Appendix B

2020 LA River Master Plan Design Guidelines – Draft Continued

SAFETY BEST PRACTICES ALONG THE RIVER

Safety along the LA River is of utmost importance to all users of the river corridor, during both regular recreational use and periodic flood events. Designers can incorporate clear lines of sight and allow clearance for emergency vehicles in order to promote safety in river projects.

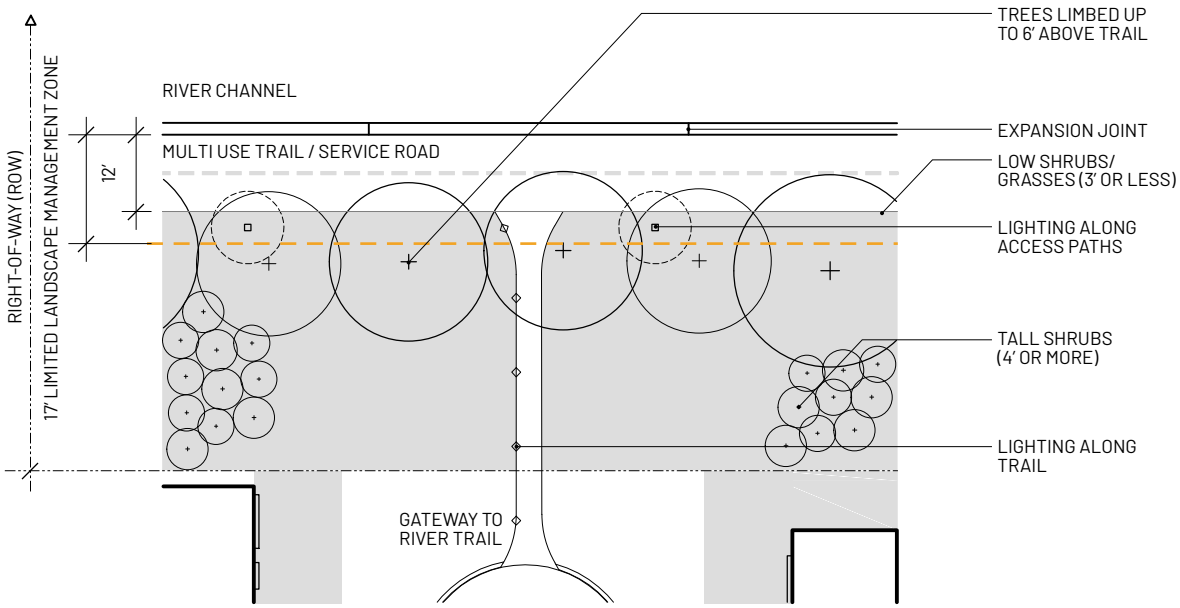
From a planting design perspective, planting densities need to consider the safety of pedestrians, joggers, and cyclists along all trails by providing sufficient line-of-sight clearance. Clear lines of sight are especially important at access points and trail intersections, where planting should be kept below three feet in height, and trees should be limbed up at least six feet (Figure 127).

Further, lighting should be spaced at regular intervals along the river trail to maintain a consistent level of visibility in the evenings. Trees should be placed so as not to shield the light sources along the trails. For further information on lighting, see Chapter 6.

Maintaining the 17′ Limited Landscape Management Zone allows for emergency vehicles to access the channel when necessary. In-channel rescues during flood conditions are performed by city and county fire departments. Rescue anchors located adjacent to major arterials throughout LA County are embedded into the concrete panels along both sides of the river for use in emergency situations.

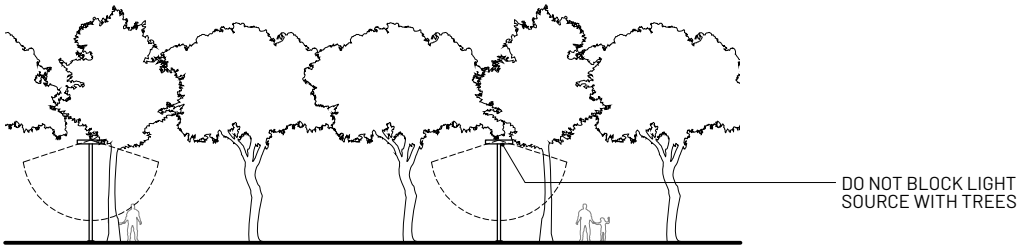
County Flood Control District Maintenance Standards for both maintenance and emergency vehicle ingress and egress apply in current and future locations. Designers should take the swift water anchor rescue locations into account when planning projects.

MAINTAINING A CLEAR LINE OF SIGHT BETWEEN 3'-6' IN HEIGHT IS ESPECIALLY IMPORTANT AT RIVER ACCESS POINTS AND TRAIL INTERSECTIONS



VISIBILITY AT ACCESS POINTS

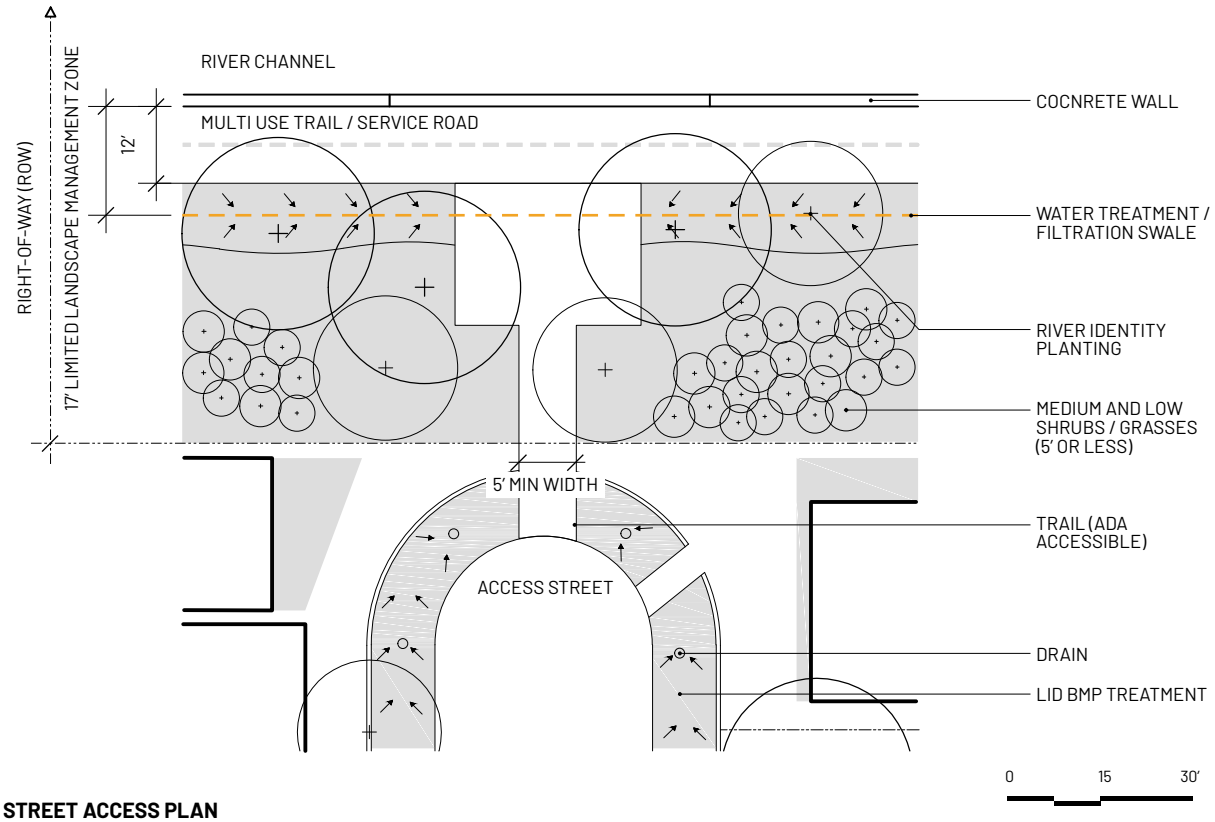
Figure 129. Clear lines of sight and consistently lit paths of travel should be included at gateways and access points.



LIGHTING ALONG THE TRAIL

Figure 130. Lighting along the LA River trail should be consistent and should not be blocked by tree limbs or any other obstructions.

0 15' 30'



STREET ACCESS PLAN

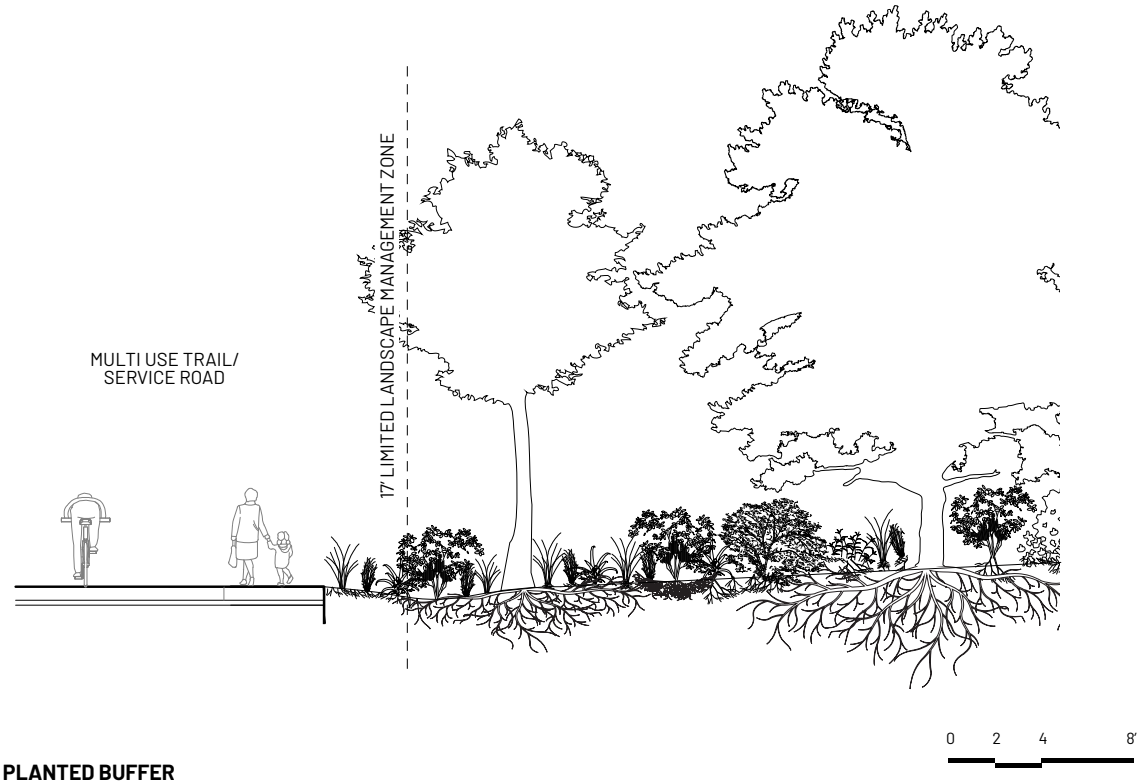
Figure 131. Access points where a street drains into the river provide opportunities to capture and treat stormwater. Swales along trails that slope away from the river also provide opportunities for water treatment.

PLANTED BUFFERS

Planted buffers along the LA River corridor provide comfort for pedestrians along the river trail, promote the unique sense of place of the river, and provide an opportunity for the treatment of stormwater before it enters the river.

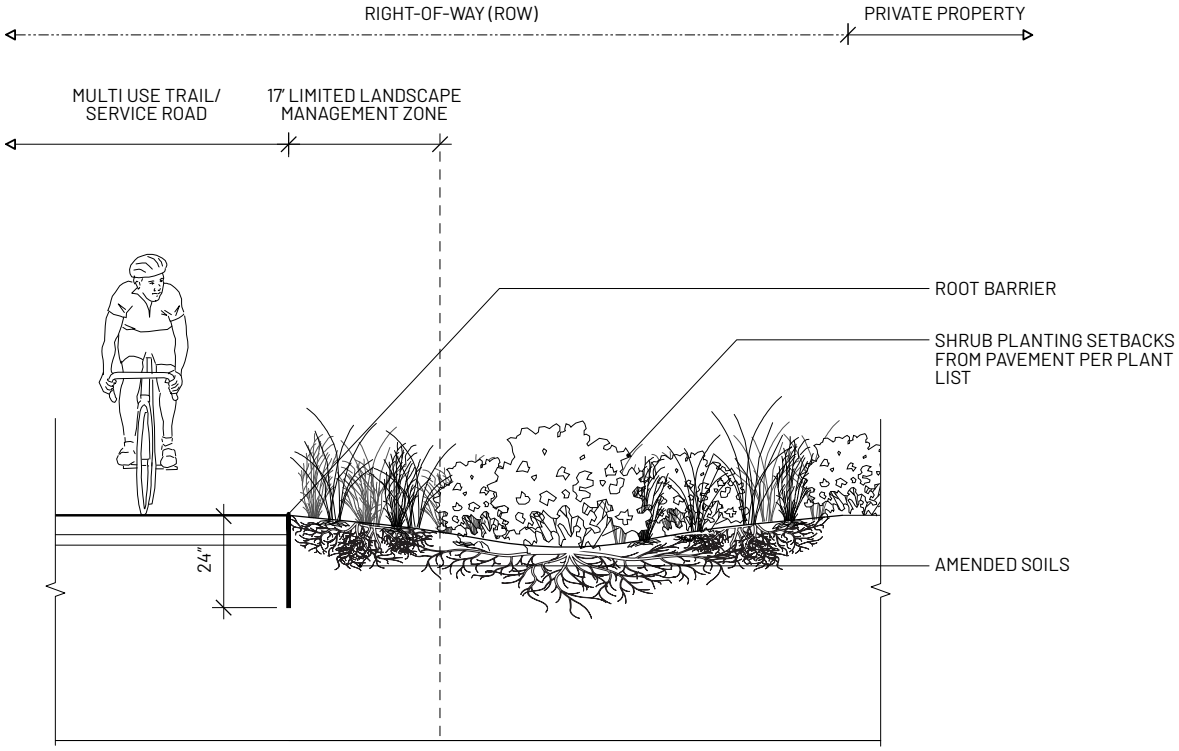
Where a neighborhood street drains directly into the river, new projects should aim to create bioswales or treatment basins to collect stormwater water runoff. Further, new trails, especially those that are paved with impervious materials, should slope to drain away from the river channel towards a bioswale or other BMP area.

Planted buffers should also adhere to suggested setbacks from pavement found in the plants lists at the end of this chapter. Trees and shrubs above 5' tall should be set back a minimum of 5' from the edge of the pavement. This setback distance can be halved if a 24" root barrier is installed immediately next to the pavement, and if the limited landscape management zone clearance is met.



WIDE PLANTED BUFFER

Figure 132. A densely planted buffer consisting of trees, shrubs, and groundcovers creates a unique sense of place along the LA River and provides opportunities to create connected habitats.



NARROW PLANTED BUFFER

Figure 133. If a trail is designed to slope towards a planted swale, it can collect, convey, and treat stormwater before it reaches the LA River.

FOR MORE IN-DEPTH INFORMATION ON STORMWATER BEST MANAGEMENT PRACTICES, PLEASE REFERENCE THE LAC PUBLIC WORKS LOW IMPACT DEVELOPMENT STANDARDS MANUAL

STORMWATER BEST MANAGEMENT PRACTICES

Stormwater best management practices (BMPs) help capture, convey, and treat stormwater through infiltration or other mechanisms during a rain event. Some of the most commonly implemented BMPs include rain gardens, swales, infiltration strips, and infiltration trenches. It is important to work with engineers to ensure that the soils in the project sites are suitable for infiltration. Overall these methods are most effective during common rain events, since during higher, less frequent flood events these methods usually become saturated to capacity.

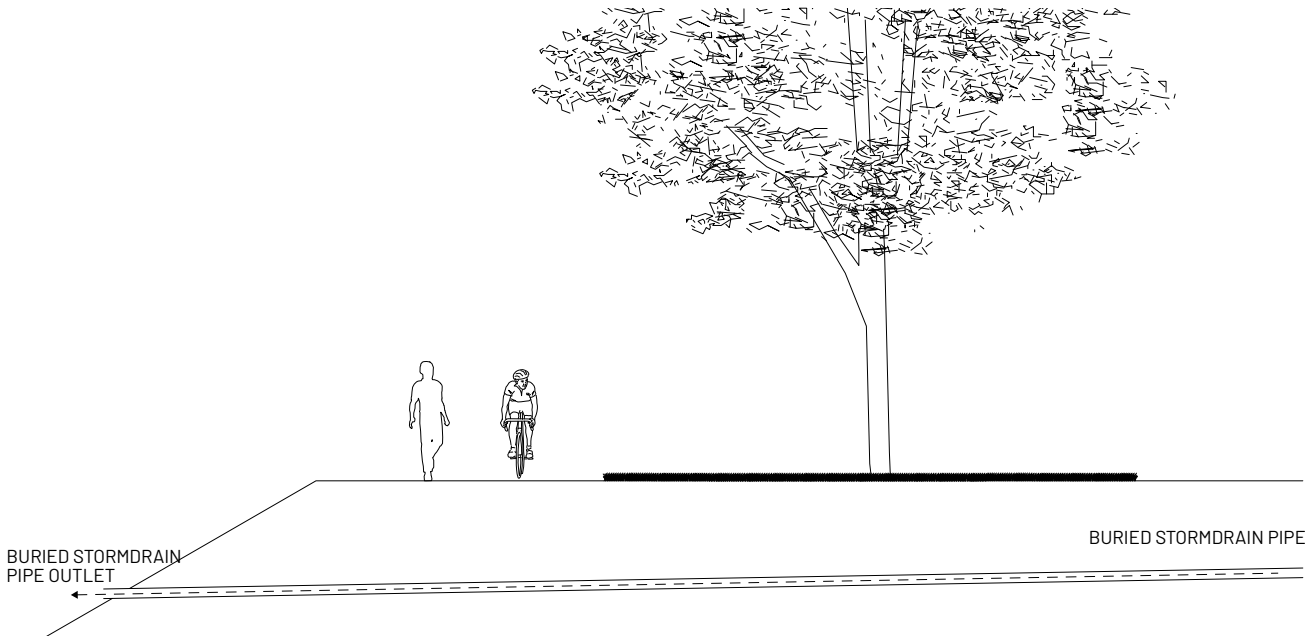
Rain gardens and swales require more space to implement, while infiltration strips and trenches are ideal for tight spaces or areas adjacent to structures. Along the LA River, rain gardens can be implemented where there is a wider project site. These project sites are to be studied to identify optimal locations and possible grading actions that will increase the capture and retention of rainfall to help sustain the growth of the native plantings. Swales can often be installed along paved trails or other linear projects. Swales convey water at a slower rate than traditional pipes do, and it is important to work with an engineer to make sure that the designed swale works with the overall stormwater approach for the project. Infiltration strips and trenches work best where there is a narrow right-of-way, or alongside structures or river pavilions (see Chapter 6). Infiltration can be further enhanced by the installation of vertical perforated pipes within the dripline of larger shrubs and tree species, installed at the time of planting. However, adequate drainage and possible bypass of the planting area, is necessary for heavier storms or obstructed systems. Typical drawdown time requirements for infiltration systems is between 72-96 hours, as dictated by vector control regulations to reduce mosquito populations.

The daylighting of existing storm drains is another method for installing BMPs, as shown in Figure 135. Daylit storm drains can be gravity fed and would help increase the treatment and re-use of stormwater in the right-of-way before it enters the river channel. All BMPs require continued maintenance for long-term success, otherwise they risk becoming obstructed with debris and rendered ineffective.

The following items are important in order to facilitate long-term success of BMPs:

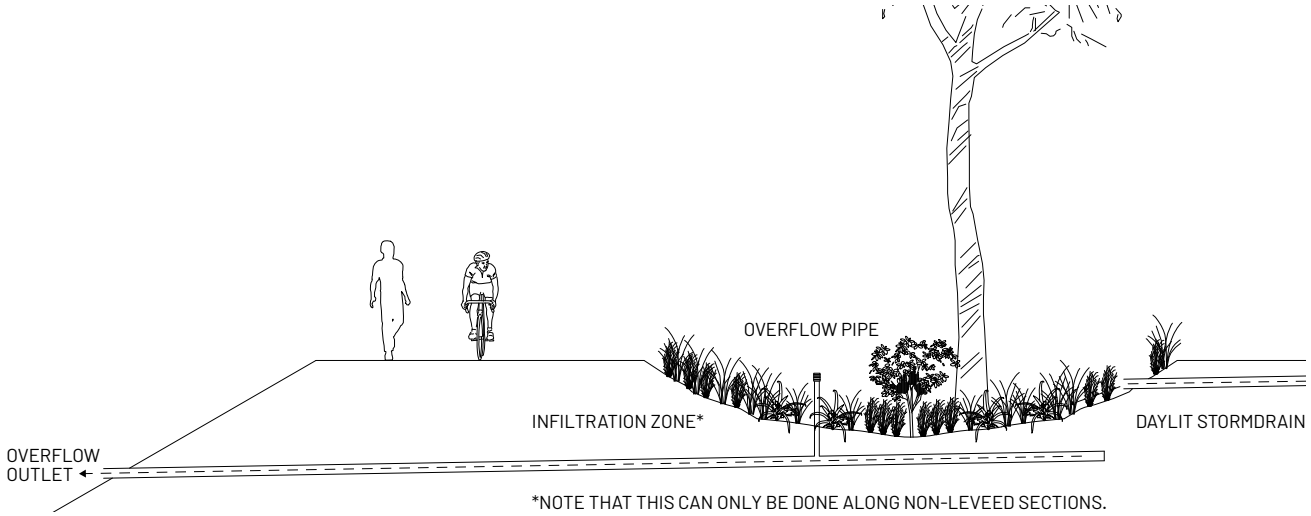
- Long-term commitment to regular maintenance of BMPs; vegetated BMPs in particular are prone to accelerated failures without regular maintenance
- Proper sizing of BMPs with respect to tributary drainage areas
- Adding/requiring pre-treatment BMPs to remove gross solids, sediments, trash, and debris are critical and recommended best practices for BMPs

For more in-depth information on BMPs, please reference the LAC Public Works Low Impact Development Standards Manual.[21]



PIPED DRAINAGE CONDITION

Figure 134. New projects along the LA River offer the opportunity to change the typical condition of stormdrain pipes that flow underneath street ends and exit directly into the river channel.



DAYLIT DRAINAGE CONDITION

Figure 135. A daylit storm drain allows for infiltration and treatment of runoff before it enters the LA River. These types of projects can help improve the water quality in the river.

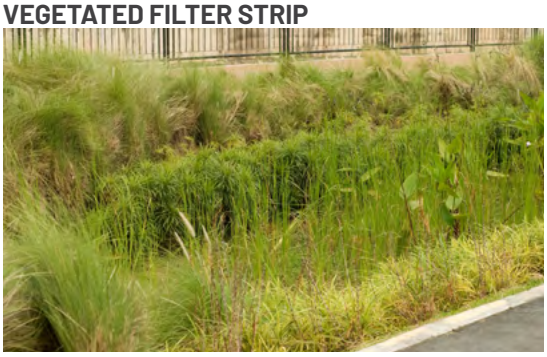
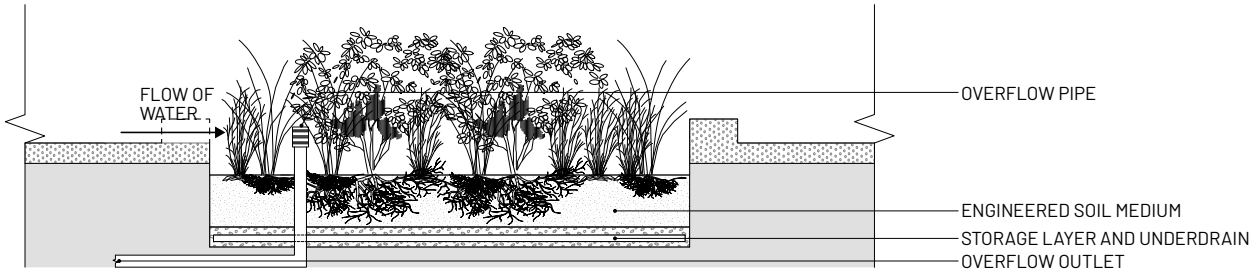
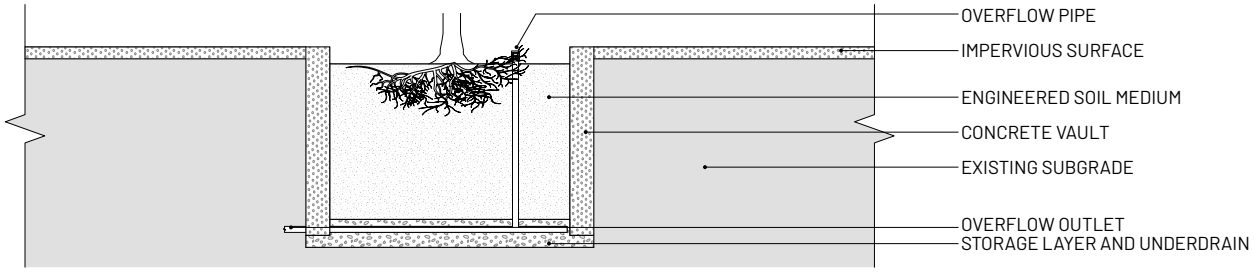
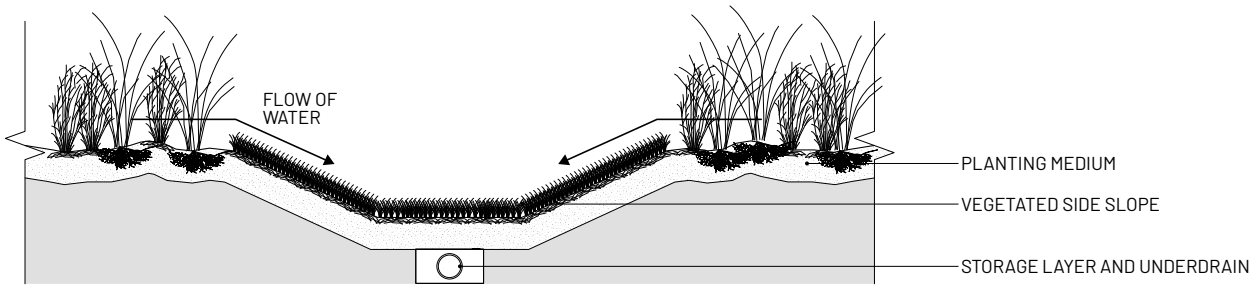
BEST MANAGEMENT PRACTICE TECHNIQUES	PROS AND CONS	
STORMWATER PLANTER 	**PROS:** • Requires little space • Reduces peak flows during small storm events • Enhances site aesthetics • May conserve water • Requires little maintenance	**CONS:** • May require additional irrigation • Not suitable for areas with steep slopes
TREE WELL FILTER 	**PROS:** • Enhances site aesthetics • Reduces stormwater runoff volume and pollutant discharge • Ideal for highly-developed sites • Integrates well with linear landscapes	**CONS:** • May require additional irrigation
VEGETATED SWALES 	**PROS:** • Low cost of installation • Reduces peak flows during small storm events • Requires little maintenance	**CONS:** • Has limited water quality benefits beyond gross solids filtration • Not suitable for areas with steep slopes • Can cause erosion when not installed and maintained properly
VEGETATED FILTER STRIP 	**PROS:** • Easy to install • Reduces peak flows during small storm events • Enhances site aesthetics • Requires little maintenance	**CONS:** • Not suitable for areas with steep slopes • Can cause erosion when not installed and maintained properly

Figure 136. Various BMP techniques can be implemented depending on the space available and intended use. Source: (Top) OLIN, 2018, (Middle) OLIN, 2018, (Bottom) Roger Soh, 2010. https://bit.ly/2ZJNv2I

SECTION







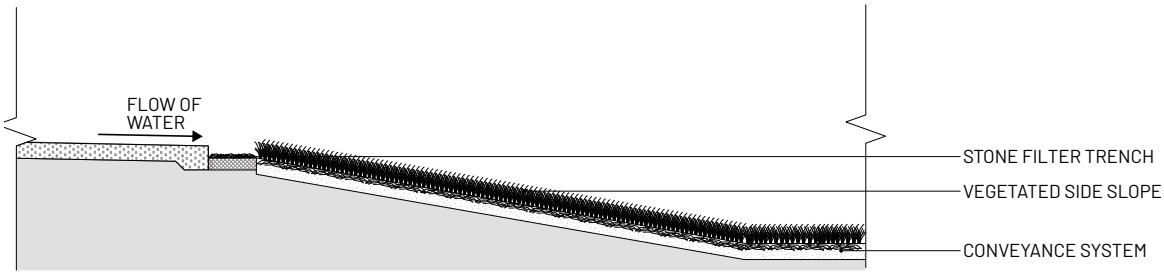
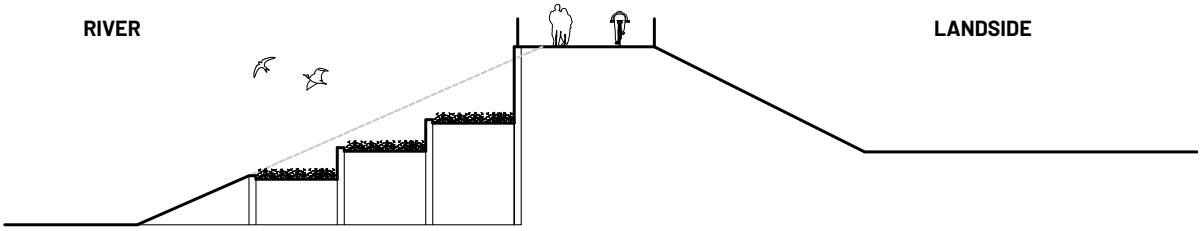
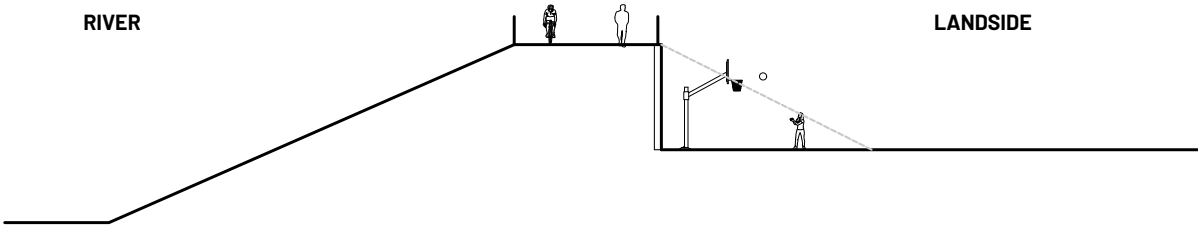


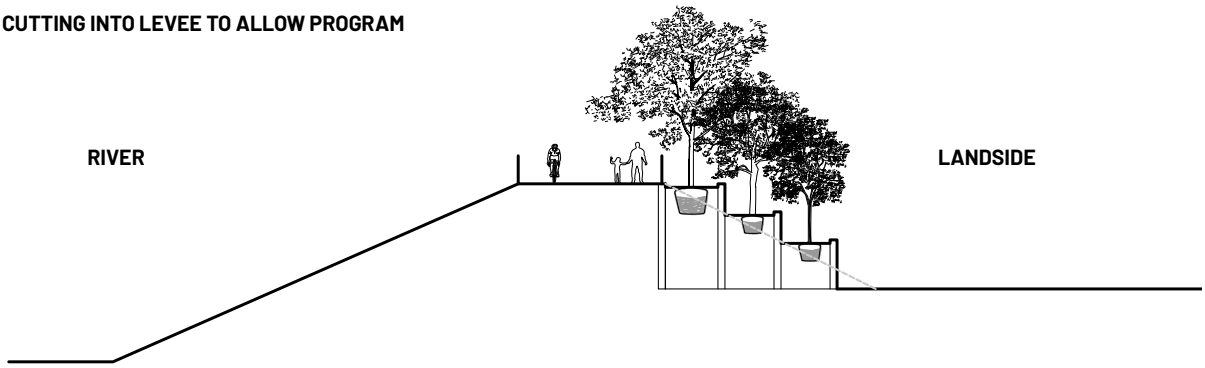
Figure 137. The infrastructure of each BMP varies based on project needs and should be designed with engineers.



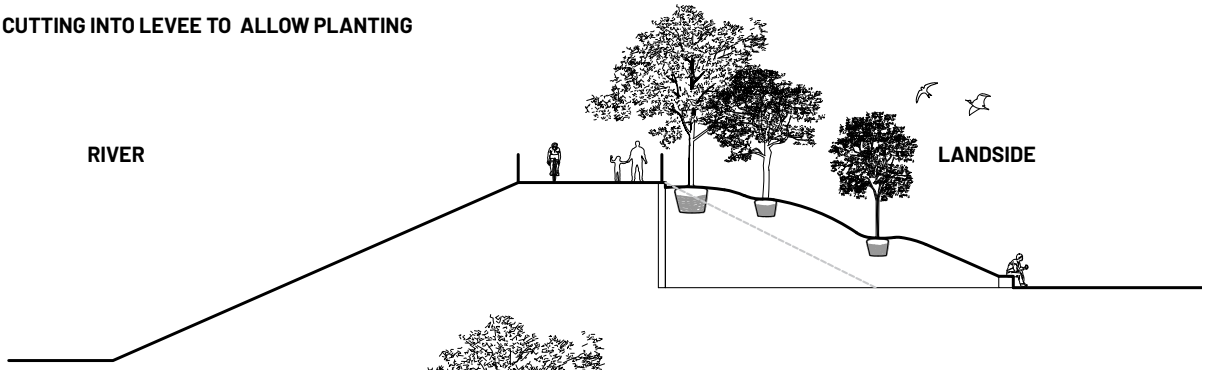
LARGE TERRACES TO ALLOW HABITAT



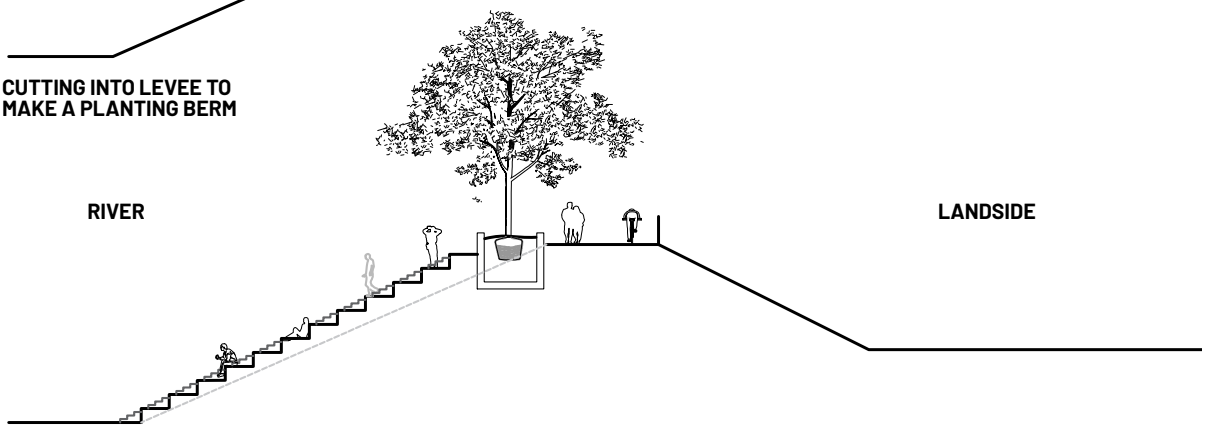
CUTTING INTO LEVEE TO ALLOW PROGRAM



CUTTING INTO LEVEE TO ALLOW PLANTING



CUTTING INTO LEVEE TO
MAKE A PLANTING BERM



TERRACING CHANNEL WALL FOR AMPHITHEATER

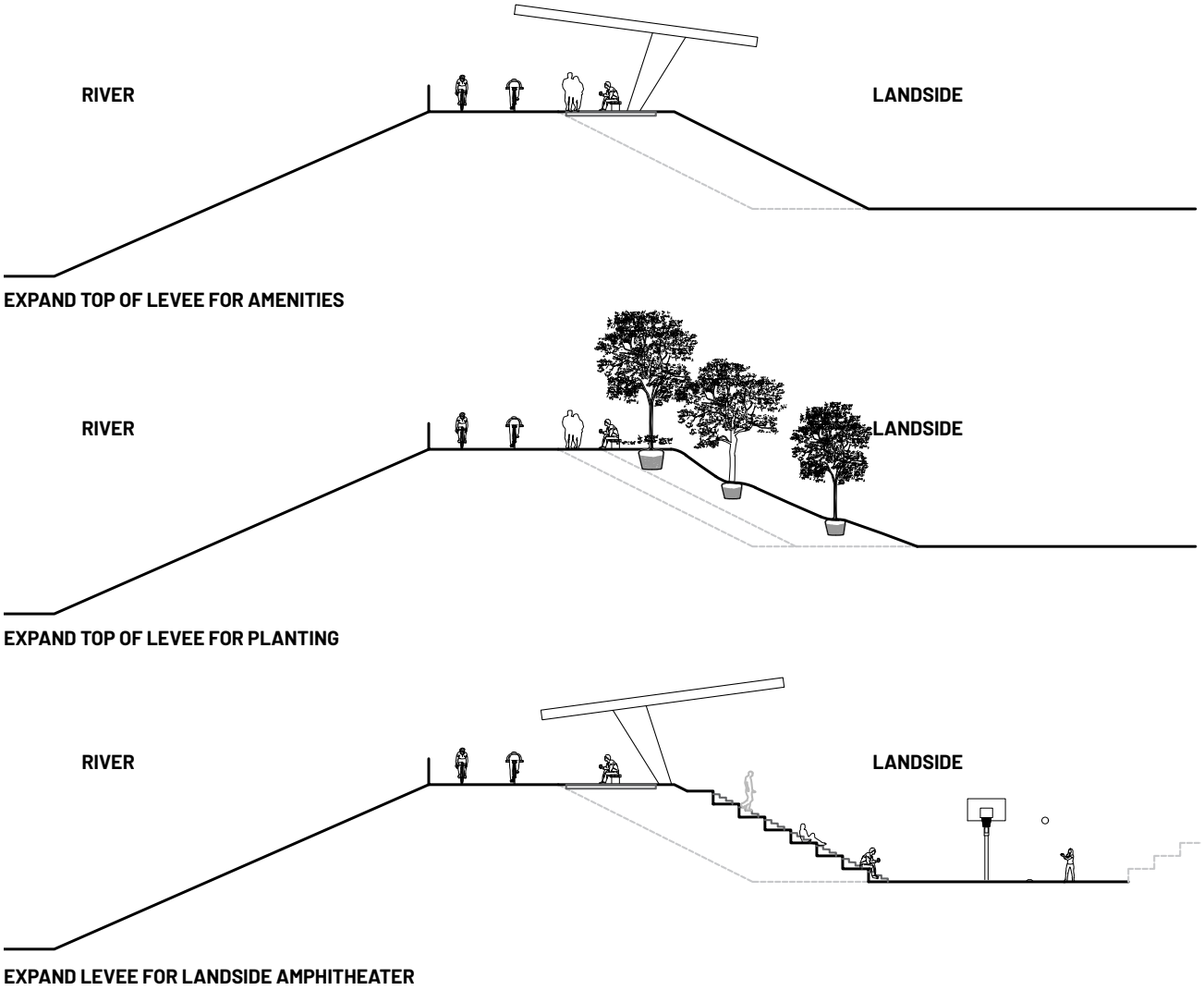


Figure 138. Ideas on variations of channel modifications help push the envelope of what is possible along the LA River. Hydraulic analysis and coordination with engineers is necessary to bring these ideas to fruition.

CHANNEL MODIFICATIONS: INNOVATION

Designers are encouraged to create innovative designs for integrating ecological function and programming into the channel edge conditions. All changes are subject to permit requirements. Proposed modifications should encourage accessibility for all.

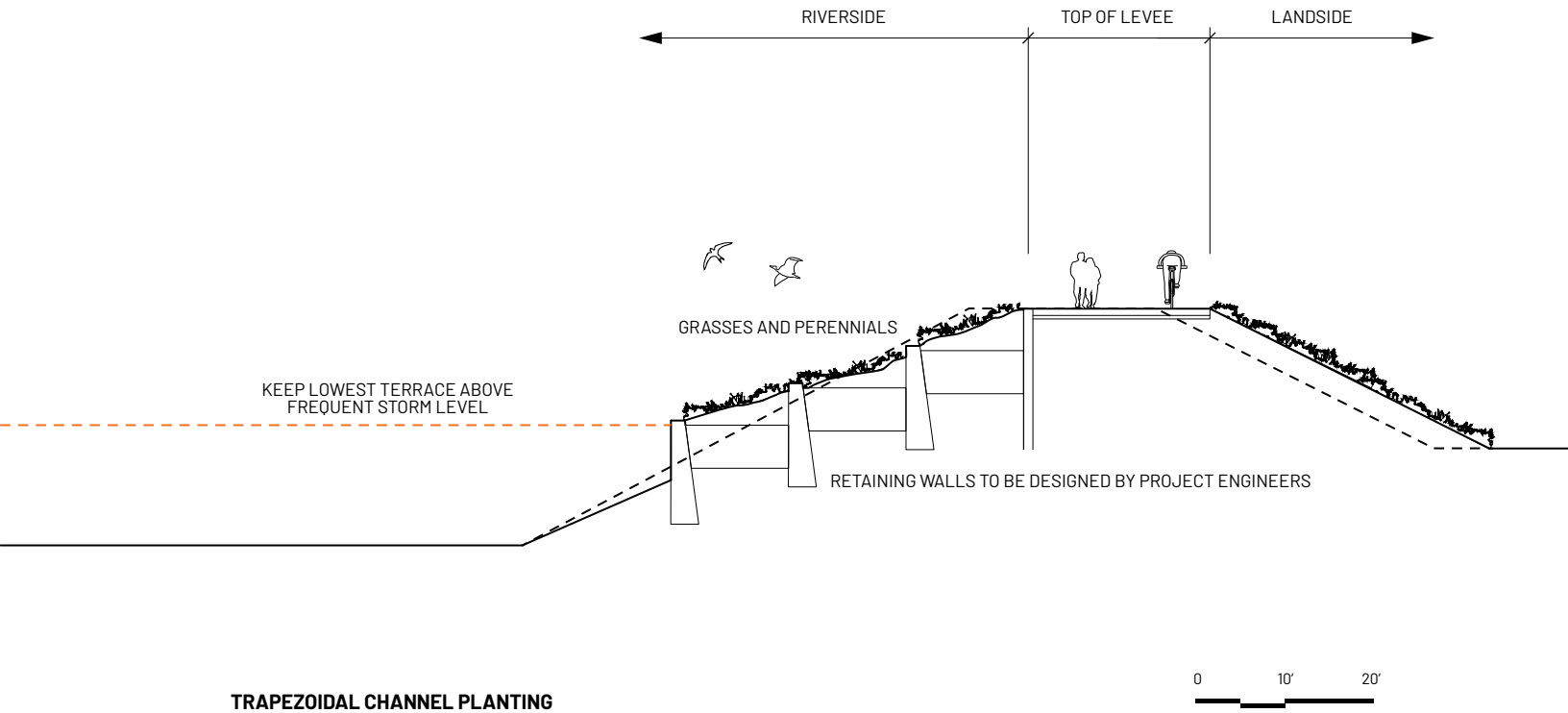
Design guidelines represent potential configurations based on general hydraulic considerations. Additional site-specific analyses, such as 2-D or 3-D numerical modeling and/or physical modeling, may be required to demonstrate hydraulic feasibility in terms of not reducing channel capacity, not significantly raising the design watersurface elevation, and minimizing and containing standing waves. These modifications are not a solution for all 51 miles of the LA River.

CHANNEL MODIFICATIONS SHOULD NOT INCREASE FLOOD RISK AND SHOULD BE UNDERTAKEN WITH A HIGHLY SKILLED DESIGN TEAM, INCLUDING QUALIFIED ENGINEERS AND LANDSCAPE ARCHITECTS

CHANNEL MODIFICATIONS: TRAPEZOIDAL CHANNEL

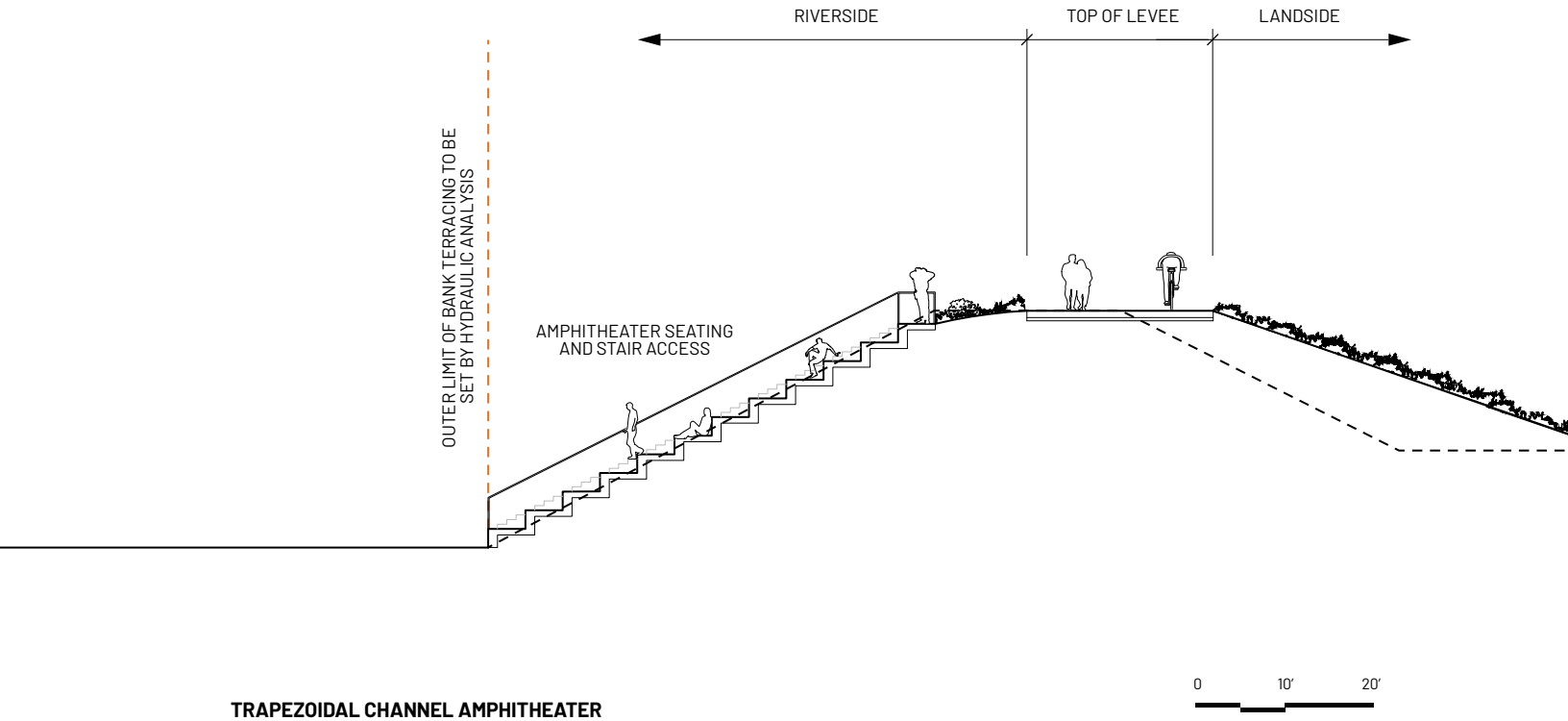
Any modification to an existing channel wall along the LA River is a significant project and investment. This should not be undertaken without qualified engineers who can evaluate the hydraulic and flood risk impacts of any proposed intervention. At a minimum, proposed modifications should not lower the level of flood risk reduction provided before the start of the project. These modifications are not a solution for all 51 miles of the LA River.

Given these parameters, there are two ways to consider terracing a trapezoidal channel where possible. The first method includes wide stepped terraces for planting. Wider planting beds help to retain soil moisture in the heat of summer. Still, additional irrigation and diligent maintenance will be required to ensure the health of the plants. Further, the lowest terrace should be elevated above a frequent storm level to prevent planting from being scoured or eroded during common rain events. In the case of a larger, less frequent flood event, the planting and soil in the terraces may still need to be replenished due to scouring and erosion. The second method of terracing would create hardscape steps and amphitheater seating along the trapezoidal wall. This terracing could be used by the public for special events or festivals that could occur in the channel with appropriate permission and outside of the flood season. While erosion would not be an issue with this method, the amphitheater and steps should still be inspected for cracks or other damage after a major flood event.



TRAPEZOIDAL CHANNEL PLANTING

Figure 139. The trapezoidal channel could be modified to create large terraces for habitat. Consultation with qualified engineers and hydraulic analysis is necessary. This is not a solution for all 51 miles of the LA River.



TRAPEZOIDAL CHANNEL AMPHITHEATER

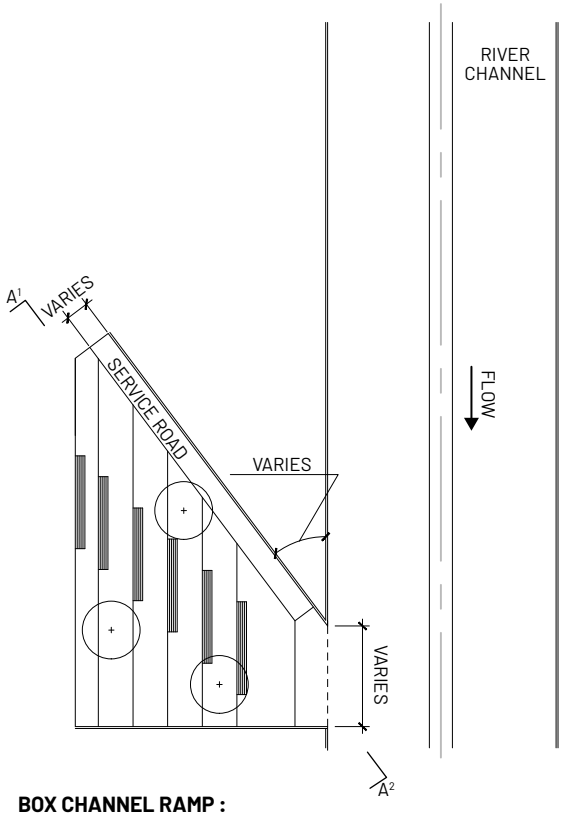
Figure 140. The trapezoidal channel could be modified to create a public amphitheater. Consultation with qualified engineers and hydraulic analysis is necessary. This is not a solution for all 51 miles of the LA River.

CHANNEL MODIFICATIONS SHOULD NOT INCREASE FLOOD RISK, AND SHOULD BE UNDERTAKEN WITH A HIGHLY SKILLED DESIGN TEAM, INCLUDING QUALIFIED ENGINEERS AND LANDSCAPE ARCHITECTS

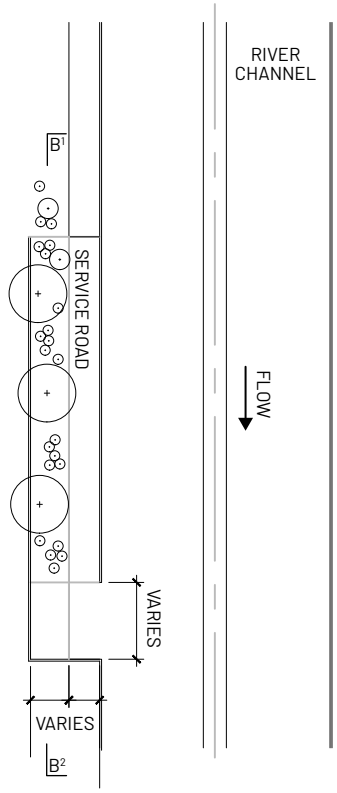
CHANNEL MODIFICATIONS: RECTANGULAR CHANNEL

Any modification to an existing channel wall along the LA River is a significant project and investment. This should not be undertaken without qualified engineers who can evaluate the hydraulic and flood risk impacts of any proposed intervention. At a minimum, proposed modifications should not lower the level of flood risk reduction provided before the start of the project. These modifications are not a solution for all 51 miles of the LA River.

Methods to potentially modify the box channel are shown in the sections to the right and plans below. One method involves creating a larger terrace for planting, and potentially for stormwater capture and treatment before being released back into the LA River. The terrace should be elevated above the design storm events to prevent scour. The other method opens the wall of the rectangular section to allow for a ramp to enter the channel. The ramps will be used by maintenance vehicles but also can be widened and joined with a large public amphitheater or a vegetated slope. The vegetated slope allows for riparian-upland connection, so that wildlife can access the river as well.

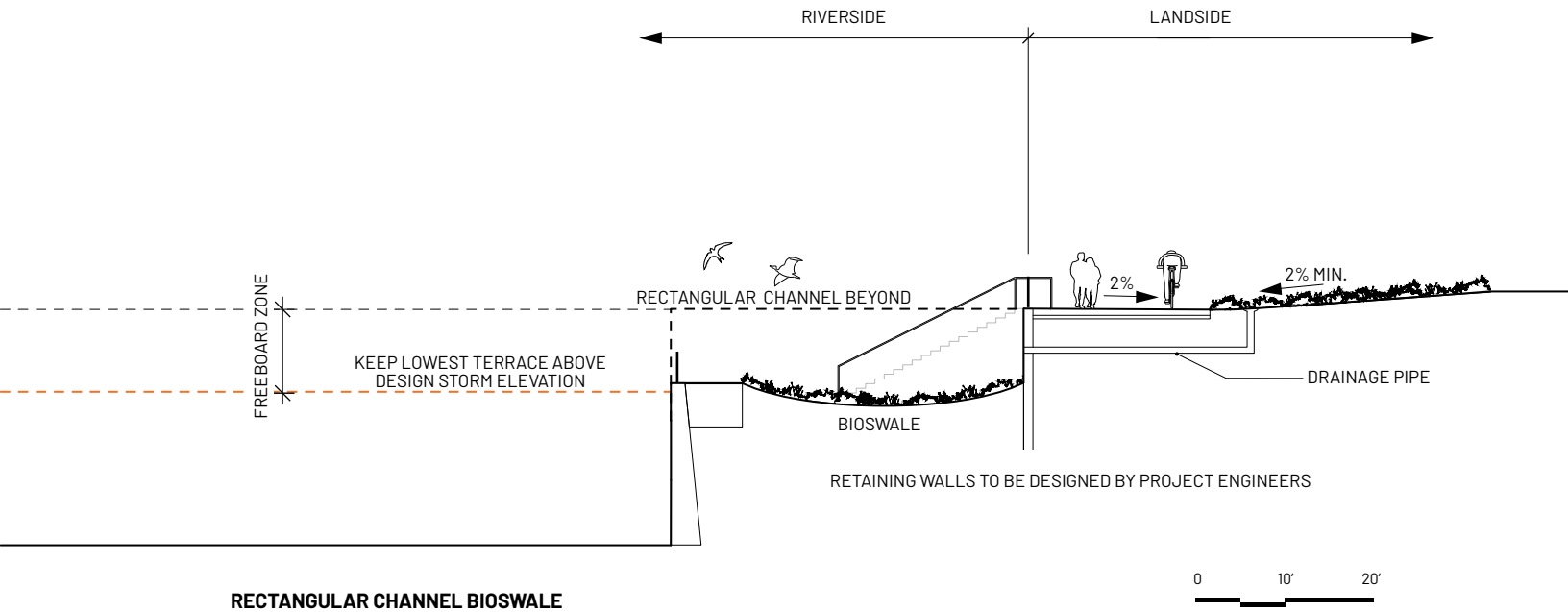


BOX CHANNEL RAMP : AMPHITHEATER



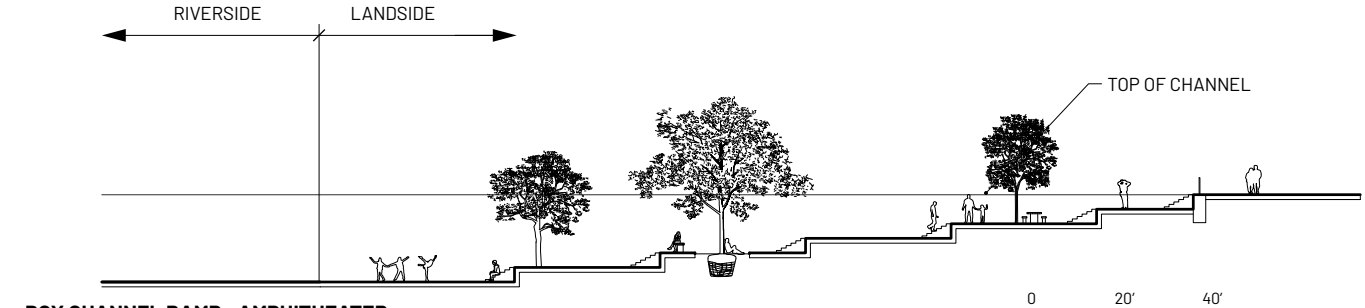
BOX CHANNEL RAMP : HABITAT CONNECTION

Figure 141. The rectangular channel could be modified to create large amphitheaters, a performance venue, or ramps for wildlife. Consultation with qualified engineers and hydraulic analysis is necessary. For sections of these conditions, See Figure 143 on page 183.



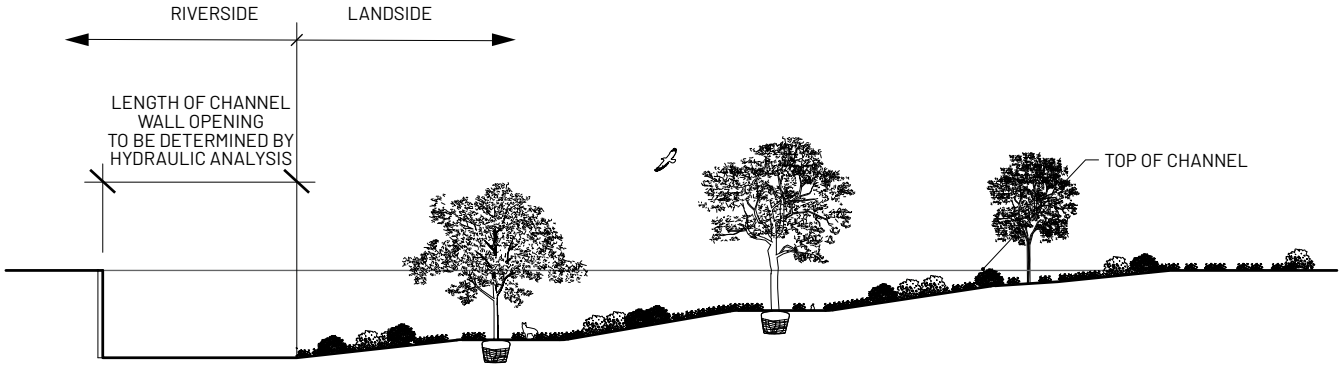
RECTANGULAR CHANNEL BIOSWALE

Figure 142. The rectangular channel could be modified to create a bioswale to collect and treat water before it enters the LA River. Consultation with qualified engineers and hydraulic analysis is necessary. This is not a solution for all 51 miles of the LA River.



BOX CHANNEL RAMP : AMPHITHEATER

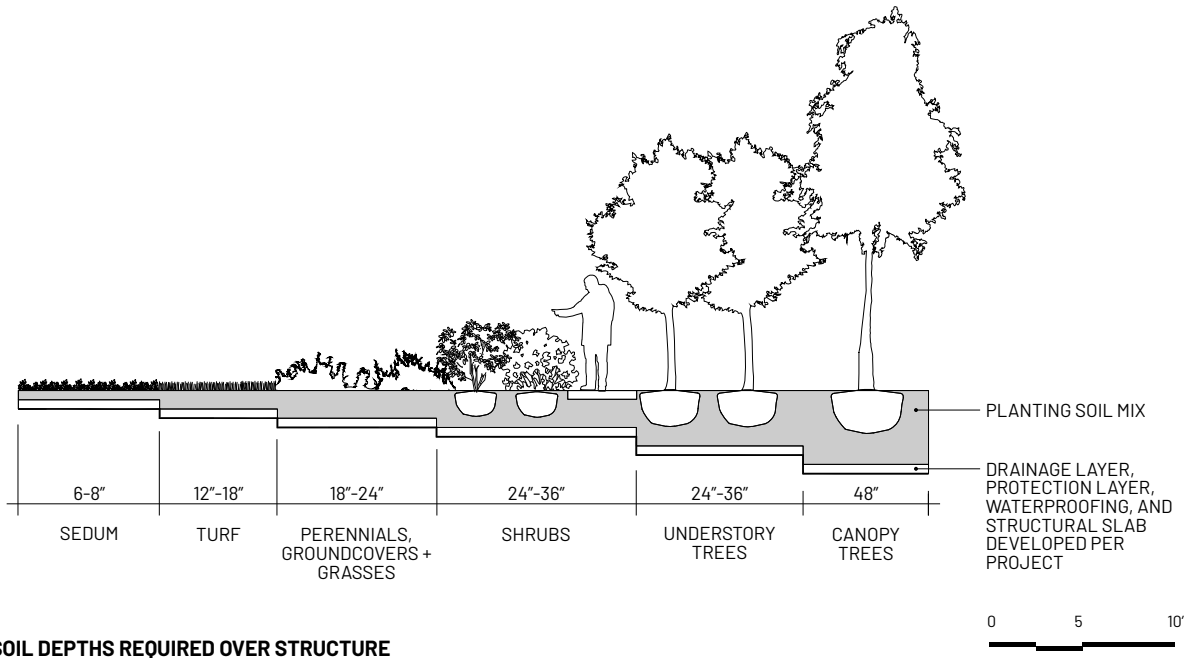
A[1] A[2]



BOX CHANNEL RAMP : HABITAT CONNECTION

B[1] B[2]

Figure 143. The rectangular channel could be modified to create large amphitheaters, a performance venue, or ramps for wildlife. Consultation with qualified engineers and hydraulic analysis is necessary.

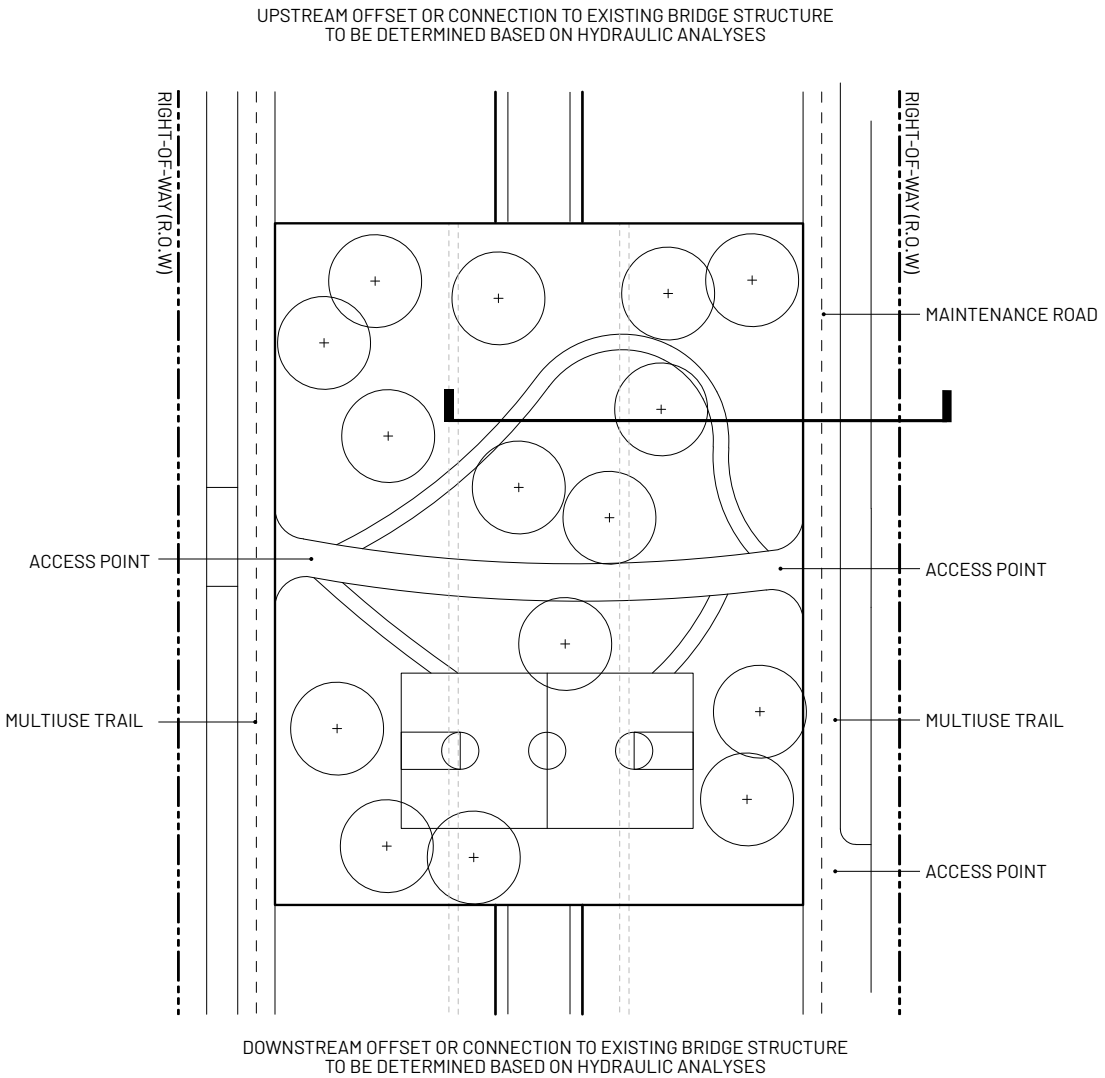


SOIL DEPTHS REQUIRED OVER STRUCTURE

Figure 144. To ensure the healthy growth of planting, the following soil depths should be implemented over structure. The required depths, drainage, and waterproofing need to be coordinated across the project team.

PLATFORM PARKS

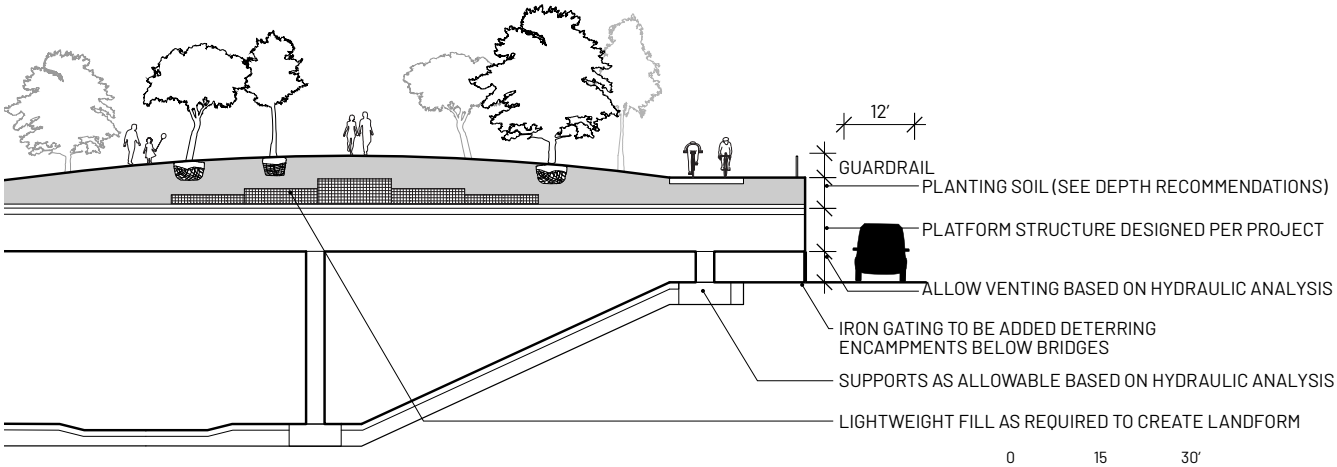
Platforms create a land bridge across the river channel. This modification is a major project and investment and should not be undertaken without both hydraulic and structural engineering. The platform strategy is most effective when there is a high need for connectivity or park space and there is limited or nonexistent landside right-of-way. The platform takes advantage of the right-of-way within the corridor itself to create an engaging public space and destination. Planting on the platform should be considered as a landscape over structure and adequate soil depths should be provided, as shown in Figure 50. Waterproofing and root barriers on the platform should be developed on a per project basis across the project team, and is crucial for ensuring proper drainage and structural integrity of the platform. This solution cannot be used over soft bottom portions of the channel or in the estuary, platforms cannot be used for development - only open space, and service trucks will need to have access underneath. Other design considerations include providing for guardrails, ADA access to the platform park, vertical clearance for maintenance vehicles, and the potential for artwork. Overall, the platform park should be welcoming, well-maintained, and programmed so as to serve the needs of the adjacent community.



PLATFORM CROSSING AND PARKWAY PLAN

0 15 30 60′

Figure 145. Platform program and design may vary to include a range of ecological functions, recreational amenities, or passive park space. Platforms cannot be used over soft bottom portions of the channel or in the estuary. Platforms cannot be used for development, only for open space. This is not a solution for all 51 miles of the LA River.



0 15 30′

PLATFORM CROSSING AND PARKWAY SECTION

Figure 146. Platform construction is complex and should be designed per project by the design team. ,Service trucks will need to have access underneath the plaform. Consultation with qualified engineers and hydraulic analysis is necessary. This is not a solution for all 51 miles of the LA River.

THE LA RIVER PROVIDES AN OPPORTUNITY TO EXPAND URBAN AGRICULTURE AND HOST ASSOCIATED URBAN AGRICULTURE EVENTS

PRODUCTIVE LANDSCAPES

Urban agriculture and other forms of productive landscapes should be encouraged in sites along the LA River, especially in communities with limited access to fresh food sources.

For continued success, urban agriculture projects should have strong ties to the community and community organizations that can conduct programming with the project itself. A continued presence and regularly scheduled events ensures that community members can become engaged stewards of the agricultural plots. Tying the project to programs such as a Community-Supported Agriculture (CSA) can provide fresh produce to community members at a lower cost.

Existing urban agriculture sites around the LA River and other initiatives provide useful precedents for expanding urban agriculture practices along the river corridor. The Urban Agriculture Incentive Zones Act (AB551) enacted by the state of California in 2014 provides incentives to landowners for putting vacant land into agricultural use.[22] The Urban Orchard Project planned by the Trust for Public Land aims to create a community garden and plant culturally significant fruit trees near the Rio Hondo confluence.[23] The Carmelitos Community Garden in Long Beach provides 60 raised beds for families to grow produce and also hosts a variety of youth programs and community events.[24] Alma Backyard Farms in Compton works with people impacted by the criminal justice system and provides on-site job training services.[25] Farm LA is also a non-profit focused on transforming vacant land in the Elysian Valley to productive land with drought tolerant vegetables such as beans and grains.[26] While these are only a snapshot of existing programs and others to come, the LA River provides an opportunity to expand urban agriculture and host associated urban agriculture events as well as opportunities for artwork.

Siting considerations for any urban agriculture projects include access to full sun and a frequent and consistent water source. Any vegetable plots would ideally be on a level surface such as a flatbed or raised box.

If urban agriculture is to be included in the planting plans of the site, those specific areas do not need to meet native planting requirements. However, under no circumstances are invasive species allowed to be planted. Under the Model Water Efficient Landscape Ordinance adopted in 2015, any areas solely dedicated to edible planting are considered a "Special Landscape Area" and can use higher amounts of water for irrigation than ornamental planting.[27] Only potable water should be used to irrigate edible plants.

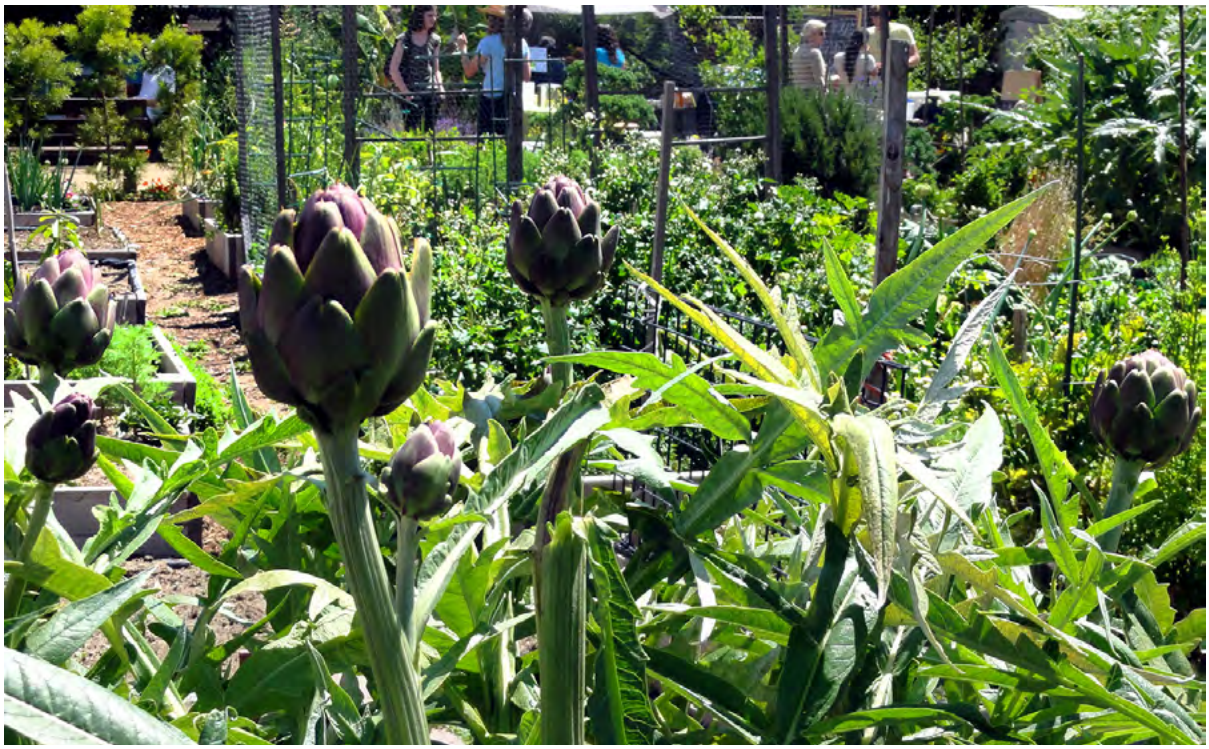


Figure 147. The creation of urban agricultural and community gardens along the LA River is encouraged and provides opportunities for education, access to fresh food, and a sense of stewardship in landscapes along the river. Productive landscapes are not subject to the same native planting or water requirements as other areas. Source: Craig Dietrich, 2011. https://www.flickr.com/photos/craigdietrich/5837953488/in/photostream/.

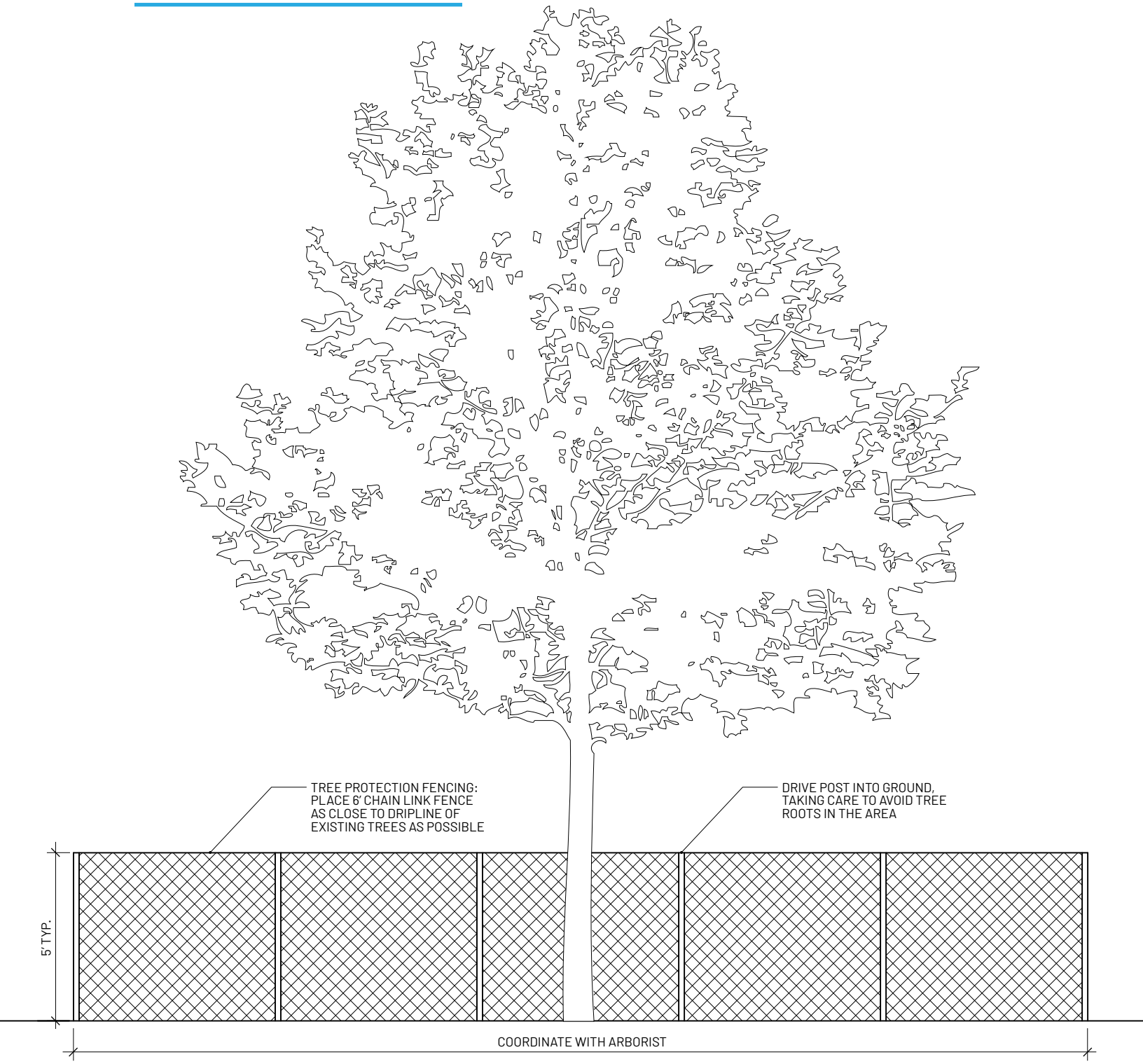
It is important to develop a maintenance plan for the plots that does not use pesticides or herbicides near crops. Consider planting insect repellent plants such as dill, thyme, lemongrass, lavender, basil, and chamomile. Additionally, strive to use organic mulch and compost. Rotate crops per season to prevent the buildup of diseases and insects specific to certain kinds of vegetables, and plan for the use of both warm season and cool season vegetables.[28]

Groundcover, shrub, vine, and canopy layers should all be considered when selecting edible plant species. It is important to consider species and foods that are culturally significant to the surrounding community. Plant species selection should also be conscious of any invasive pest or plant disease that could jeopardize the health of the plants and crop (such as the Asian Citrus Psyllid). Monitoring and maintenance programs should be adapted to any pest or disease as required. As with other plant species, only source material from qualified nurseries.

Examples of plant species that produce edible crop include, but are not limited to, the following:

- Trees: Avocado (*Persea americana guatemalensis*), Fig (*Ficus carcia*), Citrus (Oranges, Grapefruits, Lemons), Pomegranate (*Punica granatum 'Wonderful'*)
- Vegetables: Artichoke (*Cynara scolymus*), Kale (*Brassica oleracea var. acephala*), Squash (summer and winter varieties), Tomato, Eggplant (*Solanum melongena*)
- Cactii: Prickly pear (*Opuntia spp.*)
- Herbs: Oregano (*Origanum*), Rosemary (*Rosmarinus officinalis*), Garden sage (*Salvia officinalis*), Thyme (*Thymus*), Chives (*Allium schoenoprasum*)
- Vines: Raspberry (*Rubus*), Peas (*Pisum sativum*), Lima beans (*Phaseolus lunatus*)

ALL PROJECTS WITH EXISTING TREES MUST RETAIN AN ARBORIST TO REVIEW TREE HEALTH AND RECOMMEND PROCEDURES FOR PROTECTION, TRANSPLANTING, OR REMOVAL



TREE ROOT PROTECTION

Figure 148. Tree protection should be coordinated with the project arborist. Protection fencing should be placed along the dripline of existing trees.

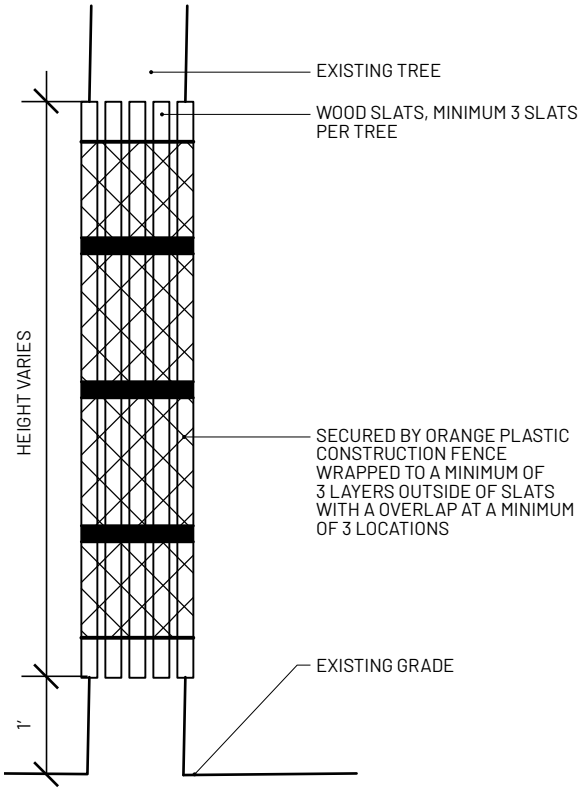
TREE AND PLANT PROTECTION

Tree and plant protection is important in both protecting existing vegetation during construction and ensuring the survival of young plants after installation. In projects where habitat succession is key, tree protection fencing may be useful in ensuring that plants can establish themselves without disturbance. All projects with existing trees must retain an arborist to review tree health and recommend procedures for protection, transplanting, or removal.

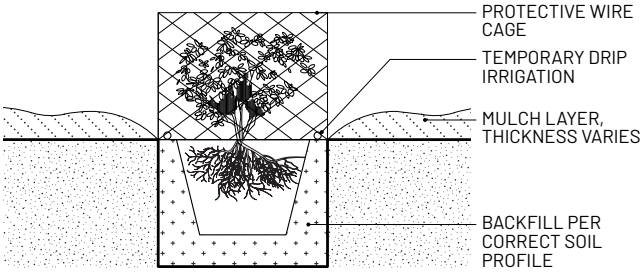
Tree protection zones are designated by tree protection fencing, which should be placed around the dripline of the existing trees. The zone should be established by the project landscape architect and arborist. Contractors are to keep soil disturbance within the tree protection zone to a minimum, excluding the use of heavy machinery. All digging in the zone is to be done by hand.

Tree trunk protection is another measure to further protect trees within the tree protection zone from damage during construction. Tree protection measures are temporary and meant to be in place during construction and removed afterward project completion. Adequate resources should be allocated for both installation and timely removal.

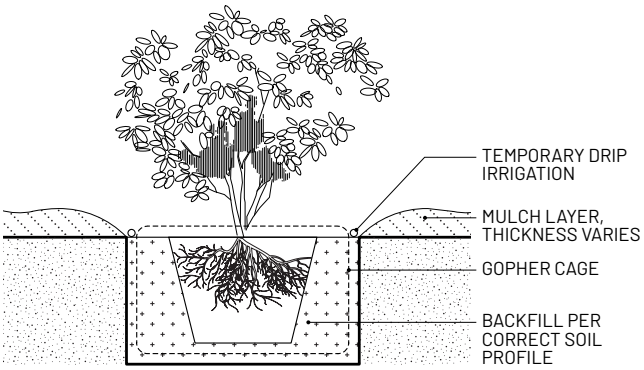
A combination of staking and installation of protective wire cages is recommended for small trees and shrubs to protect plants from vandalism and herbivory damage. In ground gopher cages may also be necessary to protect plant roots underground from squirrels, pocket gophers, and gophers.



TREE TRUNK PROTECTION



WILDLIFE SHRUB PROTECTION: CAGE



WILDLIFE SHRUB PROTECTION: GOPHER CAGE

Figure 149. (Left) Tree protection also includes wood slats around the trunk of existing trees and they should be removed after construction.
Figure 150. (Top Right) Protective wire cages around shrubs susceptible to wildlife grazing can help protect them during establishment.
Figure 151. (Bottom Right) Gopher cages help protect shrub rootballs from burrowing wildlife during establishment.

SITE PREPARATION AND SOIL

Planting failures are often a result of inadequate soil testing that would have guided a landscape architect, botanist, or ecologist towards a plant palette that could tolerate the present soil conditions. The landscape architect or planting designer should use the soil analysis results to determine the plant palette. Soil testing results are to be used to provide guidance for container planting, soil amending, and backfill conditioning. California native plants typically inhabit (and thrive in) areas with relatively low soil fertility. Therefore, the soils report fertility section must be interpreted by someone who is experienced and knowledgeable of California native plant horticultural requirements/parameters.

All existing soils should be tested to verify they are free of contaminants and debris and have the capacity to support adequate nutrients, drainage, and structure for a given planting design. Where possible, existing in situ soil materials should be amended in place after appropriate soil testing is conducted. Soil mix designs shall be based upon criteria of use. For example, soils designated for a given frame should balance the following criteria in the development of soil plans:

- **Ecological Rehabilitation** – Use a native soil type within the frame as a reference soil appropriate to the constructed context. A native reference soil will identify placement slope conditions, organic content, soil texture, and approximate pH as well as endemic vegetation supported by the soil material. Nutrient levels should also be based on this native reference soil condition.
- **Water Quality and Stormwater Management** - Refer to the Los Angeles County Public Works Low Impact Development Manual[29] for appropriate drainage classes and other functional criteria for vegetated swales, biofiltration, etc.
- **Recreational Areas** – Planted areas that receive high levels of foot traffic should be designed to resist compaction from foot traffic.

Further, all soils—amended, stockpiled or mixed—shall be tested for suitability. The Contractor shall submit representative samples of salvaged on-site topsoil, all plant mix materials, and organic material components which are intended to be used for planting soil mixes and final mixes to an independent Soil and Plant Testing Laboratory acceptable to the landscape architect. All tests shall be performed in accordance with the current standards of the Soil Science Society of America. All reports shall be sent to the landscape architect for approval. Samples of all soil materials to be brought to the site must be approved before delivery. Deficiencies in the soils shall be corrected by the Contractor, as directed by the landscape architect after review of the testing agency report.

Soil Amendment and Plant Mix analysis test methods shall show recommendations for soil additives, including organic and inorganic soil amendments, necessary to accomplish particular planting objectives noted.

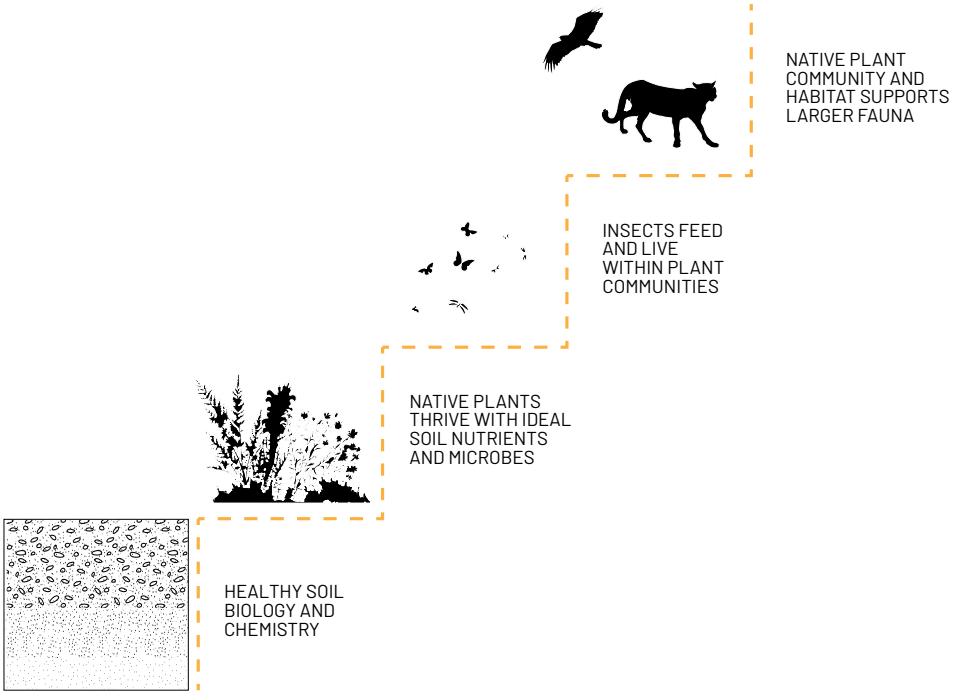


Figure 152. Ensuring proper soil testing and composition is crucial to supporting the life and structure of healthy functioning ecosystems. Soil mixes should be designed for it criteria of use, and all soils should be tested for suitability prior to installation.

The following are minimum test criteria that should be specified by the landscape architect:

- pH and Buffer pH
- Analysis for levels of toxic elements and compounds
- Particle size analysis to include sand sieve analysis shall be performed and compared to the USDA Soil Classification System
- Percent of organic matter shall be determined based on organic carbon
- Carbon-to-nitrogen ratio shall also be reported to qualify the soil organic matter suitability
- Saturated hydraulic conductivity
- Analysis for nutrient levels
- Soluble Salt by electrical conductivity
- Cation Exchange Capacity

Organic and biological approaches to soil improvement are encouraged for consideration in the planting and management program. These approaches may include the addition of biological infusions e.g., compost teas, mycorrhizal inoculations, and composted organic matter.

It is possible to alter soil conditions with a succession of plantings that will change the soil to eventually support a more diverse plant palette. At some project sites where soil contamination exists, it may be possible to utilize plants to assist in taking up toxins. However, that approach may be beyond most landscape budgets. Soil amendments are a possible alternative but should not be a part of standard planting specifications for these projects. Heavy soil contamination is a probable condition in areas along both entrenched and leveed conditions. Therefore, soils should be tested to determine its ability to retain and infiltrate water, soil fertility (macro and micro nutrients), biological activity, texture, toxics, salts, and heavy metals.

Importing soil mix materials will be required for some projects, particularly larger parks or gateways. All components for imported soil mixes should be sustainably sourced. Peat shall not be specified as a soil mix component. Landscape architects are encouraged to test and use innovative soils that promote the use of sustainable sources.

FOR BOXED TREES AND SHRUBS:
CAREFULLY REMOVE SIDES OF BOX AFTER PLACED IN PIT. WOOD BOTTOM MAY REMAIN IN PLACE. REMOVE ALL ROOT SECTIONS GROWING PARALLEL TO THE SURFACE OF THE ROOT BALL AND LOCATED AT THE ROOTBALL OUTER SURFACE GREATER THAN ¼". REMOVE SOIL AS NECESSARY TO UNCOVER ROOT FLARE

TREE AND SHRUB PLANTING

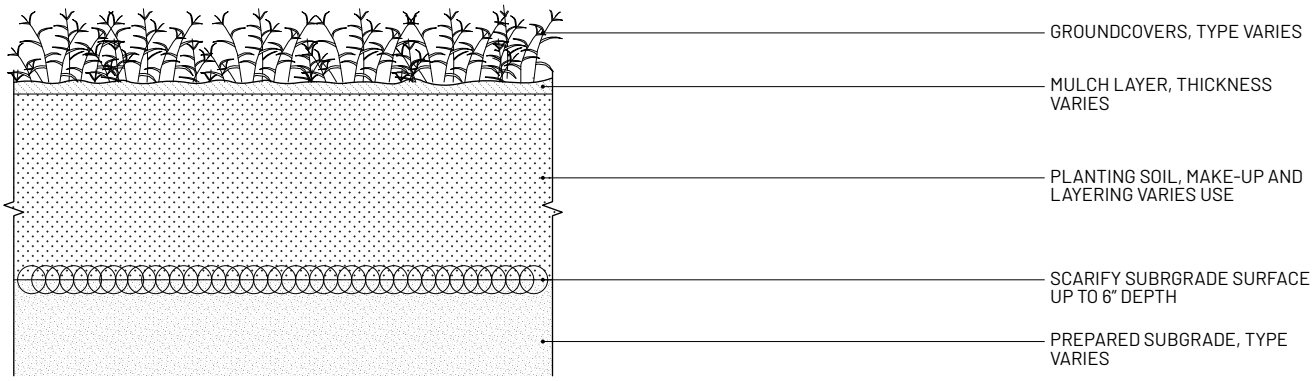
All plant material must be procured from a nursery that holds an appropriate nursery license with the California Department of Food and Agriculture (CDFA) to sell the requested plant material. Preference should be given to nurseries in southern California that are members of the Southern Californica Nursery Best Management Practices (BMP) Group. Contractor shall submit proof of license that all plant material was obtained by a pest free nursery in good standing with CDFA. Plant material quantities and handling standards must comply with the latest version of the American Standard for Nursery Stock (ANSI Z60.1) published by the American Horticulture Industry Association. Avoid purchasing plants affected by pathogens and use nurseries that incorporate best practices for pathogen avoidance.

Planting of seed and container plants is to occur in late fall through winter to benefit from seasonal rains. The project landscape architect is to prepare a specific planting schedule for each project. Plants are to be established from smaller plant sizes where practical. Plants shall be well shaped, vigorous, with healthy, well developed root systems and not be rootbound. Plants shall be healthy, and free from disease, harmful insects and insect eggs, sun-scald injury, disfigurement, and abrasion. Plant pits shall be dug to produce roughened sides and flat, uncompacted bottoms. When pits are dug with an auger and the sides of the pits become glazed, the glazed surface shall be scarified. The size of plant pits shall be as indicated on drawings. Backfill for planting pits shall comprise amended site soil or manufactured soil media and organic compost depending on soil analysis results as specified by landscape architect.

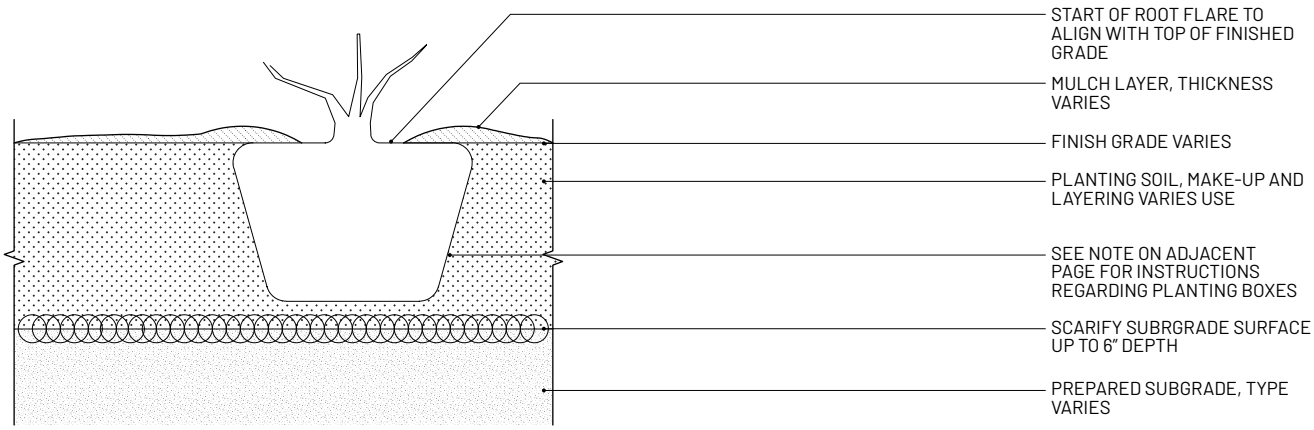
Seed and container plants of indigenous natives are to be obtained through contracts with qualified seed companies and nurseries. The contractor shall acquire all seed material of the required type, sizes, and quantities through sources approved by the project landscape architect. The contractor shall submit seed supplier's certification and contact information confirming that the collected seed is exclusively from LA River watershed sources. If LA River watershed seed sources cannot be obtained contractor shall state reasons why material is unavailable, such as insufficient quantities or lack of seed stock. Seed not required to be labeled under the California Food and Agricultural Code shall be tested for purity and germination by a seed laboratory certified by the Association of Official Seed Analysts, or a seed technologist certified by the Society of Commercial Seed Technologists not more than one year prior to application of seed. Seed treated with mercury compounds shall not be used. Seed shall be delivered to the site in original sealed packages bearing the supplier's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Weed seed shall not exceed 1% by weight of the total mixture. Wet, moldy, or otherwise damaged seed shall be rejected.

Each project is to be managed to provide adequate lead time for collection and propagation with the assistance of the project planting expert.

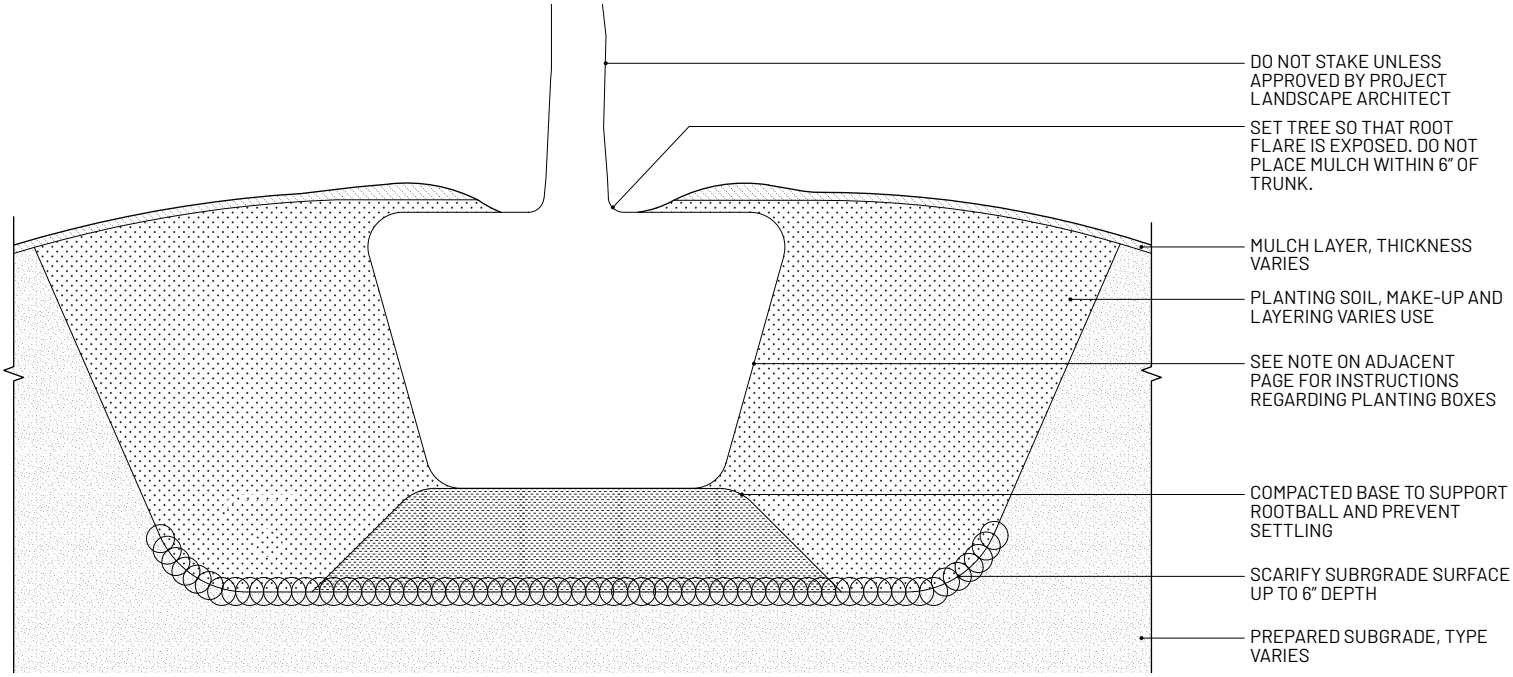
The subgrade should be scarified at least 6" deep before planting to ensure proper drainage. Seeded areas shall be lightly scarified. Finished grade shall be 1/2-inch below the adjoining grade of any paved area. New surfaces shall be blended to existing areas. All plants are to be thoroughly watered upon installation to compact soil and settle plants to natural soil depth. Planting areas that are not seeded are to be covered with 3-6" of organic mulch.



GROUNDCOVER PLANTING TYPICADETAIL



SHRUB PLANTING TYPICAL DETAIL



TREE PLANTING TYPICAL DETAIL

Figure 153. Planting installation methods should include scarifying the subgrade, aligning all root flares with the finished grade, and providing a compacted base for rootballs to provide the best growing conditions and allow the planted media to have the best chance of success.

MAINTENANCE BEST PRACTICES

EXTENDED MAINTENANCE PROGRAM

The project proponent is required to prepare a three year maintenance and monitoring program for all plantings and to designate who will be in charge of all short and long-term maintenance actions. This program is to define a schedule for observing and recording landscape performance with the goal of identifying actions that are needed to improve planting success. Such actions may include replacement plantings needed to replant areas where container plants have died or insufficient seed germination has occurred.

SUPPLEMENTAL IRRIGATION

The design and installation of supplemental irrigation systems to sustain new landscape plantings is discretionary. Ideally, planting projects will establish communities of native plants in a manner that encourages self-reliance and survival after the first three years of planting. In this regard, irrigation systems may be designed to assist in the initial plant establishment stages or during times of intense drought, but consistent long-term watering is to be discouraged. An exception would be specialty plantings in high use recreation areas, at road intersections, or in highly paved areas. These types of planting areas may require additional supplemental irrigation for an extended number of years to maintain the vitality of the landscape.

The application of supplemental irrigation water for California native species is recommended primarily during the winter months with the intent to avoid winter drought stress to newly planted plants. Winter irrigation can be very helpful in maintaining soil moisture when there are long periods of time between winter rains. Summer and fall watering may be limited in accordance with prevailing site and environmental conditions until the following winter rain cycle begins.

After the first year of establishment, the decision to provide additional supplemental irrigation during the summer should be made by the landscape architect.

Where possible, recycled or reclaimed water should be used on projects for irrigation. If recycled or reclaimed water is used, total dissolved salts from the sources should be analyzed as many California natives cannot tolerate high levels of dissolved salts.

All irrigation supply and system components shall comply with the LA County Low Impact Development Manual, LA County water sources, conservation standards, and the current California Green Building Standards Code. Consult LAC Public Works Plan Check for irrigation system design and documentation requirements. Drip irrigation systems, when installed, should be capable of providing multiple emitters to each container plant. In areas of large open landscapes, drip irrigation should be carefully monitored for performance. Often wildlife can chew or dig up flexible drip irrigation lines in large landscapes. If practical hard pipelines are more durable. Strategies for mitigating damage should be developed through an integrated pest management approach, identifying the likely source of damage. For example, ground squirrels may be addressed with netting and landscape fabric, coyotes may require hard piping or other means. Alternatives to drip irrigation can also be considered depending on project needs and code compliance. Additionally, alternatives to poly-ethylene drip piping or other easily damaged materials may be implemented depending on project needs, budget, and code compliance. As-built drawings of all irrigation systems shall be completed and submitted to LAC Public Works for future use.

Figure 154. Native planting along the LA River, as seen here at the North Valleyheart Riverwalk at river mile 39.7, should be incorporated into the trail access points. Source: OLIN, 2019.

PRUNING AND REMOVAL OF PLANTS

Landscape plantings are to be maintained in a manner that helps achieve natural form, diversity and density among plants. Trimming, pruning, and removal of plants is to be done under the guidance of a qualified native plant specialist and to avoid shearing and out-of-season cutting and pruning. Additional pruning and removal of plants shall be done to maintain public safety and access for service and emergency actions.

INVASIVE SPECIES REMOVAL AND SUPPLEMENTAL MULCHING

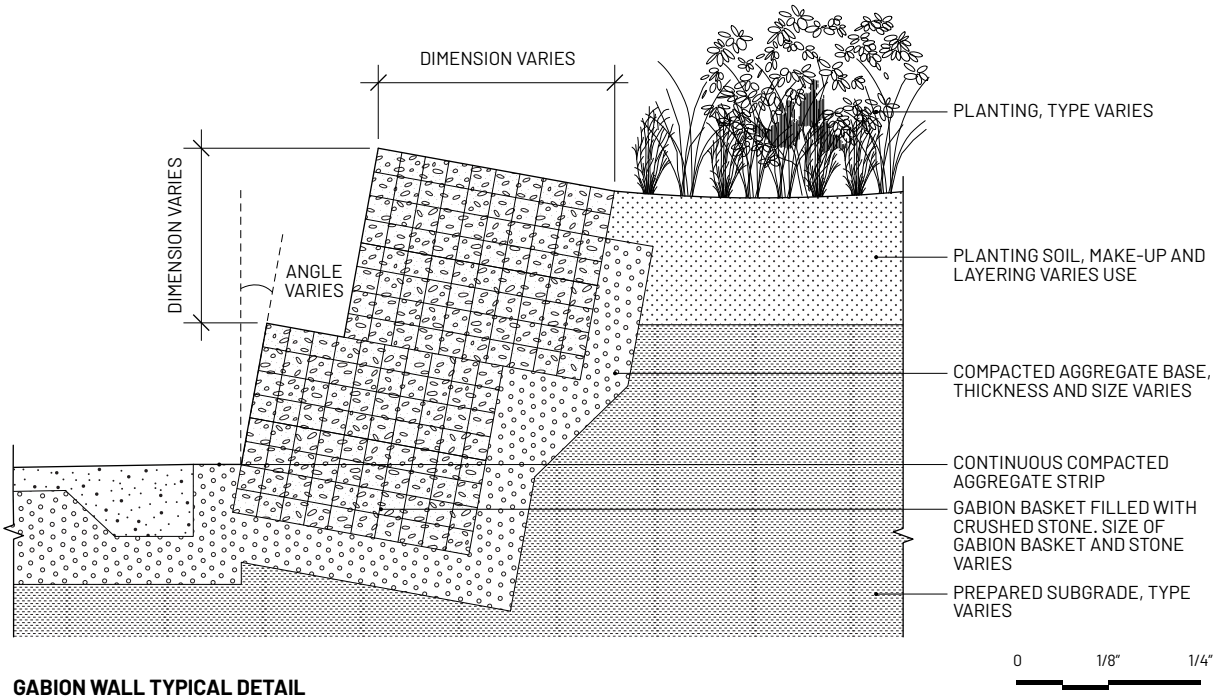
The monitoring and maintenance program shall provide for routine landscape inspections to inspect and test irrigation systems, manage weed growth, and to assess the need to provide periodic augmentation of mulches (to maintain a depth of 3-6″). Removal of invasive species by hand and mechanical means is recommended where feasible. Systemic herbicides that are glyphosate based such as Roundup or Rodeo SHOULD NOT be applied. Particularly aggressive invasive species, such as Arudo donax, spread by rhizomes and need careful consideration and monitoring when establishing a method for removal. Additional mulch is recommended to cover exposed soil and further inhibit the growth of weeds. Refer to LA County Weed Management Area Best Management Practices for Vegetation Management document (revised December 2015).[30]

WALLS

Site walls may be included in projects as barriers, seat walls, decorative elements with the potential for artwork, or to retain slope. Retaining walls are useful in projects that need to achieve a significant elevation change in a limited horizontal distance. They are a worthwhile investment where slopes need to be retained in a tight right-of-way condition.

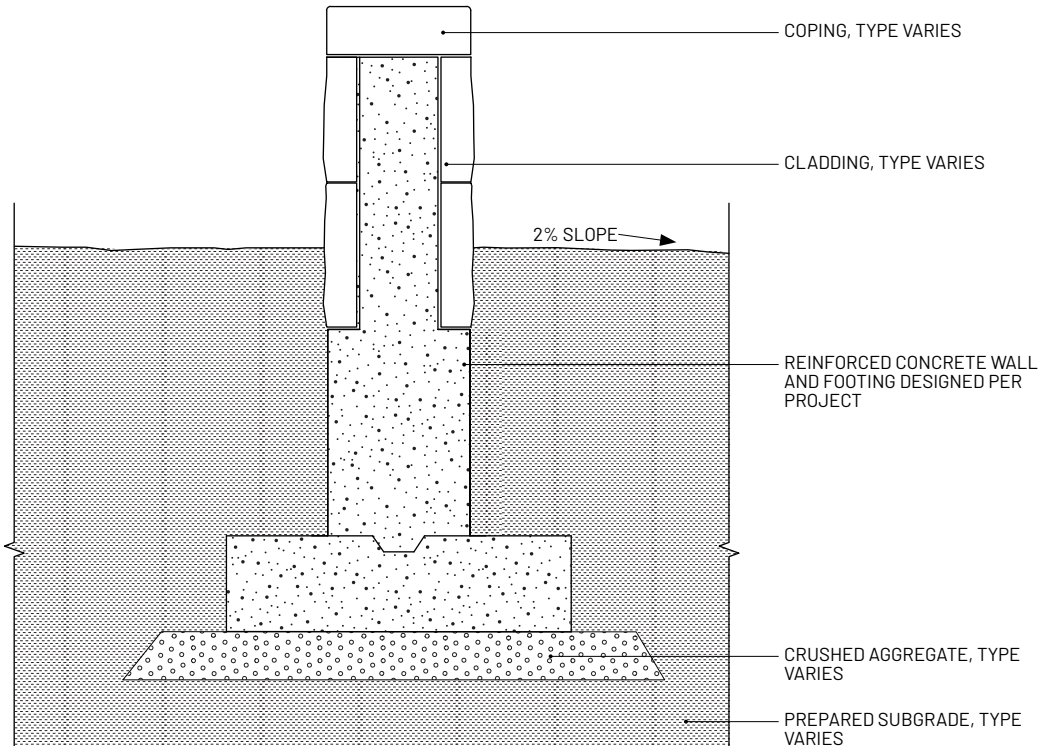
Options for retaining walls include gravity or cantilever walls, constructed from concrete and stone, or can be gabion walls, consisting of steel wire cages filled with stone. Gravity walls are monolithic pieces or stone or concrete, while cantilever walls consist of two parts - a stem and a base. Gravity walls are recommended for smaller heights, while cantilever walls are more economic for height differences of 4 to 10 ft. Gabion walls are often a more economical wall option and can allow substantial vegetation growth near the wall. Gabions are often placed against the slope at a specific angle back against the slope. All retaining walls should be designed with a structural engineer to prevent wall failure.[31]

Walls also provide an opportunity for art and community expression. Other wall treatments, such as planting or textured treatments can also be considered to deter vandalism.



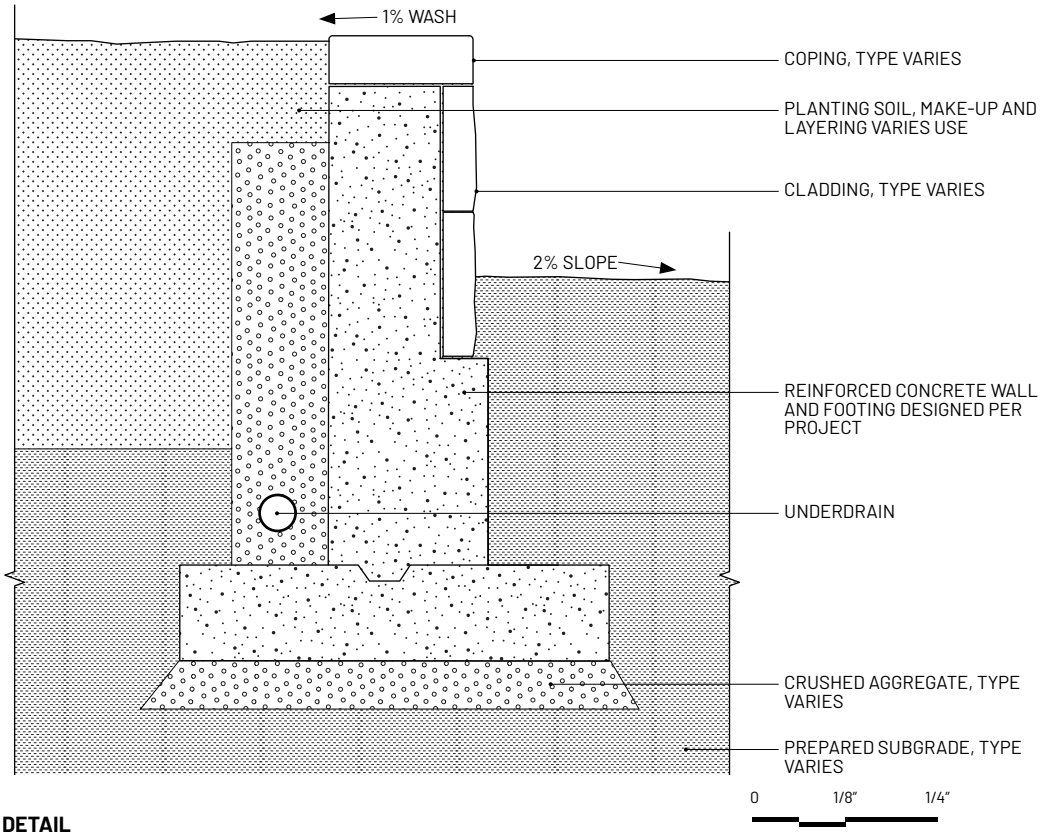
GABION WALL TYPICAL DETAIL

Figure 155. Gabion walls are often a more economical option for grade retention and allow for a substantial amount of planting near the wall. Gabion walls should be designed with a structural engineer.



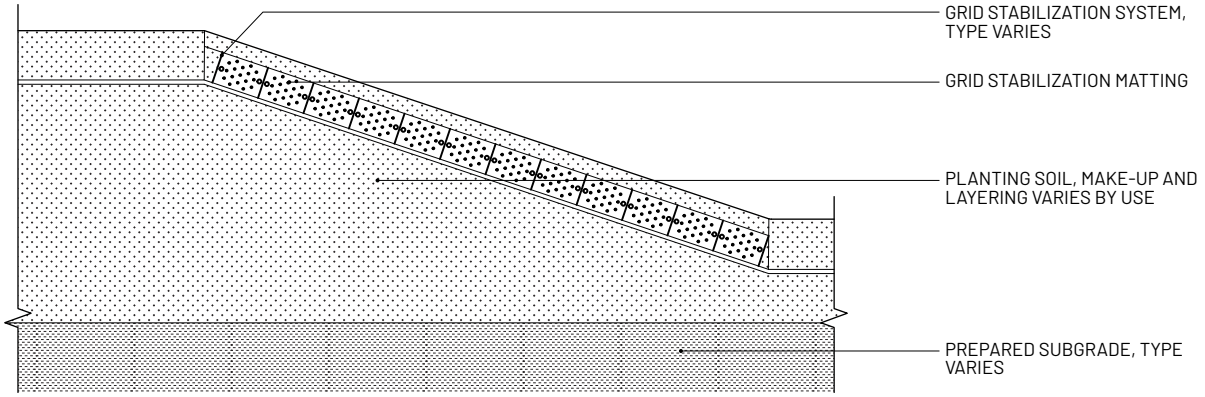
SITE WALL TYPICAL DETAIL

Figure 156. Site walls may function as barriers, seat walls, or decorative elements and should be designed with a structural engineer.

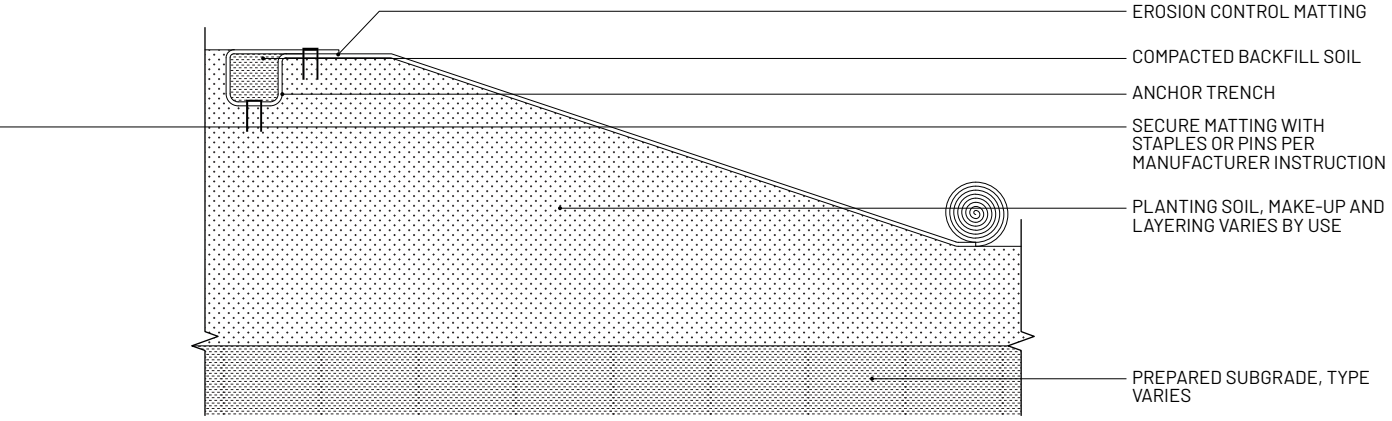


RETAINING WALL TYPICAL DETAIL

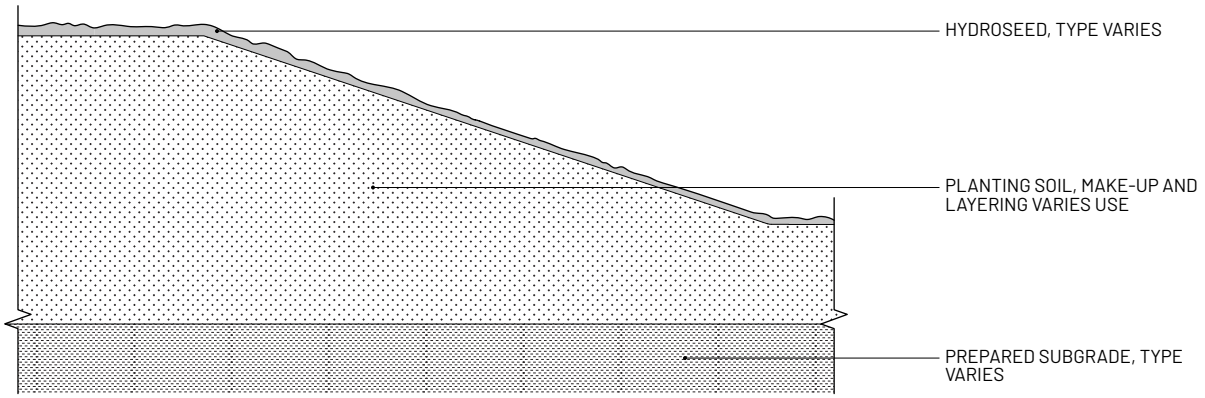
Figure 157. Retaining walls achieve a significant change in grade over a relatively narrow space and should be designed with a structural engineer.



GEO-GRID EARTH STABILIZATION



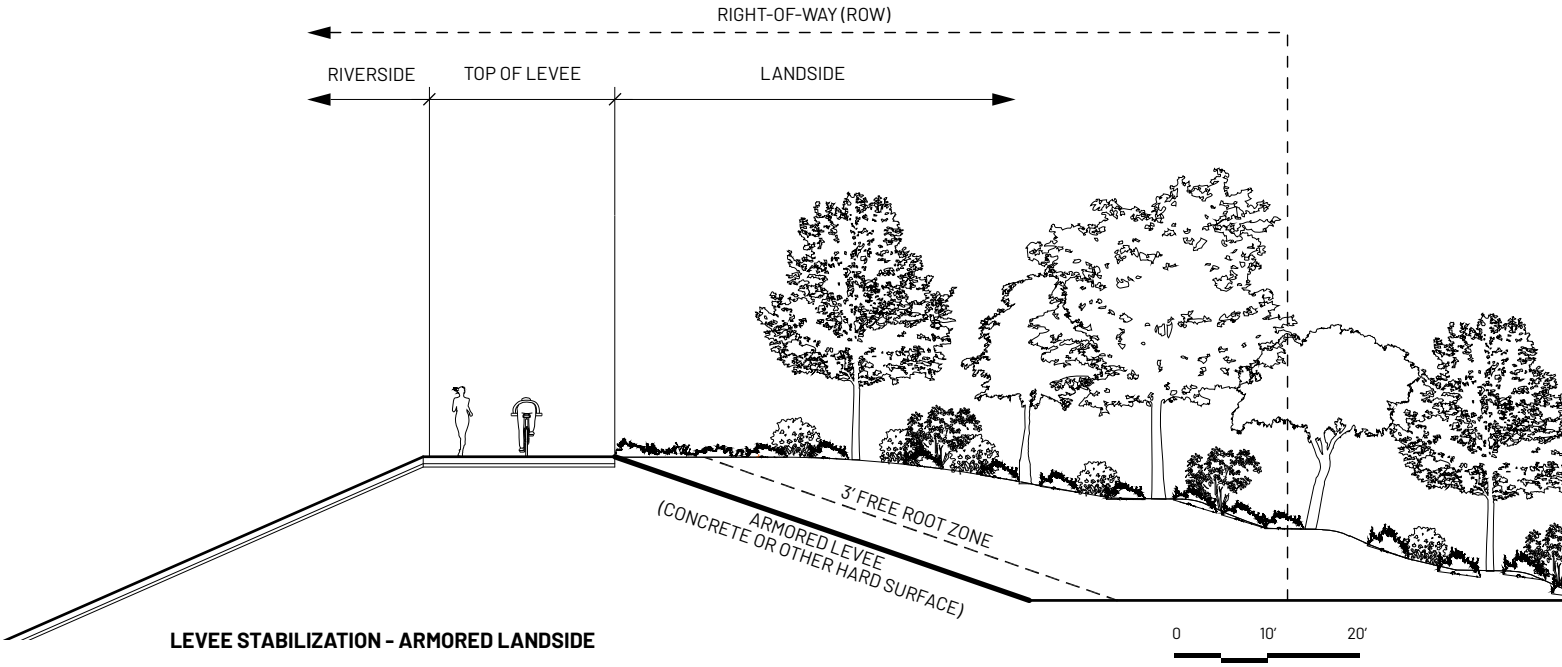
EROSION MAT STABILIZATION



0 1/8" 1/4"

HYDROSEED STABILIZATION

Figure 158. Geogrid mats, erosion mats, and hydroseeding are examples of strategies for slope stabilization on landside levee slopes. Slope stabilization should occur both during and after construction. The growth of deep rooting shrubs and groundcovers should be encouraged as a long-term slope stabilization method.



LEVEE STABILIZATION - ARMORED LANDSIDE

Figure 159. Armoring the landside slope of a levee is a technique that helps prevent levee failure under extreme overtopping events and strengthens the resilience of the levee over time. It also allows for the construction of a planting berm that supports tree and shrub planting.

SLOPE STABILIZATION AND EROSION MANAGEMENT

In projects where slopes do not have a tight landside right-of-way constraint, slopes can range up to a 3:1 slope with vegetation. During and after construction, any exposed slopes should be treated to avoid dust and sediment erosion. There are multiple methods available, including geo-grid matting, erosion control matting, and hydroseeding. Encouraging the long-term growth of deep rooting shrubs and groundcovers is the most robust and environmentally-conscious slope stabilization method. All of these techniques are meant to be deployed along the landside right-of-way only, as they would not be able to withstand the flood water velocities in the river channel.

Geogrid matting helps to stabilize steep slopes to prevent sliding. It often comes in a grid or waffle-like form, with gaps to allow planting to take hold. Erosion control matting reduces erosion by wind and runoff and also reduces runoff velocities and soil crusting. This protective covering should be of a natural, biodegradable woven material that helps to preserve soil moisture and lower soil temperatures, helping to establish more permanent vegetation over time while it biodegrades. Surface mulch for erosion control and weed abatement may comprise composted wood derivatives such as ground bark, chipped tree trimmings, or other wood waste material free of stones, sticks, and toxic substances harmful to plants and stabilized with nitrogen. Any stabilization of wood-based mulches with nitrogen should only be done at the direction of a landscape architect, botanist, ecologist or soil scientist experienced in the nutritional needs of native plant species. Hydroseeding is the act of spraying a mixture of native seeds, mulch, and binders onto a slope for temporary stabilization and to encourage the growth of both temporary and permanent vegetation. The binder in the mixture eliminates the need for matting to secure the mulch, thus allowing for easy application. Hydroseed fiber shall be produced from natural or recycled (pulp) fiber, such as wood chips or similar wood materials or from newsprint, chipboard, corrugated cardboard, or a combination of these processed materials, and shall be free of synthetic or plastic materials and shall be of such character that the fiber will disperse into a uniform slurry when mixed with water. The hydroseed and hydromulch mixtures should ideally be applied during the fall to take advantage of not only winter rains, but also the cold stratification that may enhance germination of many native plant seeds.[32]

For increased resiliency to flooding, armoring the landside of levees is a modification that would reduce the risk of levee failure under extreme overtopping events. Armoring methods such as hardening the levee with concrete or other hard material could be buried to allow for planting above.