WATER HARVESTING

Water conservation and efficiency are critical components to managing Scottsdale's water supply. Long-term drought and limited water resources are an ongoing challenge in our desert community. To balance economic growth with water needs, prioritizing landscape practices such as selecting low-water-use trees and plant material will help ensure long-term viability and a livable desert community. In that context, water harvesting is a foundational component of Scottsdale's approach to shade, comfort, and long-term landscape resilience. By treating stormwater as a resource, water harvesting expands the city's ability to sustain healthy trees, support vegetation, and cool the built environment. When paired with strategic planting and shade infrastructure, these systems strengthen Scottsdale's urban canopy and improve livability in both public and private spaces.

This section provides technical guidance and design direction for incorporating water harvesting and Green Stormwater Infrastructure (GSI) across Scottsdale. Passive systems—such as bioswales, rain gardens, curb cuts, and permeable surfaces—slow, capture, and infiltrate rainfall directly into the landscape, supporting root growth and reducing runoff. Active systems, including cisterns, collect excess stormwater for targeted reuse, reducing demand on potable water for irrigation in the process.

The Water Harvesting Guidelines establish a unified framework for designing, locating, and maintaining these systems so they function effectively in Scottsdale's desert conditions. The guidelines are intended to inform project planning and review, ensuring that new and retrofitted landscapes align with the city's broader shade and water capture goals.

Well-designed water harvesting systems strengthen the health and longevity of trees, expand rootable soil volume, and enhance the cooling performance of landscape and shade features. By integrating stormwater management with site planning, these guidelines support a greener, cooler, and more resilient Scottsdale.

Design and Implementation Framework

The Water Harvesting Guidelines outline expectations for stormwater capture, infiltration performance, and integration with site design, while allowing flexibility for context-sensitive and innovative solutions. Rather than prescribing a single approach, these guidelines establish a shared understanding of how effective water harvesting systems function across Scottsdale's varied urban environments.

Water harvesting works in tandem with the Trees and Shade Structure Guidelines, together forming the technical foundation of the Shade & Tree Plan. Passive systems provide natural infiltration that supports tree health and reduces runoff, while active systems offer opportunities to store and reuse water during dry periods. An integrated site design ensures stormwater reaches landscape areas where it can provide the greatest ecological and cooling benefits.

The Water Harvesting Guidelines provide detailed direction organized under three primary categories:

Location & Application ensures that water harvesting systems are integrated into site planning so runoff is routed into GSI features that maximize infiltration, support shade trees and pedestrian comfort, and reduce reliance on potable water for irrigation.

Stormwater Context & Performance sets expectations for capturing and managing runoff, matching designs to site drainage and infiltration conditions, and selecting from appropriate GSI practices to protect water quality and nearby infrastructure.

Maintenance & Longevity ensures that water-harvesting systems can be inspected, maintained, and adjusted over time so they continue to support shade and long-term performance.

Curb cut and bioswale.

Runoff vs. Infiltration

Low runoff, high infiltration

Permeable surfaces and GSI features slow stormwater down, spread it out, and soak it into the soil. This keeps water on-site to support trees, improve shade performance, and reduce demand on storm drains and potable water for irrigation.

High runoff, little to no infiltration

Large impervious areas shed most rainfall as fast-moving runoff. Water is quickly routed to pipes and outfalls instead of infiltrating, which limits soil moisture for trees, increases erosion potential, and misses an opportunity to cool the site.

Projects should aim to convert as much area as possible from high-runoff to high-infiltration conditions.

Gray Water

Scottsdale does not actively promote gray water systems, as wastewater from homes and businesses is already collected, treated, and reused through the City's reclamation program. Reclaimed water is used for landscape irrigation and regional partnerships, with additional supplies stored underground for future needs. While gray water can provide an additional on-site water source for trees, its citywide impact is limited given Scottsdale's existing water recycling and reuse efforts.

LOCATION & APPLICATION

Locate and configure water-harvesting systems so stormwater supports shade trees, planted areas, and comfortable public spaces.

WH 1 Integrate GSI into site planning.

WH 1.1 Route runoff from roofs, plazas, parking, and roadways to basins, bioswales, rain gardens, tree trenches, or similar GSI features before the storm sewer system.

WH 1.2 Align GSI locations with desired shade areas, pedestrian routes, and gathering spaces.

Curb cut and mini check dam.

WH 2 Direct stormwater to support tree health and pedestrian comfort.

WH 2.1 Locate basins and other GSI features so that tree root zones serving public spaces and pedestrian areas receive harvested water.

WH 2.2 Provide defined overflow paths that protect buildings, walkways, and adjacent properties from erosion and ponding.

WH 2.3 Use pretreatment (e.g., sediment traps or rock mulch) at curb cuts and inlets to protect infiltration areas from sediment and debris.

WH 2.4 Select appropriate trees for inundation areas and side slopes.

WH 3 Match water-harvesting strategies to the surrounding land-use context.

WH 3.1 In commercial and mixed-use areas, direct roof and plaza runoff to bioretention swales, basins, rain gardens, and tree planters near entries and outdoor seating.

WH 3.2 In pedestrian environments, use linear bioswales, tree trenches, and rain gardens adjacent to walkways to provide continuous shade and cooler walking conditions.

WH 3.3 In parking areas, grade pavements toward properly designed depressed landscape islands and perimeter basins rather than drive aisles.

WH 3.4 Along roadways, use bioswales, rain gardens, curb cuts, or curb extensions to intercept gutter flow and irrigate street trees.

WH 3.5 On industrial sites, use larger basins and pre-treatment where runoff volumes or pollutant loads are higher. Select appropriate microbiotic consuming plants for basin and swale bottoms to cleanse the water as it percolates into subsoils.

WH 4 Prioritize passive water harvesting systems.

WH 4.1 Use grading, curb cuts, and drainageways to feed depressed landscaped areas, bioswales, and rain gardens as the primary strategy.

WH 4.2 Add cisterns, tanks, or underground storage only where roof catchment, irrigation demand, or space constraints justify active systems.

Passive and Active Water Harvesting

Passive Systems

Systems that slow, capture, and direct water into the landscape for on-site infiltration and reuse at the surface.

- Bioswales, rain gardens, and tree trenches
- Bioretention areas
- Permeable pavements
- Curb extensions and curb cuts with sediment traps
- Street planters and other vegetated basins

Maintenance

Pros

- Easy to observe and inspect; most issues are visible at the surface.
- Fewer mechanical components, reducing risk of sudden failure.
- Routine maintenance can be done with basic tools and skills.
- Lower upfront costs and generally easier to retrofit.
- Vegetated systems support habitat, shade, and visual quality.

Cons

- Performance declines if sediment, trash, or vegetation are not routinely managed.
- Require surface space, which can be difficult on constrained or dense sites.
- May require more frequent manual cleanouts of trash, debris, and sediment.

Active Systems

Systems that collect and store water for later use, often requiring pumps, controls, or manual redistribution.

- Above-ground and below-ground cisterns
- Rain barrels and modular storage tanks
- Rainwater capture systems, first-flush diverters, and filters
- Pumps, valves, and control equipment associated with storage

Maintenance

Pros

- Stores water for intentional reuse.
- Works well on compact or urban sites with limited surface area for basins.
- Helps meet water conservation or reuse objectives.
- Storage volume can be scaled vertically or underground to achieve higher capacities on small sites.

Cons

- Harder to access and monitor; many components are out of sight or underground.
- Requires specialized equipment and technical knowledge to operate and maintain.
- More mechanical parts increase potential for malfunction or service interruption.
- Higher installation and replacement costs, with more complex design and coordination.

STORMWATER CONTEXT & PERFORMANCE

Respond to Scottsdale's rainfall patterns, drainage behavior, and soil conditions so water-harvesting systems reliably capture, infiltrate, and store runoff to support shade and landscape health.

WH 5 Apply a standard GSI toolbox to achieve predictable performance.

- WH 5.1 Select from defined GSI practices as detailed on pages 66 - 75.
- WH 5.2 Combine multiple practices where needed to meet capture, infiltration, and storage targets for larger drainage areas - together, these form a treatment train.

WH 6 Size systems to capture the first flush (at minimum) to manage runoff and support shade.

- WH 6.1 Size GSI features to capture and infiltrate a minimum of 0.5 - 1.0 inch of rainfall from the contributing impervious area.
- WH 6.2 Increase storage capacity where site area, grading, and infrastructure constraints allow, while maintaining safe overflow conditions.
- WH 6.3 Coordinate water-harvesting volumes with anticipated irrigation demand for trees and planting areas.

Vegetated bioswale.

Pedestrian bridge integration with GSI.

UNDERSTANDING SCOTTSDALE RAINFALL

Scottsdale rainfall patterns provide important context for understanding how stormwater moves across different surfaces, why certain areas generate more runoff, and how GSI features can be positioned to capture and use this water effectively.

Rainfall in Scottsdale is limited but can produce meaningful volumes of stormwater during events. The city receives an average of 7.66 inches of rain each year. While some lower-intensity storms provide prolonged infiltration and deep soil recharge, others arrive in short, high-intensity bursts that generate significant runoff across rooftops, roadways, and paved areas. When directed efficiently, this runoff becomes a valuable resource for supporting vegetation, improving soil moisture, and reducing reliance on potable water for irrigation.

Stormwater availability depends on rainfall depth, intensity, and the size and type of the contributing surface. Because many storm events are relatively small, managing the initial 0.5 inch, "first flush" runoff can deliver meaningful water-quality benefits. Hardscape areas such as rooftops, parking lots, and paved corridors shed most of the water they receive; GSI is one method of capturing and treating such before runoff is conveyed to downstream infrastructure. When directed into GSI features, this runoff can also support healthier landscapes by improving plant health, expanding rootable soil moisture, and strengthening Scottsdale's broader shade infrastructure.

Rainfall & Water Harvesting

Stormwater captured from built surfaces can provide supplemental moisture for trees and landscape areas. For example, a 25,000-square-foot asphalt parking lot can generate approximately 152,000 gallons of runoff per year if directed to GSI features.

Capturing this water reduces runoff, replenishes soil moisture, and helps planted areas perform more effectively.
When used as a local resource, rainfall supports healthier, longer-lived landscapes and strengthens the cooling benefits of Scottsdale's shade system.

Typical Storm Depth Across Scottsdale

Rainfall data collected from five Flood Control District of Maricopa County monitoring stations across Scottsdale indicate that the 90th percentile rainfall depth is consistently 1", representing the type of storm event that GSI features most often experience during heavier rainfall. This storm size provides a reliable basis for planning and sizing water harvesting systems so they function effectively under larger rainfall conditions.

How Stormwater Behaves on Different Surfaces

Stormwater moves differently depending on the surfaces it encounters:

- Impermeable surfaces—such as roadways, rooftops, and parking lots—generate runoff that must be conveyed through gutters, scuppers, or channels.
- Permeable and planted areas allow stormwater to infiltrate the soil, recharge moisture, and support vegetation.
- GSI features help slow, filter, and route this water so it can be used beneficially before reaching storm infrastructure or overflowing to downstream areas.

Understanding how rainfall becomes runoff is essential for determining where water harvesting features should be placed, how they should be sized, and how they work with Scottsdale's landscape and shade systems.

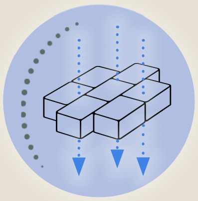
How Does Stormwater Move?

Rain Event

Rainfall begins as precipitation falling across both permeable and impermeable surfaces. Permeable surfaces allow water to infiltrate naturally, while impermeable surfaces generate runoff that is conveyed toward landscape or GSI areas designed to capture it. From there, stormwater may infiltrate into planted areas, be held temporarily in stormwater storage systems, or flow into stormwater drainage infrastructure if excess water cannot be absorbed or stored on-site.

Permeable Surface

Permeable surfaces—such as landscaped areas, rain gardens, bioretention basins, or natural ground—allow stormwater to infiltrate into the soil. As water moves slowly through these areas, it increases soil moisture and supports vegetation. Excess water may continue downslope into other GSI features or planted areas.



Impermeable Surface

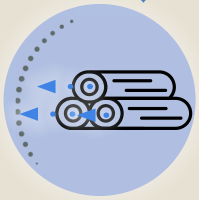
Impermeable surfaces like roofs, roadways, and paved areas do not allow infiltration. Nearly all rainfall landing on them becomes runoff that moves quickly across the surface. Gutters, scuppers, or surface grading then direct this runoff toward permeable areas, planted areas, underground storage, or storm drainage systems.

Planted Areas

Planted areas are the preferred destination for stormwater. Here, water infiltrates the soil, supports root growth, enhances plant health, and reduces irrigation needs. Infiltration in these areas also helps filter pollutants and contributes to cooler microclimates. Excess water may continue downslope into underground storage, or storm drainage systems.

Stormwater Storage

In some systems, stormwater is temporarily captured and held in storage features such as cisterns or underground tanks. Stored water can be used later to irrigate planted areas, helping reduce demand for potable water. Excess water may continue downslope into storm drainage systems.



Stormwater Drainage Infrastructure

Any water that cannot be absorbed or stored on-site eventually flows into storm drainage systems designed to convey excess runoff safely downstream. Properly designed overflow routes ensure GSI features function as intended without causing flooding or damage.

WH 7 Use site-specific drainage and infiltration conditions to set basin dimensions and drawdown times.

WH 7.1 Design basin footprint, depth, and side slopes based on contributing drainage area, surface slopes, soil infiltration rates, and available planting area.

WH 7.2 Design water harvesting features so that captured stormwater infiltrates or drains within 36 hours under typical soil conditions to meet county vector control requirements.

WH 7.3 Maintain adequate separation from buildings, utilities, and pavement subgrades.

WH 8 Route runoff to protect water quality and adjacent infrastructure.

WH 8.1 Provide pre-treatment elements—such as sediment forebays, stabilized inflow points, or trench drains—where higher sediment or pollutant loads are expected

WH 8.2 Convey stormwater from pre-treatment into infiltration or filtration features, then to clearly defined overflow or outfall locations sized for larger storm events.

WH 8.3 Stabilize inflow and outfall points to prevent erosion, protect nearby improvements, and maintain long-term system performance.

Rainfall Capture Calculator

Use this quick tool to estimate how much runoff a typical, larger Scottsdale storm can provide. Higher gallon values mean that the surface produces more runoff and is a good candidate to divert to water-harvesting systems. Lower gallon values mean less runoff and smaller harvesting opportunities from that surface.

Inputs:

- **Storm Depth** (1 inch): The amount of rain that falls during a single storm, measured in inches. Use 1 inch for a typical larger Scottsdale storm (a 90th-percentile event).
- **Conversion Factor** (0.623): Converts inches of rain on a square foot of surface into gallons. One inch of rain on 1 square foot produces about 0.623 gallons of water.
- **Catchment Area** (square feet): The horizontal area of a hard surface that produces runoff that could drain toward your water-harvesting feature.
- **Runoff Coefficient** (see Table below): The fraction of rain that turns into runoff from a surface. A value of 1.0 means almost all of the rain runs off; 0.5 means about half runs off and half soaks in. To keep it simple, use the value that best matches your surface type.

Formula

Storm Depth × 0.623 × Catchment Area × Runoff Coefficient = Gallons of Runoff

Example

45,000 sq. ft. parking lot, 90th-percentile storm of 1.00”, and a runoff coefficient of 0.95 (pavement):

1.00 × 0.623 × 45,000 × 0.95 ≈ 26,633 gallons from a single storm.

Table

Material	Runoff Coefficient
Roof or covered structure	0.95
Pavement (concrete/asphalt)	0.95
Landscaping (typical turf/soil)	0.50
Vegetable/flower garden	0.35

MAINTENANCE & LONGEVITY

Ensure water-harvesting systems can be maintained and adjusted over time so they continue to function as designed and support healthy trees, shade, and landscapes.

WH 9 Design GSI features for clear visibility and access to support efficient maintenance.

WH 9.1 Locate inlets, outlets, overflow structures, sediment traps, and cleanouts where they are visible from grade and easy to identify in the field.

WH 9.2 Avoid locating key components in locations that would limit access or conceal problems such as clogging or erosion.

WH 10 Select plants and materials that support long-term function and tree health in GSI systems.

WH 10.1 Use desert-adapted plant species, mulch, and surface treatments that tolerate periodic inundation, sediment deposition, and drought conditions.

WH 10.2 Avoid species and materials that are likely to clog inlets, permeable pavements, or outlet structures with excessive litter, thatch, or aggressive root systems (e.g., tree species that drop seedpods or large leaves, fine sediment or decomposed granite fines).

WH 10.3 Coordinate plant selection, soil amendments, and mulch types with the intended maintenance approach (e.g., hand tools vs. mechanized equipment).

WH 10.4 Where infiltration is desired, use soils and other media that balance permeability, moisture retention, and plant health.

WH 11 Establish inspection and maintenance schedules and assign responsibilities for each GSI practice.

WH 11.1 Define inspection frequencies (e.g., after major storms, seasonally, and annually) appropriate to each GSI feature type.

WH 11.2 Identify specific routine tasks such as sediment removal, trash and debris clearing, vegetation management, mulch replacement, and surface vacuuming for permeable pavements.

WH 12 Monitor system performance and adjust maintenance or design details as conditions change.

WH 12.1 Modify maintenance practices, plant palettes, or specific design details (e.g., rock armoring at inlets, sediment trap sizing, overflow protection) when field conditions show that adjustments are needed to maintain performance.

WH 12.2 Conduct periodic assessments of structural components and vegetation health to confirm ongoing functionality of water-harvesting systems.

GSI PRACTICES

Effective water harvesting depends on choosing the right mix of GSI features for the site, capturing and treating stormwater as close as possible to where it falls, slowing runoff to promote percolation and absorption, and linking multiple practices together as “treatment trains” so water is managed in stages as it moves downstream. Well-designed systems maximize stormwater capture, support vegetation, and improve outdoor comfort.

Permeable Pavement

Passive GSI practice

Permeable pavement is a paved surface that allows stormwater to pass through joints or pores into a gravel storage layer and underlying soil. It reduces runoff, supports nearby trees, and helps recharge the ground.

Benefits

- Reduces surface runoff by promoting on-site infiltration.
- Provides subsurface storage and slow release of stormwater.
- Supports tree and planting health by increasing soil moisture.
- Can reduce the need or size of separate surface basins.
- Useful in retrofits where surface space is limited, and low/moderate vehicular areas.

Use Case

- Parking stalls or parking bays with light to moderate traffic.
- Sidewalks, multi-use paths, courtyards, and pedestrian plazas.
- Avoid heavy vehicles and areas of increased vehicular traffic.

Maintenance Considerations

- Vacuum sweep the surface twice a year to remove fine sediment from joints or pores.
- Inspect after storms for ponding, clogged areas, loss of infiltration, or surface damage.
- Remove weeds and debris from joints and edges without damaging the surface.
- Repair settled, cracked, or displaced units and replenish joint or infill material as needed.

Permeable interlocking concrete pavers.

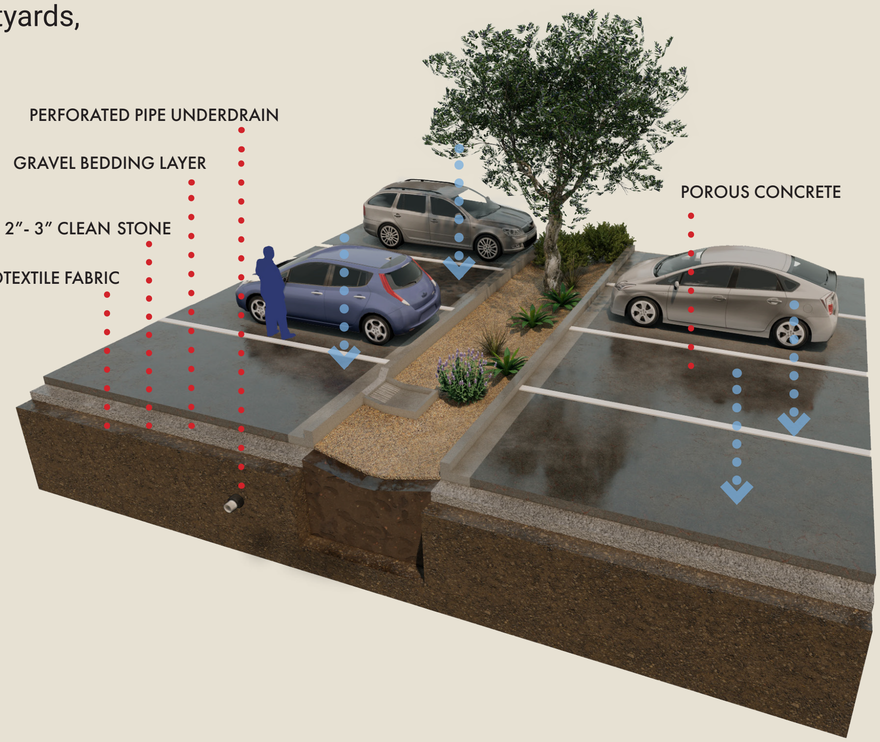


Figure 2-1. Permeable pavement.

Curb Openings, Curb Cuts, & Sediment Traps

Passive GSI practice

Curb cuts are openings in the curb that let stormwater leave impermeable surfaces and flow into adjacent landscape basins. Sediment traps are shallow depressions or rock pockets at the inlet that slow water and capture debris before it reaches planted areas.

Benefits

- Directs runoff from paved areas into basins, bioswales, or rain gardens.
- Reduces localized street and parking-lot flooding.
- Protects downstream GSI features by capturing sediment, trash, and leaf litter.
- Simple, low-cost elements suitable for both new and retrofit projects.

Use Case

- Along streets and within parking lots, draining into landscape islands or basins.
- Within curb extensions and stormwater planters as part of traffic-calming projects.
- Within civic or commercial plazas.

Maintenance Considerations

- Keep curb openings clear of trash, leaves, sediment, and overgrown plants so water can enter freely.
- Remove accumulated sediment and debris from sediment traps and forebays twice a year to maintain capacity.
- Check rocks or splash pads at outlets for erosion or undercutting and repair as needed.
- Watch for blocked inlets, full sediment traps, and erosion at discharge points.
- Replace fill materials as needed.

Curb cut and bioswale.

Curb cut and landscape basin.

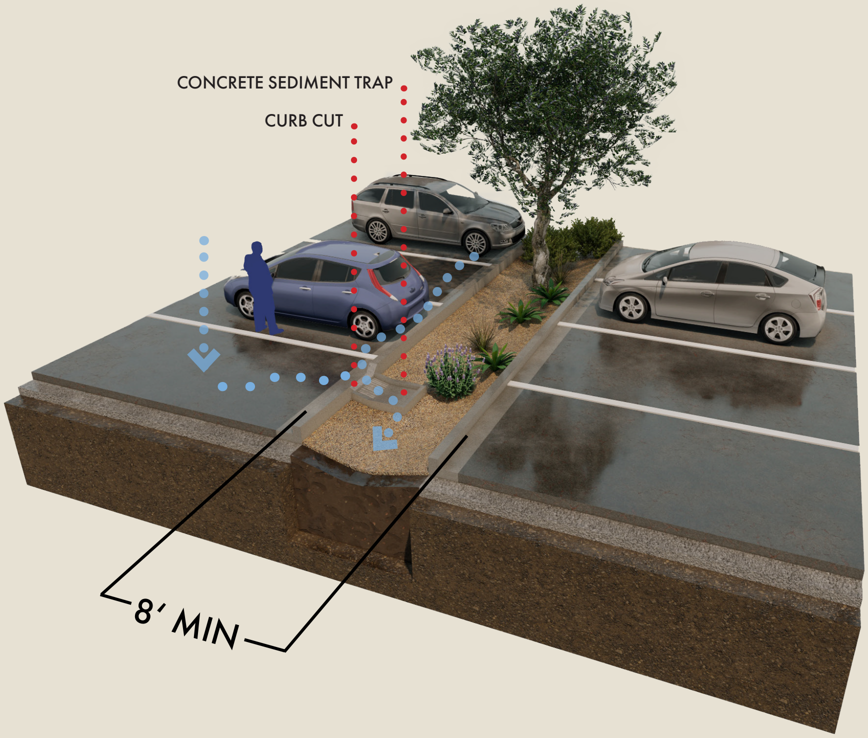


Figure 2-2. Curb openings, curb cuts, & sediment traps.

Suspended Pavement

Passive GSI practice

Suspended pavement systems, such as soil cells, support sidewalks, plazas, or parking areas on a structural deck or frame so that soil beneath remains largely uncompacted and usable for tree roots and stormwater infiltration. They often work with structural soils to provide both loading capacity and high-quality rooting volume.

Benefits

- Provides substantial rooting volume for street and plaza trees beneath paved areas.
- Reduces pavement heaving and cracking caused by shallow surface roots.
- Allows stormwater to be directed into soil below pavement for infiltration and tree uptake.
- Supports larger, mature trees that provide significant shade and cooling.

Use Case

- Urban streetscapes, often as continuous tree trenches along sidewalks.
- Plazas, courtyards, and transit stops with trees integrated into paved areas.
- Parking lots or drop-off areas where trees are surrounded by pavement.

Maintenance Considerations

- Monitor tree health (canopy vigor, dieback, rooting issues) and adjust irrigation or soil management as needed.
- Inspect adjacent pavement for settlement, cracking, or trip hazards and repair as needed.
- Keep surface inlets, openings, or adjacent planting areas clear so water can reach the structural soil zone.
- Avoid heavy equipment or activities that exceed the system's design loading over root zones.
- Watch for poor tree performance or localized pavement failure that may indicate issues within the system.

Suspended pavement soil cells.

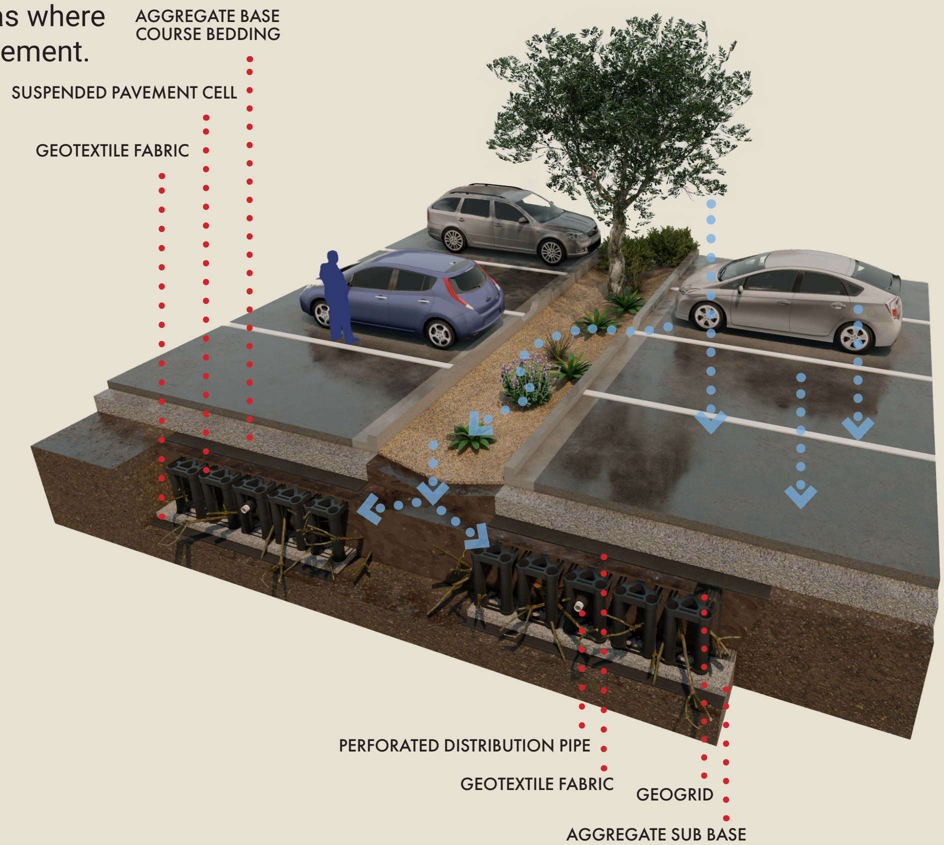


Figure 2-3. Suspended pavement.

Structural Soil

Passive GSI practice

Structural soil is an engineered mix (typically angular stone with a soil component) designed to support pavement loads while still providing limited rooting space for trees. It allows tree roots to grow under or adjacent to pavement where conventional, uncompacted soil is not feasible.

Benefits

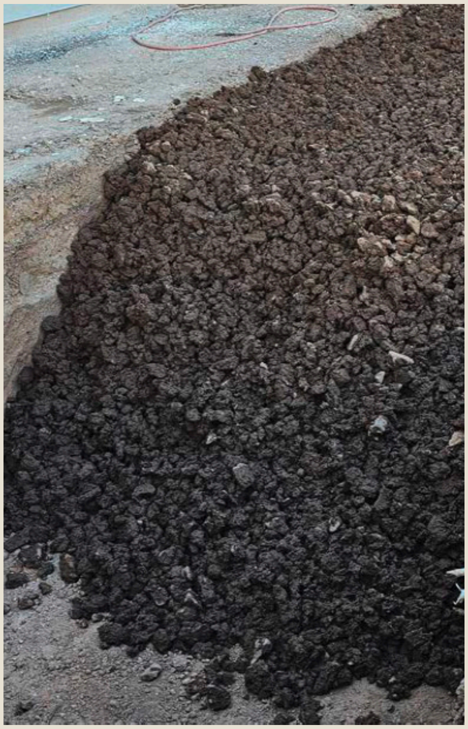
- Provides rootable volume in locations that must also support pavement or light vehicular loads.
- Reduces pavement heaving and cracking caused by shallow surface roots.
- Can be used to connect tree wells or create tree trenches, improving root spread and stability.
- Useful in retrofits where existing subgrade conditions constrain planting options.

Use Case

- Beneath sidewalks or plaza paving between tree wells.
- In narrow street planters or medians where space for open soil is limited.
- Around street trees adjacent to parking lanes or drop-off areas where trees are surrounded by pavement.

Maintenance Considerations

- Monitor tree health (canopy vigor, dieback, stability) to confirm that rooting conditions are adequate. Poor tree performance may signal the need for soil remediation or additional rooting volume.
- Inspect adjacent pavement for settlement, cracking, or trip hazards and repair as needed.
- Keep surface inlets, openings, or adjacent planting areas clear so water can reach the structural soil zone.
- Avoid over-compacting surface areas beyond intended design loads, which can further restrict rooting and infiltration.



Structured soil.

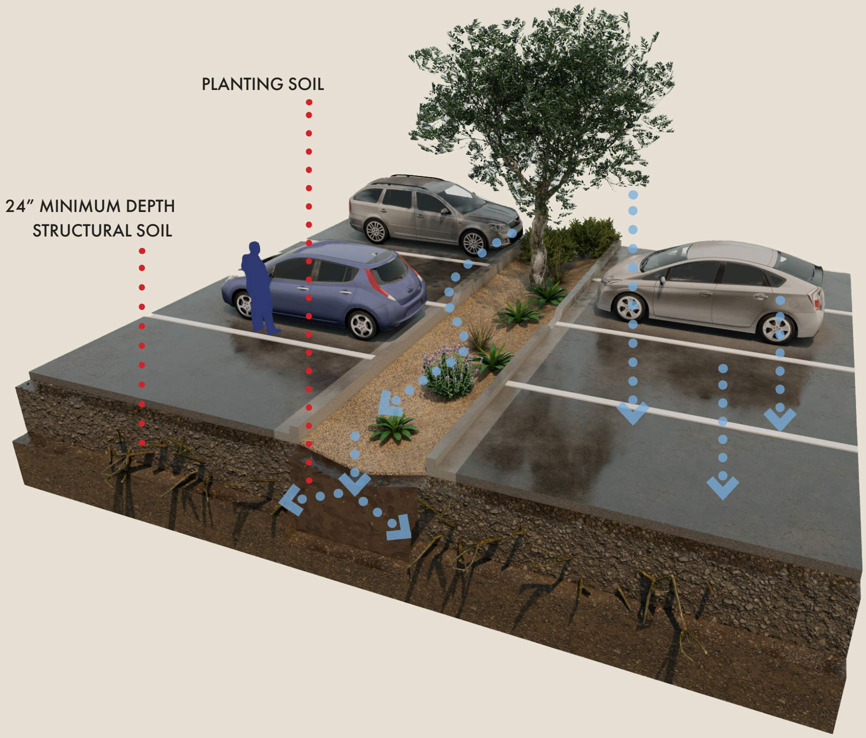


Figure 2-4. Structural soil.

Bioswale

Passive GSI practice

A bioswale is a shallow, gently sloped, vegetated channel that slows, filters, and absorbs stormwater as it moves across a site. Water spreads out through the swale, allowing sediment to settle and pollutants to be filtered by soil and plants before infiltrating or flowing to another GSI feature.

Benefits

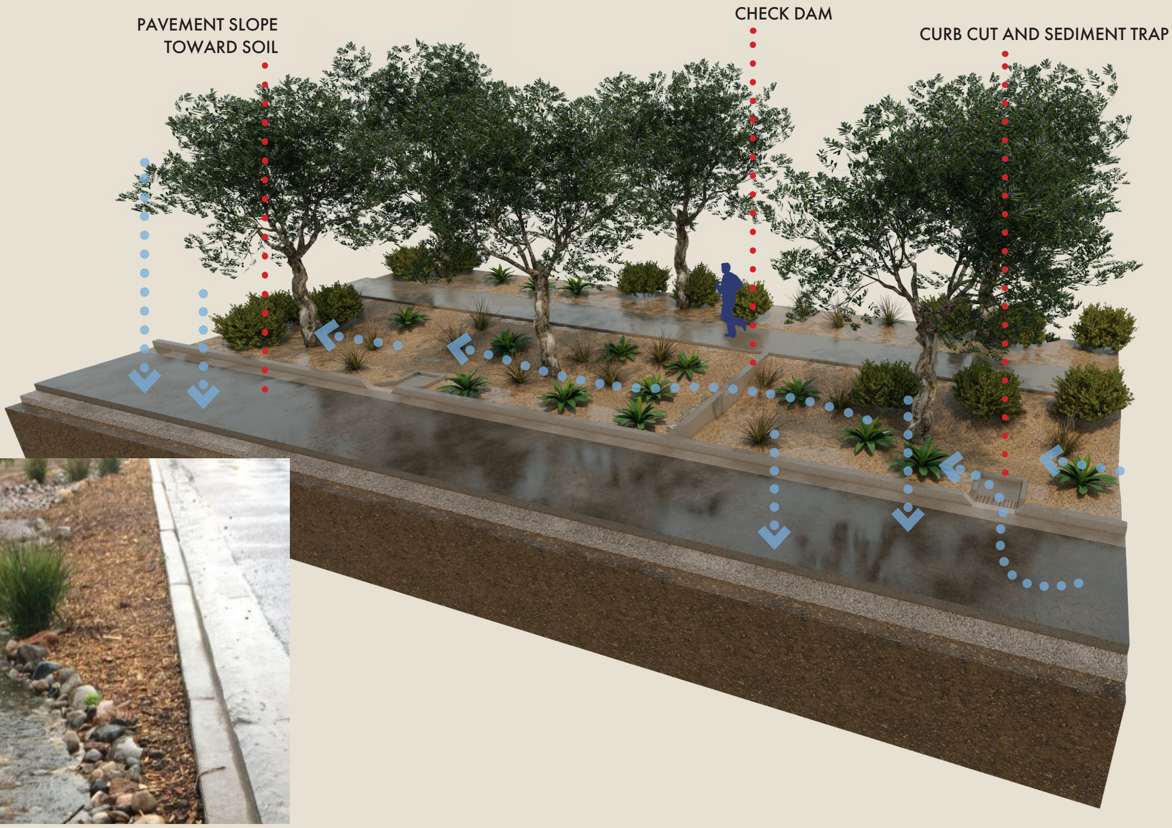
- Moves and captures stormwater on the surface instead of in pipes.
- Provides cost-effective, passive drainage for large contributing areas.
- Filters sediment and pollutants through soil and vegetation.
- Supports desert-adapted planting, shade, and habitat along streets and edges.

Use Case

- Adjacent to streets and within medians.
- Parking lot edges and between parking bays.
- Larger swales in parks, campuses, and open space areas.
- Along multi-use paths or at the base of sloped landscaped areas.

Maintenance Considerations

- Remove trash, leaves, and sediment from inlets, forebays, and low points—especially after monsoon or large rain events.
- Regrade compacted or eroded areas and replenish decomposed granite or rock in high-flow zones to restore flow and infiltration.
- Prune or replace vegetation to maintain clear flow paths and visibility while keeping good plant cover.
- Watch for common issues such as blocked inlets, dead or overgrown vegetation, erosion, and mulch washing out of the swale.



Bioswale.

Figure 2-5. Bioswale.

Rain Garden

Passive GSI practice

A rain garden is a shallow, planted basin that captures runoff from nearby roofs, sidewalks, or paved areas and allows water to pond temporarily, soak into the soil, and be taken up by plants. It is typically smaller and more contained than a bioswale, serving as a focal landscape feature as well as a stormwater facility.

Benefits

- Captures and infiltrates runoff close to where it falls.
- Reduces peak flow and erosion by slowing and storing water on-site.
- Filters sediment and pollutants through soil and vegetation.
- Supports desert-adapted plants, shade, habitat, and visual interest in small spaces.

Use Case

- At roof downspouts near building entries or courtyards.
- In parking lot islands or along the edges of small lots.
- Along sidewalks, multi-use paths, or between buildings.
- In residential or neighborhood-scale landscape areas.

Maintenance Considerations

- Remove trash, leaves, and sediment from inlets, forebays, and the basin surface—especially after storms.
- Replace dead or stressed plants and prune as needed to maintain coverage, sightlines, and clear inflow paths.
- Replenish mulch or surface treatments that wash out or break down over time.
- Repair localized erosion at inlets or overflows and regrade low spots if needed to restore even ponding and infiltration.
- Watch for common issues such as bare or compacted soil, persistent standing water, and declining vegetation.

Rain garden.

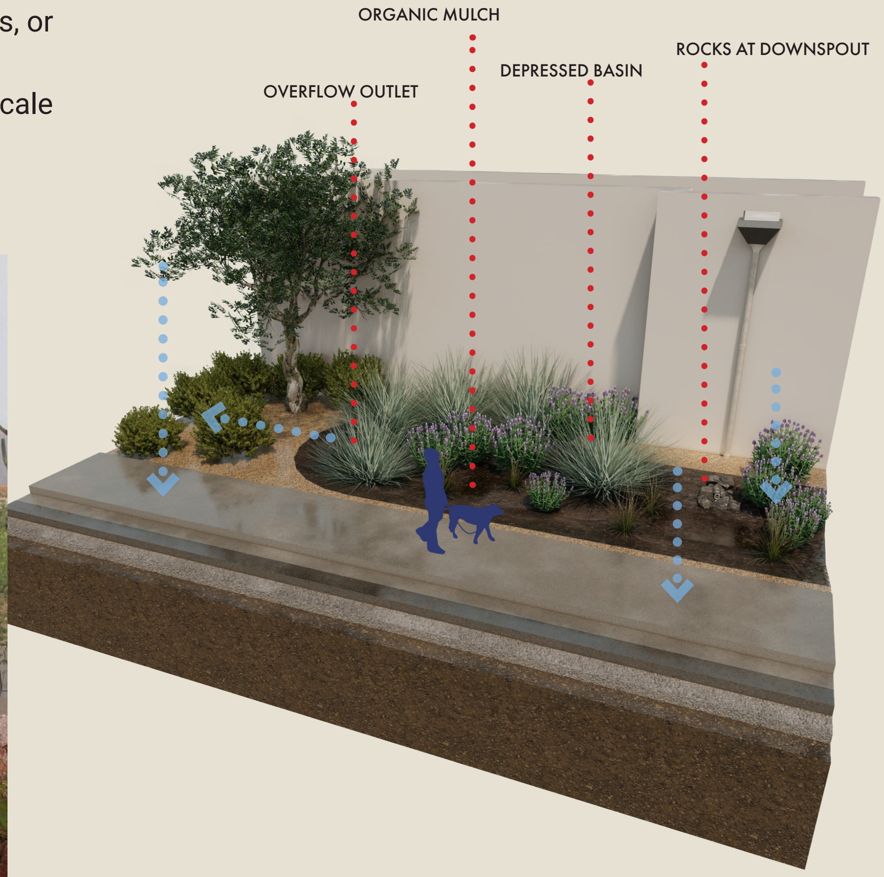


Figure 2-6. Rain garden.

Pedestrian Bridge

Access over GSI features

Pedestrian bridges or grates span bioswales, rain gardens, or basins to maintain continuous walking routes while leaving the underlying GSI feature open to water, light, and air. They provide crossings in specific locations to protect vegetation and soils from compaction.

Benefits

- Provides safe, accessible crossings over GSI features.
- Protects planted areas and soil structure by limiting informal footpaths.
- Allows stormwater to continue flowing and infiltrating beneath the structure.
- Can be integrated as a visible design element along streetscapes and trails.

Use Case

- Across bioswales or rain gardens along sidewalks and multi-use paths.
- Between parking lots and building entries where GSI features run parallel to walkways.
- At access points in plazas, courtyards, or parks with linear basins.

Maintenance Considerations

- Keep bridge decks and grates clear of leaves, trash, and sediment so water and light can pass through.
- Inspect rails, supports, and fasteners for damage, corrosion, or trip hazards and repair as needed.
- Check approaches and abutments for erosion, settlement, or ponding and stabilize if required.
- Ensure the underlying GSI feature remains accessible for vegetation care and sediment removal.

Pedestrian bridge over bioswale.

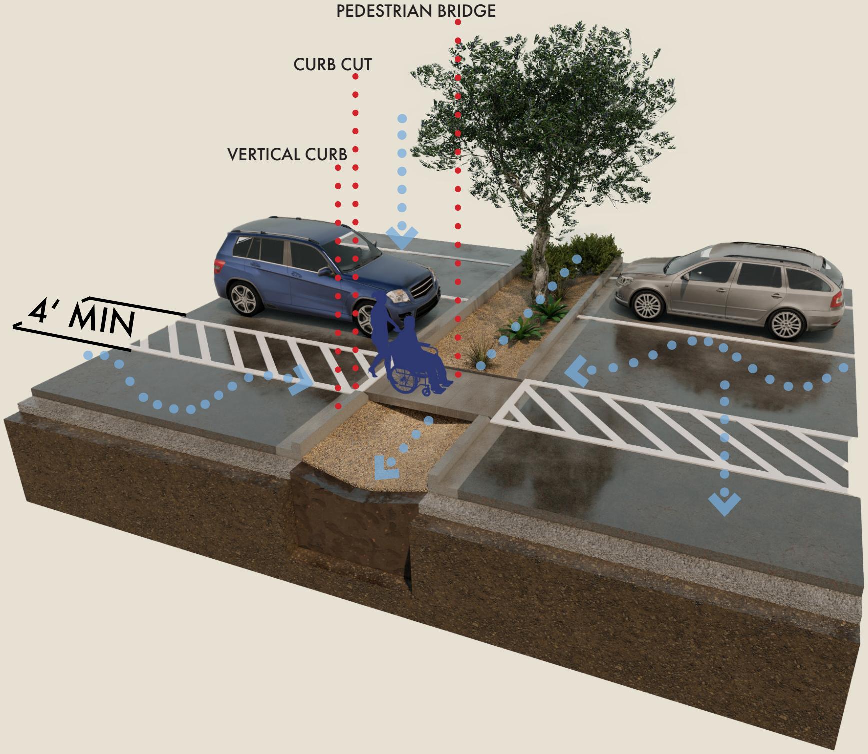


Figure 2-7. Pedestrian bridge.

Curb Extension

Can be combined with other GSI features

A curb extension narrows the roadway to slow traffic and shorten pedestrian crossing distances, while inlets - typically curb cuts with sediment traps - capture gutter flow. When combined with basins, bioswales, or rain gardens, curb extensions direct stormwater into planted areas.

Benefits

- Calms traffic and improves visibility at crossings.
- Reduces pedestrian crossing distance and exposure to vehicles.
- Captures and infiltrates street runoff in integrated planting areas.
- Provides opportunities for trees, shade, and streetscape greening.

Use Case

- In streetscapes, at intersections, or mid-block crossings.
- Near schools, transit stops, and commercial main streets where lower speeds are desired.
- In traffic-calming projects.

Maintenance Considerations

- Keep inlets, curb cuts, and gutter approaches clear of trash, leaves, and sediment so water can enter the extension.
- Remove accumulated sediment and debris from the planted basin and any forebays to maintain capacity.
- Maintain plants, mulch, and soil to prevent bare spots, overgrowth, or blocked sightlines for pedestrians and drivers.
- Inspect curb edges, pavement, and pedestrian routes for settlement, cracking, or trip hazards and repair as needed.

Curb extension with curb cut and bioswale.

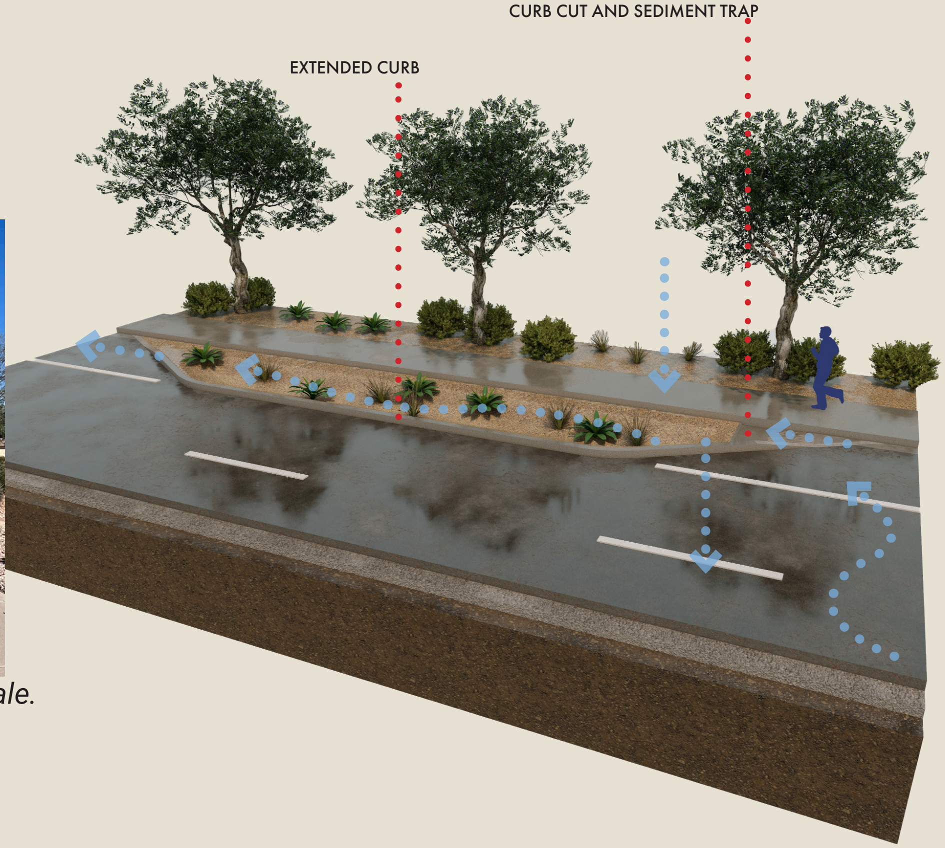


Figure 2-8. Curb extension.

Above Ground Cistern

Active water harvesting practice

An above-ground cistern is an enclosed tank that collects and stores stormwater, typically from roof downspouts, for later non-potable use such as landscape irrigation. It is visible at the surface and includes inlets, overflows, and outlets or hose connections.

Benefits

- Stores captured rainwater for intentional reuse.
- Works well on sites with limited space for basins or swales.
- Can be located and detailed as an educational or design feature.
- When combined with passive GSI, helps extend water availability for trees and planting.

Use Case

- Near building downspouts in courtyards, side yards, or service areas.
- At commercial or civic buildings where tanks can be integrated into façades or screened enclosures.
- In schools, parks, and community facilities as demonstration systems.

Maintenance Considerations

- Keep inlet screens, gutters, and first-flush devices clear of leaves, sediment, and debris.
- Inspect the tank, fittings, and supports for leaks, corrosion, and structural stability.
- Check overflows and splash pads to ensure water is safely conveyed away from buildings and accessible routes.
- Periodically drain and clean the cistern to remove accumulated sediment and organic material.
- Ensure lids, vents, and screens remain secure to prevent mosquitoes, algae, animal entry, and safety hazards.
- For pumped systems, test pumps, valves, and controls regularly.

Above ground cistern.

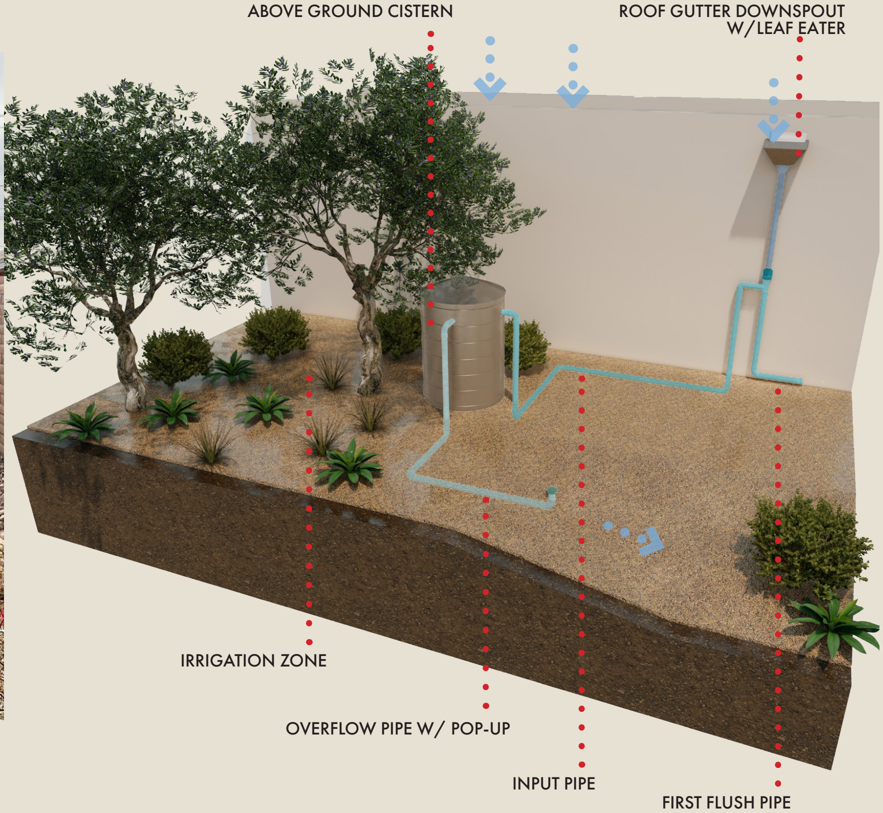


Figure 2-9. Above ground cistern.

Below Ground Cistern

Active water harvesting practice

A below-ground cistern is a buried tank that collects and stores stormwater, typically from roof drains or surface inlets, for later non-potable use such as landscape irrigation. It is concealed below grade and includes access hatches, inlets, overflows, and outlet piping or pump connections.

Benefits

- Stores significant volumes of captured rainwater without using surface space.
- Preserves usable area for parking, plazas, or playgrounds while providing water storage.
- Helps reduce peak runoff and potable water demand for irrigation.
- Can be paired with passive GSI features that receive overflow or supplemental irrigation.

Use Case

- Sites with limited above-ground space.
- Under parking lots, plazas, or courtyards near contributing roofs.
- Beneath landscape areas where tanks or modular units can be covered by soil and planting.
- At commercial, civic, or institutional sites with larger roof areas and irrigation needs.

Maintenance Considerations

- Inspect inlets, pretreatment devices, and access risers for sediment, trash, and blockages.
- Periodically remove accumulated sediment and organic material in the tank.
- Check pumps, valves, float switches, and control systems regularly to confirm operation.
- Check overflows and splash pads to ensure water is safely conveyed away from buildings and accessible routes.
- Inspect lids, hatches, and vents.
- Settlement, surface cracking, or sinkholes above the cistern may indicate structural or subsurface issues.

Below ground cistern.

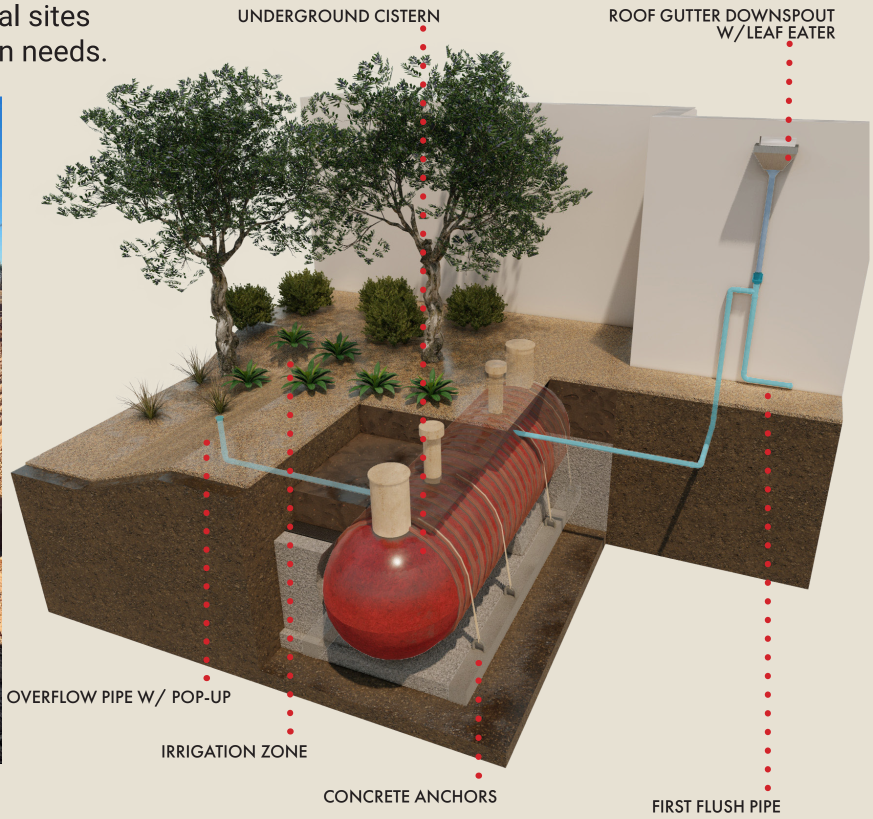


Figure 2-10. Below ground cistern.

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