City of Riverside

Multi-Purpose Recreational Trails Master Plan
and
Trails Standards

As
Adopted Per Council Resolution No.18852
Dated 01/02/96 Per City Ordinance No.6266 Amending Title 13
By Adopting New Chapter 13.18 Entitled "Trails Master Plan"

Plans Prepared By:

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Revisions	Date	Council Action	
1	01/02/96	Agenda Item # 15	"Trail Recommendations in the Arlanza/La Sierra Community Development Study"

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Section S1 Trails Standards

TRAIL TREAD WIDTH: 10' minimum
EASEMENT WIDTH: 26' minimum

SETBACK:

The trail tread is to be set back from:
- the street curb a minimum of 5' ;
- bikeways/sidewalks a minimum of 4' (per detail 1); and,
- retaining walls/fences above 4' in height a minimum of 2', except where noted otherwise on details.

GRADE:

- Grade: Most trails segments shall be 10% maximum. However, slopes steeper than this for short distances may be allowed under the following conditions:

- Maximum of 15% slope for distance of 500' or less.
- 20% slope permitted only in unique situations and limited to 100' or less.
- Under no circumstances shall any slope exceed 20%.
- The majority of trail should be 2% - 4% on level ground.
- To decrease grade, utilize terrace steps (per detail 2)."
- ADA Access: Some segments of trail should be accessible to handicap users, with the following standards applying:
  - 8.33% maximum slope and 2% maximum cross slope.
  - A level pad 60" by 60" must be provided for rest every 30' where grades are between 5% and 8.33%.

Note: Trail construction shall comply with established standards whenever possible. However, it is recognized that in certain situations due to physical constraints (e.g., existing utilities, existing rights-of-ways, etc) this may not be possible. In such cases, variation from these standards may be allowed on a case-by-case basis subject to approval by the Trails Steering Committee, based upon review and recommendation by the Park Planner.

CROSS GRADE: Shall not exceed 2%. Low grades help prevent drainage problems; steep grades allow the water to run faster, building up erosive force. If minor rivulets appear, a water bar should be installed (per detail 3) to decrease the chances of more serious erosion. See details 4, 5, and 6 for typical cross sections.

CULVERTS: Where the trail crosses a stream, whether permanent or intermittent, a culvert will be needed. If a culvert is used, it is very important to prevent erosion at the outfall end by providing rip-rap or other hard surface for the water to hit first. If this is not provided, the water leaving the culvert will erode the surface below it, and eventually fail around the downslope end of the culvert. Avoid causing off-trail drainage problems, such as erosion or siltation, by careful culvert placement.

For small drainage areas, culverts should have a 12" minimum diameter for ease of cleaning. They should have 12" minimum cover and be sloped approximately 2%. The size, slope and cover of culverts should be calculated using standard engineering formulas. Soil should be protected with rip-rap from concentrated flow, particularly at culvert outlets. Headwalls and outlets should be protected and concealed with boulders where possible.

VERTICAL CLEARANCE: 10' minimum beneath structures or tree limbs.

TRAIL TREAD SURFACING: Verify soil expansiveness with a soil test performed by a certified laboratory approved by the City of Riverside. All trail tread surfacing shall be non-expansive soil (D.G.), and shall be treated with a polymer material such as manufactured by Poly Pavement or Soil Stabilizer, for erosion resistance. Application rates shall be as recommended by the polymer manufacturer for high traffic use.

Non-expansive Soil: Where soil tests confirm the existing soil is non-expansive and the soil structure meets the gradation and quality requirements for Disintegrated Granite (Section

400-2.3 Disintegrated Granite of *"Greenbook" Standard Specifications for Public Works Construction*), the existing soil may be used for trail purposes. Remove soil down to suitable subgrade to a depth as necessary to provide 12" of compacted subgrade soils beneath the trail's Decomposed Granite. Scarify trail tread subgrade to a minimum depth of 6" removing rocks, clods and all undesirable materials. Backfill and compact subgrade in 6" lifts to a 90% relative compaction in preparation for placement of the trail tread D.G. material. Where existing soils are suitable for use as D.G., excavate, scarify, backfill and compact native soil to result in minimum compacted dept of 12" to a 90% relative compaction rate.

Expansive Soil and Trails within the Street Right-of-Way : Remove soil to the depth prescribed by the soil report. Remove all remaining rocks, clods and undesirable materials from the exposed soil base.

Trail Tread D.G. with Stabilizer: Evenly spread a minimum of 3-1/2" of decomposed granite or suitable native soils, premixed with the polymer stabilizer per the manufacturer's recommendations. Wet and compact the D.G. as specified by the stabilizer manufacturer.

Trail Edge: Where adjacent to developed landscape areas, trail shall be contained by a concrete mowcurb on each edge of the trail tread. Where adjacent to native landscapes, no mowcurb is required and may be omitted.

WEED CONTROL:

As weeds appear, apply Roundup (or approved equal) combined with a spray pattern indicator such as "Blazon" (or approved equal). There must be strict supervision of crews to ensure that application is confined only to the trail tread.

WATER BARS:

Effective water bars minimize the speed, volume and distance travelled by water down a trail. The actual number and spacing of water bars depends on the steepness of slope, the amount of water entering the trail, the construction of the tread (hillsides or steps), and the availability of places to divert water. See detail 3 for water bar spacing. Generally, the

greater the slope and the more water channeled by a trail, the greater the need for water bars. Placement should be near the top of the slope to catch water before it gains momentum.

DRIVEWAY AND SIDEWALK CROSSING:

Where the trail crosses concrete aprons and sidewalks, the trail shall be constructed of concrete with rough broom or rake finish to prevent slipping (per detail 7).

VEGETATION:

Vegetation should be preserved as much as possible to protect the aesthetic quality of the trail. Vegetation should be cleared to a height and width of 10' for a riding trail. Pruning along trails should be selective. Stumps may be treated to prevent sprouting. Dead and dying limbs and snags which may fall on the trail should be removed. Groundcover plants and low shrubs should not be cleared except from the actual tread. Where a trail is on a side slope, the vegetation on the uphill side will be more invasive and should be cut back more severly than vegetation on the downhill side (per detail 8).

FENCING:

Trail fencing shall be constructed of hollow PVC material available from Kroy Industries (818-888-6517) or approved equal (per detail 9). Fences will be used:

- continuously in areas where side slopes exceed 3:1;
- continuously along canals or flood control hazards;
- continuously where trail segments designated for equestrian use run along a secondary or arterial street;
- continuously on the private property side of the trail in residential areas where the trail passes across the fronts and sides of residences; and,
- at intersections where reverse frontages occur to delineate the trail entrance. The entry fence will consist of two fence segments on each side of the trail tread (per detail 11U) where non-equestrian use is proposed. Where equestrian use is proposed, the fence on the street side of the trail is to run continuously for the full block.

SIGNAGE:

Trail markers shall be installed every 200' unless the trail is defined by the designated PVC trail fence. Where the fence adjoins the trail, signage shall occur at all trail entry points and intersections.

The trail signage shall be decals affixed either to a brown 5-1/2' by 3-3/4" flexible fiberglass, Carsonite Dual Side Recreational Marker (CIB-380R, or City approved equal) per Detail 12, or affixed to a trail fence end post (see Detail 12a). Sign stakes are to be driven to a depth of 18" using a Carsonite driver per manufacturer's instructions. Affixed decals will be a 3-1/2" square, and will include symbols for equestrian, hiking and bicycle usesl with a "red slashed" motorized trail bike symbol at all trails, delineating that the trail is not authorized for motorized vehicle use. A "red slashed" equestrian decal and/or wheelchair access decal shall be provided at trail segments that are either designated as non-equestrian and/or are non-accessible for the handicapped.

Trail markers shall have symbol decals affixed to both sides in the same position. Signage shall alternate from one side of the trail to the other. Markers shall be offset from the trail edge a minimum of 2'.

Appropriate warning signs shall be affixed to the same brown 5-1/2' by 3-3/4" signs to detail hazards, clearance requirements, approaching intersections, the need to stop or yield, and staging areas, as delineated in the plan.

BARRIERS:

A trail which is used by equestrians and bicyclist can be made difficult to motorcyclists by creating a log barrier at the entrances (per detail 13) and by leaving fallen logs on the trails. These are difficult to cross with a motorcycle, but may be stepped over by hikers and bicycle riders. Install these barrieres where motorcyclist use will be a problem.

Where segments of a trail are designated for handicapped usage, entrances to the trail should utilize detail 14. These segments should be free of fallen logs and debris, and should follow the standards delineated for handicap usage.

UNDERPASSES:

Underpasses or culverts used for trail undercrossing shall conform to the following standards:

Height:	10' Minimum
Width:	10' Minimum
Length:	No Longer than 75'

In underpasses 50' or longer, a light should be installed in the passage.

Where wet areas exist that are not feasible to drain, utilize turnpike construction (per detail 15). Turnpike technique involves a raised tread bound by treated log sides bordered by a trench on each side of the tread. This will enable the trail tread to be raised to a level above the water level.

In usually wet areas, the turnpike construction will prove to be unsatisfactory. Puncheon construction should therefore be used (per detail 16).

Puncheons shall consist of a deck, or flooring, approximately 4'wide using treated planks or landscape timbers laid on stringers. The stringers should be set on mud sills and should generally be placed at each edge of the widened trail at about 3' centers. The mud sills should be set at right angles to the trail at 6' to 8' intervals. Proper subdrainage should be provided under the stringers and mud sills. The decking should then be securely spiked to the stringers. Cover the deck with a layer of dirt to cushion the traffic and save wear on the deck planks caused by shod horses. Puncheons shall be engineered with drawings being submitted to the City of Riverside for approval.

INTERSECTION DESIGN:

The design of intersections where traffic and the trail interface will require that both the motorist and trail user are informed of the dangers. Scaled down versions of city stop signs (18" by 18") will be posted on the standard sign to inform trail users. All crossings should be at grade with striping and signing as shown in detail 11. Where feasible, textured paving (sandblasting) shall be utilized to prevent slipping. To increase the safety

of trail users, the following features should be provided:

- A minimum waiting area setback from curb of 8 feet, with a grade that does not exceed 6% for more than 20 feet.
- A signal actuating crossing button situated a minimum of 12 feet from the curb face.
- A minimum 3-foot-wide railroad tie or pressure-treated wood threshold located between the trailhead and the sidewalk or street to provide a transition from the trail surface to the paved surface.
- Prohibitions on concrete or masonry abutments, slippery or wet base footing, multiple surfaces, obstacles to vertical clearance and drainage from any adjacent landscaping.

STAGING AREAS:

Staging areas may vary in size depending on location, physical constraints and need. However, for the purposes of this plan, staging areas are defined as:

Large - can accommodate 50 vehicles (including trailers)
Small - can accommodate 6 vehicles (including trailers)

Surfacing with well-drained, non-cohesive soils is desirable, where feasible. Large staging areas should be a minimum of 1.5 acres and have the following:

- Identification and directional signs.
- Marked parking stalls long enough for a car and horse trailer, laid out so that straight ahead entrance and exit is possible.
- Water for horses.
- Water for riders and hikers
- Simple fenced corrals containing hitching posts
- Picnic Tables
- Restrooms
- Shade
- Trash Receptacles

Small staging areas should be a minimum of .25 acres and have the following:

- Identification and directional signs
- Marked parking stalls long enough for a car and horse trailer, laid out so that straight ahead entrance and exit is possible.
- Water for horses.
- Water for riders and hikers
- Hitching posts
- Shade
- Trash Receptacles
-

TRAIL PLANTING:

Shrubs shall be selected to reach a maximum height of 4' at maturity. Where a fence is not provided, a non-broken plant barrier shall be installed in parkway areas between vehicular traffic & the trail to prevent trail users from leaving the trail. In areas where a parkway planting is specified, vines, shrub and tree planting must be of a non-toxic selection to horses and shall be restricted to non-thorn bearing water-effecient plants. Irrigation systems shall be designed to avoid water overspray and draining onto trails. Refer to Appendix A for a list of poisonous plants that should not be used.

Section S2 Trail Standards Check List

TRAIL TREAD WIDTH: 10'minimum

EASEMENT WIDTH: 26' minimum

SETBACK: The trail tread is to be set back from:

- the street curb a minimum of 5';
- bikeways/sidewalks a minimum of 4' (per detail 1); and ,
- retaining walls/fences above 4' in height a minimum of 2', except where noted otherwise on details.

GRADE:

- Most trail segments shall be 10% maximum. However, slopes steeper than this for short distances may be allowed under the following conditions:
  - Maximum of 15% slope for distances of 500' or less.
  - 20% slope permitted only in unique situations and limited to 100' or less
  - Under no circumstances shall any slope exceed 20%.
- The majority of trail should be 2%-4% on level ground.
- To decrease grade, utilize terrace steps (per detail 2)
- ADA Access: Some segments of trail should be accessible to handicap users, with the following standards applying:
  - 8.33% maximum slope and 2% maximum cross slope.
  - A level pad 60"-by-60" must be provided for rest every 30' where grades are between 5% and 8.33%.

Note: Trail construction shall comply with established standards whenever possible. However, it is recognized that in certain situations due to physical constraints (e.g, existing utilities, existing rights-of-ways, etc.) this may not be possible. In such cases, variation from these standards may be allowed on a case-by-case basis subject to approval by the Trails Steering Committee, based upon review and recommendation by the Park Planner.

CROSS GRADE: Shall not exceed 2%. See details 4, 5, and 6 for typical cross sections.

CULVERTS: Where the trail crosses a stream, whether permanent or intermittent, a culvert will be needed.

VERTICAL CLEARANCE: 10' minimum beneath structures or tree limbs.

TRAIL SURFACING: Verify soil expansiveness with a soil test performed by a certified laboratory approved by the City of Riverside.

Non-expansive Soil: Where soil tests confirm the existing soil is non-expansive and the soil structure meets the gradation and quality requirements for Disintegrated Granite (Section 400-2.3 Disintegrated Granite of *"Greenbook" Standard Specifications for Public Works Construction-1994 Edition)* the existing soil may be used for trail purposes. Remove soil down to subgrade and comact subgrade to a 90% relative compaction. Scarify tread areas to a depth of 6" removing rocks, clods and all undesirable materials. Fine grade and compact native soil to a 90% relative compaction.

Expansive Soil and Trails within the Street Right-of-Way: Remove soil to the depth prescribed by the soils report. Remove all remaining rocks, clods and undesirable materials from the exposed soil base. Evenly spread a minimum of 3-1/2" of decomposed granite contained by a concrete header on each side of the trail tread.

WEED CONTROL: As weeds appear, apply Roundup (or approved equal) combined with a spray pattern indicator such as "Blazon."

DRIVEWAY AND Where the trail crosses concrete aprons and sidewalks, the trail shall be constructedof concrete with rough broom or rake finish to prevent slipping (per detail 7).

VEGETATION: Vegetation should be cleared to a height and width of 10' for a riding trail (per detail 8).

FENCING:

Trail fencing shall be constructed of hollow PVC material available from Kroy Industries (818-888-6517) or approved equal (per detail 9). Fences will be used:

- in areas where side slopes exceed 3:1;
- along canals or flood control hazards;
- adjacent to the trail on the street side where the trail is constructed along the street ;
- in residential areas where the trail passes to the front of residences; and,
- on reverse frontages at street intersections to delineate the trail entrance. The entry fence will consist of a section on either side of the trail tread of two rail segments long. See detail 11.

SIGNAGE:

Trail markers shall be installed every 200' unless the trail is defined by the designated PVC trail fence. The trail signage shall be a brown 5-1/2' by 3-3/4" flexible fiberglass, Carsonite Dual Side Recreational Marker (CIB-380R) or approved equal, buried to a depth of 18" (per detail 12).

UNDERPASSES:

Underpasses or culverts used for trail undercrossing shall conform to the following standards:

Height:	10' Minimum
Width:	10' Minimum
Length:	No Longer than 75'

In underpasses 50' or longer, a light should be installed in the passage. In wet areas, use details 15 and 16 to ensure that the trail tread is kept dry.

INTERSECTION DESIGN:

All crossings should be at grade with striping and signing as shown in detail 11.

TRAIL PLANTING:

Shrubs shall be selected to reach a maximum height of 4' at maturity. Where a fence is not provided, a non-broken plant barrier shall be installed in parkway areas between vehicular traffic & the trail to prevent trail users from leaving the trail. In areas where a parkway planting is specified, vines, shrub and tree planting must be of non-toxic selection to horses. Refer to Appendix S-B for a list of poisonous plants that should not be used.

Section S3 Trail Details

Appendix A - Poisonous Plants

It is nearly impossible to list every plant species, which, at some time, has been responsible for illness, irritation, dermatitis, or other allergy. Remember, some poisonous plants may cause only slight skit irritation; others, such as castor bean, may cause severe illness or death. Some are toxic when eaten raw, but are safe when cooked.

The following partial list contains many world-favorite garden ornamentals. A few weeds are also included in the listing.

	Scientific Name	Common Name	Poisonous Part of the Plant[2]
*	*Acokanthera* species	Bushman's Poison	All parts
*	*Aconitum* species	Monkshood	All parts, especially roots and seeds
	Adonis aestivalis	Summer Adonis	Leaves and stems
	Aesculus species	Horsechestnut, Buckeye	Leaves and fruit
	Ailanthus altissima	Tree of Heaven	Leaves, flowers - D
	Amaryllis belladonna	Belladonna Lily	Bulbs
	Anemone species	Windflower, Anemone	Young plants, flowers
	Asclepias species	Milkweed	All parts, especially leaves and stems
	Asparagus officinalis	Edible Asparagus	Young stems - D
	Baileya multiradiata	Desert Marigold	Entire plant
	Brunsvigia rosea	Garden Amaryllis, Naked Lady	Bulbs
	Buxus sempervirens	Common Boxwood, English Boxwood	Leaves - D

[2] D means that the plant causes dermatitis.

	Caesalpinia gilliesii (Poinciana gilliesii)	Bird-of-paradise Bush	Fruit, pods, seeds
	Calonyction species	Moonflower	Seeds
	Cephalanthus occidentalis	Buttonbush	Leaves
	Cestrum species	Cestrum, Night Jessamine	Leafy shoots
	Clematis vitalba	Traveler's Joy	Leaves
*	*Colchicum autumnale*	Autumn Crocus, Meadow Saffron	Leaves
*	*Convallaria majalis*	Lily-of-the-valley	All parts, especially leaves and flowers
	Corynocarpus laevigata	New Zealand Laural, Karaka Nut	Fruit, seeds
	Crinum asiaticum	Crinum Lily	Bulbs
	Crotalaria species	Canary Bird Bush	All parts, especially seeds
	Cypripedium species	Lady Slipper Orchid	Hairy stems and leaves - D
*	*Daphne* species	Daphne	Bark, leaves, fruit
	Daubentonia punicea	Rattlebox	Seeds
*	*Delphinium* species	Larkspur, Delphinium	Young plant, seeds
	Dicentra species	Dutchman's breeches, Bleeding-heart	Leaves, tubers
	Dieffenbachia species	Dumb Cane	Stems, leaves
*	*Digitalis purpurea*	Foxglove	All parts, especially leaves
	Duranta repens	Skyflower, Golden Dew Drops	Fruit, leaves
	Echium vulgare	Blue Weed	Leaves, stems - D
	Eriobotrya japonica	Loquat	Seeds
	Euonymus europae	European Burning-bush	Leaves, fruit
	Eupatorium rugosum	White Snakeroot	Leaves, stems
	Euphorbia species	Euphorbias, Poinsettia Snow-on-the-mountain	Milky sap

	Ficus species	Figs	Milky sap
	Fragaria species	Strawberry	Fruit - D
	Gelsemium sempervirens	Carolina Jessamine	All parts, especially flowers, leaves, roots - D
	Ginkgo biloba	Ginkgo, Maidenhair Tree	Fruit juice - D
	Gletchoma hederacea	Ground Ivy	Leaves, stems
	Gloriosa species	Climbing Lily	All parts
	Hedera helix	English Ivy	Leaves, berries
	Helenium species	Sneezeweed	Entire plant
	Helleborus niger	Christmas Rose	Rootstock and leaves - D
	Heteromeles arbutifolia	Toyon, Christmasberry	Leaves
	Hyacinthus species	Hyacinth	Bulbs
	Hydrangea macrophylla	Hydrangea	Leaves
	Hymenocallis species	Spider-Lily	Bulbs
	Hypericum perforatum	St. John's Wort	All parts when eaten - D
	Ilex aquifolium	English Holly	Berries
	Impatiens species	Impatiens	Young stems and leaves
	Ipomoea alba	Morning Glory, Moonflower	All parts
	Iris species	Iris	Rhizomes - D
	Juglans species	Walnut	Green hull juice - D
	Kalmia latifolia	Mountain Laurel	Leaves and flower nectar
*	*Laburnum vulgare*	Goldenchain Tree	Leaves, seed pods, seeds
	Lantana species	Lantana	Leaves
	Lathyrus odoratus	Sweet Pea	Seeds
	Ligustrum species	Privet	Leaves, berries
	Linum usitatissimum	Flax	Entire plant, especially immature seed pods
	Lobelia species	Lobelia	Leaves, stems, fruit - D

	Lupinus species	Lupines	Leaves, pods, especially seeds
	Lycium halmifolium	Matrimony Vine	Leaves, young shoots
	Macadamia species	Macadamia Nut, Queensland Nut	Young leaves
	Maclura pomifera	Osage Orange	Milky sap - D
	Melia azedarach	Chinaberry	Fruit, flowers, bark
	Mirabilis jalapa	Four O'Clock	Seeds
*	*Myoporum laetum*	Myoporum	Leaves
*	*Narcissus* species	Narcissus, Daffodil	Bulbs
	Nepeta hederacea	Ground Ivy	Leaves, stems
*	*Nerium oleander*	Oleander	All parts
	Nicotiana species	Tobaccos	All parts, especially foliage
	Ornithogalum species	Star of Bethlehem, Pregnant Onion, Chincherinchee	All parts
	Oxalis pes-caprae (O. cernua)	Bermuda Buttercup	Leaves
*	*Papaver somniferum*	Opium Poppy	Un-ripe seed pods
	Paphiopedilum species	Orchids	Hairy stems and leaves - D
	Pastinaca sativa	Parsnip	Hairs on leaves and stems - D
	Philodendron species	Philodendron	Entire plant
*	*Pittosporum* species	Pittosporum	Leaves, stems, fruit
	Poinciana gilliesii (Caesalpinia gilliesii)	Bird-of-paradise Bush	Fruit, pods, seeds
	Primula species	Primrose	Leaves, stems - D
	Prunus species	Cherries, Peaches, Plums	Seeds, leaves
	Ranunculus species	Ranunculus, Creeping Buttercup	Leaves - D
	Rhamnus species	Buckthorn, Coffee Berry	Sap and fruit - D

	Rheum rhaponticum	Rhubarb	Leaves - D
	Rhododendron species	Rhododendron, Azalea	Leaves
*	*Ricinus communis*	Castor Bean	Seeds, foliage
	Robinia pseudoacacia	Black Locust	Young shoots, bark, seeds
	Rumex acetosa	Sour Dock	Leaves
	Saponaria vaccaria	Cow Cockle	Seeds
	Senecio mikanioides	German-Ivy	Leaves, stems
	Solandra maxima (S. guttata)	Cup-of-Gold Vine	Leaves, flowers
	Solanum dulcamara	European Bittersweet	Leaves, berries
	Solanum pseudocapsicum	Jerusalem Cherry	Fruit
	Solanum tuberosum	Irish Potato	Green skin or tubers
	Tanacetum vulgare	Common Tansy	Leaves
	Taxus baccata	English Yew	Foliage, bark, seeds
	Thevetia peruviana (T. neriifolia)	Yellow Oleander	All parts
	Veronica virginica	Culver's Root	Roots
	Wisteria species	Wisteria	Seeds
	Zephyranthes species	Zephyr Flower, Fairy Lily	Leaves, bulbs

* Very poisonous substances.

Source: Poisonous Plants in the Gardens, leaflet 2561, Division of Agricultural Sciences, University of California, 1978

SECTION 02211 - TRAIL GRADING AND CONSTRUCTION

PART 1 - GENERAL

1.01 STANDARD SPECIFICATIONS: The provisions of the "Standard Specifications for Public Works Construction" shall apply except as modified herein.

1.02 SCOPE: The Work of this Section shall consist of furnishing all labor, materials, equipment, appliances and services necessary for the execution and completion of all **Trail Grading and Construction Work** as shown on the Plans and as described in the Specifications including, but not necessarily limited to, the following:

- Rough grading as shown on the plans, including cut, fill, backfill and backfill compaction
- Subgrade preparation for D. G. paving including any over-excavation and re-compaction as may be required
- Excavation of soils for all trail fence posts and structures
- Excavation, backfill and compaction of soils for all mowcurbs
- Soil compaction as required;
- Protective measures;
- Dust and noise abatement;
- Borrow from and/or export to a local borrow/disposal site as directed and as necessary for a balanced grading operation;
- Fine grading of the work site;
- Decomposed Granite Paving;
- Soil testing as required;
- Coordination with Work of other Sections;
- Clean-up; and,
- Erosion Repairs, Guarantees and Warranty Work.

1.03 RELATED WORK SPECIFIED ELSEWHERE:
Finish Grading in Landscaped Areas Section 02480

1.04 QUALITY ASSURANCE:

A. Other Requirements: All Work of this Section shall comply with the requirements of the following:
   1. The Grading Code of the City of Riverside.
   2. The Soils Engineering Investigation Reports for the site prepared by Soils Engineer (see Appendix___).

B. Tests and Inspections:
   1. All Work in this Section shall be subject to the observation and testing as required by the Soils Engineer selected by City. The Soils Engineer will submit a compaction report to the Parks Department Representative certifying Contractor's compliance with the Plans, Specifications, Soils Reports and City Grading Ordinance in placing all fills and backfills. The Soils Engineer will conduct all specified tests to insure compliance. The Soils Engineer will also test, identify and make recommendations on borrow site fill materials as specified in this Section.
   2. The number and location of soils tests shall be at the discretion of the Soils Engineer to assure uniformity and compliance with the City Grading Ordinance, and shall be at least one test per two vertical feet of fill, but not less than one test per 500 cubic yards, all as approved by the Parks Department Representative.
   3. The costs of services of the Soils Engineer for specified field density and maximum density tests, compaction reports and certificates of compliance, will be borne by City except that additional tests and recompactions made necessary by inadequate compaction, inadequate materials provided by Contractor, or inaccurate excavations shall be paid for by Contractor.

1.05 GRADING A "BALANCED" OPERATION: It is the intent of the Plans and Specifications that the grading shall be a balanced operation with site material. No import nor export is contemplated. If during grading operations an excess or deficiency of earth becomes apparent, Contractor shall notify the Parks Department Representative immediately in writing

and ask for direction in adjustment of plan grades such that the grading shall be completed with site material conforming as nearly as possible to the finish grades shown and insuring positive drainage all at no additional cost to City.

1.06 WATER: See Special Provisions Section **7-8.5 Temporary Light, Power, and Water** regarding temporary construction water.

1.07 JOB CONDITIONS:

A. Protection of Existing Items:
   1. Contractor shall furnish, place and maintain all shoring and bracing as may be required for protection of existing structures and utility services during execution of the Work.
   2. All bench marks, monuments and other reference points shall remain undisturbed unless specifically directed otherwise by the Park Projects Inspector.

B. Coordination with Others:
   1. Contractor shall give written notice to the Parks Department Representative, utility agencies, and other legal authorities prior to starting Work.
   2. Contractor shall coordinate Contractor's operations with other trades, utility agencies, and other affected public departments to assure continuity for both access and service of all utility service distribution lines, in conformance with applicable requirements of these organizations. No services to any property shall be impeded.

C. Abandoned and Unknown Utilities:
   1. Abandoned lines, meters and boxes, obstructions or piping, shall be removed, plugged, or capped in accordance with the requirements and approval of the agencies affected, or as directed by the Park Projects Inspector. Coordinate all such Work with applicable mechanical or electrical trade having responsibility. Remove all abandoned utility lines, pipes, or conduits, to a point outside new construction lines.
   2. Where unmarked utility lines or other underground obstructions or piping are uncovered within the Work area, notify the agencies or service utility companies having jurisdiction and take necessary measures to prevent interruption of service. Should such lines or services be damaged, broken, or interrupted through Contractor's own negligence, those services shall be repaired immediately by the party designated by the utility owner, at Contractor's expense. If an unmarked utility is damaged other than through the negligence of Contractor, Contractor's responsibility is limited to providing immediate and proper notification of the damage to the utility owner so that repairs can be made. Contractor shall cooperate with the utility owner and provide access for repair work.

PART 2 - MATERIALS

2.01 D.G. PAVING:

A. D.G.: Shall be color as approved by the Inspector to match existing, decomposed granite free of silt, clay, weed seed, and any other deleterious material, conforming with Section 400-2.3 Disintegrated Granite, per the Standard Specifications and as approved by the Parks Department Representative. Contractor shall provide a one pound sample to the Parks Department Representative a minimum of 35 days prior to ordering materials for the review and approval of the Parks Department Representative.

B. Stabilizer: Shall be "Stabilizer" as manufactured by Stabilizer Solutions, Phoenix, AZ PH: 1/800/336-2468; “Poly Pavement” as manufactured by Poly Pavement Co, Los Angeles, CA 90036 PH: 323/954-2240, or City approved equal.

2.02 DRAIN ROCK: Drain rock for all sumps and french drains shall be pervious backfill as specified in Standard Specifications, Section **300-3.5.2 Pervious Backfill**.

2.03 FILL MATERIAL:

A. Required Approval: All fill material must be approved by the Soils Engineer and the Parks Department Representative.

B. On-site Material: On-site excavated materials may be used for fill as approved by the Soils Engineer and the Parks Department Representative.

2.04 GRANULAR BEDDING MATERIAL: Where called for on the Plans, granular bedding material shall be crushed stone or pea gravel conforming to the following grading:

Sieve Size	% Passing
3/4"	100
1/2"	95
#4	5

2.05 IMPORT:

A. Landscape Fills: All import soil used for fill in landscape areas shall be Class 'A' topsoil per Standard Specifications, Section **212-1.1 Top Soil, General**.

B. Structural Fills: All import soil used solely for structural fill shall be non-expansive, predominantly granular material free from organic contaminants, and capable of attaining the required compacted densities.

C. Approved Samples: Samples of all import soil, as obtained by the City's Inspector at the borrow site, must be approved by the Parks Department Representative prior to start of import of soil to the Project site.

2.06 TRAIL FENCE: Trail fence shall be a heavy duty two rail white vinyl fence designed for agricultural uses, as manufactured by Kroy Building Products, Inc. (800/933-5769), Ultra Guard Fence (800/592-6220), or City approved equal. Fence rails shall be nominal 2 x 6 x 16' ribbed type, with minimum 0.11 inch wall thickness. Posts shall be nominal 5" square by minimum 6' length with minimum 0.20 inch wall thickness, installed with a minimum 24" bury at 8' on center. Use aluminum inserts at all end, corner and gate posts (both latch and hinge sides), or fill with concrete.

PART 3 - EXECUTION

3.01 GENERAL:

A. Work Sequence: All demolition, clearing and grubbing of objectionable materials must be completed to the satisfaction of the Parks Department Representative before starting any earthwork grading and excavation.

B. Survey: See Special Provisions Section **2-9.3 Survey Service** regarding responsibility for provision of all survey services as necessary for horizontal and vertical control points, layouts, lines and levels, and staking of the Work.

C. Allowable Gradients: Trails shall be constructed in the field to comply with the following maximum and minimum gradients.
   1) Cross Slope: Trail cross slope shall be between 1% minimum and 2% maximum.
   2) Longitudinal Gradients:
      a) Accessible Trails: Trails designated for ADA access shall not exceed a longitudinal slope of 5% (20:1) unless configured as an Accessible Ramp.
      b) Non-Accessible Trails: Trails designated as non-accessible, must be so marked, and generally shall not exceed a longitudinal gradient of 10% (10:1). However, slopes steeper than this for short distances may be allowed under the following conditions:

- Maximum of 15% slope for distance of 500' or less.
- 20% slope permitted only in unique situations and limited to 100' or less.
- Under no circumstances shall any slope exceed 20%.

c) Alternate Trail Designs: Where the natural terrain is so steep that provision of a trail at more than 20% gradient is required, to decrease grade, terrace steps may be used.

3) Accessible Ramp Systems: All ramps shall not exceed a maximum slope of 8.333% (12:1). Ramps shall not exceed a maximum of 30' in length between landings. All landings shall not exceed a maximum cross slope of 2% in any direction. All landings shall be sized at a minimum of 60" x 60" or the width of the trail whichever is greater, all per ADA requirements. All ramps and landings shall be provided with accessible handrails.

4) Trail Edge: Where adjacent to developed landscape areas, the trail D.G. shall be contained by a concrete mowcurb on each edge of the trail tread. Where adjacent to native landscapes, no mowcurb is required and may be omitted.

5) Trail Fence and Markers: All trails along public streets shall be fenced and marked per Trails Standard Details.

6) Crossing Concrete: Where the trail is designated to cross concrete aprons and sidewalks, such aprons and sidewalks shall be constructed of concrete with rough broom or rake finish to prevent slipping. Where such areas exist, they shall be removed and replaced with rough broom finish concrete, or shall be heavy sandblasted in place to provide an equivalent non-slip surface..

3.02 ROUGH GRADING:

A. Conformance with Plans: Rough grading of the site shall be completed in accordance with indicated contours, elevations, and limit lines shown on the Plans and shall allow for the depths of slabs, paving, sub-base, topsoil, and controlled fills.

B. Grading Tolerances:

1. Sub-grades to receive slabs and pavements shall be graded to a tolerance of plus or minus one-half (1/2) inch, and shall be compacted as specified below in Sub-section **3.04 CONTROLLED FILL**, paragraph **G. Relative Compaction Requirements**, sub-paragraph **1. Slabs & Pavement Subgrades**.
2. Tolerance for rough grading in all other areas is 1/10th of a foot.
3. In all areas, appearance and positive drainage will be factors in the acceptability of grades.

C. Compacted Lifts: Graded material shall not be left in loose layers, but shall be stockpiled for use in controlled fill or compacted in thin layers as grading takes place in accordance with the requirements for controlled fill.

D. Scarification: Shall be performed on all areas indicated to receive paving to depths as indicated in the soils report. In the absence of a soils report, scarification shall be to a minimum depth of six (6) inches or to a depth permitting twelve (12) inches of controlled fill whichever is greater.

E. Engineer's Approval: Contractor shall obtain the Soil Engineer's approval of all scarified surfaces prior to placement of fill.

3.03 CONTROLLED FILL:

A. Landscape Fills: The topmost 12" of fill in all landscape areas shall be topsoil.

B. Rocks: Rocks larger than two (2) inches in diameter shall be removed from all fills to be compacted.

C. Lifts: Fill material shall be spread in uniform lifts of six (6) to eight (8) inches of un-compacted thickness.

D. Moisture Content: Prior to starting compaction, the fill material shall be brought to optimum moisture content by spraying with water if too dry, and aeration if too wet.

E. Mixing: Thoroughly mix each lift to assure uniform distribution of water content.

F. Allow for Shrinkage & Subsidence: Bring fills to suitable elevations above required grades to provide for effects of shrinkage and settlement.

G. Relative Compaction Requirements:
1. D.G. Pavement Subgrades: For all areas designated to receive D.G. pavement and within a perimeter five (5) feet outside these areas, each lift shall be compacted to a minimum of 90% of maximum density as determined by ASTM D1557-78.
2. Planting Areas: Where fill is required in planting areas each lift shall be compacted to a minimum of 85% maximum density.
3. Mechanical Equipment: Perform all compaction by suitable mechanical equipment and methods approved by the Soils Engineer.

H. Contractor's Responsibility: During the grading operations, inspection and field tests will be carried on by the Soils Engineer. However, Contractor is responsible to ensure obtaining the required degree of compaction and the proper moisture content. Where compaction of less than the specified percentage is found, additional compaction effort shall be made with adjustment of the moisture content as necessary until the minimum specified compaction is obtained.

I. Over-excavation Due to Unsuitable Materials: Excessively wet material, material in any soft or spongy spots, and material in standing water shall be over-excavated to such depth as directed by the Soils Engineer and replaced with suitable material, properly compacted.

3.04 EXCAVATION: Contractor shall perform all necessary excavation work for trail fence footings and mowcurbs and shall perform any additional excavation work necessary to provide ample room for installation of concrete forms where required. The bottom of all excavations shall be level and free from loose material, and shall be brought to the indicated or required grades in undisturbed earth. All excavations shall be kept free of standing water. Contractor shall perform all pumping, draining, and dewatering as may be necessary to keep excavations free of standing water while carrying on the Work. Should excavations for footings, through error, be excavated to a greater depth or size than indicated or required, such additional depth or size shall be filled with concrete at Contractor's expense.

3.05 OPEN TRENCH OPERATIONS: Shall conform with Standard Specifications Section **306-1 Open Trench Operations**, as modified by the following:

A. General: Add the following to Standard Specifications Section **306-1.1.1 General**:

"Where trench is close to existing pole mounted lights, catch basins, or other structures that are to remain, Contractor shall brace as necessary to prevent dislocation of such structures. In the area of any such structures, the trench backfill shall be compacted to 90% to the full depth of the structure."

B. Unsuitable Material: Add new subsection 306-1.1.7 as follows:

3.06-1.1.7 Unsuitable Material. The conditions and requirements for the determination and disposition of unsuitable material encountered during open trench operations shall be in accordance with Standard Specifications Section **300-2.2 Unsuitable Material**.

C. Trench Backfill: Shall conform with Public Works Department Standard Drawing No. 453.

3.06 BACKFILLING:

A. Material: Select site material shall be used for backfill of trenches and shall be free from large stones and clods. Material shall be as approved by the Soils Engineer.

B. Pre-Conditioning and Placement:

1. Layers of backfill shall be pre-conditioned by moistening with water, the amount to be controlled to insure optimum moisture conditions for the type of fill material used. Excess water causing saturated earth beneath footings, walks, and curbs is unacceptable.
2. Backfill shall be deposited in layers of maximum six inch thickness.
3. Backfill shall be compacted by suitable means to a minimum relative compaction of 90%.
4. All trenches shall be backfilled in accordance with this Section, and may be tested at the discretion of the Engineer.

3.07 FINE GRADING: Fine grading, as specified under this Section, is a separate operation from finish grading as specified under Section **02480 Planting**. Fine Grading Work is to commence upon completion of all trenching and backfill operations, and prior to soil preparation.

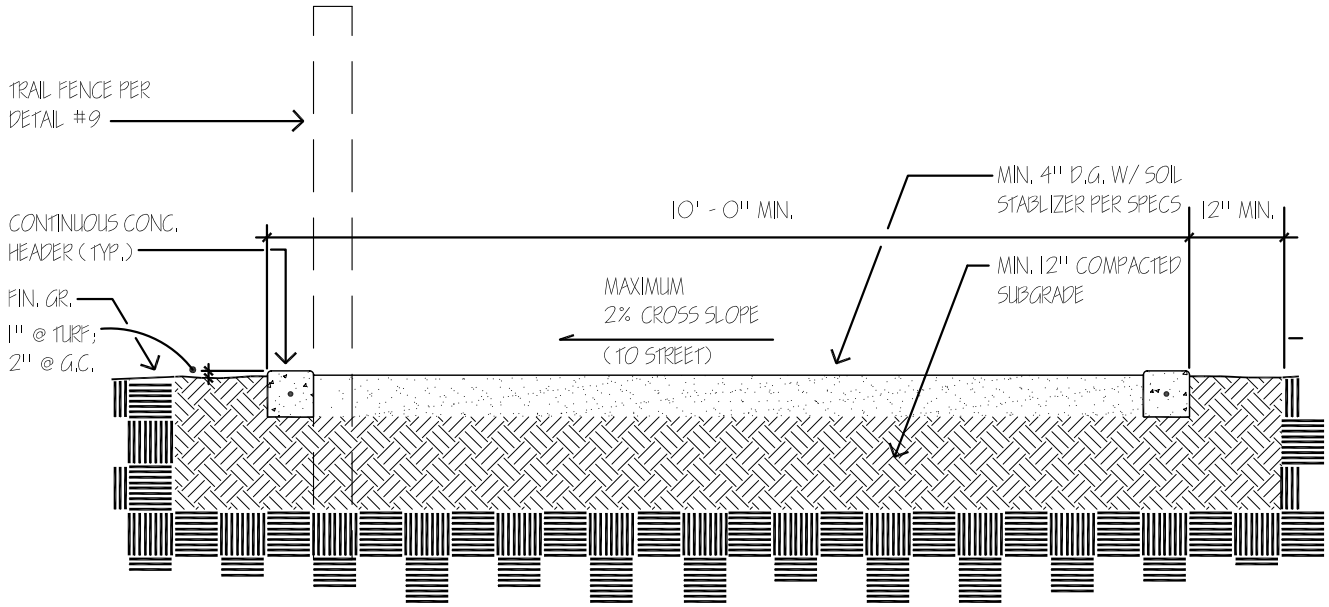
Upon completion of Fine Grading Work all areas shall slope to drain without water pockets or irregularities and shall conform to the intent of all Plans and Specifications after thorough settlement and compaction of the soil. Fine grading should allow for Soil Preparation Work as specified under Section **02480 Planting**, such that finish grades shall meet the elevations indicated on the Plans. Tolerance for fine grading is 1/4 inch, plus or minus. Any corrections to the Grading Work required to obtain proper drainage and to bring it into conformance with the intent of the Plans and Specifications and City codes shall be performed by Contractor at no additional cost to City.

3.08 DECOMPOSED GRANITE: Stabilizer shall be mixed with decomposed granite in proportions as recommended by the manufacturer for "high traffic" usage. Pre-mixed D.G. and stabilizer shall be placed in lifts, wetted and compacted as specified by the stabilizer manufacturer to a minimum relative compaction of 90%. D.G. pavement shall be smooth, free of rills, dips, and flow lines, such that surface water will properly drain off the surface of the pavement. Contractor shall provide as a turn-over item a minimum of 10 pounds of stabilizer product per 1000 lineal feet of trail being installed.

3.09 DUST AND NOISE ABATEMENT: During the entire construction period, site areas shall be kept sprinkled (either with water or an approved dust palliative) as necessary to minimize dust in the air and annoyance to surrounding properties. Adhere to the requirements of City ordinances for dust and noise control.

END OF SECTION

BJ/02210.MAS
08/22/96



NOTES:

GRADES:

TRAIL LONGITUDINAL GRADIENT SHALL COMPLY W/ ADA STANDARDS WHERE FEASIBLE.

TRAIL SUBGRADE TO BE COMPACTED TO 90% RELATIVE COMPACTION FOR MINIMUM OF 12" BELOW D. G. SUBGRADE.

GRADE TRAIL TREAD FLUSH TO T.C. AT LOWER SIDE AND MAX. 1/ 2" BELOW AT UPPER SIDE.

TRAIL LONGITUDINAL GRADIENT SHALL NOT EXCEED 10% WITHOUT PRIOR WRITTEN CITY APPROVAL.

NATIVE SOILS MAY BE USED FOR D.G. WHERE MEETING 'GREENBOOK' DEFINITION OF "D.G."

D.G. TO BE MIXED WITH SOIL STABLIZER AS SPECIFIED PRIOR TO PLACEMENT. APPLICATION RATE TO BE FOR "HIGH TRAFFIC."

FENCE:

WHERE R.O.W. IS 66' OR LESS, AND TRAIL IS ALONG FRONT OR SIDE YARDS, PLACE FENCE AT EDGE OF TRAIL EASEMENT ADJACENT TO PRIVATE PROPERTY TO SERVE AS P/L FENCE.

WHERE R.O.W. EXCEEDS 66' (e.g. REVERSE FRONTAGE LANDSCAPE AREAS) PLACE TRAIL FENCE ON STREET SIDE OF TRAIL TREAD.

TRAIL FENCE MAY BE OMITTED WHERE TRAIL LEAVES RIGHT OF WAY ONCE 25' AWAY FROM R.O.W. LINE.

CONCRETE:

CONCRETE MOWCURB(S) MAY BE OMITTED WHERE TRAIL ABUTS "NATIVE VEGETATION" (I.E. NON-IRRIGATED) AREAS.

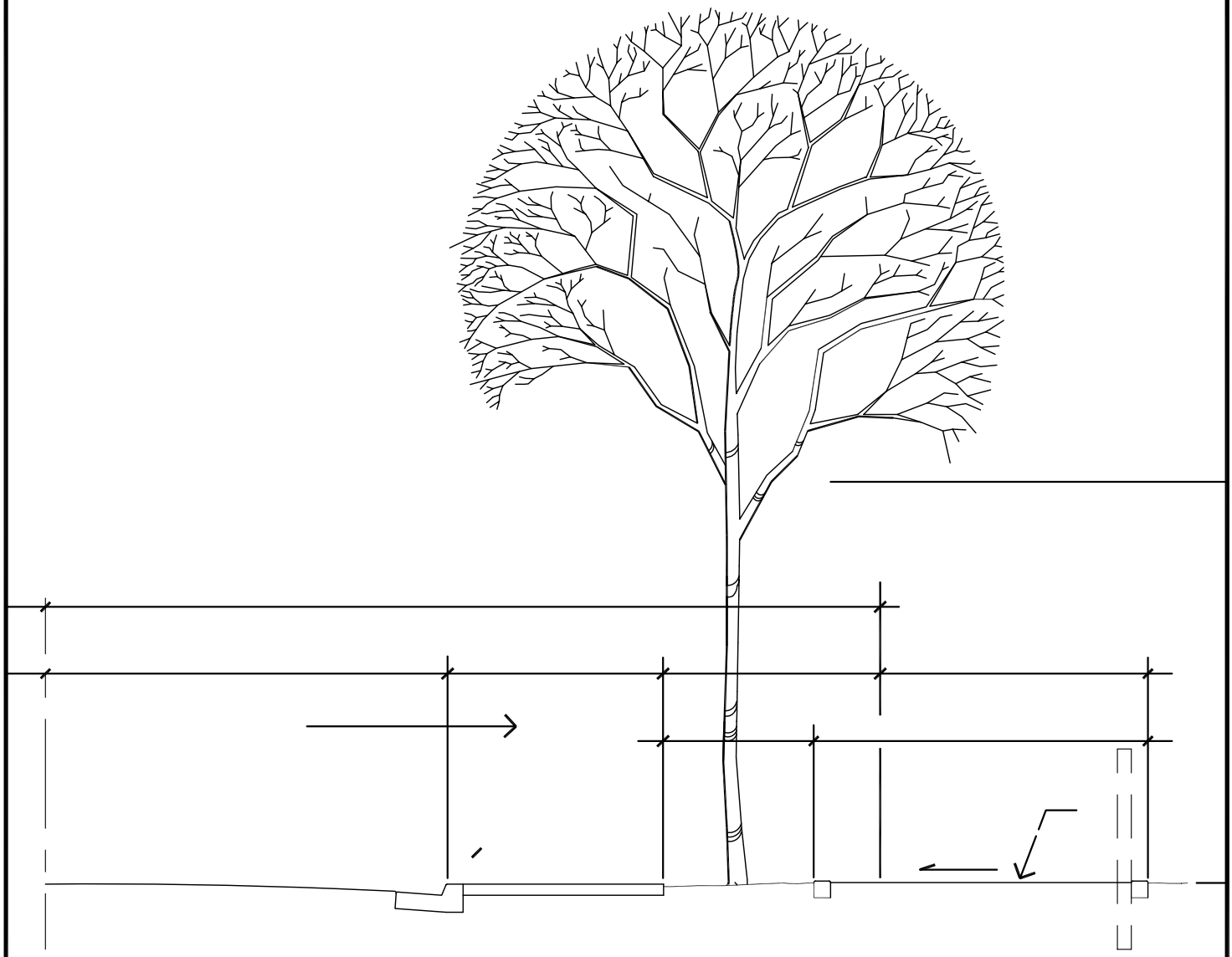
WHERE TRAIL CROSSES DRIVEWAYS/ SIDEWALKS PROVIDE HEAVY BROOM FINISH CONCRETE.

Approved	Date
BJ	09/12/03
Revised	Date

Park and Recreation Department
CITY OF RIVERSIDE

STANDARD TRAIL SECTION

Detail No.
1

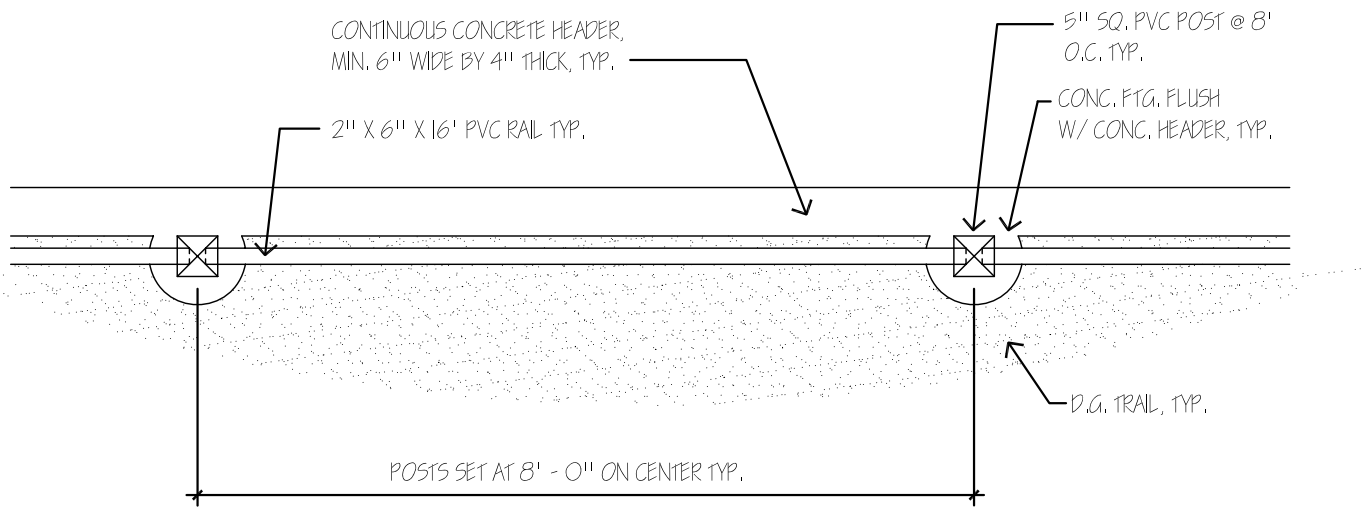


Approved	Date
BJ	09/12/03
Revised	Date

Park and Recreation Department
CITY OF RIVERSIDE

TYP. TRAIL @ FRONT YARD

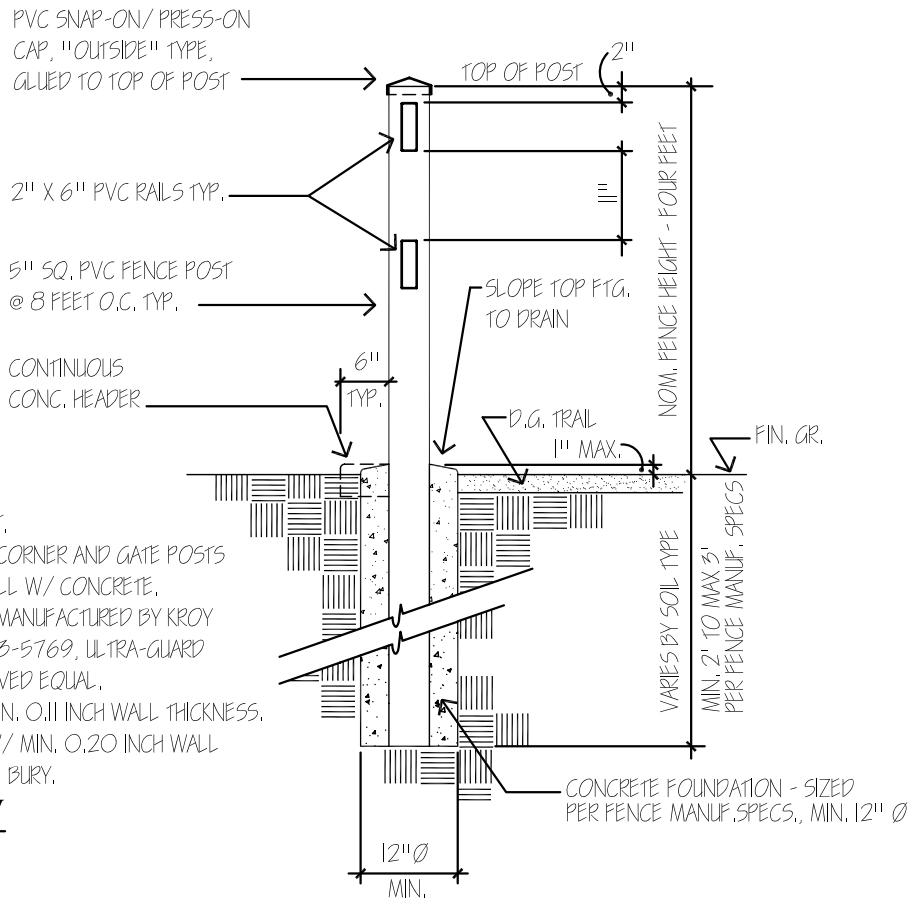
Detail No.
2



PLAN VIEW

NOT TO SCALE

AT RESIDENTIAL FRONT YARDS INSTALL FENCE AT PROPERTY-LINE SIDE OF TRAIL. ALL OTHER LOCATIONS, INSTALL FENCE ON STREET SIDE OF TRAIL



- PROVIDE CONC. FTG. AT EVERY POST.
- USE ALUMINUM INSERT AT ALL END, CORNER AND GATE POSTS (BOTH LATCH & HINGE SIDES) OR FILL W/ CONCRETE.
- ALL FENCE MEMBERS SHALL BE AS MANUFACTURED BY KROY BUILDING PRODUCTS INC, 800/ 933-5769, ULTRA-GUARD 800/ 592-6220, OR CITY APPROVED EQUAL.
- RAILS SHALL BE RIBBED TYPE, W/ MIN. 0.11 INCH WALL THICKNESS.
- POSTS SHALL BE MIN. 6' LENGTH, W/ MIN. 0.20 INCH WALL THICKNESS, INSTALLED W/ MIN. 24" BURY.

POST SECTION VIEW

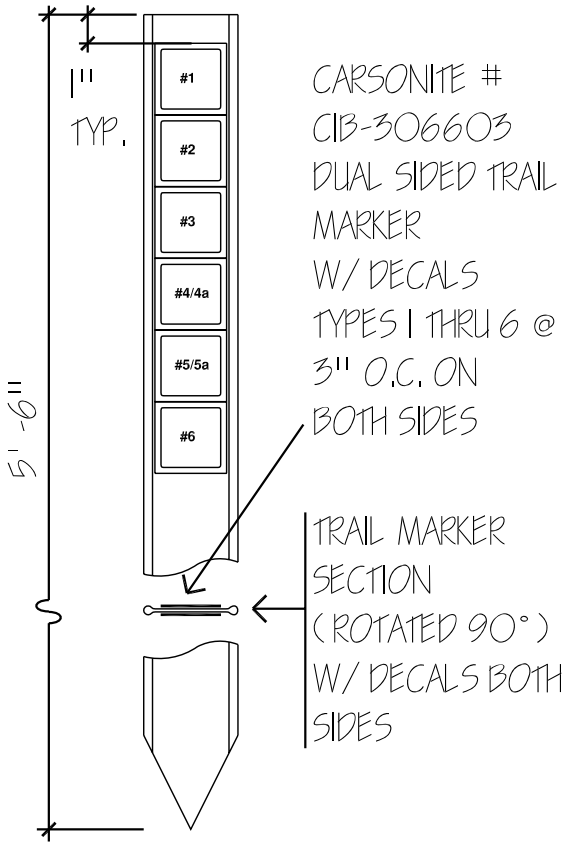
NOT TO SCALE

Approved BJ	Date 01/ 02/ 96
Revised BJ	Date 08/ 23/ 02

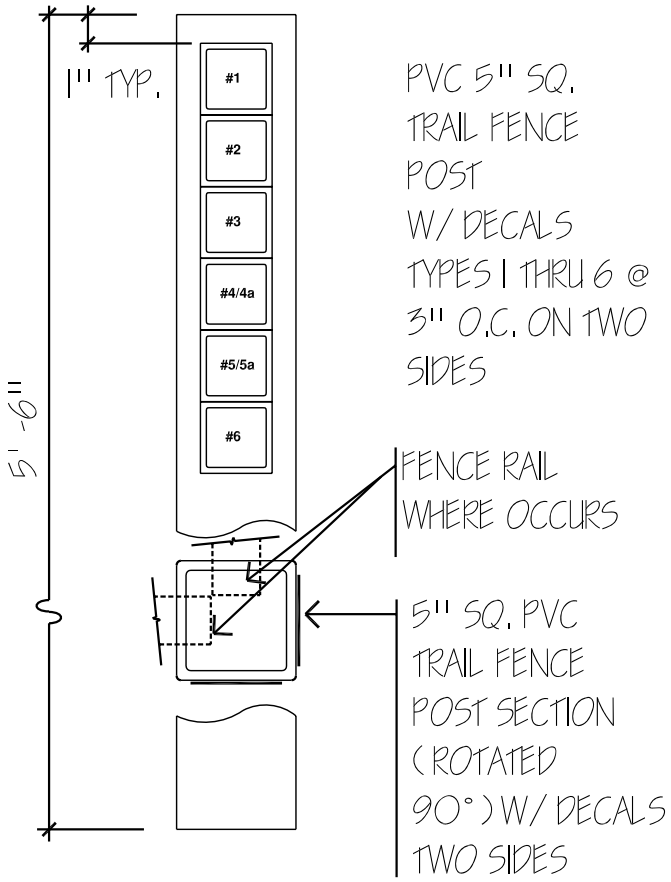
Park and Recreation Department
CITY OF RIVERSIDE

PVC TRAIL FENCE

Detail No.
9



CARSONITE MARKER W/DECALS (TYP.)



PVC TRAIL FENCE W/DECALS (TYP.)

CARSONITE DECALS
TOLL FREE CONTACT NUMBER 1-800-648-7915

TYPE	DESCRIPTION	TYPE	DESCRIPTION
#1	CLOSED TO ALL MOTORIZED VEHICLES — CLOSED TO ALL MOTORIZED VEHICLES CARSONITE DECAL 4149TMD	#4a	NON-EQUESTRIAN TRAIL CARSONITE DECAL RS-064 W/ SLASH
#2	HIKING/ JOGGING TRAIL CARSONITE DECAL RS-068	#5	 ACCESSIBLE TRAIL CARSONITE DECAL RS-028
#3	BICYCLE TRAIL CARSONITE DECAL RS-066	#5a	NON-ACCESSIBLE TRAIL CARSONITE DECAL RS-028 W/ SLASH
#4	EQUESTRIAN TRAIL CARSONITE DECAL RS-064	#6	NO MOTORIZED VECHICLES PERMITTED CARSONITE DECAL RS-065 W/ SLASH

Approved	Date
BJ	09/12/03
Revised	Date

Park and Recreation Department
CITY OF RIVERSIDE

TRAIL MARKERS/DECALS

Detail No. 12