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SECTION 4 – URBAN AND LANDSCAPE DESIGN ELEMENTS

4.1.0 GENERAL

This Design Criteria establishes the minimum standards to be used in the design of RTD bus transit facilities. This section is intended to direct the Design Engineer in the design of urban design elements at all RTD bus transit facilities.

4.2.0 LANDSCAPING

4.2.1 Landscaping Requirement and Ordinances

Most governing agencies within the Regional Transportation District have landscape requirements or ordinances that dictate the amount and type of landscaping to be accomplished on a particular site. Each jurisdiction has its own requirements, however, all require live plant material be used in the facility design. Landscaping of facilities is desirable for aesthetic as well as ecological reasons and should consist of plantings that will be compatible with the operation of the facility. Generally trees will be placed on plaza areas and not on adjacent station platforms. The placement of trees in tree grates is discouraged due to the difficulty of maintaining these plants over a long period of time. Trees and shrubs in plaza areas shall be installed in planting beds. An area with a well maintained landscape is perceived as being safer than those which are bare of vegetation. Plants are to be used for screening neighboring land uses and to enhance the appearance and feel of the facilities. Trees planted in hardscape plaza or pedestrian areas should be installed in planters in lieu of tree grates wherever possible. Planter areas should include a raised curb to reduce the amount of snow melting agents being pushed into planting areas.

Landscape area slopes that are planted with sod or seed shall not exceed a 3:1 (H:V) gradient so that safe, convenient and efficient mowing and other maintenance operations can occur. The preferred slope is 4:1 (H:V) or flatter if not controlled by limited area or other site constraints.

4.2.2 Crime Prevention Through Environmental Design

The design shall incorporate Crime Prevention Through Environmental Design (CPTED) strategies to the entire design. Refer to Section 12.12.0 for CPTED guidelines.

4.2.3 Xeriscape Principals

Planning and Design

Planning and design of the site is critical to identify watering zone requirements and to determine soil types as well as to identify which locations are the most extreme for plant survival. Parking facilities are

particularly difficult as the plants are primarily installed in locations that are surrounded by reflective hard surfaces, steep slopes or along roadways where exhaust fumes are a constant.

Soil Improvement

Proper soil preparation is the key to successful water conservation. If the soil is sandy, water and nutrients will be lost due to leaching below the root zone. If the soil is heavy clay, water will be lost through runoff. Heavy clay soils tend to repel surface water resulting in runoff. The water that does get into these soils is held so tightly by the clay itself that plants cannot use it. Plants in a clay soil, even though moist often tend to wilt from lack of moisture. Plant roots also need air to thrive. In clay soils, air spaces are small and may fill with water, so plants suffer from oxygen starvation.

In very sandy soils, the opposite is true. Sandy soils have very large pore spaces. Because the particles are large, there is little surface area to hold the water, so sandy soils tend to lose water rapidly.

Efficient Irrigation

Proper irrigation practices can lead to significant water savings. Different plant types should be watered with different irrigation zones. The system needs to be designed to fit the landscape, minimizing overlap onto streets, sidewalks and parking areas. Plant types need to be installed in zones that have similar water needs. This will optimize the irrigation system, saving significant amounts of water. Drip zones are to be used in locations that are shrubs and trees only.

Zoning of Plants

Plants of similar water use requirements need to be grouped together to take advantage of water savings. Selecting plants that will do well depending on the site exposure is also important. The use of the most water conserving plants on south and western slopes and those that require more moisture can be placed close to drainage ways and low lying areas. Grouping plants appropriately will minimize water waste.

Mulches

Mulching helps keep plant roots cool, prevents soil from crusting, minimizes evaporation and reduces weed growth. Organic mulches such as shredded cedar should be placed 4 inch thick. Inorganic mulches and landscape/geotextile fabrics are generally not used at RTD facilities.

Turf Alternatives

RTD encourages the use of alternative turf grasses to reduce the amount of water needed to keep an area looking attractive and green. A variety of success has been achieved with warm season buffalo grass, gramma grasses and cool season fescue and hybrid bluegrass blends.

Appropriate Maintenance

Regular scheduled maintenance is a requirement of all contractors doing work for RTD. The first two years is a specification requirement for warranty and maintenance of the landscape components of the facility. The maintenance plan shall include regular weeding, pruning, water management, fertilizing, pest control, irrigation system maintenance and plant replacement.

4.2.4 Standard Landscape Elements

The standard landscape elements to be included in pnR and station design include trees, shrubs, groundcovers, perennials, grasses, mulch, decorative landscape boulders, patterned concrete, decorative pavers, site amenities, planters, irrigation systems and pedestrian shelters. These elements shall correspond to local requirements and meet local jurisdiction requirements.

4.2.5 Standard List of Landscape Plant Material

The following is a list of acceptable landscape plant material for RTD bus transit facilities. Trees with fruit or pods are not allowed at pnRs or passenger boarding locations.

Plant List

Low Water Use Trees

Tartarian Maple	Limber Pine
Bigtooth Maple	Ponderosa Pine
Western Hackberry	Southwestern White Pine
Curlleaf Mountain Mahogany	Plains Cottonwood
Green Ash	American Plum
Thornless Honeylocust	Burr Oak
One Seed Juniper	Buffaloberry
Rocky Mountain Juniper	Japanese Pagoda Tree
Golden Raintree	Lilac Sp.
Bristlecone Pine	Wayfaring Tree

Pinion Pine

Russian Hawthorn

Low Water Use Shrubs

Saskatoon Utah ServiceBerry

Indigo Bush

Cliffrose

Silverberry

New Mexico Privet

Mugo Pine

Sumac Sp

Rose Sp.

Buffaloberry

Fourwing Saltbush

Pygmy Peashrub

Buckbrush

Bladder Senna

Mormon Tea

Snakeweed

Russian Sage

Antelope Bitterbrush

Silver Sagebrush

Cotoneaster

Low Water Use Perennials, Grasses and groundcovers

San Verbena

Persian Stonecress

Atlas Daisy

Sage

False Indigo

Fendler's Sundrops

Virgin's Bower Clematis

Ice Plant

Mock Strawberry

Alpine Wallflower

Nannyberry Viburnum

Swamp White Oak

Siberian Peashrub

Mountain Mahogany

Moonlight Broom

Cliff Fendlerbush

Sea Buckthorn

Sand Cherry

Yellow Flowering Currant

Tall Western Sage

Leadplant

Japanese Barberry

Bluemist Spirea

Rabbitbrush

Spanish Gold Broom

Apache Plume

Red Yucca

Potentilla Sp.

Current Sp.

Shrubby Sage

Lena Broom

Woolly Yarrow

Sunset Hyssop

Pearly Everlasting

Butterfly Weed

Poppy Mallow

Snow-in-summer

Coreopsis

Hardy Ice Plant

Showy Fleabane

Poppy

Wintercreeper
Cushion Spurge
Avens
Sunrose
Daylily Sp.
Iris Sp.
Lavender
Flax Sp.
Evening Primrose
Russian Sage
Purple Coneflower
Silver Lace Vine
Creeping Potentilla
Prairie Coneflower
Salvia
Dwarf Pincushion Flower
Thyme
Speedwell
Big Bluestem Grass
Blue Avena Grass
Indian Rice Grass
Blood Grass
Feather Reed Grass
Heavy Metal Switch Grass
Purple Maiden Grass
Pampas Grass
Northern Sea Oats

Moderate Water Use Trees

Ohio Buckeye
Thinleaf Alder
Pyramidal European Hornbeam
Hawthorn Sp.
Honeylocust

Snow-on-the-Mountain
Blanket Flower
Baby's Breath
Maximilian Sunflower
Scarlet Gilia
Red Hot Poker
Gayfeather
Bee Balm
Virginia Creeper
Himalayan Border Jewel
Creeping Phlox
Fleeceflower
Creeping Buttercup
Black-eyed Susan
Stonecrop
Hens and Chicks
Native Verbena
Creeping Veronica
Little Bluestem Grass
Blue Fescue
Mexican Feather Grass
Blue Lyme
Hardy Fountain Grass
Maiden Grass
Variegated Maiden Grass
Ribbon Grass
Zebra Grass

Maple Sp.
Serviceberry
Peking Cotoneaster
American Ash
Spruce Sp.

Lodgepole Pine	Scotch Pine
Cottonwood Sp.	Douglas Fir
Pear Sp.	English/Red/White Oak
Pagodatree	Japanese Tree Lilac
Greenspire Linden	Blackhaw Viburnum
Crabapples	Emerald Queen Maple
Norway Columnar Maple	

Moderate Water Use Shrubs

Ginnala Maple	Thin Leaf Alder
Shadblow Serviceberry	Barberry
Butterfly Bush	Quince
Smokebush	Cotoneaster
Euonymous Sp.	Beauty Bush
Privet	Honeysuckle 'tartarica'
Oregon Grape Holly	Ninebark Sp.
Pyracantha	Buckthorn
False Spirea	Weigela
Cranberry Viburnum	Carol Makie Daphne
Arnold Dwarf Forsythia	Comp. Oregon Grape Holly
Lodense Privet	Snowberry
Coralberry	Spirea
Dwarf Cranberrybush Viburnum	Hibiscus, Disco Belle

Moderate Water Use Perennials, Grasses and Groundcovers

Bishop's Weed	Lebanon Stonecress
Bugle Weed	Lady's Mantle
Mountain Basket of Gold	Windflower
Golden Marguerite	Columbine
Rockcress	Sea Pinks
Aster	Basket of Gold
Miniature Mat Daisy	Bergenia
Snowbank Boltonia	False Forget-me-not
Trumpet Vine	Pigmy Peashrub
Cupids Dart	Hardy Bachelor Button

Daisy/Mum
Larkspur
Pinks, Carnation, Sweet Williams
Sweet Woodruff
Hardy Gazania
Avens
Dwarf Globularia
Coral Bells
Hop Vine
Shrub Mallow
Sea Lavender
Lupine
Boston Ivy
Thyme
Salvia
Variegated Moor Grass
Gazania
Moneywort

High Water Use Trees

White Fir
Black Alder
Redbud
Pagoda Dogwood
Vanderwolf Limber Pine
Pin Oak
Redmond Linden

High Water Use Shrubs

Chokecherry
Dogwood Sp.
Elder
Kelsey Dogwood
White Pine
Silver Creeping Willow

Colewort
Rose Pink Daisy
Coneflower
Whirling Butterflies
Cranesbill
Ground Ivy
English Ivy
Plantain Lily
Iris Sp.
Hardy Lily
Honeysuckle Vine
Poppy
Himalayan Border Jewel
Periwinkle
Japanese Blood Grass
Ribbon Grass
False Spirea

Horse Chestnut
American Hornbeam
Fringe Tree
Spruce
Aspen
Willow
Greenspire Linden

Greenleaf Barberry
Blue Fountain Willow
Doublefile Viburnum
Twinberry Honeysuckle
Dwarf Arctic Willow

High Water Use Perennials, Grasses and Groundcover

Leatherleaf Sedge	White Bottlebrush
Clematis	Coral Bells
Japanese Spurge	Primrose
Bethlehem Sage	Buttercups
Yellow/Blue-Eyed Grass	Gold Globeflower
Tufted Hairgrass	Bamboo Yellow Groove
Prairie Cord Grass	Annual Pink Crystals Grass
Ligularia	Hostas
Monkshood	Meadow Rue
Creeping Oregon Grape Holly	Lupine

4.2.3 Turf and Native Grasses

There are a number of varieties of turf grasses currently on the market as alternatives to a standard bluegrass blend. Even though bluegrass is a fairly hardy species, a few of the newer varieties can provide the look of bluegrass without the water requirements.

Natural grass species can also be used in many areas in lieu of bluegrass, however, many counties, municipalities and special districts are now requiring that all areas on a site be irrigated and maintained to establish an acceptable ground cover. This is to minimize the amount of weeds allowed to flourish on a site in lieu of grasses in accordance with local ordinances and the Colorado Noxious Weed Act.

4.2.4 Maintenance Standards

Landscape maintenance tasks are the recurring procedures and duties required to ensure a viable, functional and attractive RTD facility environment. Landscape maintenance methods are the standards and practices of the landscape industry used to accomplish these tasks. Standard maintenance activities include aeration, fertilization, mowing, trimming, watering and pest and weed control for turf and native grass areas. Generally grasses should never have more than one third the blade length removed during one mowing. Maintaining a turf grass length of 2½-3 inches is the most desirable. Grass fertilization should be accomplished by applying 0.5-1 lb of nitrogen 2-3 times per year per 1000 square feet of turf-type grass. Approximately half that amount is needed on some native or natural grasses. Fertilizer application should follow the maintenance program established for each location.

Tree, shrub and perennial areas include weed, pest control, regular mulch application and fertilization. Occasional pruning of dead or dying branches or to encourage a natural shape and appearance is required. (A separate Landscape Management Plan is to serve as a more detailed guide for maintenance of RTD sites).

4.3.0 IRRIGATION

4.3.1 Standard Irrigation Components

The following is a list of acceptable irrigation system components to be used at RTD bus transit facilities:

Irrigation Heads:

- Rainbird 1800 series pop-up spray heads
- Hunter PGP, PGJ or I-25 Rotor heads
- Rainbird Bubbler

Drip Emitters:

- Rainbird Xeribug
- Agrifim emitters
- Netafim drip line for turf
- Rainbird dripline for shrubs and perennials

Controller:

- Rainbird ESP-MC or Rain Master Eagle with I-Central card Controller
- Stainless Steel Pedestal or Wall Mount Enclosures for outdoor Controller Installation
- Master Valve (size to match mainline)
- Flow Sensor (size to match mainline)
- Rainbird wireless Mini Click rain/freeze sensor

Valves:

- Rainbird GB valves for spray and Rotor zones
- Rainbird DV valves for drip or bubbler zones
- Rainbird EFB-CP Series for Dirty water applications
- Ametek or Carson Valve boxes
- Strongbox enclosure for Backflow Preventer
- Febco 825Y Reduced Pressure Backflow Preventer
- Rainbird 44RC Quick Coupler Valve
- Flow Sensor and Rainbird Flow Monitor

Pipe:

- Class 200 PVC for mainline
- Schedule 40 PVC connections
- NSF Polyethylene pipe with 70 psi rating for laterals
- UV resistant polyethylene pipe with 50 psi rating for capillary drip tubing

Remote Control:

- Eicon Standard or Remote Ready MRC maintenance controls

4.3.2 Remote Control Equipment

The Rain Master Eagle with I-Central card controller, removable backboard, terminal interface board, Eicon remote connections for field remotes and 120 volt receptacle or approved equal. Flow control valve normally open and flow sensor with rain sensor. Field remotes shall be the Eicon Standard or Remote Ready MRC or approved equal.

4.3.3 Watering Restrictions and Watering Requirements

Irrigation Systems shall be designed and installed to accommodate various local agencies watering restrictions and include a rain sensor to turn systems off during rain storms.

4.3.4 Maintenance Standards

Standard maintenance practices for the facility irrigation systems shall include a two year commitment from the installer for regular bi-monthly irrigation checks and adjustments following initial acceptance of the system. A water management program is intended to maximize plant health, keep water bills as low as possible, minimize water damage to hardscape areas and property and limit over watering and water run off.

Bi-monthly maintenance shall include the adjustment of heads and watering times depending upon local weather conditions and soil moisture levels. Each zone valve shall be checked for leaks and operation efficiency. The entire system shall be activated in the spring and deactivated in the fall. Fall winterization procedure shall include the elimination of water in the system by means of blowing compressed air through each zone.

An irrigation-scheduling chart shall be provided by the Contractor and kept with the controller along with a site plan showing the zone numbers and locations. The chart and plan shall be legible and laminated. Scheduling of irrigation zones should be based upon an average application of 1.5 inches per week for turf grasses, 1.0 inch per week for trees, shrubs and groundcovers and 0.5 - 0.75 inches per week for native and natural grasses.

These are the amounts that should be maintained during the peak of the season. A lower percentage is recommended for early spring and fall depending on local weather conditions and soil moisture content.

4.4.0 SHELTERS

4.4.1 Standard Shelter Design

The RTD Standard Shelter shall be Tolar – RTD Denver Model, Option 1 (open front), or as specified by RTD. The shelter is a modular design to allow for different combinations of wall panels. Standard Shelters include glass panels on the top portion of the enclosure and perforated steel panels on the bottom portion. Footings or foundations for the shelters vary depending on location, soil conditions and the final design, and shall be designed by a Professional Engineer on a site specific basis. Shelter concrete pads are typically 6 inch thick.

4.4.2 Custom Shelter Design

Custom shelter designs are often requested by local agencies to better integrate the pnR facility with the neighborhood or provide identity for the local agency. RTD will consider the design and construction of custom shelters on a case by case basis and require that the local agency participate in the additional financial commitment necessary to install these custom shelters.

Custom shelters must meet all RTD criteria including safety and security requirements.

4.5.0 FURNITURE AND FIXTURES

4.5.1 General

RTD standard shelters, benches, newspaper racks and trash receptacles shall all be color RAL 6009. Alternative colors may be permitted with approval from RTD.

4.5.2 Benches

Benches at bus and rail facilities shall be Victor Stanley (RB-28 or RB-12 – backless) with a powder coated finish or approved equal. Benches shall have fully welded joints throughout. Total number of benches included at a station or pnR location is a factor of total number of patrons at a location. Generally one 6 foot bench per 50 pnR patrons is required. Most transit users tend to arrive a few minutes before their bus or train is scheduled to leave and will not dwell in an area for long periods of time, thereby reducing the need for large numbers of seating locations.

All benches shall include anti-sleep rails that prevent a person from lying down on the bench.

4.5.3 Trash Receptacles

Trash receptacles are an inexpensive way to control litter at the pnR and station facilities. The trash receptacle shall be Victor Stanley (SD-42) with a powder coated finish, dome lid and latch door, or approved equal. Trash receptacles shall have fully welded joints throughout.

The number of trash receptacles shall be no less than two and no more than fifteen. The final amount will depend upon overall site design and configuration of newspaper, ticket and vending machine and waiting areas. No trash receptacles will be located within designated parking areas.

The location of trash receptacles shall meet the security requirements in subsection 12.15 of this Manual, which require they shall not be placed within 250 feet of a station, station area or patron gathering area for outside locations. Explosion resistant receptacles may be placed within 250 feet of a station, station area or patron gathering area. The Design Engineer shall coordinate with RTD for specifications for explosion resistant receptacles.

4.5.4 Public Telephones

At least one public telephone shall be provided at each bus transit facility, pnR or station location for convenience and safety. Total number of phones at each location will depend on number of patrons at each location. A minimum of one phone, plus one additional phone per 200 cars shall be installed. Location of public telephones shall be in close proximity to the designated parking areas and bus plaza areas. Public telephones are generally located in designated public information space that may include ticket vending machines, newspaper racks, system maps and information kiosks.

4.5.5 Newspaper Racks

Newspaper rack systems shall be provided for vendor use at each bus transit facility. These are installed to limit the number, types and colors of individual paper vending machines located at any one facility, and shall provide a neat and orderly appearance. The rack systems can be installed in groups of 6 or more to accommodate the number of vendors interested in providing a service. The color chosen for each location depends on the overall site design and location of the racks.

The location of newspaper rack systems shall meet the security requirements in subsection 12.15 of this Manual, which require that they shall not be placed within 250 feet of a station, station area or patron gathering area for outside locations.

4.5.6 Food Vending Machines

Generally food vending machines are not included at RTD facilities. In situations where they are included, a special area shall be established with the proper electrical service, trash receptacles, access and cover.

4.5.7 Bike Lockers and Racks

See Section 5.

4.6.0 HARDSCAPE

4.6.1 Design Objective

The design objective of hardscape features at bus transit facilities shall be to develop elements for each location (some may be unique to the area) that provide a functional, aesthetically pleasing and maintainable site. Each element within the hardscape portion of the design shall be constructed of durable materials.

4.6.2 Access to Pedestrian Areas

Access to pedestrian plazas shall meet the requirements of ADA criteria (ADAAG), ANSI 117.1 or more restrictive requirements as determined by local, state or federal laws or codes.

4.7.0 ART-N-TRANSIT

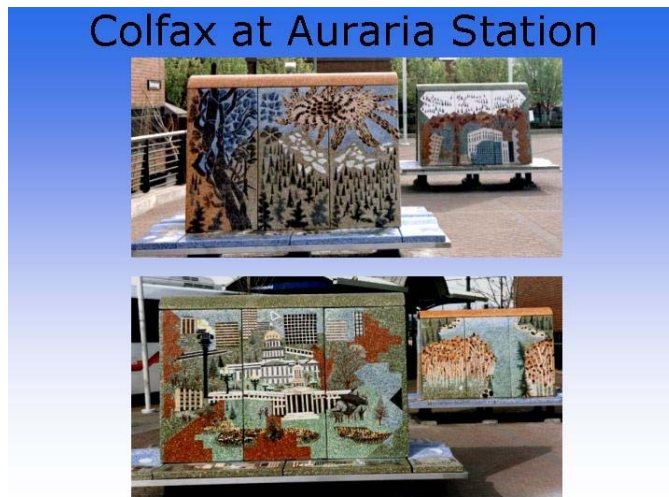
4.7.1 Art Selection Process

Art selection shall be based on available space and budget and shall be approved by RTD's art-n-Transit coordinator. Functional art proposed as part of the initial construction shall use materials and design that are acceptable to RTD, durable and easily maintained.

Art-n-Transit is encouraged as an integral part of the site and to provide a unique identity.



“Hand Up” by Scott Donohue at Alameda LRT Station



“Bookmark” by Donna Billick @ Colfax & Auraria

Art-n-Transit is a safety certifiable item under RTD's Safety Certification Program (refer to Section 12). As such, art-n-transit design and placement shall be approved by RTD's Executive Safety and Security Committee.