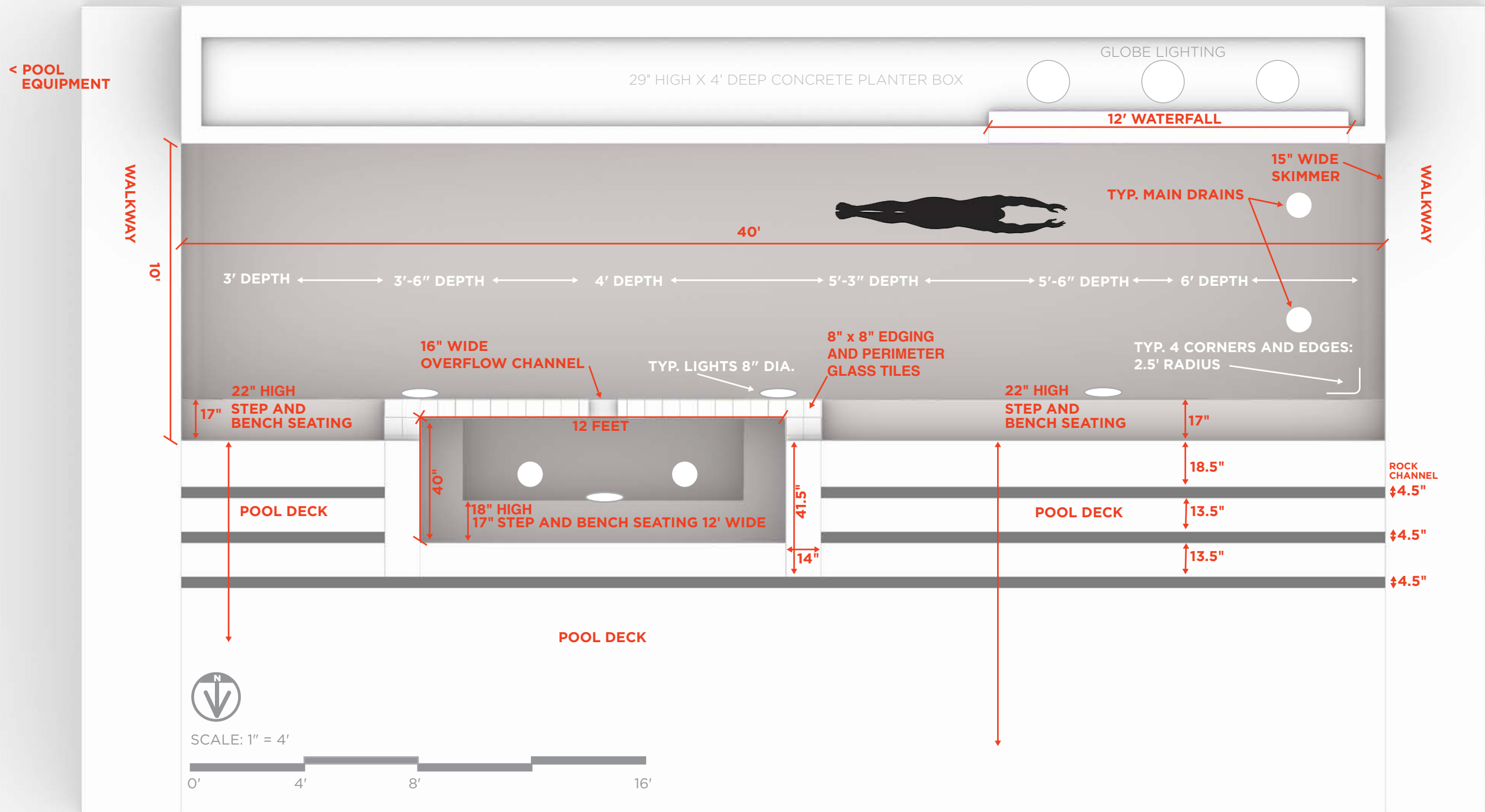
**HOW MUCH SALT DO YOU NEED?**

CURRENT SALT LEVEL	STANDARD POOL DIMENSIONS*						
	12' x 24'	14' x 28'	15' x 30'	16' x 32'	18' x 36'	19' x 39'	20' x 40'
0 ppm	8 BAGS 8,500 to 11,000 gallons	11 BAGS 13,000 to 16,000 gallons	11 BAGS 13,900 to 18,200 gallons	15 BAGS 17,200 to 20,000 gallons	18 BAGS 22,500 to 24,500 gallons	20 BAGS 24,400 to 27,500 gallons	25 BAGS 30,000 to 34,000 gallons
1,000 ppm	6 BAGS	8 BAGS	8 BAGS	10 BAGS	13 BAGS	14 BAGS	18 BAGS
2,500 ppm	2 BAGS	3 BAGS	3 BAGS	4 BAGS	5 BAGS	6 BAGS	7 BAGS

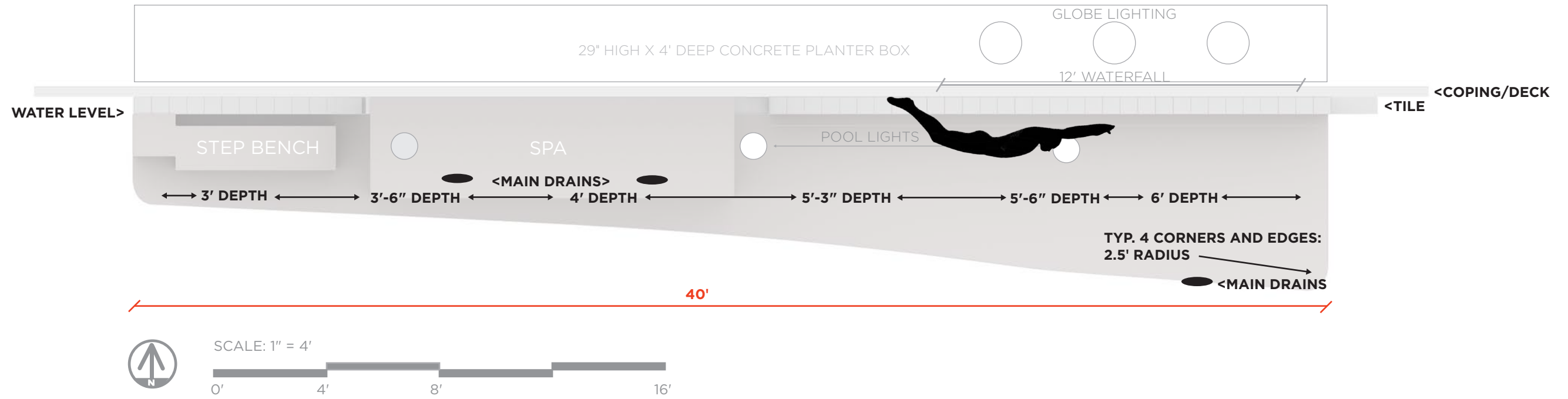
\*Always refer to your system's owner's manual. \*Standard pool sizes gallons with 4' shallow & 7' to 9' ft deep end average (40lb bag = 480ppm, for 10,000 gallons of water)



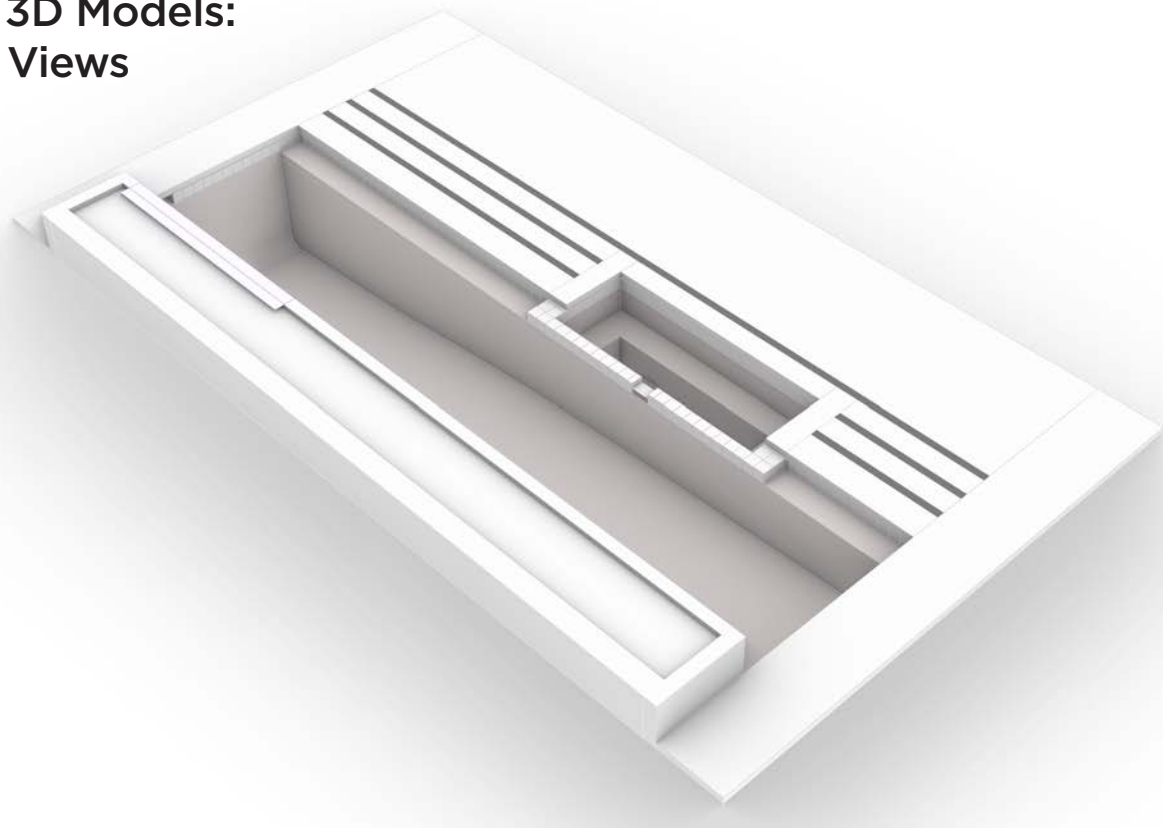
As-Built Site Plan



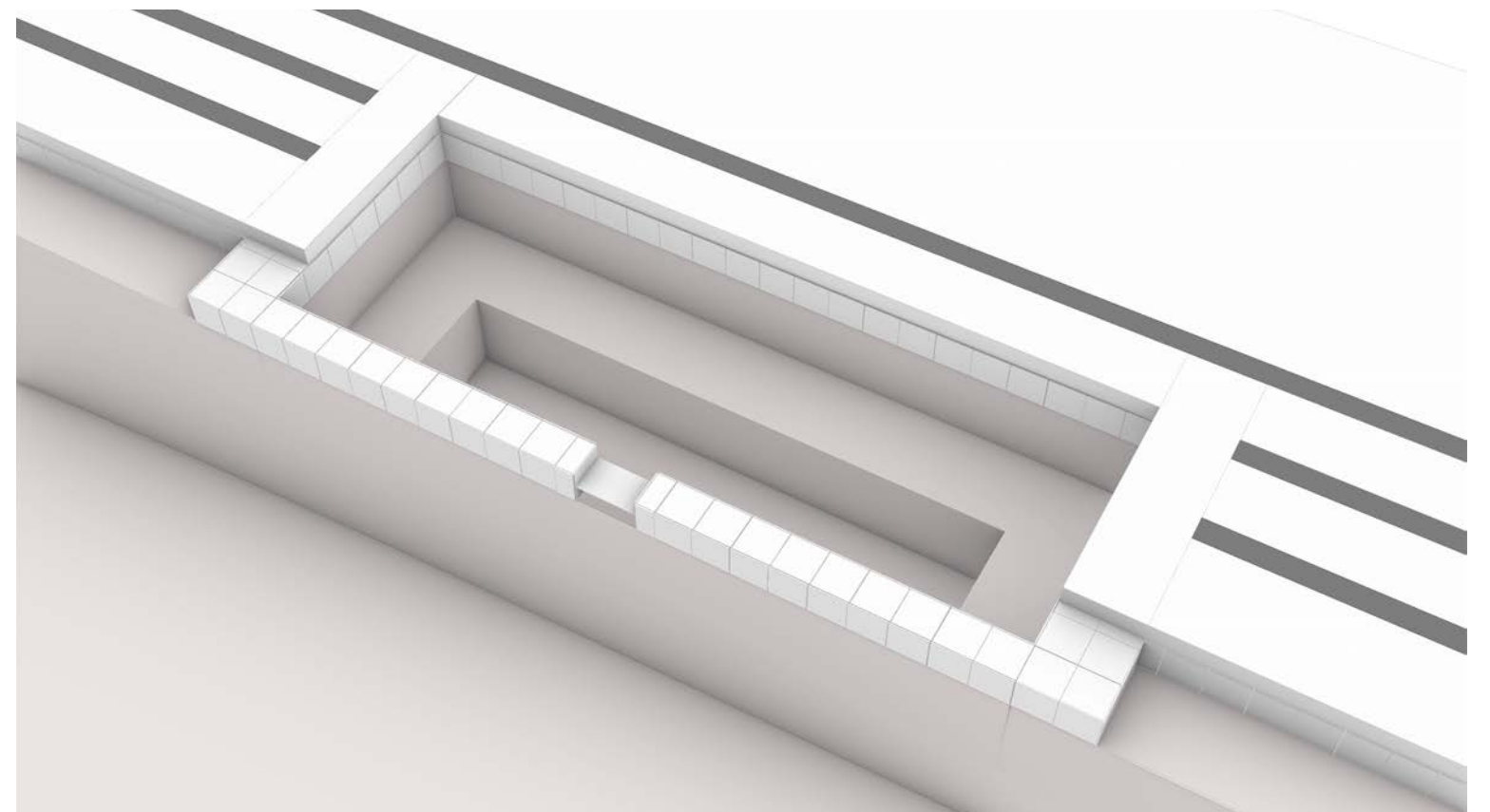
Pool Elevation



Pool 3D Models:  
AXO Views

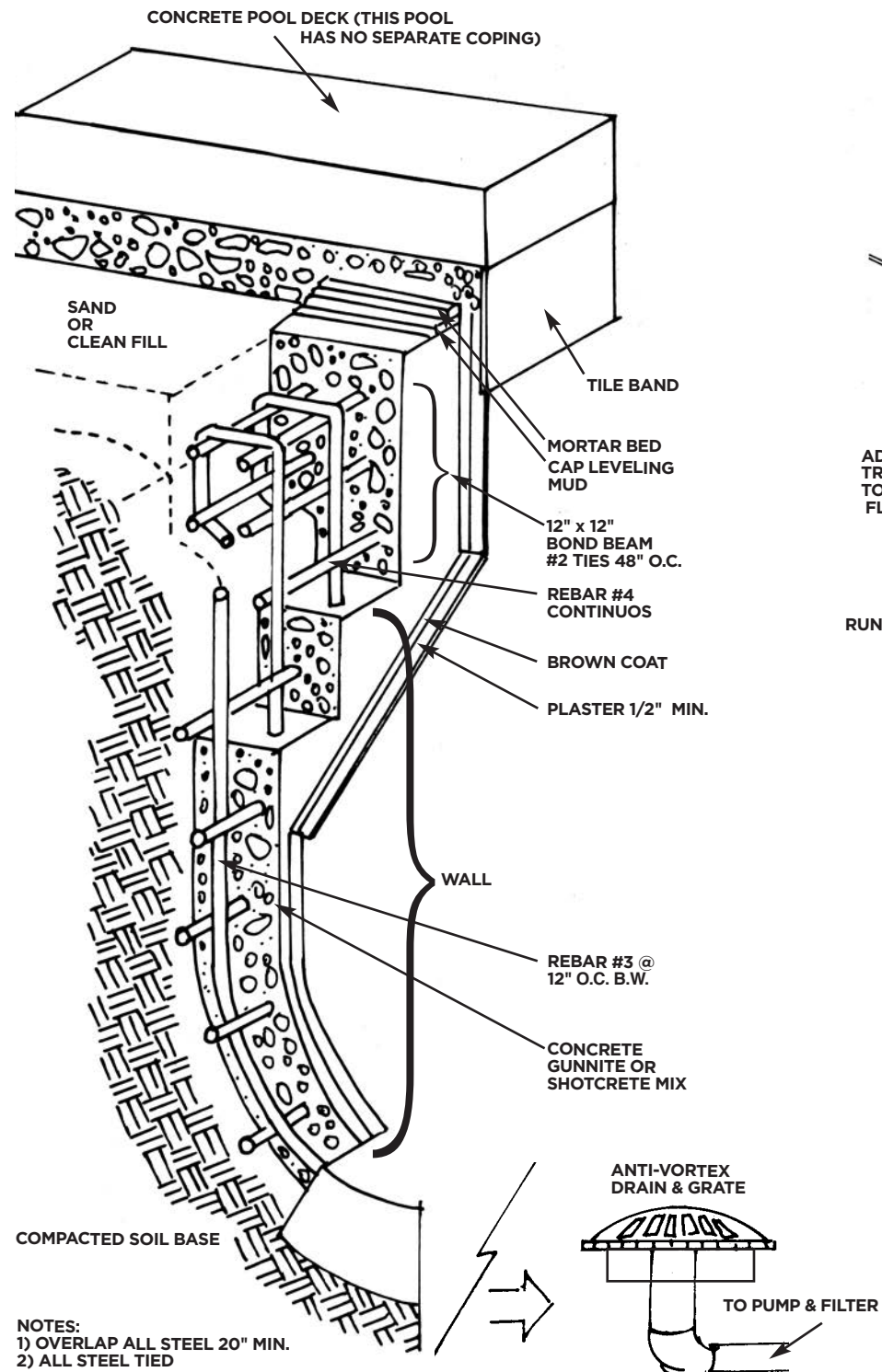


View from shallow end

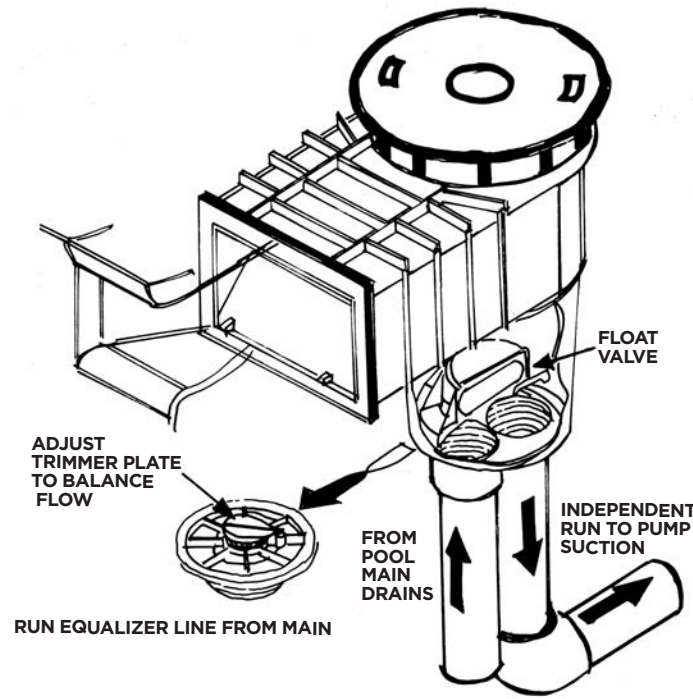


Close up of spa

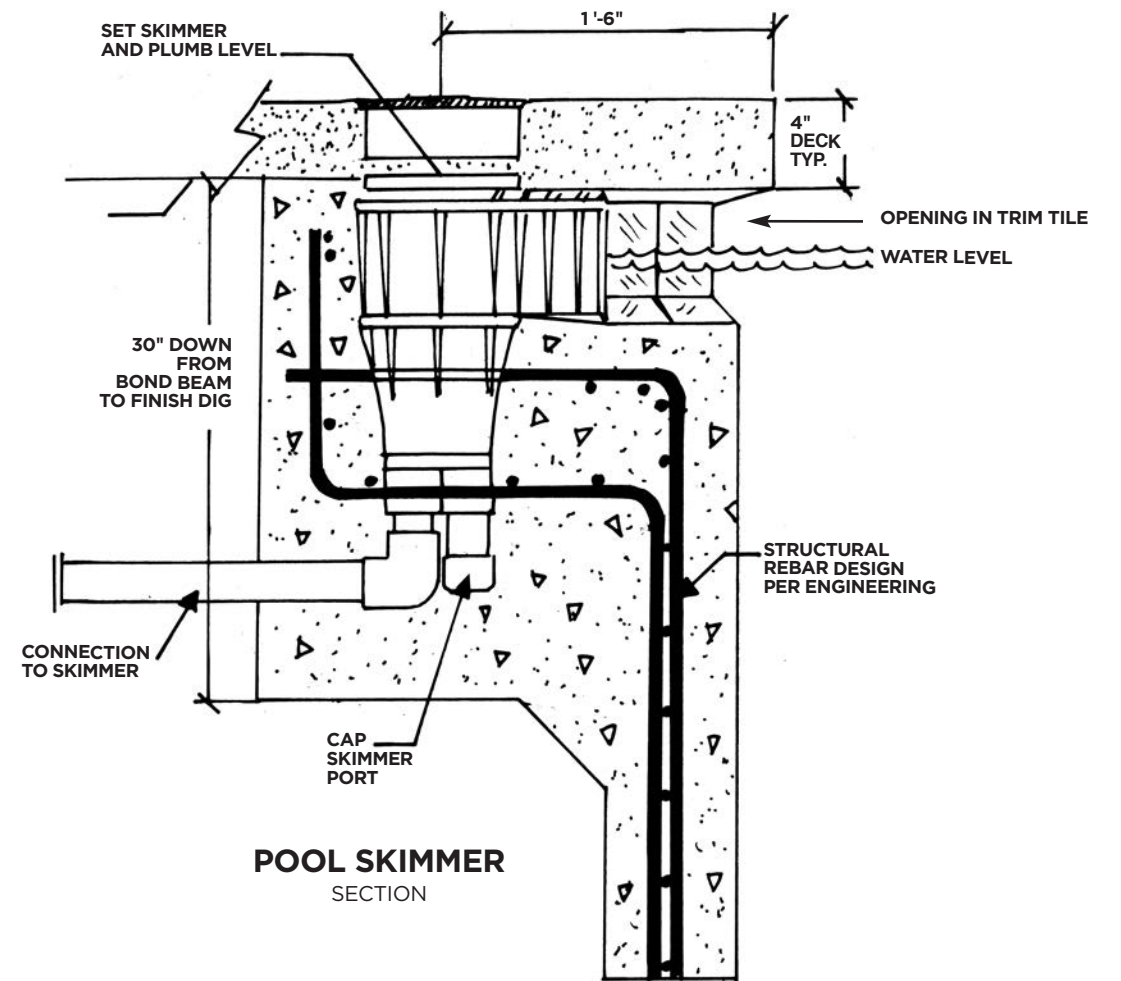
Pool & Pond Construction Details



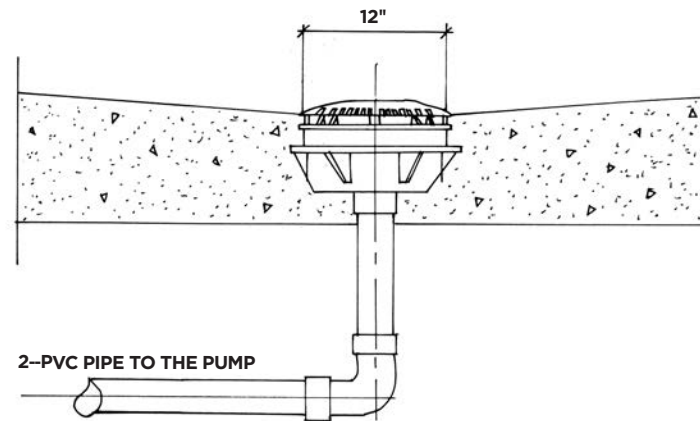
**POOL EDGE**  
AXO - SHOWING BOND BEAM



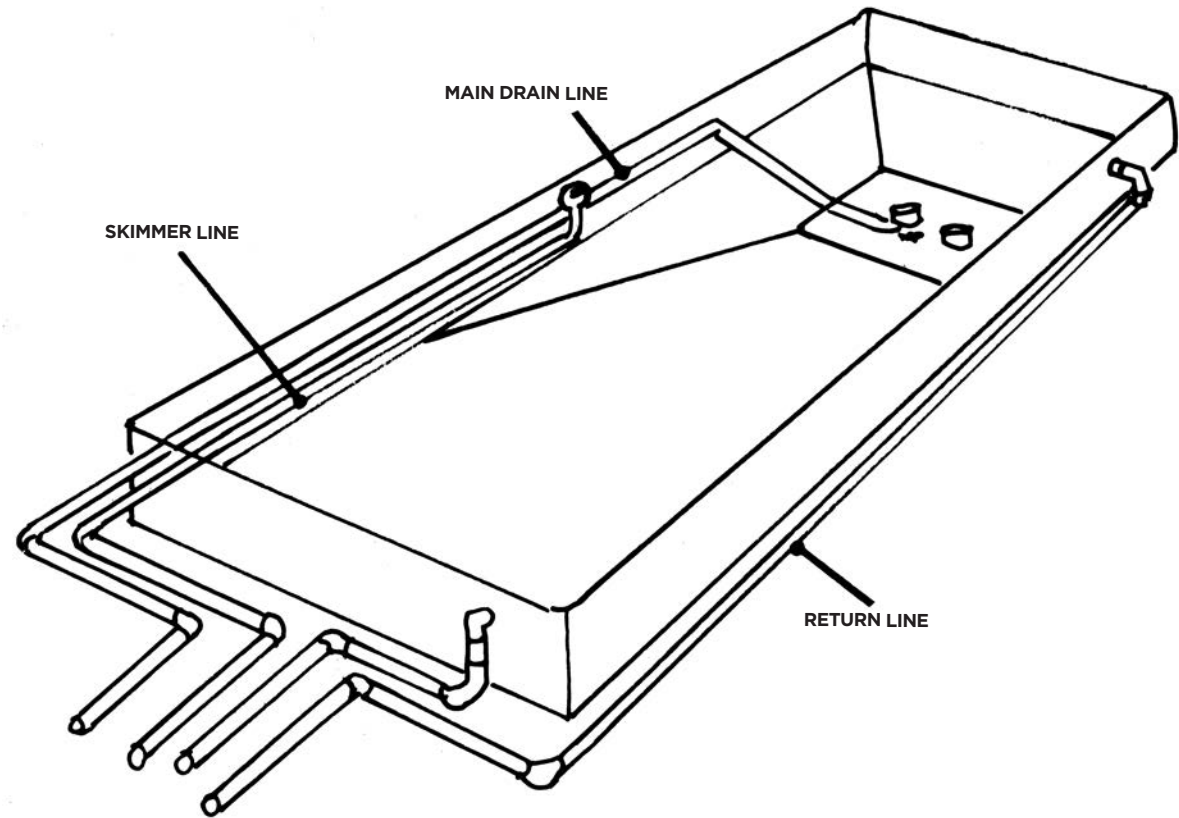
**POOL SKIMMER**  
SHOWING VALVES



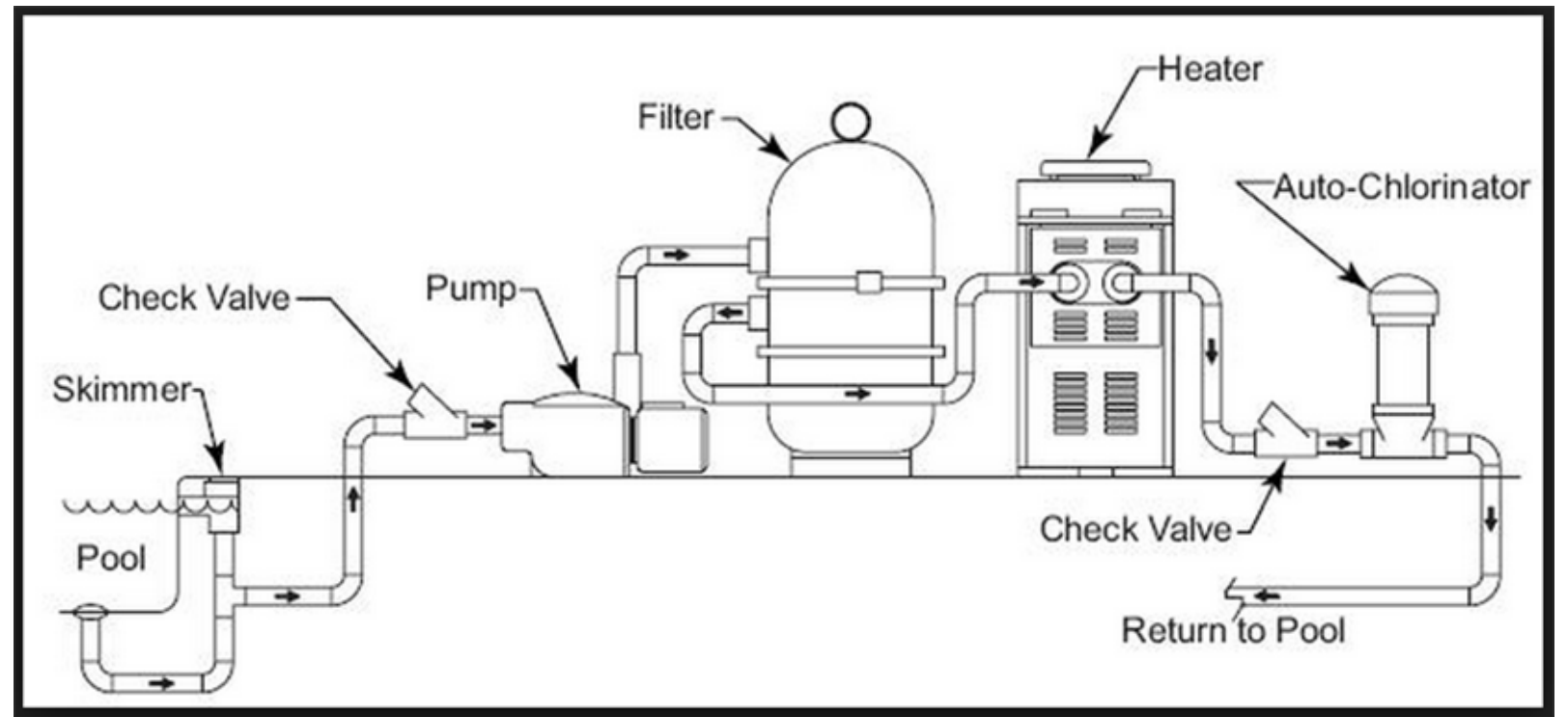
**POOL SKIMMER**  
SECTION



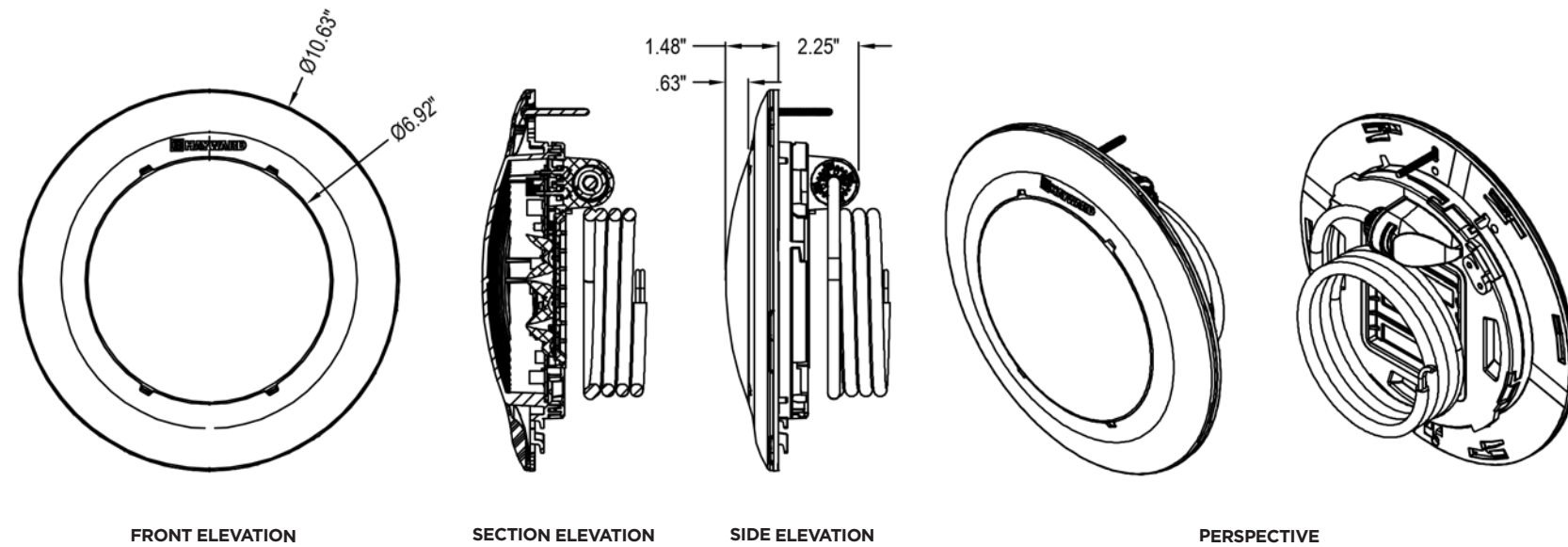
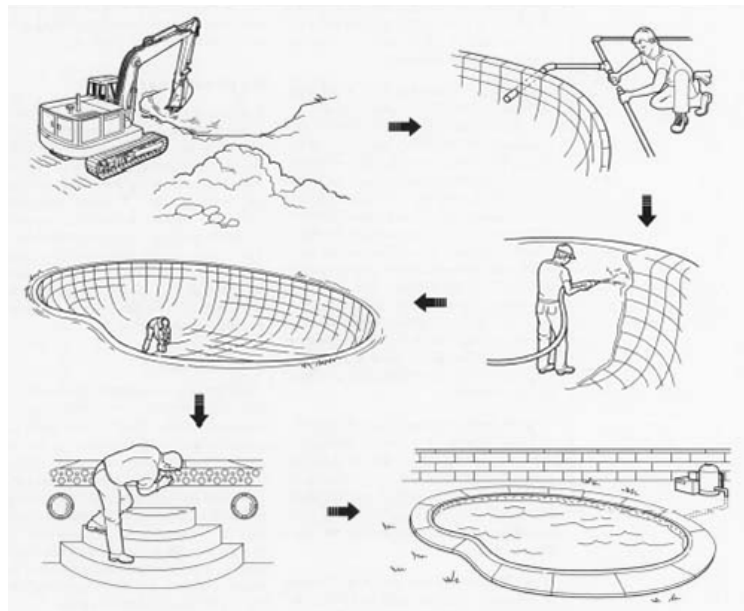
**POOL DRAIN**  
ANTI-VORTEX DRAIN



**POOL LINES**  
SKIMMER, RETURN and MAIN DRAIN



**POOL EQUIPMENT**  
SAMPLE SYSTEM



**LED POOL LIGHTS**  
HAYWARD COMMERCIAL AQUATICS

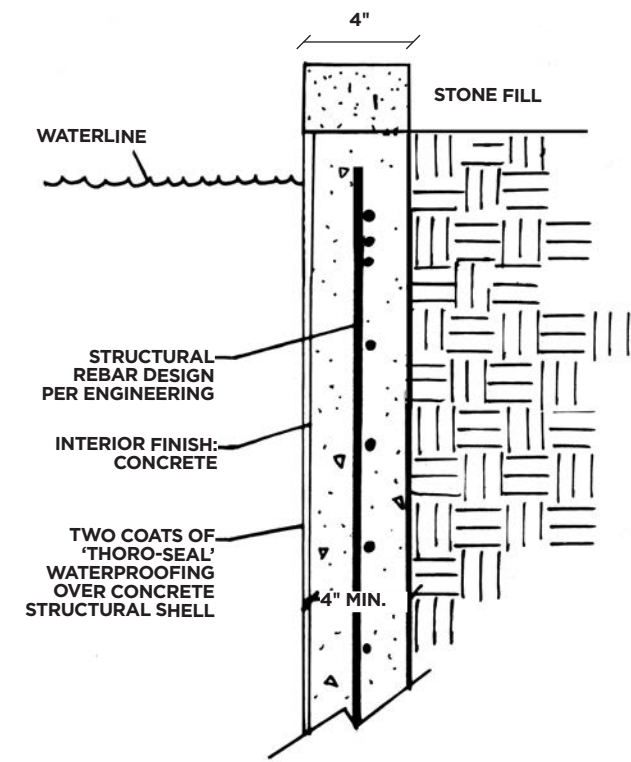
Koi Pond Details



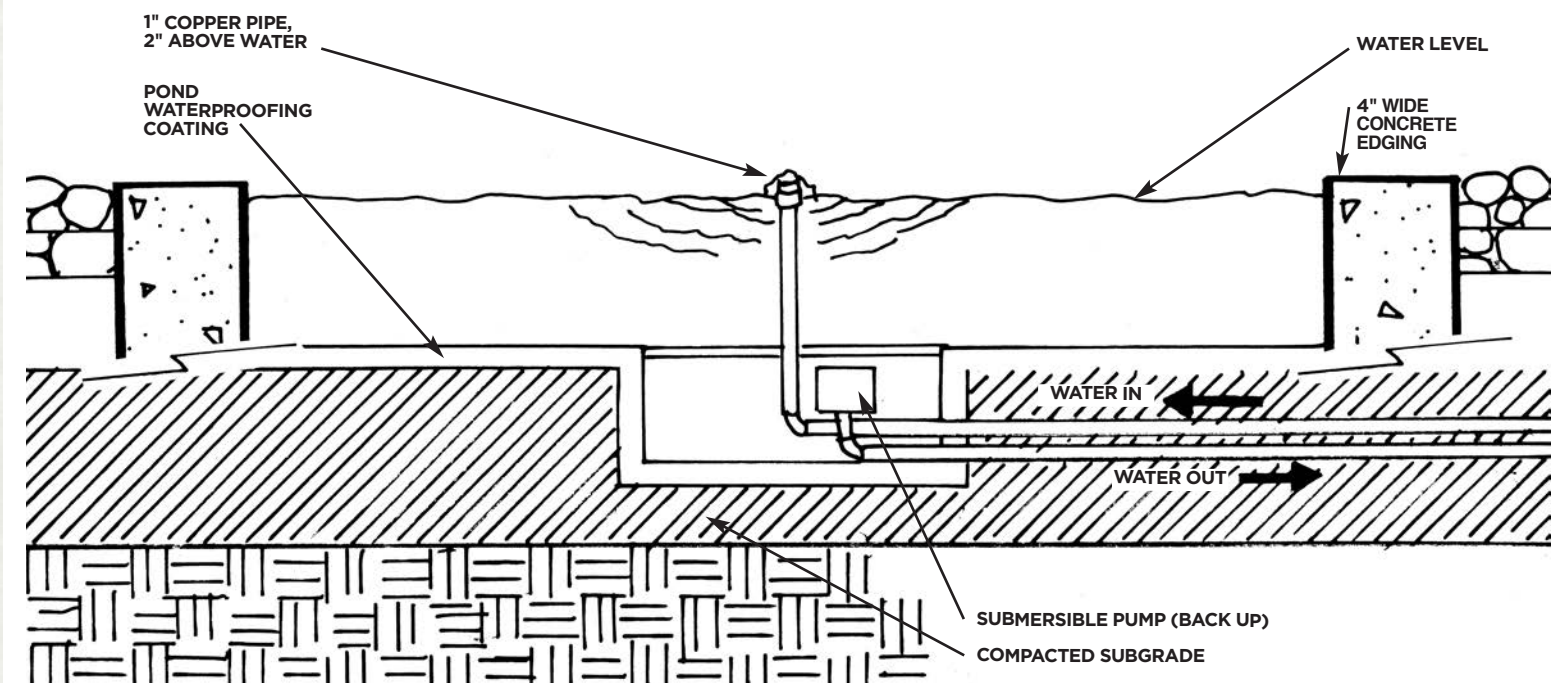
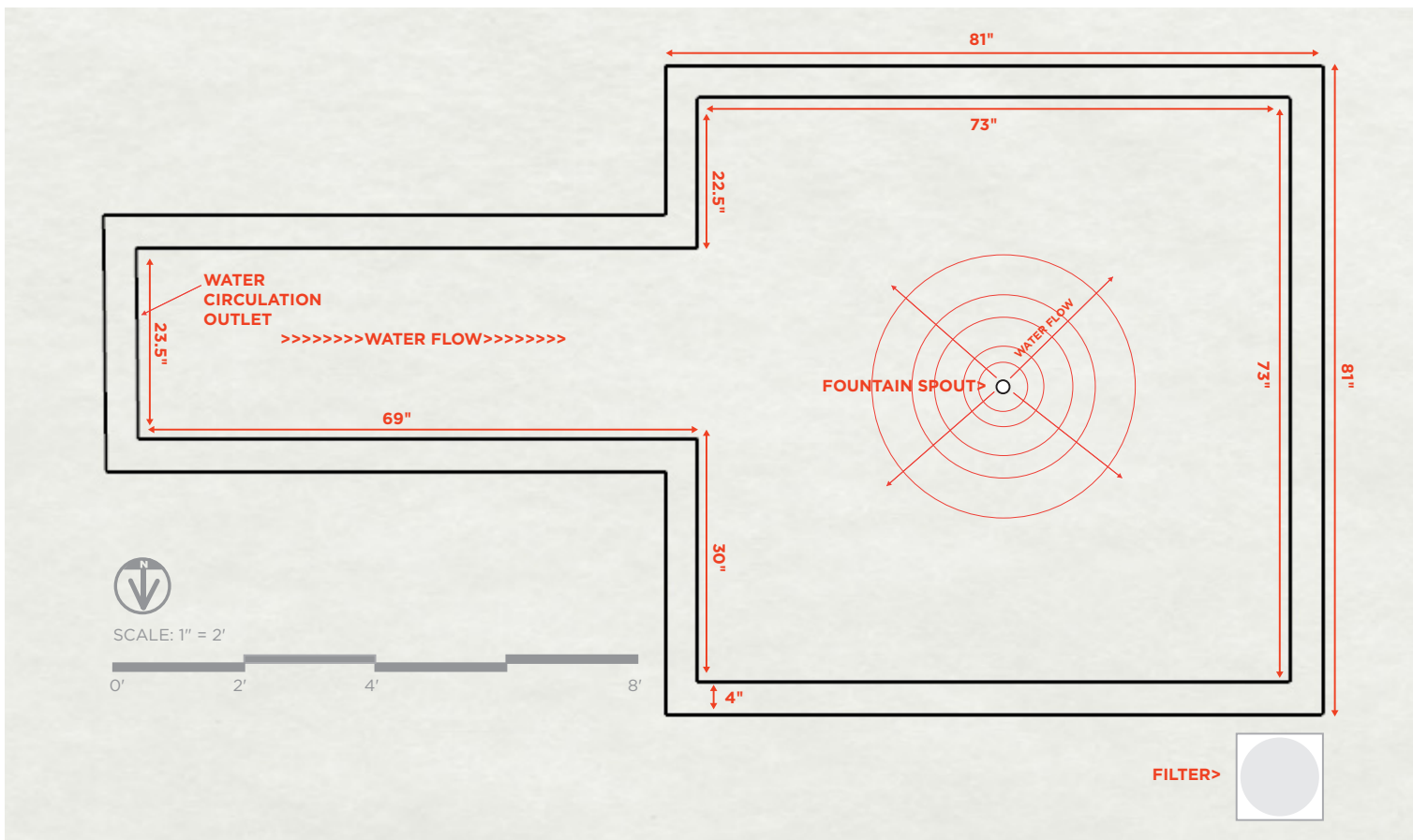
Koi pond tucked into a shaded courtyard



Pond equipment

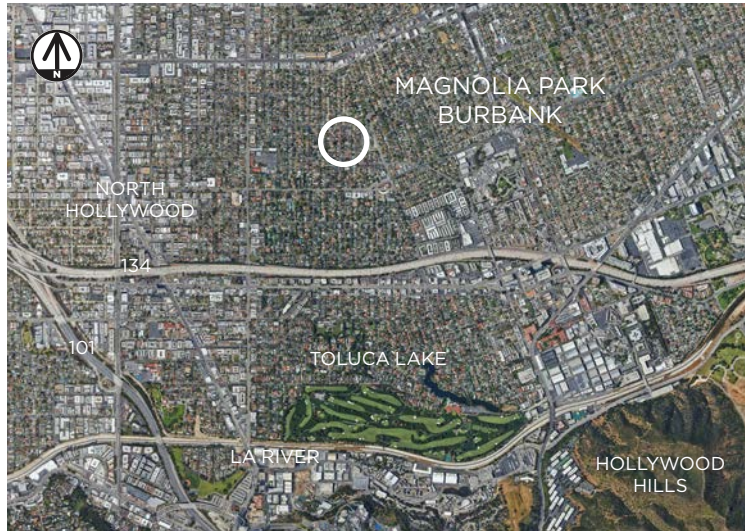


KOI POND EDGE SECTION



FOUNTAIN PLUMBING WITH SUBMERSIBLE PUMP

## Lighting Location and Analysis



The best description for this **1938 Burbank ranch house outdoor lighting system** is hodge-podge.

### The front yard

- Has its own 60W PowerPak transformer. Lighting goes on at dusk and off 6 hours later, per the magic eye, and choosing 6 hours on the timer.
- Wiring on front porch is Series-wired. If one GFI goes out, the other one does too.
- Plugs are shared with house Christmas lights at holiday time, which always causes problems, especially if it rains.
- Porch light and RING security lamp overcompensate on porch. Would be nice to combine somehow.
- Could use dramatic uplighting in large Elm tree.

### The back yard

- Has 2 PowerPak transformers. Same timing as the front.
- Courtyard, off the kitchen, is overlit by (2) 120 flood lights. This is not good mood lighting, too overpowering, but it is functional when full light is needed.
- Side lighting (south side of house — where trash cans are stored) needs better motion lights. Right now when turned on they go on and off, like a prison. They are left off because this is annoying, and the solar motion lights are used instead. Since they are charged in unobstructed bright light all day long, and are motion activated, they usually always work, no matter how late it is. They are functional, but very unattractive.
- The down light in the tree by the back door is very useful, as it is on at dusk, and lights the area when coming in from parking the car in the garage at night.



- 120 hardwired lights on the house, garage and shade structure are adequate.
- Solar path lights are barely successful, as they usually only stay charged until about midnight.
- Downlights at shed walkway and potting table work well. Unfortunately, they are connected via series wiring from the shade structure GFI to the shed. If the GFI at the patio goes out, down goes the shed and the 2 overheads.
- Need better pathway lighting in the backyard, that goes on at dusk, and side and back courtyard lighting for ambiance. Also consolidation of the transformer in the back would be simpler. Putting the transformer in the garage, where there are available unused plugs, would keep it dry and out of harm's way, opening up plug access in the GFIs.
- My redesign is for the backyard only.



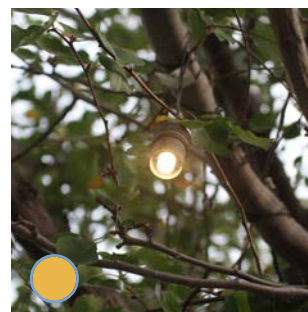
Existing Lighting



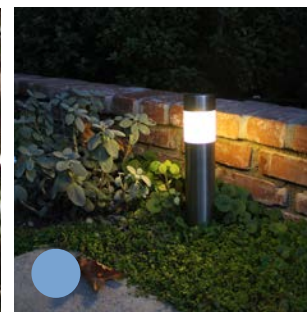
LEGEND

- EXISTING 120 HARDWIRED
- SOLAR LAMPS
- LOW VOLTAGE HALOGEN TREE DOWN LIGHTS
- LOW VOLTAGE LED PATH LIGHTS
- 12 VOLT POWER PACK/TRANSFORMER WITH PHOTO EYE SENSOR
- OUTSIDE 2-PLUG GFIs
- MAIN PANEL and SUB PANEL
- WIRING IS 12 GAUGE

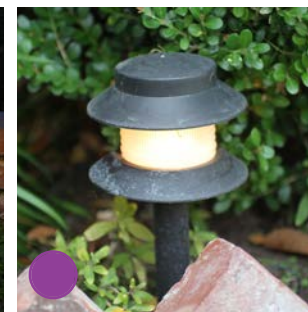
EXISTING FIXTURES



LED Down light



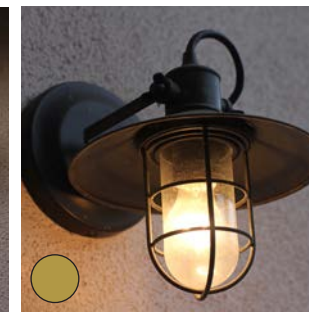
Solar path



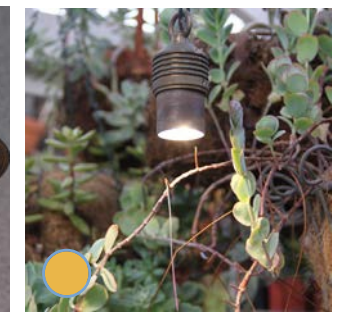
Low Voltage LED



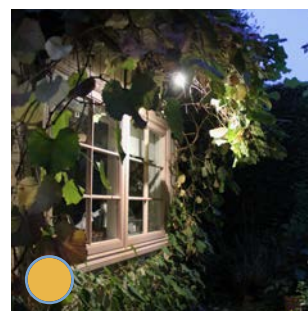
Courtyard Flood



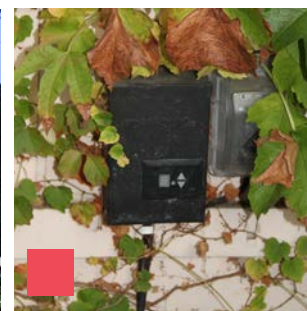
House Hardwired



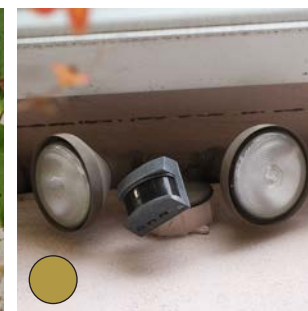
LED Down light



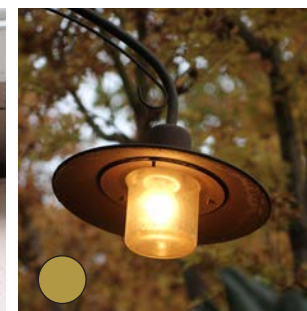
LED Down light



Transformer



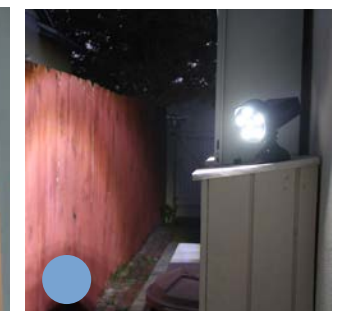
Motion Sensor Light



Garage Light

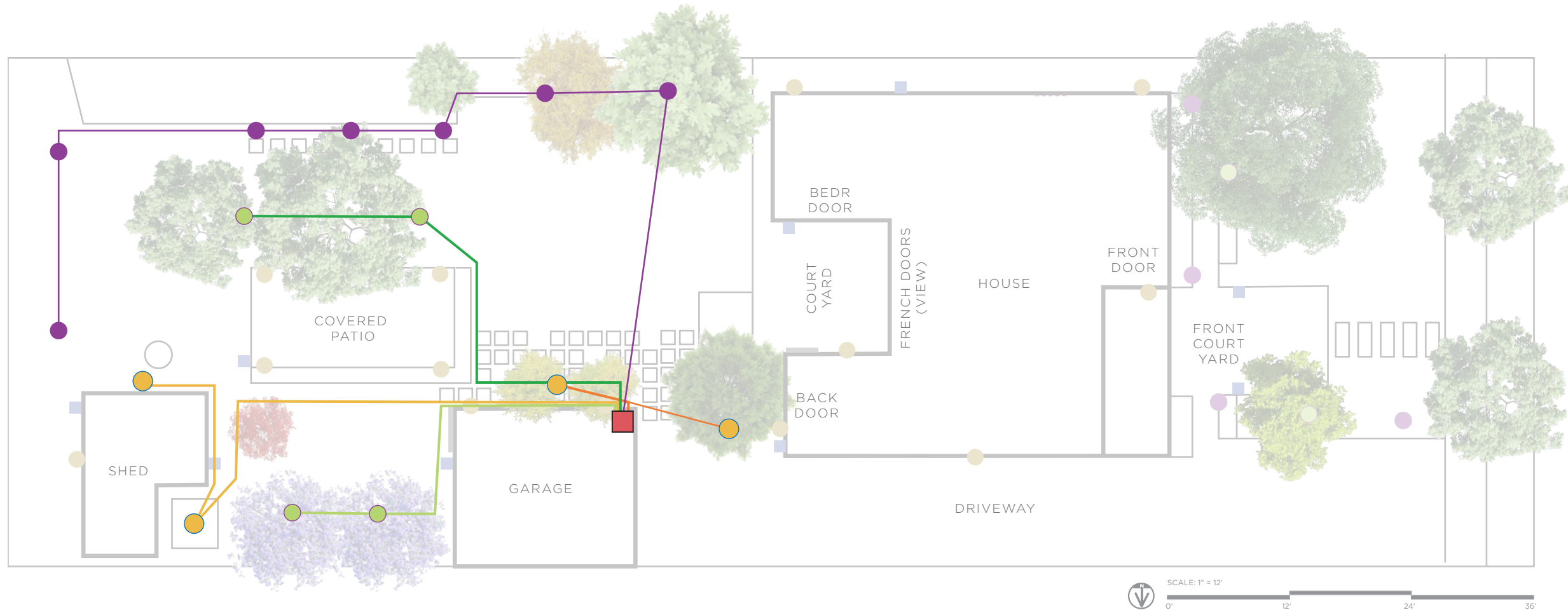


Pergola Hardwired



Solar motion

New Design Lighting: Backyard



LEGEND

- UP LIGHTS FOR TREES
- LOW VOLTAGE LED DOWN LIGHTS
- LOW VOLTAGE LED PATH LIGHTS
- EXISTING 120 HARDWIRED
- FX LUMINAIRE DX 300W STAINLESS STEEL TRANSFORMER

WIRING IS **12 GAUGE**

- CIRCUIT A-1
- CIRCUIT A-2
- CIRCUIT B-1
- CIRCUIT B-2
- CIRCUIT C

BACKYARD CALCULATIONS

**Circuit A-1 FXLuminaire LE LED Down Light: 4 watts**

(2 watts) x (2 fixtures) = 4 watts  
#12 Cable, 7500 constant

$$I = W/V = (4 \text{ watts}) / (20 \text{ volts}) = .2 \text{ amps}$$

$$VD = (4 \text{ watts}) \times (146 \text{ ft}) / 7500 (12 \text{ gauge}) = .077 \text{ voltage drop}$$

**Circuit A-2 FXLuminaire LE LED Down Light: 4 watts**

(2 watts) x (2 fixtures) = 4 watts  
#12 Cable, 7500 constant

$$I = W/V = (4 \text{ watts}) / (20 \text{ volts}) = .2 \text{ amps}$$

$$VD = (4 \text{ watts}) \times (28 \text{ ft}) / 7500 (12 \text{ gauge}) = .014 \text{ voltage drop}$$

**Circuit B-1 FXLuminaire FB LED Up Light: 4.2 watts**

(4.2 watts) x (2 fixtures) = 8.4 watts  
#12 Cable, 7500 constant

$$I = W/V = (8.4 \text{ watts}) / (15 \text{ volts}) = .56 \text{ amps}$$

$$VD = (8.4 \text{ watts}) \times (320 \text{ ft}) / 7500 (12 \text{ gauge}) = .35 \text{ voltage drop}$$

**Circuit B-2 FXLuminaire FB LED Up Light: 4.2 watts**

(4.2 watts) x (2 fixtures) = 8.4 watts  
#12 Cable, 7500 constant

$$I = W/V = (8.4 \text{ watts}) / 15 \text{ volts} = .56 \text{ amps}$$

$$VD = (8.4 \text{ watts}) \times (204 \text{ ft}) / 7500 (10 \text{ gauge}) = .22 \text{ voltage drop}$$

**Circuit C FXLuminaire PM LED Path Light: 11.2 watts**

(11.2 watts) total (up to 9 lights)  
#12 Cable, 7500 constant

$$I = W/V = (11.2 \text{ watts}) / 15 \text{ volts} = .74 \text{ amps}$$

$$VD = (11.2 \text{ watts}) \times (452 \text{ ft}) / 7500 (12 \text{ gauge}) = .67 \text{ voltage drop}$$

### Circuit A-1 and A-2: FXLuminaire LE LED Down Light

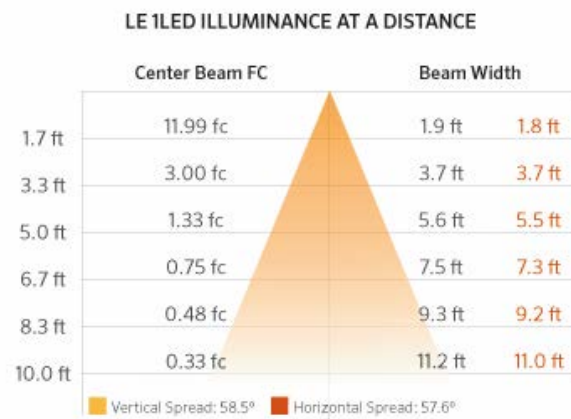


#### Circuit A-1 and Circuit A-2

Choice for these circuits is the LE Down Light from FXLuminaire. There are two lamps on each circuit. The LE is a hanging downlight designed for overhead illumination with (1) LED. It is available in brass/copper construction.

It is hung between 7 and 9 feet high to create the proper lighting effect and have clearance from ladders. There are cables attached and the 10 gauge wire should be attached (small nails or staples) in various increments down the tree trunks for tree downlighting. There is plenty of wire included on the light for beam and other installations. There is also an optional cable lock available.

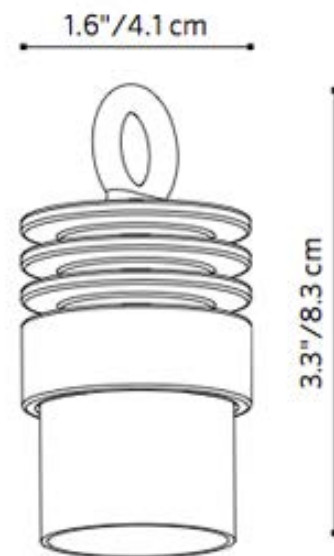
#### LE Photometrics



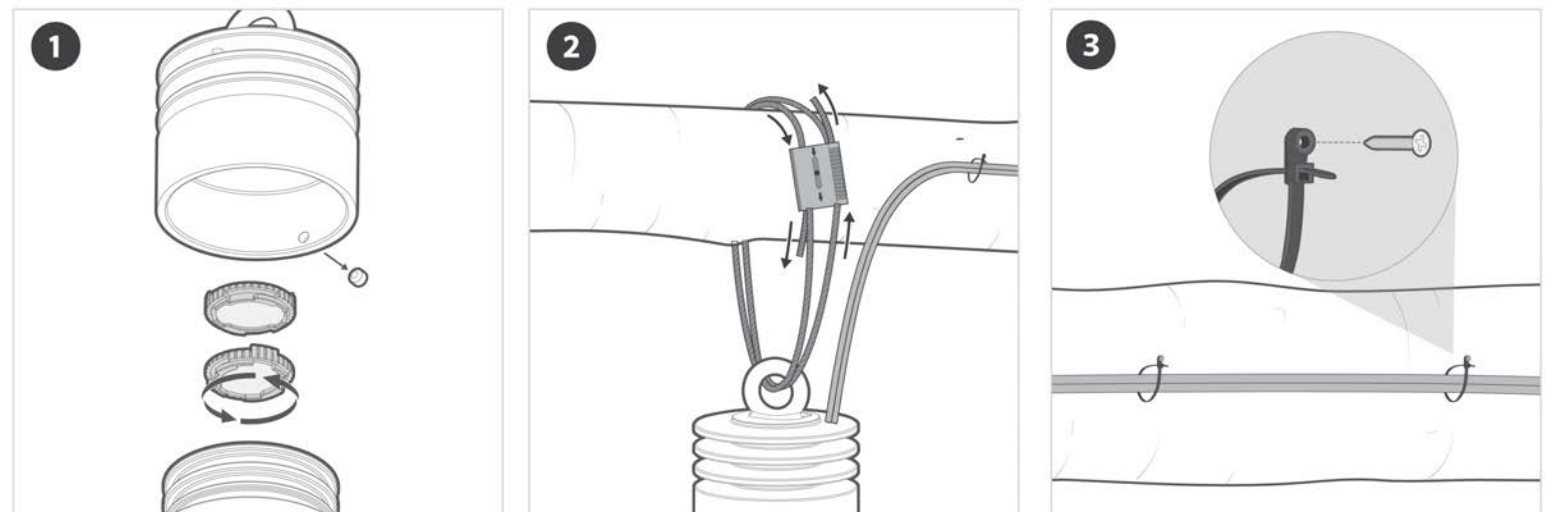
#### LE Spec Chart

Number of LEDs	1
Halogen Lumen Output Equivalent	10 Watt
Useful LED Life (L70)	50,000 hrs avg
Input Voltage	10 to 15V
VA Total (Use this number to size the transformer)	2.4
Watts Used	2.0
Lumens per Watt (Efficacy)	22.6
Max Lumens	55
CRI (Ra)	80.8

#### LE Dimensions



#### LE Installation Instructions



### Circuit B-1 and B-2: FXLuminaire FB LED Up Light



#### Circuit B-1 and Circuit B-2

The choice for these circuits is the FB Up Light from FXLuminaire. There are two lamps on each circuit.

The FB fits nicely into smaller landscapes and tight spaces. Includes fixture, specified LED board (1), 10' (3 m) lead wire\*, lock ring (1), spike (1), and color filters. The finish is a two-layer protection of sulfuric acid anodization and polyester TGIC powder coat, providing superior outdoor weathering in all conditions.

#### FB Photometrics

*FB 1LED Illuminance at a Distance*

Feet (Meters)	Center Beam	Beam Width	
	Foot-Candle (Lux)	Vertical 19.3°	Horizontal 19.9°
4' (1.2 m)	19.3 fc (208 lx)	1.4' (0.4 m)	1.4' (0.4 m)
8' (2.4 m)	4.8 fc (52 lx)	2.7' (0.8 m)	2.8' (0.9 m)
12' (3.7 m)	2.1 fc (23 lx)	4.1' (1.3 m)	4.2' (1.3 m)
16' (4.9 m)	1.2 fc (13 lx)	5.4' (1.7 m)	5.6' (1.7 m)
20' (6.1 m)	0.8 fc (9 lx)	6.8' (2.1 m)	7.0' (2.1 m)
24' (7.3 m)	0.5 fc (5 lx)	8.1' (2.5 m)	8.4' (2.6 m)

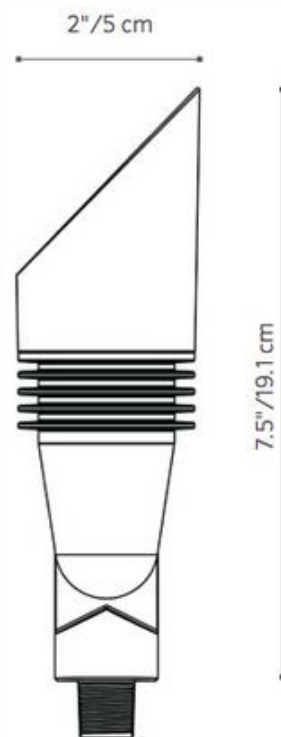
*FB 3LED Illuminance at a Distance*

Feet (Meters)	Center Beam	Beam Width	
	Foot-Candle (Lux)	Vertical 17.3°	Horizontal 17.2°
4' (1.2 m)	69.2 fc (745 lx)	1.2' (0.4 m)	1.2' (0.4 m)
8' (2.4 m)	17.3 fc (186 lx)	2.4' (0.7 m)	2.4' (0.7 m)
12' (3.7 m)	7.7 fc (83 lx)	3.6' (1.1 m)	3.6' (1.1 m)
16' (4.9 m)	4.3 fc (46 lx)	4.9' (1.5 m)	4.9' (1.5 m)
20' (6.1 m)	2.8 fc (30 lx)	6.1' (1.9 m)	6.1' (1.9 m)
24' (7.3 m)	1.9 fc (21 lx)	7.3' (2.2 m)	7.3' (2.2 m)

#### FB Spec Chart

	1 LED	3 LED
Output		
Total Lumenst	60	165
Input Voltage	10 to 15V	10 to 15V
Input Power	2.0 W	4.2 W
Power Consumption (VA)	2.4 W	4.5 W
Efficacy (lm/W)	31	40
Color Rendering Index (CRI)	79	79
Center Beam Candle Power (CBCP)*	309	1,107
<b>Dimming</b>		
Primary Dimming (Transformer level)	Consult transformer specifications	
Secondary Dimming (Fixture level)	Phase-cut**, Luxor	
RGBW Available	No	No
<b>Luxor Compatibility</b>		
Default	Zoning	Zoning
ZD Option	--	Zoning/Dimming
ZDC Option	--	--
Minimum Rated Life - L90 B10 (hrs)	55,000	55,000

#### FB Dimensions



#### FB Installation

SEE PLAN LEGEND FOR WATTAGE, BEAM SPREAD AND ACCESSORIES

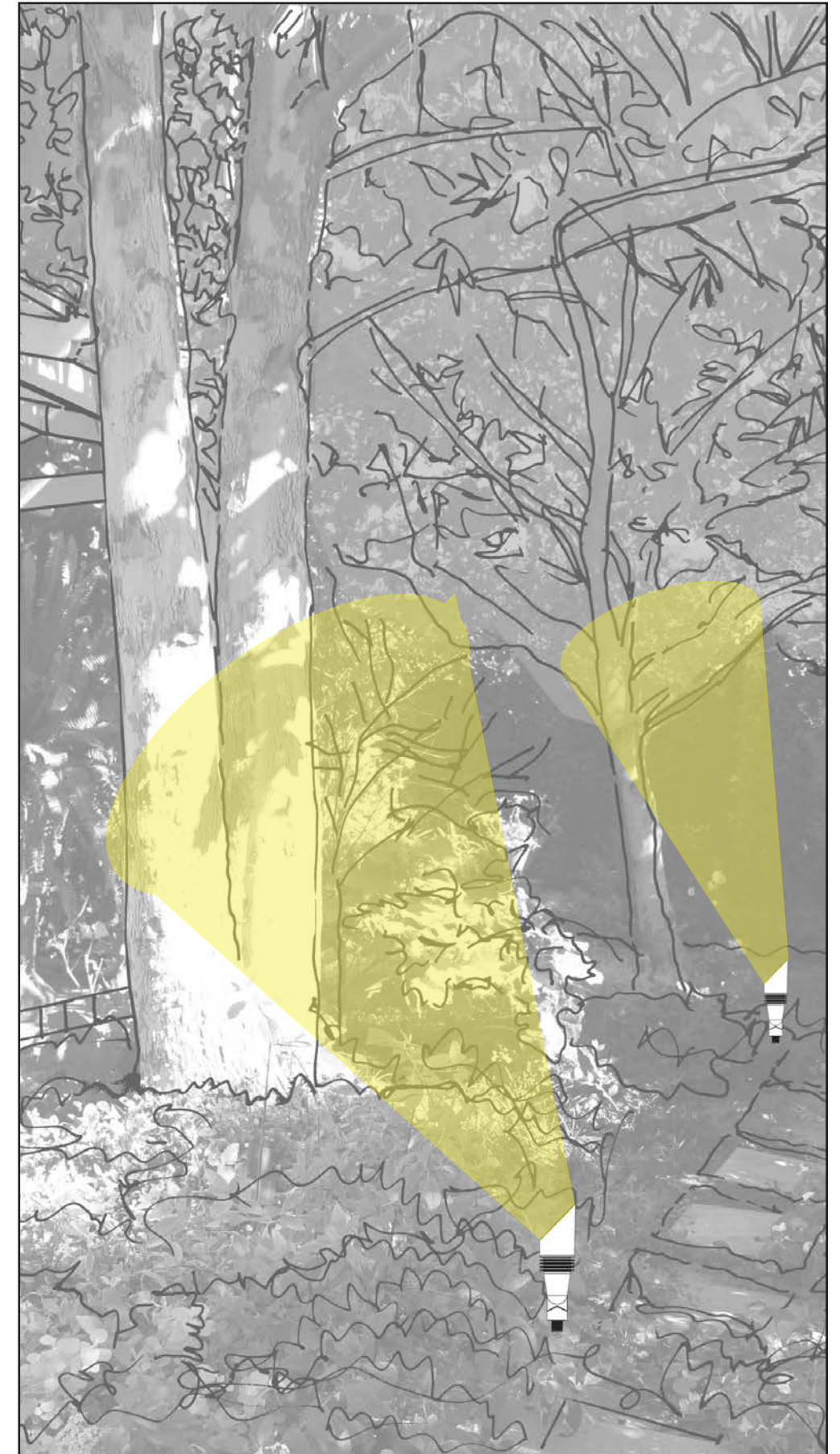
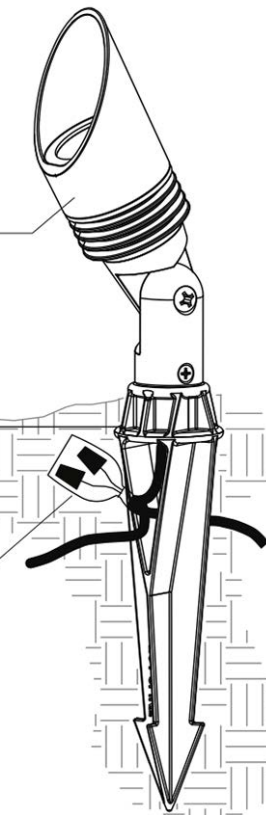
AIM FIXTURE A MINIMUM OF 10° OFF VERTICAL TO ALLOW WATER AND DIRT TO DRAIN OFF LENS CAP

FX SUPERSPIKE MOUNT

FINISHED GRADE

UL APPROVED LOW-VOLTAGE WIRE SPLICE

LEAVE 18" MIN. LOOP COILED BELOW FIXTURE FOR SERVICE



†Measured using 3,900 CCT. Multipliers for other CCTs include 0.80 (2,700K), 0.65 (4,500K), and 0.65 (5,200K).

\*Information not available for Flood or Wide Flood.

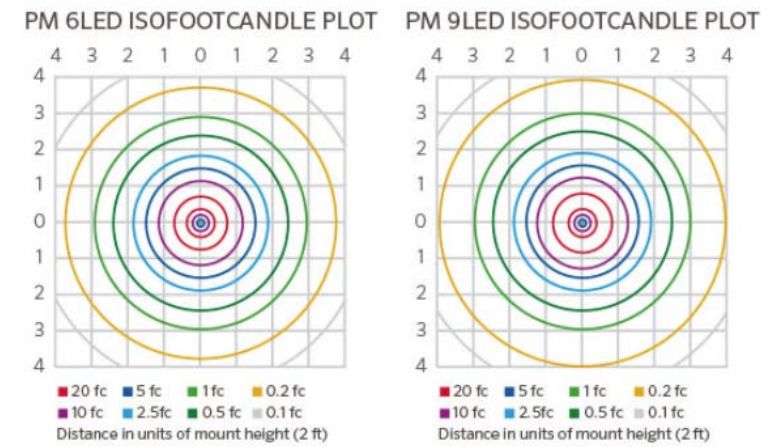
### Circuit C: FXLuminaire PM LED Path Light



#### Circuit C

Choice for this circuit is the PM Path Light from FXLuminaire. There are 7 lamps on this circuit. Designed for mid-sized landscapes, the PM is engineered in the spirit of a large contemporary commercial bollard. Precisely milled from 6061 T-6 alloy, this model looks very contemporary and the light is very subtle. Computer designed parabolic reflector, diffuser cone and optics work together to produce long projection beam spread with no glare.

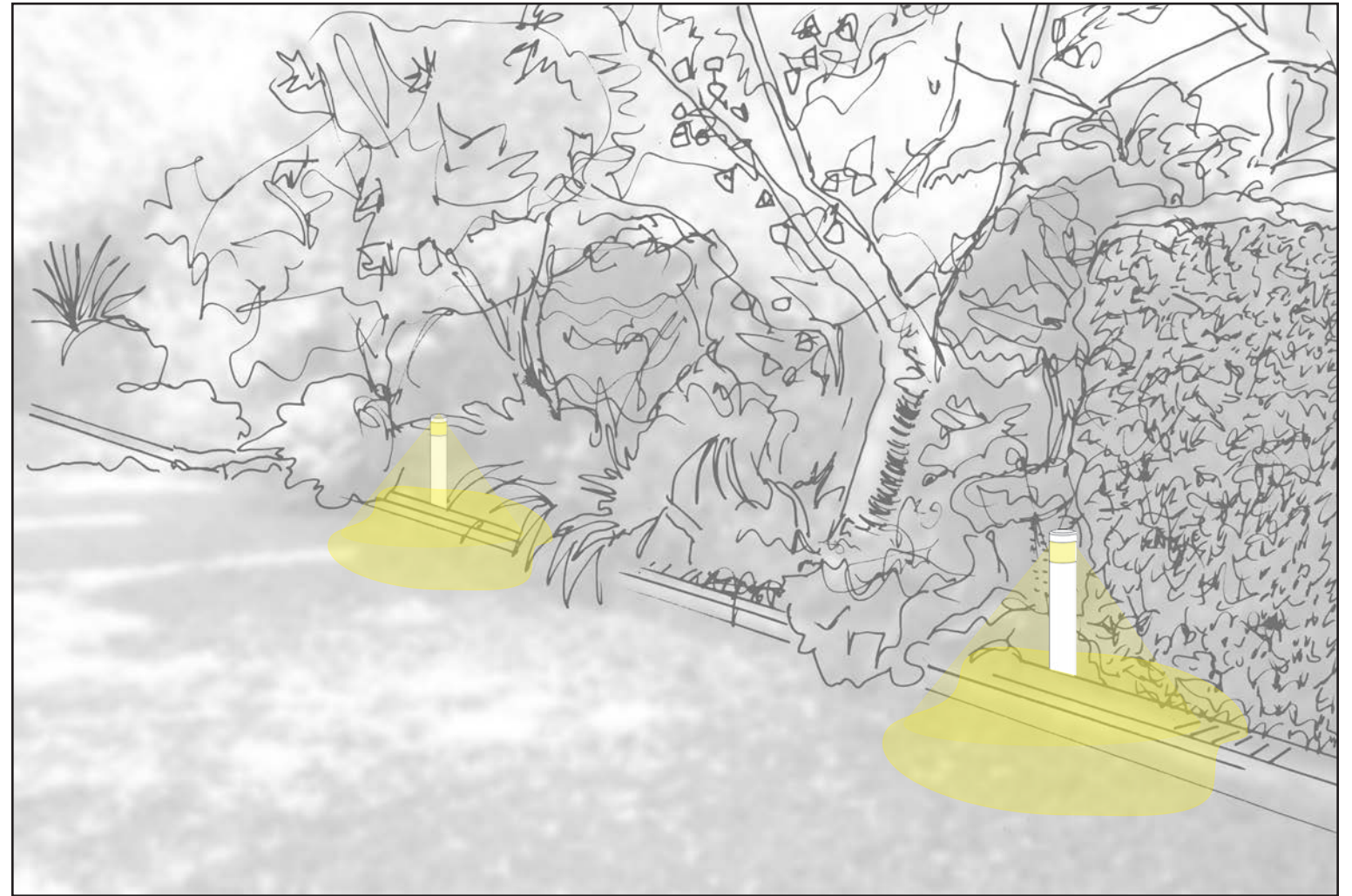
#### PM ISO Foot Candle Plot



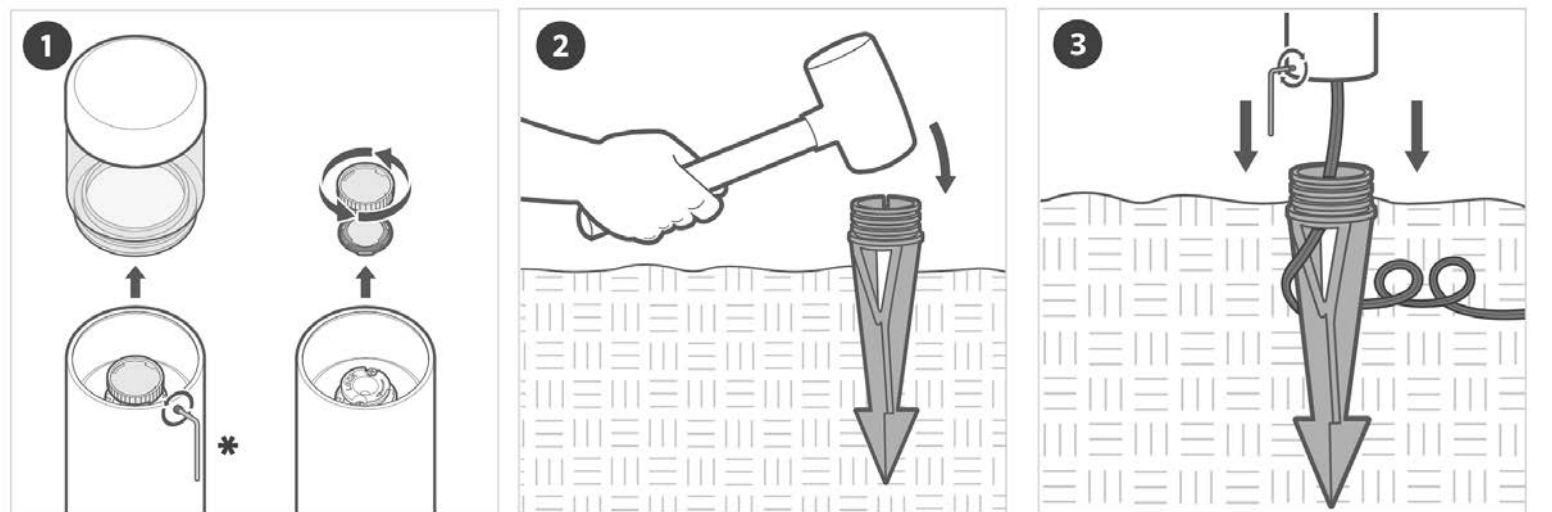
#### PM Spec Chart

Output	6LED	9LED
Total Lumens† (Delivered)	186	219
Input Voltage (V)	10 to 15V	10 to 15V
Input Power (W)	10.1	11.2
VA	13.5	13.5
Efficacy (Delivered)	23	22
Efficacy (Source)	114	114
Color Rendering Index (CRI)	80+	80+
Maximum Candela	39	43
Dimming	PWM, Phase**	PWM, Phase**
RGBW Available	No	No
Luxor Compatibility		
Default	Zoning	Zoning
ZD Option	Zoning/Dimming	Zoning/Dimming
ZDC Option	--	--
Minimum Rated Life (L70)	55,000 Hrs	55,000 Hrs
BUG Rating	B0-U2-G0	B0-U3-G0

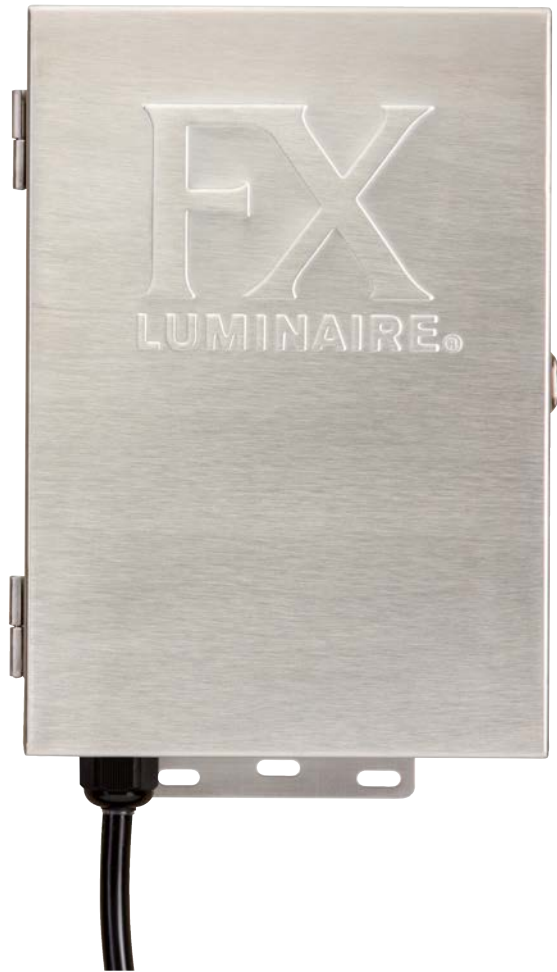
#### PM Dimensions



#### PM Installation Instructions



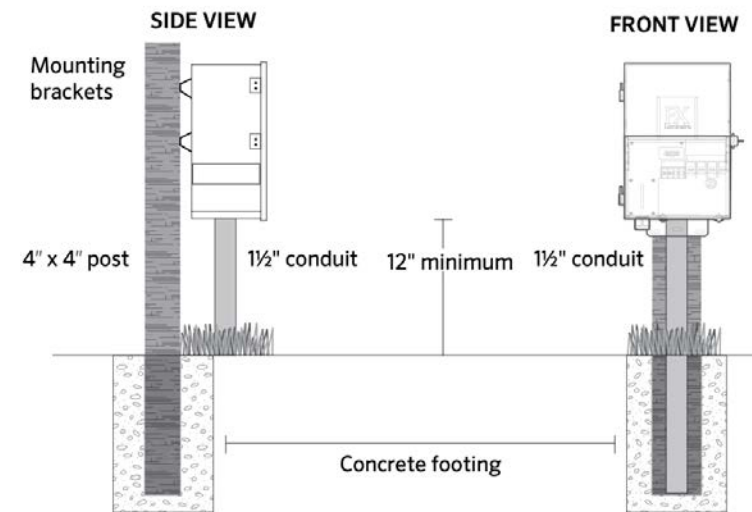
### Transformer: FXLuminaire DX Lighting Controller



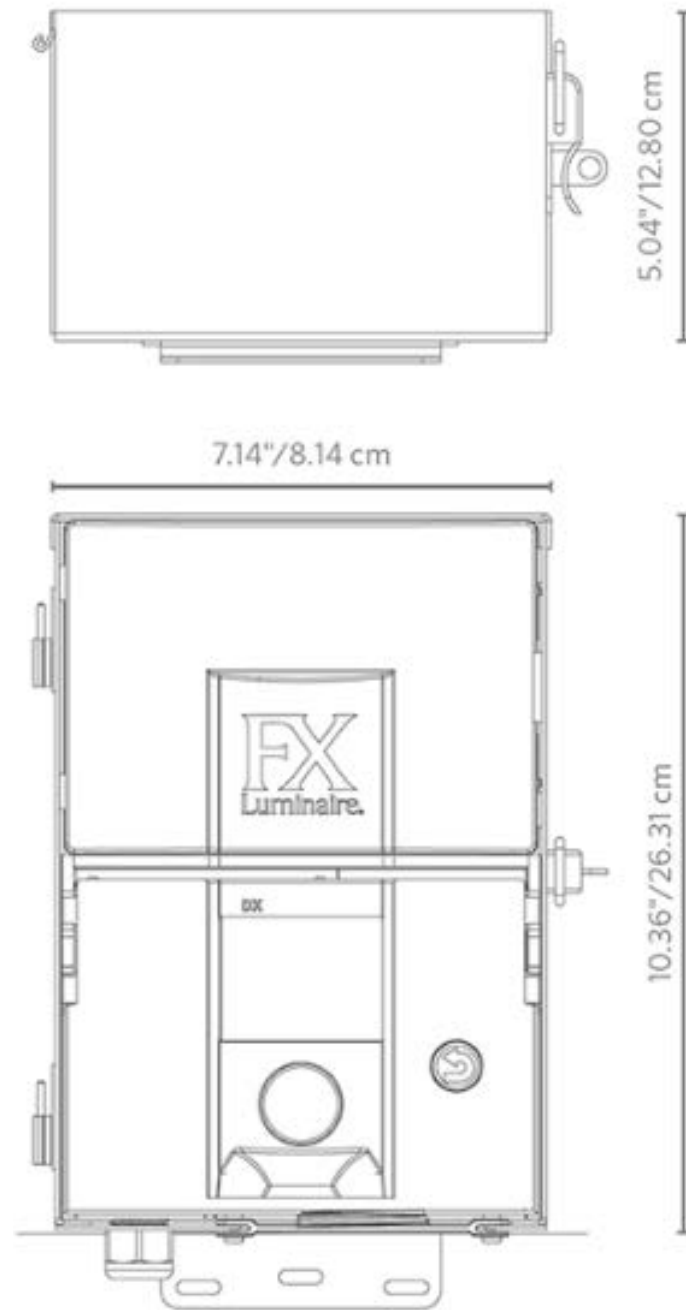
The DX controller is an easy-to-program, low-voltage lighting transformer with intermediate on/off lighting control needs. It's the only digital facepack-controlled transformer with astronomical timing and event-based programming capabilities pre-installed, so there is no need for plug-in accessories such as timers and photocells.

- Digital facepack control with built-in astronomical timing
- External input option
- Event-based programming with timed offsets
- 150- and 300-watt models
- Multi-tap output (12V, 13V, 14V)
- Powder-coated galvanized steel and stainless steel options
- UL-1838, UL-379 compliant

#### DX Installation



#### DX Dimensions



#### DX Spec Chart

<b>Power</b>	150 watts	300 watts
<b>Input Primary</b>	120 volts, 60 Hz	120 volts, 60 Hz
<b>Input Amperage Primary</b>	1.48A	2.68A
<b>Output Voltage Secondary</b>	12 VAC, 13 VAC, 14 VAC	12 VAC, 13 VAC, 14 VAC
<b>Maximum Open Circuit Volts</b>	15 VAC	15 VAC
<b>Class</b>	2	2

Planting Location and Analysis



Large box planters atop the parking garage

Located in Universal City, the entrance to this **Hilton Hotel** is a long driveway **atop the parking garage** for the hotel. Bordering the drive is a series of planters at the edge of the driveway separating the roadway from the building drop off. Large “boxes” with grey painted stucco surfacing are interspersed with lower tiered planters. The large boxes are planted with newly trimmed *Washingtonia robusta* palms, which have various plants at their base. The lower tiers are planted with *Schinus molle* trees at the top tier, and *Buxus microphylla*, *Verbena canadensis*, *Zauschneria californica*, *Rosa spp.* ‘Iceberg’ and *Sedum nussbaumerianum*.

The planters are well irrigated, and each section has up-lighting making for a grand entrance at night. There are weep holes at the curb and a mix of bubblers and spray sprinkler heads.

The large planter box is 7' high, 9' wide and 12.5' deep with a 8" wall thickness. They are concrete with a stucco finish.



Entrance, left to parking garage below, straight to valet.

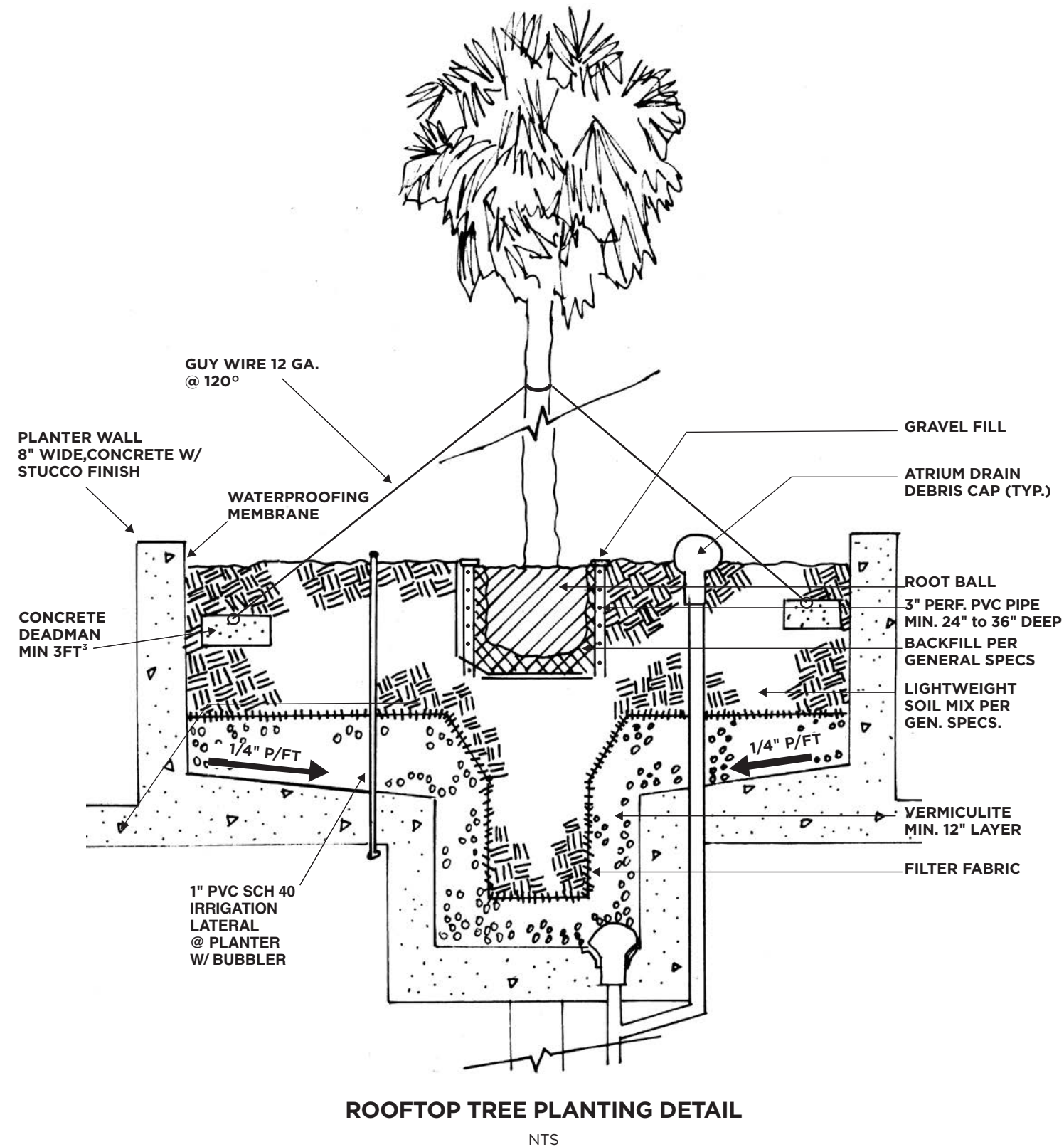


Driveway curve with alternating tree planters, showing lighting and sprinklers.



Lower tiered planter showing irrigation piping and weep holes for drainage.

On Structure Planting Detail



Since it was an easily accessible parking garage, I was able to go underneath the planter to the level underneath. In the stairwells I could see the bottom of a few planters, but once on the parking level I could see the infrastructure for the drains and pipes. The pipes were rusty iron with pipe clamps and beam attachments. There was a leak onto the third floor and they had rigged a system that took the water from the leak over to the edge of the wall and let it flow down to the slope planting below.



Depth of planter, approx. 2' below street level



Overflow indicator?



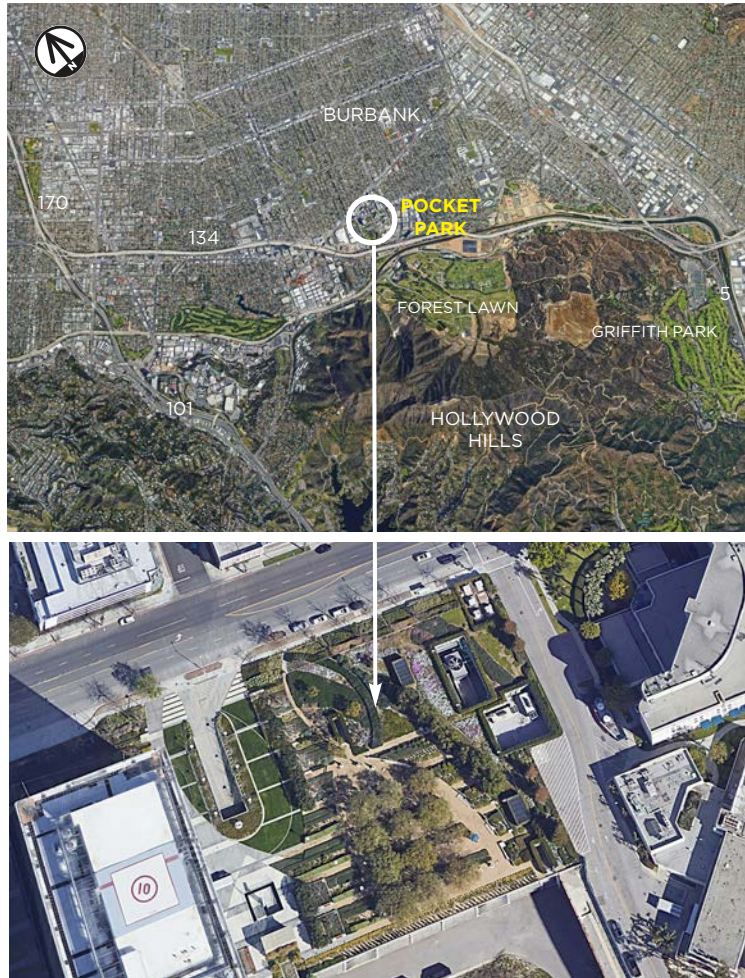
Drainage pipes under the planter boxes from level below in the parking garage



Drainage pipe system under the planter boxes, showing leaking pipes, capture system and drain through weep hole to the slope below.



Planting Location and Analysis



My favorite **pocket park** in Burbank is full of surprises. It's next to a skyscraper where the last thing you would expect is this lovely, organized, stylish and serene landscape. The plantings are very drought tolerant, with natives and Mediterraneans. There is sophisticated seating areas where office workers take lunch breaks or hold meetings in the shaded groves. Near Providence St. Joseph's Hospital, it is a restful, healing garden.

The style is geometric, but not cold or hard edged. Organic mow strips break up the lush lawn. The building blocks the harsh southwest sun, so the grounds stay relatively shaded year round. Seating is incorporated with Kayu Batu or IPE wood in a mid-century modern slated-style. Some benches are broken up with stainless steel oval bowls that hold various Sedums. The view from the offices above commands interest because of the geometric break-up of textures and surfaces below. Down to the street level is just an added bonus of the organic and gorgeous landscape design.



*Arbutus 'marina' in a row separated by geometric seating blocks. The lawn is broken up with curvilinear low strips.*



*Formal and informal seating areas.*

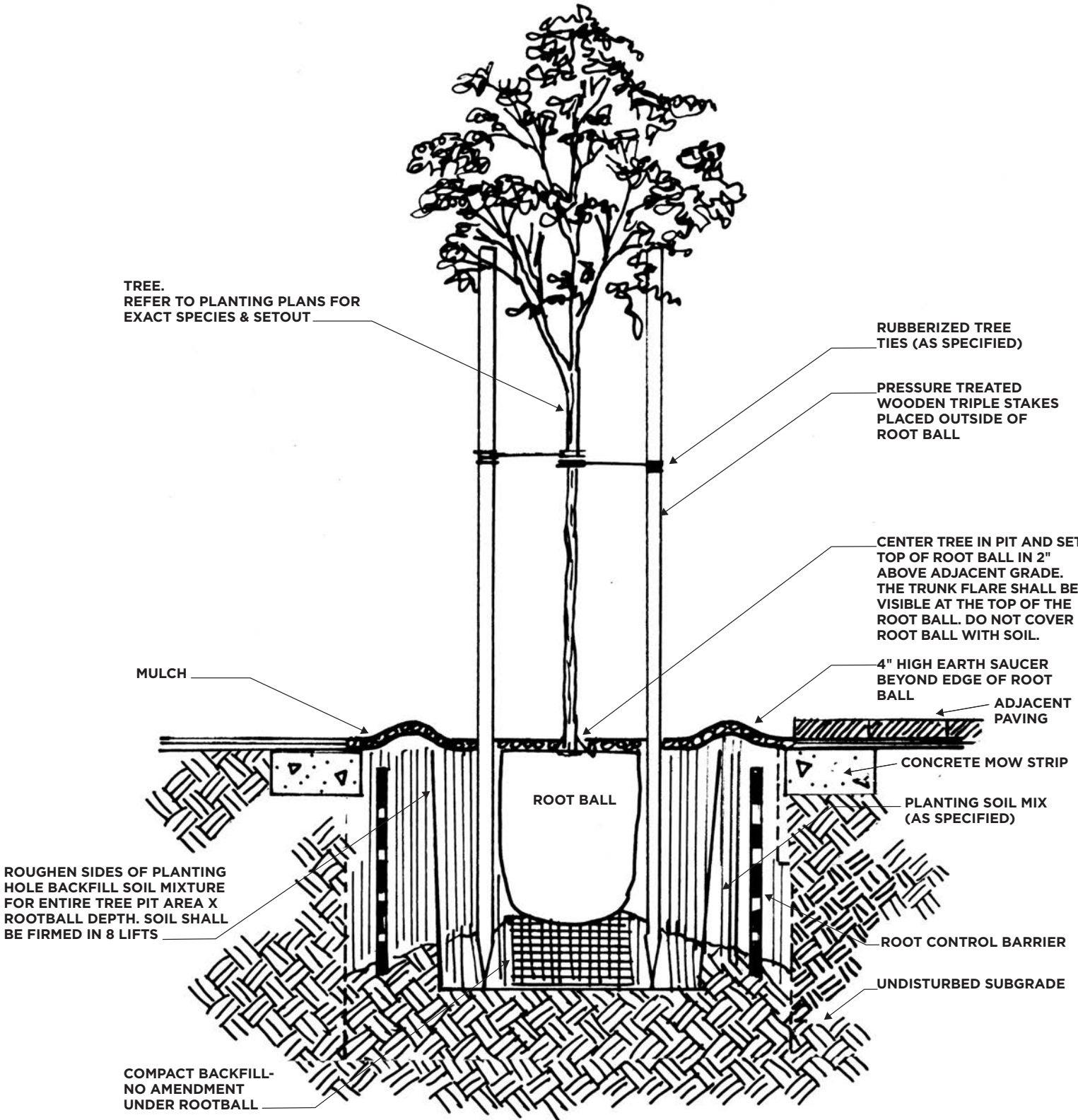


*Planter that incorporates IPE wood and bowls of succulents.*

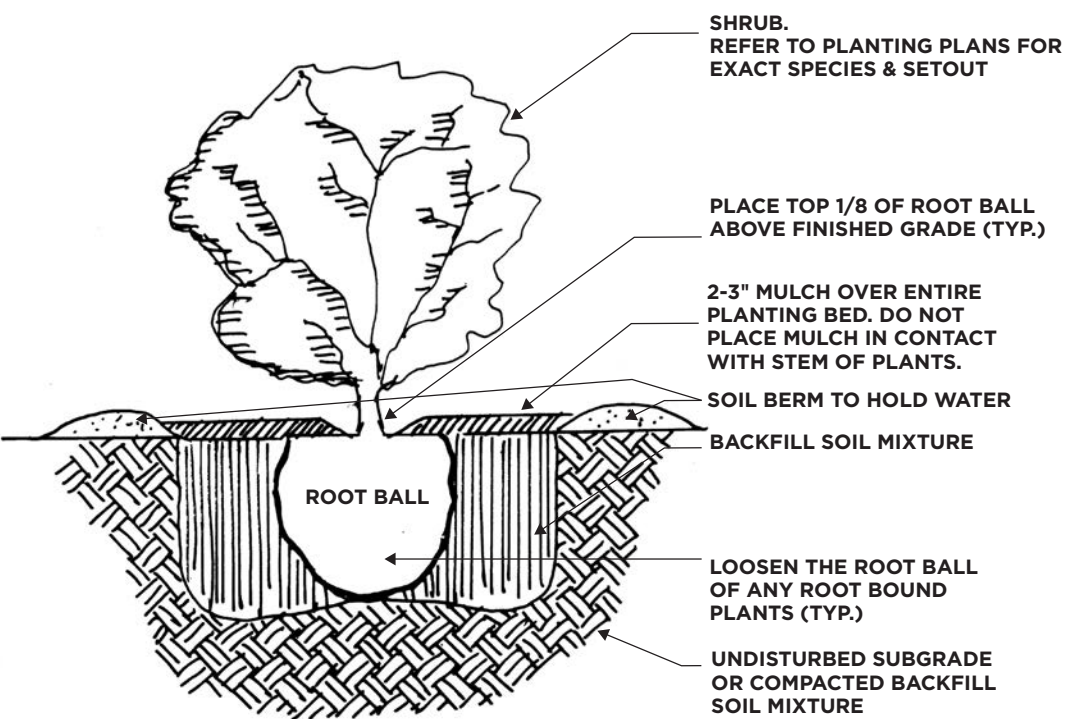


*Plantings set in geometric beds on the parking lot walkway.*

Planting Area Detail



**TREE PLANTING DETAIL**  
FOR OPEN AREAS/NEAR MOW STRIP/NTS



**PERENNIAL PLANTING DETAIL**  
TRIANGULAR SPACING/NTS

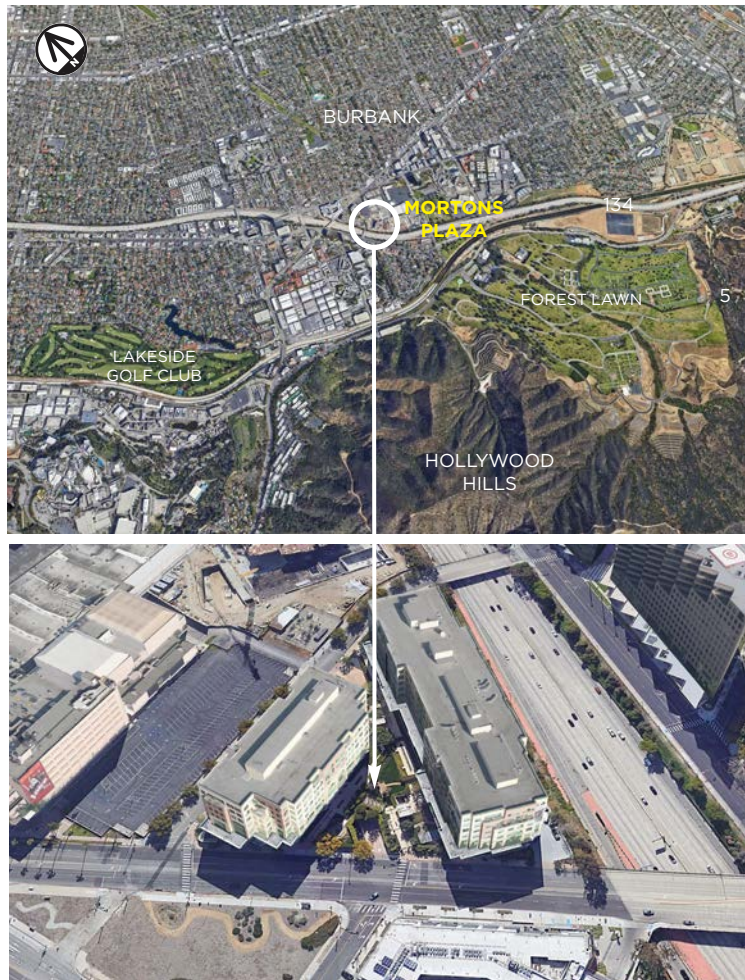


*Westringia fruticosa* shrubs



Exit path lined by various perennials.

Planter Location and Analysis



*Planter walls are also benches under the stone columned walkway pergola*

In a recently developed area of Burbank, there is a beautiful office building near the 134 Freeway that is occupied by many media companies and the high-end restaurant Arnie Morton's. It was meant to attract the studio clientele that would think nothing of going to Beverly Hills for lunch, because they said, at the time, there were no decent restaurants in the area. Everything about this courtyard is high end. There is a sculpture garden, lovely sitting areas. The materials are well appointed and the gardens well maintained.

The noise from the freeway is bad, but the atmosphere in this garden could distract and be a decent place to meet or eat lunch from Whole Foods across the street.

What is most attractive is that the planters are almost all dual-purpose. They aren't just walls. Most incorporate benches and have beautiful capped mini-columns that add to the richness of the site. They are thick (17") and sturdy and give a feeling of permanence to what could be just another boring office park.



*Wide walled planter near steps*



*Planter wall with benches*

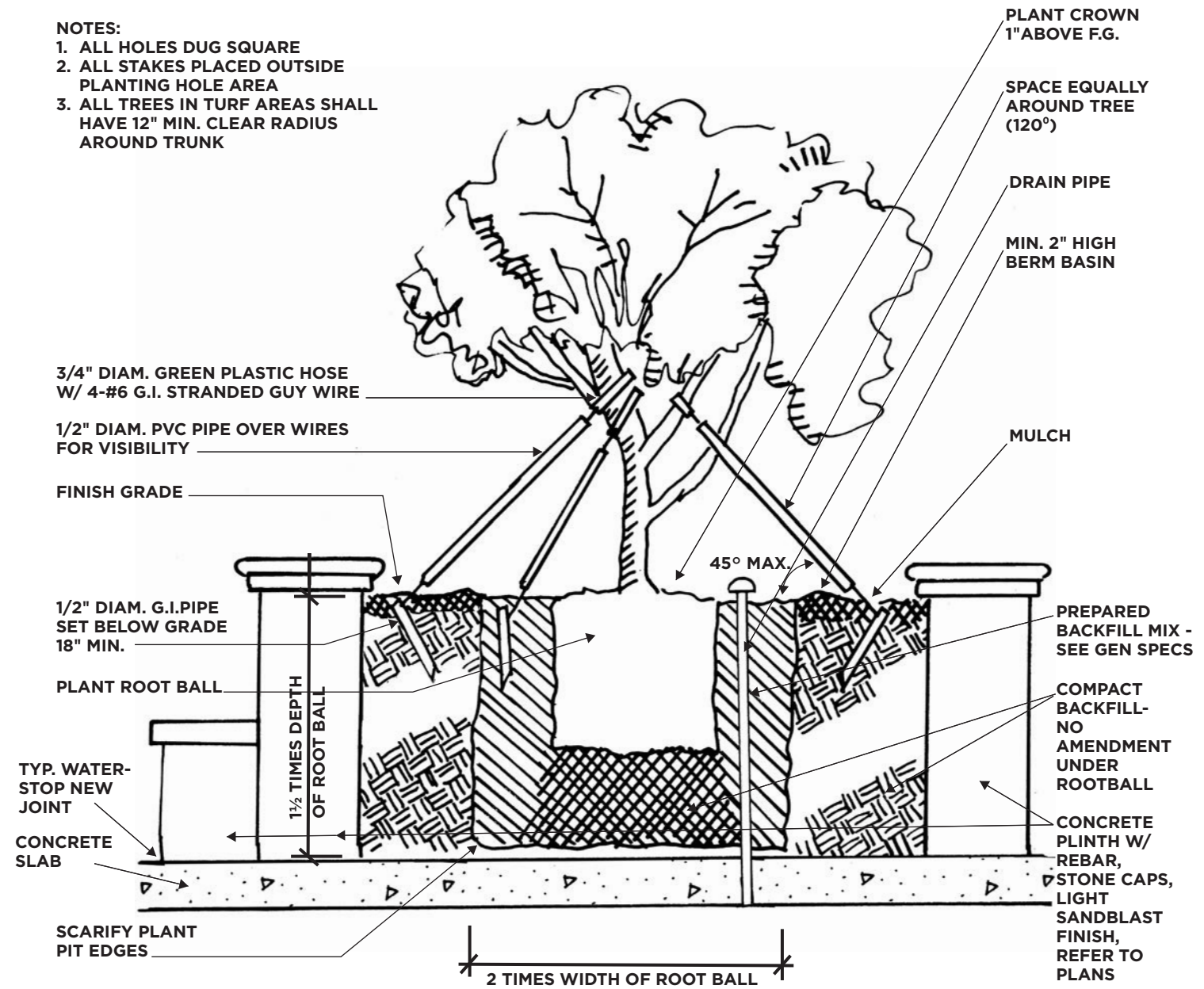


*Planter wall at gate entrance, with ramp and bench*

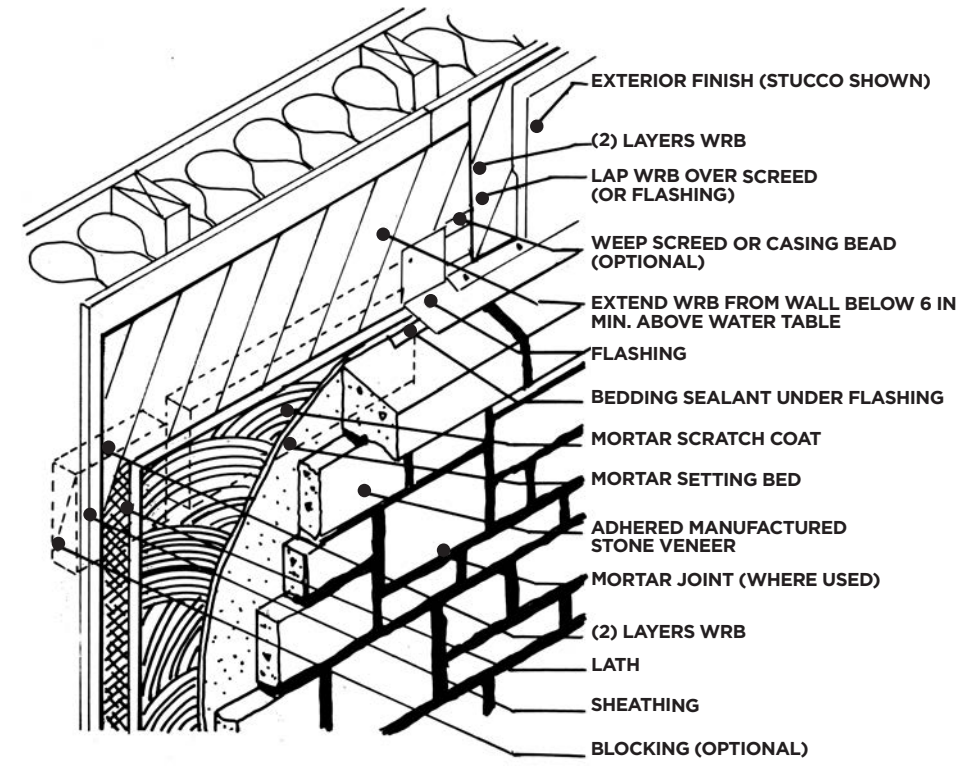
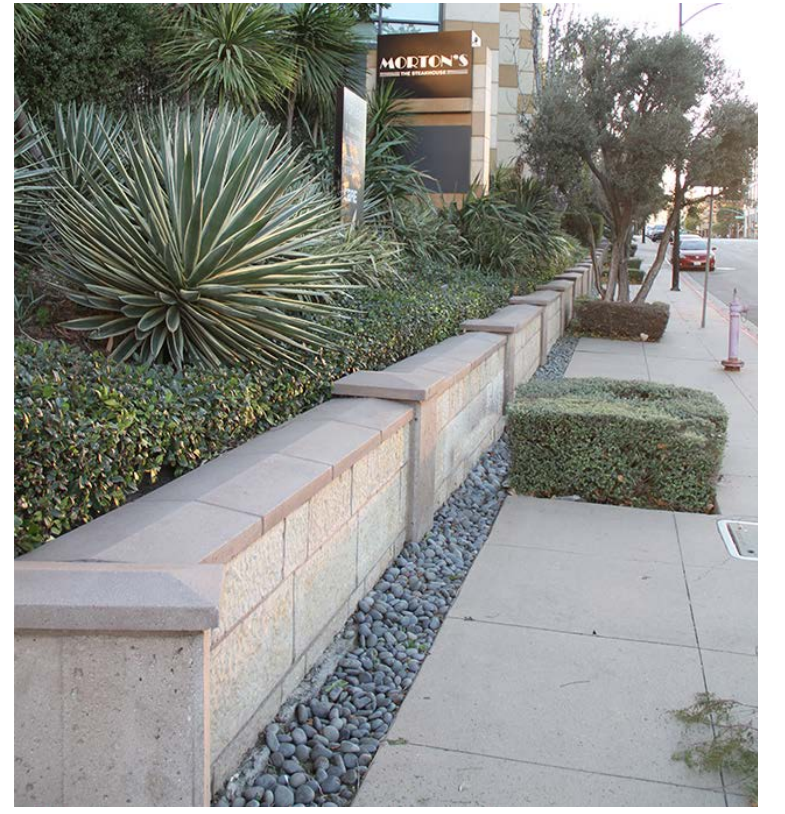


*Cap detail*

Raised Planter Detail



**TREE GUYING IN PLANTER DETAIL**  
 NTS



**STONE VENEER WALL ASSEMBLY**  
 NTS