

Appendix E

Succulent Transplanting Plan

Salvage, Stockpiling, and Final Transplanting of Cacti and Yucca

The salvaging contractor or a qualified biologist shall identify on site within the right-of-way (ROW) with flagging tape all cacti and yucca that are subject for removal and will mark the north orientation for all cacti and yucca to be transplanted. The following plants will be salvaged: 1) all yucca less than 10 feet in height, 2) all barrel cactus, 3) all hedgehog cactus, 4) all cottontop cactus, 5) all beavertail cactus; and 6) all cholla less than three feet in height. Cholla greater than three feet in height and Joshua trees greater than 10 feet in height will not be salvaged. This material may be used as vertical mulch and spread over the surface of the restored areas to prevent possible trespass. Vertical mulching techniques are described below.

Prior to removing any cactus or yucca, the plant must be inspected by a biologist qualified to determine if nesting birds, such as cactus wren or other passerine bird species, are occupying or nesting in or around the plant if the removal is to occur during the avian nesting season (March 15 to July 30). Furthermore, the area surrounding the removal site will be surveyed for protected plant and animal species prior to the relocation. Any protected plant or animal species is to be avoided as described in the project permits and documents.

A qualified botanist, familiar with transplanting cacti and yuccas, should either conduct or direct the removal, stockpiling, and transplanting of the plants. The goal is to achieve an 80 percent survivorship.

1.1 PLANT SALVAGE

Each individual to be salvaged will be assigned an ID number and will be permanently tagged on the north side of the plant. Global Positioning System (GPS) coordinates will be taken at all removal locations and recorded so that each plant can be returned to its original location on the ROW after the fiber optic line is installed. The optimal time at which plant salvage should occur is between March and November and when nighttime temperatures do not fall below 60 degrees Fahrenheit. If planting is to occur outside this period, additional measures will be necessary (see Section 1.2).

1.1.1 Cacti Species

Cacti should be dug by hand and carefully removed in order to not damage roots. Cacti removal/transplanting have numerous important procedures that should be followed.

1. The rooting distance of cactus is typically three to five times the width of the plant. Therefore, the salvaging contractor should begin the digging/excavation no less than 6 inches and an average of 4 times the width of the above-ground stem segments from the base of the cactus to avoid damaging the roots.
2. Cacti are very shallowly rooted. The contractor should excavate all cacti with a shovel just below the root ball of the plant, typically 4 to 8 inches below the soil surface.
3. Lift cacti out of their original locations using a worn-out garden hose placed slightly below the midpoint of the plant, or using foam squares or a blanket to avoid damaging the spines and the vertical segments of multi-branched cacti.
4. Carefully trim any damaged roots, if necessary, using sharp disinfected scissors that have been cleaned in a 10 percent bleach solution to prevent infection. Re-clean tools in the bleach solution after each cut. No healthy roots will be trimmed. Dust the cut roots

with a powdered fungicide or sulfur to decrease the likelihood of infection and to hasten callousing. Benalate, Captan, and Maneb are effective fungicides. Dry the roots on all cacti for a minimum of 3 days and up to 2 weeks, depending on ambient temperatures by allowing them to sit in the shade at the stockpiling area.

1.1.2 Yucca Species

1. All yuccas in excess of 2 feet in height must be salvaged with heavy equipment (e.g., front-end loader). The yucca must be carefully extracted to not damage any of the roots, stems, or lower part of the plant. It is recommended that Joshua trees greater than 6 feet in height should be transplanted by professional tree movers, experienced and having proven success with Joshua tree relocations.
2. When documenting numbers of individual plants that will be transplanted, all yucca clusters shall be counted as separate plants. However, yucca plants growing in clusters shall be salvaged as a single unit to minimize root damage. The integrity of the clusters should be maintained to the greatest extent possible by securing the cluster with rope and transporting the yuccas with a front-end loader, tree spade, or other piece of heavy equipment capable of lifting large specimens.
3. Carefully trim any damaged roots, if necessary, using sharp disinfected scissors that have been cleaned in a 10 percent bleach solution to prevent infection. Re-clean tools in the bleach solution after each cut. No healthy roots will be trimmed. Dust the cut roots with a powdered fungicide or sulfur to decrease the likelihood of infection and to hasten callousing. Dry the roots on all yuccas for a minimum of 3 days and up to 2 weeks, depending on ambient temperatures by allowing them to sit in the shade at the stockpiling area.

1.2 STOCKPILING

During the process of temporary stockpiling, large plants will require support to prevent tipping. Large stones may be placed over the root area (2 to 4 inches from the stem), or tree stakes and tubing may be used to secure top-heavy specimens. The stockpile location will need to be shaded with a minimum of 30 percent shade-level cloth to minimize stress and water loss from the plants.

If nighttime ambient temperatures remain above 60 degrees and there is a low potential for theft, salvaged plants may be left onsite adjacent to the ROW during drying. When placing the salvaged plants off the ROW, the contractor will need to ensure additional native plant species are not impacted. Salvaged plants would need to be individually covered with shade cloth if left onsite. The project botanist will monitor the salvaged plants once after three days and again each subsequent day thereafter to determine the point at which the roots have calloused and the plants are ready to be replanted.

If there is a high potential for theft, salvaged plants will need to be transported to the stockpiling area, which must be a protected location (fenced). The fence will consist of an eight-foot high, chain-link locked enclosure. The equipment staging area onsite may suffice if the plants can remain undisturbed in the yard. When transplanting between December and February in which nighttime temperatures fall below 60 degrees Fahrenheit, extra precautions will need to be taken to ensure plants do not freeze and new roots can continue to form. Additional drying time to harden roots may be required and the stockpiling area may require extra protection from the elements. Soil temperatures that are too cool can hinder root development resulting in either delayed establishment or death of the plant.

If more than two weeks are required before transplantation of salvaged plants back onto the ROW can be completed, the salvaged plants will be transferred to prepared 3-foot wide, 18-inch deep stockpiling trenches of any desired length after their roots have calloused. If using

multiple, parallel trenches, they should be far enough apart to allow heavy equipment access to each trench. Trenches shall be watered thoroughly prior to transplanting material. In planting cacti and yucca, they should be placed in the trench and covered with native soil. Care should be taken to properly tamp down and compact all soil around roots of plants to remove all air pockets. A depression around each plant should be formed to hold water. Watering within the fenced enclosure will occur two times per week during plant establishment.

1.3 FINAL PLANTING INTO ROW

All salvaged plant material should be replanted in a natural pattern and in as close to their original location as possible. Each plant must be replanted at the original depth and orientation and, as much as practicable, in the same soil conditions as from where it originally came.

Plants will be carefully removed from the stockpiling area or from where they were positioned adjacent to the site, taking care to not damage stems, roots, or the base of the plant. Cacti will be planted into holes two to three times the width of the species, but only as deep as the rootball. Large single-stem yucca will be planted into a hole at least two feet deep and three feet wide. Multiple stem plantings will be accordingly larger to accommodate the stem size. The salvaged plants will be planted and the soil tamped by hand or with the handle of a shovel around the plant so that there are no air pockets around the roots.

1.3.1 Shading

Cover the plant with shade cloth (30 percent) if planting occurs during the summer to protect the plant from the sun and minimize water loss. Shade cloth may be placed directly on the plant, or on a support. The shade cloth can be removed at the first sign of establishment and growth (which may take up to 1 year).

1.3.2 Staking

It will not be necessary to secure plants less than 5 feet in height after transplanting; however, larger plants will require staking. Make a collar around the plant with a material that will not cut into the skin. Attach this collar to wire and connect to rods or stakes that have been driven into the ground. There should be a stake on each side of the plant. Leave this support on the plant for at least three months in heavy soil or for six months in finer soil or very rocky locations. The stakes can be removed when the plant has developed new growth and is stable in the ground.

1.3.3 Watering

Water cacti and yuccas deeply and slowly at the time they are transplanted to remove or minimize any air pockets and assure proper soil compaction. After the first watering, the backfill soil settles and the plant may shift or lean. Simply straighten the plant, firm the soil, and re-secure the stakes, if necessary. An additional watering event approximately 15 days after planting shall occur.

If transplanting in the spring, it will be necessary to water regularly through the first summer. In the hottest days of the summer, this will be every two to three weeks, unless there is a rain. If the plant is transplanted near the end of the summer, it will need water only two to three times during the winter. Begin a summer water schedule when the weather has warmed and there has been no rain for 30 days, typically in April. When monsoon rains arrive in July, reduce or discontinue irrigation until the end of the monsoon season in September.

To reduce labor associated with hand-watering, DriWater can be applied around the base of each plant at a rate of one quart for every foot in plant height instead of manually watering the plants. DriWater is a gelatinous polymer that slowly breaks down to water with time. DriWater comes in biodegradable cartons and is applied by cutting the top of the carton and placing it upside-down around the plant to be watered. DriWater cartons are to be buried completely, or according to manufacturer's directions. At the soil surface, a watering well will be formed around the plant. After the DriWater is installed at the base of the plant and the soil is tamped, water the plant thoroughly to activate the DriWater. Typically, the DriWater will need to be replaced at the end of two months, depending on weather conditions.

1.3.4 Vertical Mulch

Vertical mulching involves installing dead and downed plant materials into the ground. Placing vertical mulch (shrubs, cacti, grasses, etc.) helps obscure closed roads or barren ROWs, which is especially important at former access roads or staging areas to prevent trespass. Vertical mulch reduces wind speed, facilitates deposition of blowing soil and organic litter, and creates safe sites for plant establishment. Any cacti or yucca species that were beyond the suitable range for transplanting can be installed as vertical mulch on the ROW.

1.4 MAINTENANCE AND MONITORING

1.4.1 Monitoring Schedule

Maintenance monitoring of the transplanted species during monitoring period will be performed with the knowledge and oversight of the project botanist (or restoration specialist) after installation back onto the ROW is completed. Maintenance will be performed by the salvaging contractor experienced in the care of native succulents.

The botanist will be responsible for inspecting the transplanted species annually and, if necessary, providing recommendations to the contractor for changes in the maintenance program. After each monitoring visit, the botanist will submit a report to the project applicants summarizing the status and survivorship of the transplanted succulents at the site.

If mortality of any transplanted species is confirmed after two years and this number falls above the 20 percent mortality threshold, replacement planting may occur. The lost species will be left in place as vertical mulch. Remedial seedlings should be obtained from a local native nursery. If cacti collected from a desert habitat within a 20 mile radius are not available, the contractor may arrange for seed collection or asexual propagation of the cactus species (excluding barrel cactus) to occur under the direct guidance of a nursery and with the approval of the project botanist. Small cuttings (i.e., individual limbs, single pads) from healthy cacti of the same species may be salvaged from areas adjacent to the ROW as long as this action will not adversely affect the parent plant. The procedure for taking cuttings follows that for trimming roots as described above. Disinfected tools must be used; sulfur and fungicide must be applied to the cut surfaces of both the parent plant and the cutting; the cutting must be dried prior to planting; and the cutting must be watered immediately after installation on the ROW and again 15 days after planting. Replacements will be monitored with the original plantings during the monitoring period with the same survival requirements as the original plantings.

1.4.2 Contingency Measures

If 80 percent survivorship is not observed and the replacement plantings were not sufficient to counteract the losses, remedial planting may be implemented. For every full-sized mature plant that was lost, 10 seedlings of the same species will be planted in the vicinity of the original planting and with similar soil conditions.

The maintenance of any newly planted replacement plants may require additional monitoring by the project botanist. A description of all remedial actions will be included in the annual reports.

1.4.3 Notification of Completion

When the monitoring period is complete and if the final success criteria have been met, notification of these events will be provided as part of the final annual report. A final report submitted by the botanist will be provided to the reviewing agencies within 60 days of project completion.

Following receipt of the report, the applicant or their designee may provide access and guidance through the site to agencies involved, including the Bureau of Land Management and the State Lands Commission, to confirm the adequate completion of the mitigation effort.