

TOWN OF CAVE CREEK



SETTLED 1870 · INCORPORATED 1986

TECHNICAL DESIGN GUIDELINE NUMBER 5 - TRAILS

EFFECTIVE DATE: JULY 8, 2008



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SECTION 1 – INTRODUCTION

1.1 **PURPOSE:**

The purpose of this document is to provide guidance on the planning, design, construction and maintenance of trails within the Town of Cave Creek (TOCC), Arizona. The term “trails” refers to non-paved, non-motorized, shared use trails, which are legally accessible by the general public. The main objectives of the manual are to:

- ✓ Develop and maintain a Town wide interconnecting network of trails to provide valuable recreation and transportation opportunities.
- ✓ Provide guidelines that reflect the requirements of the TOCC Codes and Ordinances, as well as other applicable County, State or Federal regulations.
- ✓ Provide guidelines on the use, availability and appropriateness of data.
- ✓ Provide guidelines for constructing and modifying trail systems to be owned and operated by the TOCC.
- ✓ Provide guidance on agreements, design preparation, and Final Plan preparation.

1.2 **GENERAL INFORMATION:**

The purpose of this document is to provide guidance on non-paved trail design and development. Trails function as transportation links between residential areas, parks, places of employment, shopping areas and other areas of interest. Trails also provide hikers, walkers, joggers, equestrians, and mountain bicyclists, with opportunities to improve health and fitness, spend time with family and friends, enjoy the natural environment and escape the stress of everyday life.

The Town’s General Plan - Trail’s Plan identifies the proposed trail alignments within the TOCC. The growing use of trails has spurred the development of more trails near populated areas. Increasingly, trails are being seen as an integral part of the Town’s infrastructure.

This document should be used in conjunction with the most recently adopted Ordinances, Plans and Guidelines as listed below:

- TOCC Zoning and Subdivision Ordinances
- TOCC General Plan
- Maricopa Association of Governments (MAG) Standard Specifications & Details
- TOCC Infrastructure Improvements Plan
- TOCC Technical Design Guideline No. 1 - Grading & Drainage
- TOCC Technical Design Guideline No. 2 - Transportation
- TOCC Technical Design Guideline No. 3 - Utilities
- TOCC Technical Design Guideline No. 4 - Landscaping



1.2.1. Standard Trail Specifications:

The applicable specifications for trail design and construction are as contained herein under Section 2.12.1

1.3 DISCLAIMER:

Construction documents and construction plans for development and/or improvement of properties within the TOCC are reviewed and approved by the TOCC for general conformance with the TOCC Ordinances, Codes, Policies and Standards. The TOCC does not, however, assume responsibility or liability for insufficient design and/or improper construction. Review and approval by the TOCC does not absolve the owner, developer, design engineer, or contractor of liability for inadequate design or poor construction. The trail designer has the responsibility to design trail improvements and facilities that meet the standards of practice for the industry and promote public safety.

Compliance with the regulatory elements, policies, and design standards documented herein, does not imply a guarantee that properties will be free from flood, geologic, and geotechnical related damage and failures.

The TOCC and its officials, employees, and contract reviewers, assume no liability for information, data, or conclusions prepared by private designers or engineers and makes no warranty expressed or implied in its review/approval of trail projects.

The data and information provided herein are offered as guidelines to development regarding trail systems design. With the exception of requirements mandated by TOCC Codes and Ordinances, all guidelines provided are subject to change or variation at the discretion of the Zoning Administrator and/or Town Manager.

1.4 DEFINITIONS:

ADA: American with Disabilities Act: Passage of the Americans with Disabilities Act gives civil right protection to individuals with disabilities.

ABA: Architectural Barriers Act

ADJACENT GRADE: The elevation of the ground, sidewalk, patio, deck support, or basement entryway immediately next to a structure.

ANNEXATION: To incorporate a land area into an existing district or municipality, with a resulting change in the boundaries of the annexing jurisdiction.

APPROVAL: Written notice by the TOCC staff approving the design, progress or completion of work. Copies of which shall be filed in the office of the TOCC Trails Coordinator and Building Official.

APPROVED PLAN: The most current trails plan which bears the authorized signature of approval of the appropriate TOCC staff member.



AREA: An area of a town that has a unique character identifiable as different from surrounding areas because of distinctive architecture, streets, geographic features, culture, landmarks, activities, or land uses.

BERM: Is soil that has built up on the downhill edge of the trail tread.

BICYCLE LANES: These are on-street facilities, typically 5.5 feet wide, designed for a bicycle, created by means of pavement striping.

BORROW: Earth material acquired from an offsite location.

BRUSHING: The selective removal of vegetation from a proposed development site or other piece of property.

BUILDING OFFICIAL: The TOCC Building Official.

CLEARING OR GRUBBING: Removal, relocation or demolition of any plant, bush, tree, cacti, earth or rock from a property as preparation for subsequent development and construction.

COMMERCIAL: A land use classification that permits facilities for the buying and selling of commodities and services.

COMMUNITY PARK: A publicly owned land site with full public access intended to provide recreation opportunities beyond those supplied by neighborhood parks.

COMPACTION: The process whereby the in-place density of any earth material is increased by mechanical equipment, hydraulic means or other approved method.

CONSERVATION: The management of natural resources to prevent waste, destruction, or degradation.

CONSTRUCTION DOCUMENTS: The reviewed plans, drawings, specifications, and other Instruments of service.

CONSTRUCTION PHASE: The period beginning with the issuance of the Construction Notice to Proceed and ending on the date of Final Completion of the Project.

CONSTRUCTION WORK: That portion of the work consisting of the provision of labor, materials, equipment and services provided in connection with the construction of a project as described in the Construction Documents.

COST OF THE WORK: Those items of work that are paid for by the TOCC.

DESIGN MATERIALS: Any and all documents, shop drawings, electronic information, data, plans, drawings, sketches, illustrations, specifications, descriptions, models and other information developed, prepared, furnished, delivered or required to be delivered to the TOCC under the terms of the Contract Documents.

DESIGN PHASE: The period set forth commencing with the receipt of a Notice to Begin Design and ending when all design work is complete.

DESIGN WORK: That portion of the work consisting of the programming and design services required to be provided in connection with the design of a project as set forth in the Contract Documents.



DEVELOPMENT 1: The physical extension and/or construction of urban land uses. Development activities include: subdivision of land; construction or alteration of structures, roads, utilities, and other facilities; grading; and clearing of natural vegetative cover (with the exception of agricultural activities). Routine repair and maintenance activities are exempted.

DEVELOPMENT 2: Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, fencing, excavating or drilling.

DEVELOPMENT ENVELOPE: The delineated boundary inside the property limits within which all development and disturbance of ground must be contained. No disturbance of any kind for any purpose is allowed outside of the development envelope except for driveway access.

EARTH MATERIAL: Any rock, natural soil or fill, and/or any combination thereof.

ENGINEER: The TOCC Town Engineer

ENGINEERING PLANS: Plans, profiles, cross-sections, and other required details for the construction of improvements which shall be prepared and bear the seal of a professional engineer, currently registered in the State of Arizona under the appropriate discipline for the type of project which has been designed.

EXCAVATION: Any act, by which earth, sand, gravel, rock, or other earthen material is cut into, dug, uncovered, displaced or relocated, and shall include the conditions resulting therefrom. In other words, the artificial (e.g. mechanical, manual, blasting, etc.) removal of earth materials.

EXISTING GRADE: The original grade or elevation of the existing ground surface prior to excavating, filling, stockpiling, and/or storage.

FILL: Deposits of soil, rock, or other materials placed by artificial or mechanical means.

FINAL INSPECTION: Field inspection conducted by the TOCC staff prior to project acceptance or release of assurances (if required).

FINISH GRADE: The final grade or elevation of the improved or altered surface after grading and construction is completed.

FLOODPLAIN: The relatively level land area on at least one side of a continuous elevated landform, regularly subject to flooding. That part of the floodplain subject to a one- percent chance of flooding in any given year is designated as an "area of special flood hazard" by the Federal Insurance Administration.

GENERAL PLAN: A compendium of Town goals, objectives, and policies regarding its long-term development, in the form of maps and accompanying text.

GOAL: A general, overall, and ultimate purpose, aim, or end toward which the TOCC will direct effort.

GRADE DIP: Short segments of trail with a grade opposite to the prevailing longitudinal grade of the trail.

GRADING: Any excavating or filling to level land or create a slope or combination thereof.



GRADING PERMIT: An official document issued by the TOCC Building Department staff authorizing the grading and related site work activity specified by the permit conditions.

GRUBBING: The clearing of a majority of the vegetative matter within a certain area.

HILLSIDE: All lands where the natural desert terrain of any lot, track or parcel has a slope of fifteen percent (15%) or greater as measured over a minimum one-hundred (100) foot linear distance.

HISTORIC TOWN CORE, HTC: Beginning at the intersection of East Cave Creek Road and North Scopa Trail and extending parallel to Cave Creek Road north to the East LaSalle Road alignment and south to the East Skyline Drive alignment; thence west along East Cave Creek Road to its intersection with North Spur Cross Road then extending parallel to North Cave Creek Road west to the North Conestoga Trail alignment and East to the North Basin Road alignment; thence south along North Cave Creek Road to a point 275 feet (+/-) south of East Carriage Drive to its terminus, an area of approximately one and a quarter (+/-) square mile.

INFRASTRUCTURE: Services and facilities, such as sewage-disposal systems, water-supply systems, other utility systems, roads and trails.

ISA: International Society of Arboriculture.

LAND DISTURBANCE: Any human caused alteration of the land surface or indigenous vegetation including all clearing, grubbing, grading, and mining activities.

LAND USE: The occupation or utilization of land or water area for any human activity or any purpose defined in the General Plan.

LANDSCAPE DESIGNER: The landscape designer or architect responsible for the plan design, construction documentation preparation and landscape cost estimate of a project.

MAG: The Maricopa Association of Governments.

MAJOR WASH: The area that has been designated a Federal Floodplain by the Federal Emergency Management Agency (**FEMA**) or any wash having a one-hundred (100) – year peak flow of fifty cubic feet per second (50 cfs) or greater.

MASTER PLAN: A plan for a large area that may address land use, landscaping, infrastructure, circulation or service provision.

MINOR WASH: A wash or constructed drainage feature having a one hundred (100) – year peak flow of less than fifty cubic feet per second (50 cfs).

MIXED-USE: Properties on which various uses, such as office, commercial, institutional, and residential, are combined in a single building or on a single site in an integrated development project with significant functional interrelationships and a coherent physical design. A "single site" may include contiguous properties.

NOTICE TO PROCEED: The notice given by the TOCC authorizing work to begin.

NPDES PROGRAM: National Pollution Discharge Elimination System is the federal law requiring a developer, public or private, to control or eliminate erosion and other forms of water pollution from a site.



OPEN SPACE: Any parcel or area of land or water that is improved or unimproved, and devoted to an open space use for the purposes of (1) the preservation of natural resources, (2) the managed production of resources, (3) outdoor recreation, or (4) public health and safety. Open Spaces include functional open space, agriculture, retention/detention areas and floodways and floodplains. Open space may be publicly or privately owned and maintained.

PARKS: Open space lands whose primary purpose is recreation, or passive enjoyment by the public.

~~**PATHS AND TRAILS:** Trails and paths include on-street bicycle lanes, equestrian; multiple use paths and trails; pedestrian, equestrian and multiple use easements; and trailheads and staging areas. These facilities will continue to be publicly and privately owned and maintained. Trailheads may be privately or publicly owned and maintained, and may be constructed privately and dedicated to the Town.~~

PLANNING AREA: The area directly addressed by the General Plan. The Town's planning area typically encompassing the existing town limits, and potentially annexable land which will ultimately form the Town limits at build out, and to which the Town will provide services.

PLANNING DIRECTOR: The Town of Cave Creek Planning Director.

PTE: Public Trail Easement - Non-motorized

PUE: Public Utility Easement.

REGIONAL: Pertaining to activities or economies at a scale greater than that of a single jurisdiction, and affecting a broad geographic area.

REVEGETATION: Establishing native plants at a density similar to existing natural conditions in disturbed or denuded areas.

REZONING: An amendment to the Official Zoning Map and/or text of a zoning ordinance to effect a change in the nature, density, or intensity of uses allowed in a zoning district and/or on a designated parcel or land area.

RIGHT-OF-WAY: Publicly owned land occupied or intended to be occupied by certain transportation and public use facilities, such as roadways, railroads, and utility lines.

SITE: Any lot or parcel of land, or contiguous combination of lots and parcels under the same ownership, or unified control, where related site work is to be performed. The subject land shall have access to a public or an approved private street.

SLOUGH: Is material that has moved downhill from the backslope and has been deposited along the uphill edge of the trail tread.

STABILIZED SLOPE: A slope treated with revegetation or other mitigation measures approved by the TOCC that resist erosion or augment the structural integrity of the slope.

STRUCTURE: That which is built or constructed, an edifice or building of any kind, or any piece of work artificially built up or composed of parts joined together in some definite manner, which requires location on the ground or is attached to something having location on the ground.



SUBDIVISION: The division of a tract of land into four or more defined lots, either improved or unimproved, which can be separately conveyed by sale or lease, and which can be altered or developed.

TCC: Town Core Commercial Zoning.

TOWN ARBORIST: The Town of Cave Creek Town Arborist.

TOCC: The Town of Cave Creek, Arizona.

TOWN COUNCIL: The Town of Cave Creek Town Council.

TRAILS COORDINATOR: The Town of Cave Creek Trails Coordinator.

TRAIL DESIGNER: The designer and/or engineer responsible for the plan design, construction document preparation and cost estimate of a trails project.

TRAILHEAD: The beginning-point of a trail which may include one or more of the following; parking, trail information, rubbish containers, water and sanitary facilities.

TRAILS & PATHWAYS: Trails and Pathways including on-street bicycle lanes; off-street bicycle trails; pedestrian and equestrian paths and trails; are multiple use non-motorized easements; trailheads; and staging areas within the Town of Cave Creek's jurisdiction. Trails and Pathways may be located within the Town's rights-of-way, or can be dedicated to the Town from private property owners. The Trails and Pathways within the Town provide safe alternative non-motorized transportation access and connectivity to Recreation and Town Core areas.

UTILITY DEPARTMENT: The Town of Cave Creek Utility Department.

UTILITY DEPARTMENT MANAGER: The Town of Cave Creek Utility Department Manager.

WATERBAR: Native rocks or logs embedded in the trail surface at a 45-degree angle to the longitudinal slope for the purpose of directing surface water off the trail.

WATERCOURSE: Any lake, river, stream, creek, wash, arroyo, or other body of water or channel having banks and bed through which waters flow at least periodically and any depression serving to give direction to a current of storm water.

WILDLIFE: Animals or plants existing in their natural habitat.

WORK: The activities specifically identified within the Contract Documents.

ZONING: The division of a town or county by legislative regulations into areas, or zones, which specify allowable uses and required development standards for real property within these areas; a program that implements policies of the General Plan.

ZONING ADMINISTRATOR: The Zoning Administrator shall be designated at the discretion of the Town Manager.

1.5 STANDARD SPECIFICATIONS & DETAILS:

The latest MAG Standard Specifications and Standard Details have been adopted by the TOCC. All design and construction shall be in accordance with the Uniform Standard Specifications and Details published by the Maricopa Association of Governments and as amended by the TOCC. Alternate details and specifications may be submitted for

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review and acceptance by the Planning Department. If accepted, alternate details shall be shown as part of the approved engineering plans.

Uniform specifications and details are not a substitute for good engineering judgment. Unique conditions will arise that are outside the scope of these standards. When this happens, professional engineers and architects are required to use their judgment to amend these standards to best meet site-specific project needs in accordance with the rules set forth by the State of Arizona and policy statements made by the Arizona State Board of Technical Registration.

SECTION 2 – TRAIL DESIGN GUIDELINES

2.1 GENERAL:

This Technical Design Guideline and the associated standards have been developed to assure that a Project's Trail System is reliably capable of providing safe access to a Town wide interconnecting network of trails (TOCC Master Trail System) that provide valuable recreation and transportation opportunities to a variety of non-motorized users.

The guideline contains recommended procedures, classifications and design standards that the project engineer, planner, designer and/or property owner is generally required to use. A Project Trail Plan shall be prepared in adherence to the guidelines presented herein.

The design standards are intended to be used in conjunction with the governing specifications of the appropriate ordinances of the Town of Cave Creek, Maricopa County, and State of Arizona and Federal agencies.

The design concepts, procedures and technical data are presented herein only as guidelines and are not intended to replace sound engineering judgment and experience.

The TOCC does not guarantee the accuracy and/or applicability of the standards presented in this manual. The user shall be entirely responsible for the verification of the reasonability of all proposed designs and shall incorporate alternative design methodology when appropriate.

2.2 CODES, ORDINANCES & REGULATIONS:

The Town of Cave Creek, as part of its regulatory function, has established Zoning Ordinances and Subdivision Ordinances.

The Zoning and Subdivision Ordinances regulate the development and use of private and public land. Long range land use planning is guided through the TOCC General Plan. The Planning Department is responsible for current planning, long range planning and zoning enforcement and administers the Zoning and Subdivision Ordinances. All project related planning and design activities shall comply with the Zoning and Subdivision Ordinances of the Town of Cave Creek. Copies of these ordinances may be obtained from the TOCC and are electronically available at www.cavecreek.org.



2.3 DILIGENCE:

2.3.1 Verification & Compliance:

It is strongly advised that all developers and property owners verify the need for any trail system extensions necessary to provide trail connectivity to a site and the compliance of proposed projects with the TOCC Ordinances and Codes.

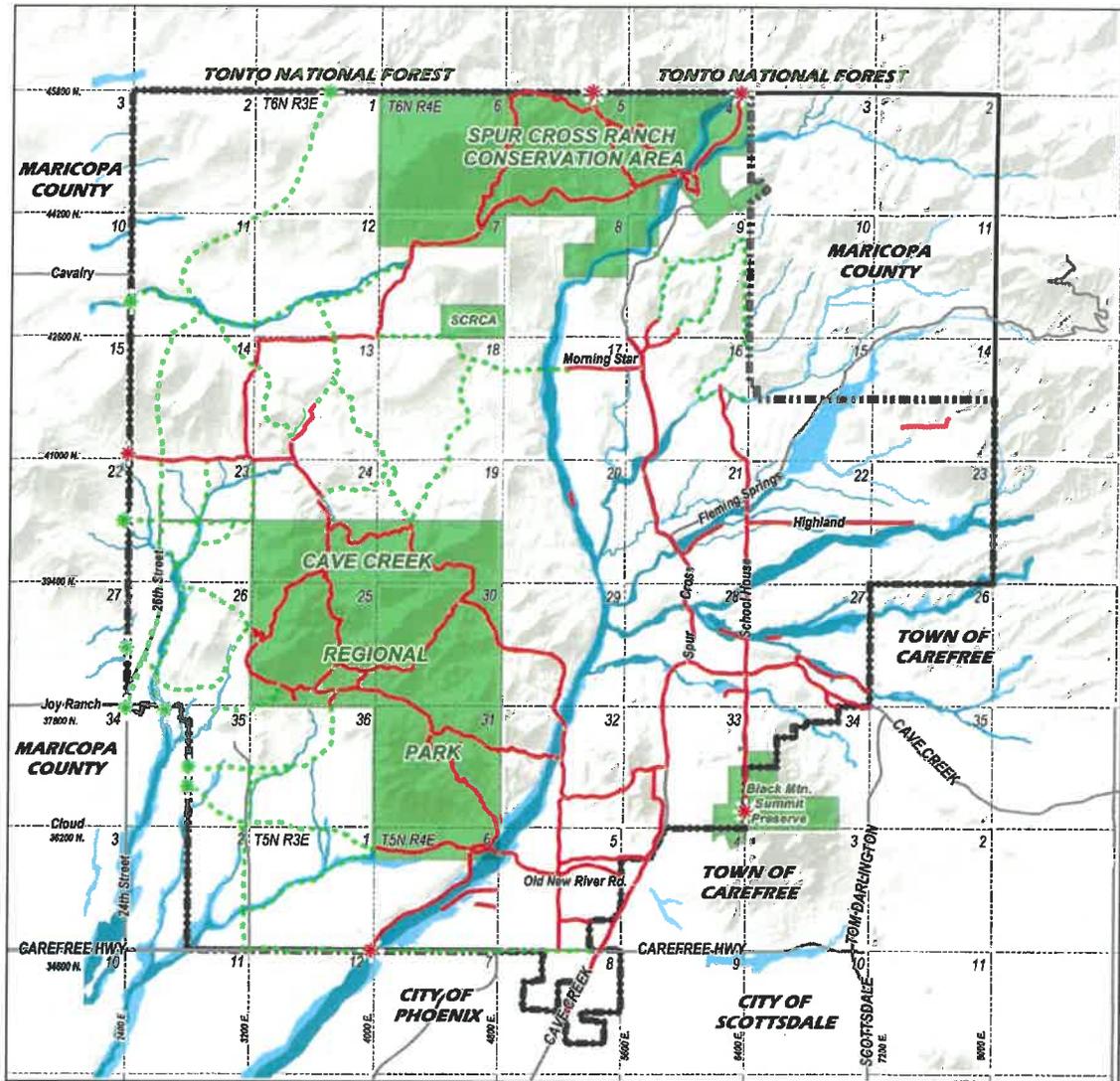
2.3.2 Available Resources:

1. The TOCC Planning Department – to obtain existing trail maps and design requirements (480-488-6610).
2. The TOCC General Plan – Circulation Element, Trails Plan – found at www.cavecreek.org.
3. The TOCC Town Code, Zoning Ordinance and Subdivision Ordinance – found at www.cavecreek.org.
4. The Trails Coordinator for confirmation as to the need for extensions to the TOCC Trails System (480-488-6609).
5. The Planning Department for information related to Native Plant Inventories, Salvage Reports & Revegetation requirements (480-488-6600).
6. TOCC Technical Design Guideline No. 5 – Trails.
7. TOCC Technical Design Guideline No. 4 – Landscaping.
8. TOCC Technical Design Guideline No. 2 – Transportation.
9. Maricopa County Parks & Recreation Department – existing county trail maps for trails located within and adjacent to the TOCC jurisdictional boundaries.

2.3.3 Additional Review Agencies:

In addition, the US Fish and Wildlife Service, US Forest Service, Arizona Game & Fish Department, Arizona State Historical Preservation Office and Arizona State Land Department have important advisory roles. In order to allow time for permit processing and coordinating with their timeframes, the developer needs to contact the above noted agencies early in the project planning stage for information about potential permits and submittal and notification requirements.

2.4 TOCC GENERAL PLAN - TRAILS FRAMEWORK PLAN



Legend

- | | | | | | |
|--|------------------------------------|--|------------------|--|-----------------------------------|
| | Cave Creek Municipal Planning Area | | FCDMC Floodplain | | Trail Type |
| | Cave Creek Municipal Limits | | Floodplain (A) | | Dedicated/Existing Public Trail |
| | SECTION LINES | | Floodplain (AE) | | Potential/Proposed Future Trail |
| | Major Roads | | Floodway | | Existing Trail Connection |
| | | | | | Potential Future Trail Connection |

NOTE: This map is a Planning Document ONLY. This is NOT an Official Trail Access Map. Proposed Trails are NOT Existing Trails until they are Dedicated. Trail Locations depicted on this map are approximate.

TOWN OF CAVE CREEK GENERAL PLAN

TRAILS FRAMEWORK PLAN

Amended Date _____ by Resolution: _____
 Amended Date _____ by Resolution: _____



Figure 2.4-1



2.5 PROJECT TRAIL MAP & DESIGN REPORT:

2.5.1 General:

Project Trail Maps & Design Reports shall provide an analysis of the impact that a development will have on the TOCC Trails System. These maps and reports are reviewed and accepted by the Planning Department, and are then utilized by the Department's Trails Coordinator to verify the infrastructure to be constructed. Accepted design maps and reports are retained by the Planning Department and are made available to developers and project engineers/designers upon request.

2.5.2 Design Policy:

The project engineer or designer shall analyze all proposed development that is determined by the Planning Department to have an impact on the TOCC Trails System. The connectivity to the existing TOCC Trails System shall be examined to ensure proper classification and design of any required trail system extensions and/or improvements.

A Project Trails Map and Design Report may be required for each development within the TOCC when an extension of the public trail system is required by the TOCC.

The Trails Coordinator shall determine if a trail map and/or design report is appropriate for a given development and convey this requirement to the TOCC project coordinator for inclusion in the project file. Maps and reports shall be submitted for review to the Planning Department, directed to the attention of the Trails Coordinator.

All required trail maps shall be accepted by the Planning Department prior to the submittal of Final Plans for review by the Planning Department's plan reviewer, unless otherwise agreed to in writing by the Planning Department Manager.

2.5.3 Project Trails Map:

A Project Trails Map is required when phased construction is proposed, or conditions are present where the Planning Department determines one is necessary.

The objectives of a Project Trails Map are to demonstrate that the proposed trail system improvements comply with both the most recent update of the TOCC Trails Master Plan and the TOCC design criteria and development policies for each phase of the project.

2.6 PROJECT TRAIL DESIGN REPORT REQUIREMENTS:

When required by the TOCC, a Project Trails Design Report shall be prepared in accordance with this technical design guideline by a professional engineer and/or designer. The Project Trails Design Report shall address, but not be limited to the following:

2.6.1 Terms & Requirements:

The Project Trails Design Report shall specify the terms and requirements for trail service to the proposed project.



2.6.2 Needs Determination:

The owner/project engineer/designer of the proposed project will be responsible for determining the specific TOCC Trails System needs and include the projections for future surrounding projects to ensure synergy within the system.

2.6.3 General Format:

1. The report shall be on letter-sized paper (8 1/2" x 11").
2. All reports shall have a Table of Contents.
3. Maps and other supporting materials shall not be larger than folded ledger size paper (11" x 17").
4. The trails engineer/designer shall sign each report.

2.6.4 Report Covers:

1. Covers should consist of hard stock paper or better.
2. The project name shall be located on the cover.
3. The name, address and phone number of the developer/owner and the project's engineer/designer shall be stated on the cover.
4. The original submittal date and any subsequent revision dates shall be located on the cover.

2.6.5 Vicinity Map:

Identify the project's location with respect to major cross streets.

2.6.6 Introduction:

1. Provide a summary of the proposed project.
2. Include a legal description based on the sectional breakdown or parcel number reference when located within a platted development.
3. Describe the existing and proposed site zoning and land uses.
4. Include reference to elements of the TOCC General Plan and identify any designated character area or studies that will affect the project's design.

2.6.7 Design Documentation:

1. Note the project's design compliance with the latest revision of this Technical Design Guideline and all other applicable design standards and codes.
2. Include a discussion of which design procedures, policies and methodologies will be incorporated into the design of the Project's Trail System.



2.6.8 Existing Conditions:

1. State the existing land use.
2. Describe the existing topography, vegetation, cultural resources and landform features.
3. Include the location and description of existing public rights-of-way (R.O.W.'s) and public utility easements (P.U.E's) in the vicinity.
4. Reference any existing master plans or design reports applicable to adjacent projects.

2.6.9 Proposed Conditions:

1. Describe the proposed connection(s) to the TOCC Trails System. Show looping and/or extension of the trail into the site.
2. Address maintenance responsibilities for the proposed Project Trail System.

2.6.10 Summary:

1. Provide a summary of all proposed Project Trail System improvements stating that all of the TOCC adopted design standards and policies have been met or indicate any exceptions. Note within the summary the rationale for the developer/owner requesting an exception(s).
2. Include a brief project schedule indicating the proposed start and completion of the project's improvements.

2.6.11 Supporting Maps:

1. Include a scaled Site Plan showing all existing and proposed trails and associated improvements.
2. Graphics should screen the project's background, present existing trails as bold solid lines and proposed trails as dashed lines.
 - a. Screen existing topography into the background. At two foot (2') intervals, clearly label all existing and proposed contour intervals.
 - b. Show, dimension and clearly label all property lines, rights-of-way, tract and easement lines.
 - c. Show all major washes, and hillside areas within the project.

2.6.12 Miscellaneous:

Requests for more specific information regarding report requirements and the TOCC Trails System may be obtained by contacting the Planning Department @ 480-488-6609.



2.7 PROJECT TRAIL MAP CONTENT:

When required by the TOCC, a Project Trail Map shall be prepared in accordance with this Technical Design Guideline by a professional engineer and/or designer. The Project Trail Map shall address, but not be limited to the following:

2.7.1 Project Trail Map:

Each Project Trail Map shall show the following:

1. All proposed on-site and off-site facilities including, but not limited to, trail cross-sections & profiles, trailheads, trail signage, wash crossing, roadway crossings and special structures.
2. Proposed street locations, parcel boundaries and proposed lots, tracks and/or parcels within the project.
3. Labeled contour lines at two foot (2') intervals.
4. Compliance with TOCC Trail Classification Standards as contain herein.

2.7.2 Vicinity Map:

Include a Vicinity Map showing all existing and proposed streets and approved trails within a distance of one (1) mile from the exterior boundaries of the subject project.

2.7.3 Construction Schedule:

Include a construction schedule, in table format, for all trail related construction required to serve the project. The schedule shall address each phase, where applicable, or parcel and how the project schedule relates to an orderly extension of the TOCC Trails System.

2.7.4 Compliance:

Demonstrate compliance with the TOCC Trails Master Plan.

2.7.5 Phased Development:

Projects that design a trails system that will be phased shall provide a synopsis of the phasing to the Planning Department upon acceptance of the Project Trail Map.

For specific information regarding Project Trail Map requirements and/or the current TOCC Trails Master Plan, contact the Planning Department @ 480-488-6609.

2.8 TRAIL LOCATIONS:

Location work must begin early in the trail design process and be completed prior to construction. The amount and level of work that is required varies depending on the type of trail being designed and the terrain on which the trail is being constructed. The necessary steps to properly lay out the trail include the following:



2.8.1 Reconnaissance:

The reconnaissance process includes the identification and evaluation of alternative routes, which leads to final selection of the best possible route to meet the established objectives of the trail

2.8.2 Grade:

The degree to which a trail rises or falls over a linear distance is an important factor in determining the length of the trail, level of difficulty, appropriate user types and drainage and maintenance requirements.

2.8.3 Drainage:

Proper drainage of surface water is the most important factor in design, construction and maintenance of trails. Surface erosion resulting from improper drainage will have a detrimental impact on the trail surface, causing damage to the natural environment and increasing maintenance requirements.

2.8.4 Surveying & Flagging:

Accurate staking/flagging of the trail acts as a guide so that the alignment, grade and distances can be easily followed during construction.

2.9 PUBLIC TRAIL EASEMENT REQUIREMENTS:

2.9.1 General Requirements:

Trails outside of a public right-of-way or a public street tract shall be placed in a minimum 5' to a maximum 15' wide Public Trail Easement (PTE) located within a dedicated tract (portion of a drainage tract or open space tract) unless otherwise approved by the Planning Department. The PTE shall be accessible from a public right-of-way.

2.9.2 Accessibility:

The PTE shall be free of obstruction, shall not be located in a fenced area, and shall be accessible at all times to TOCC maintenance and emergency service equipment. Areas in question shall be approved in writing by the Planning Department. In situations where encroachment into the PTE with structural improvements such as screen walls and paving cannot be avoided, the Planning Department shall request an indemnity agreement from the property owner.

2.9.3 PTE Located Outside of a Dedicated Tract:

All public trails shall be installed in a PTE located within a tract dedicated to the TOCC. The Planning Department may approve, in writing, a waiver for the placement of a trail in a PTE within a tract not dedicated to the TOCC when dictated by case specific conditions.

2.9.4 PTE Located Outside of Paved Areas:

Any revegetation within the PTE shall consist of low growing native shrubs acceptable to the TOCC. Trees may be located along the edge of the PTE in accordance with the



design guidelines provided herein. Refer to the TOCC Technical Design Guideline No. 4 – Landscaping for approved plant lists.

2.9.5 Approvals:

A copy of any written approved waivers from these requirements granted by the TOCC Planning Department shall be submitted along with the Final Plans submittal.

2.10 TRAIL DESIGN CONSIDERATIONS:

2.10.1 Purpose:

The TOCC's objective is to design, construct and maintain trails that:

1. Provide safe, non-motorized transportation links, and/or close-to-home recreation opportunities.
2. Provide legal public access to destination points and other areas of interest.
3. Blend with the surrounding environment.
4. Minimize impacts on the natural environment.
5. Minimize impacts on adjacent landowners.
6. Require minimum levels of maintenance.

2.10.2 Human Factors:

Trails shall be planned and constructed with the needs of the trail user in mind. Trail users tend to desire routes that access and connect areas of significant community activity such as schools, businesses, shopping areas and parks, as well as other areas of interest such as viewpoints, water sources, natural areas, desert preserves, scenic and vista corridors, and interesting geologic features. Visual qualities are important to trail users, therefore trails should be designed to blend with the surrounding environment. Views from the trail to the surrounding environment should also be considered. Trail users enjoy changes in scenery, thus the increasing demand for loop trails and trail networks that allow the user to return to the starting point without traveling the same trail twice. Trail users tend to favor the easiest, most obvious route. If the designated trail is not the easiest and most obvious, trail users will begin to create new, unauthorized trails.

2.10.3 Coinciding Easements:

Trails are frequently located within common tracts and easements dedicated for other purposes such as drainage, flood control, public utility, natural area open space, and scenic and vista corridors. In situations where these common tracts and easements are wider than that needed for a trail easement, it may be advantageous to dedicate the same area of these coinciding common tracts and easements for the purposes of public trail use. This will increase the flexibility to properly layout, design and construct public trails, and will allow the trail to be positioned away from undesirable areas such as low-flow wash channels, areas of extreme topography, dense vegetation, critical animal habitats and adjacent properties.



This will also allow future realignment of the trail, should such a realignment become necessary. In cases where a separate trail easement is delineated with other easements or common tracts, it is extremely important that the alignment of the trail easement be reviewed on the ground to assure suitability.

2.10.4 Trail Viewshed:

The line of sight from a trail to the surrounding landscape and from the surrounding landscape to a trail are important design considerations. Views from the trail to the surrounding landscape improve the quality of the trail users' experience; therefore, trails should be designed to provide users varying views of the surrounding area. However, obscuring views of the trail from the surrounding landscape is also important, since adjacent landowners may not want to view the trail from their properties.

2.10.5 Native Plants:

The design, construction and maintenance of trails within the TOCC shall incorporate the requirements as outlined within TOCC Technical Design Guideline No. 4 – Landscaping. Trails should be aligned whenever possible to avoid disturbance of, and to have a minimum negative impact on all protected plant species.

2.10.6 Sensitive Wildlife Habitat:

Trail design and construction within natural desert park and preserve areas shall be evaluated in terms of the effect that the trail will have on sensitive wildlife habitats. The Arizona Game and Fish Department shall be consulted during the trail design process to assure that the trail will not have a negative impact on such resources.

The best means of preventing negative impacts on wildlife is to simply avoid sensitive areas. Seasonal trail closures may be necessary in some situations.

2.10.7 Archaeological and Cultural Resources:

Trail design and construction shall be evaluated in terms of the effect the trail will have on archaeological and cultural resources. Such activities should be done in accordance with the Arizona State Historic Preservation Office requirements.

Potential options to prevent and mitigate damage to these resources include:

1. Altering the trail alignment to avoid archaeological and cultural resources.
2. Protecting the resources by utilizing methods to obscure them from view.
3. Mitigating the cultural resource, this involves removal and thorough documentation of all found artifacts by a professional archaeologist. The documentation of any found cultural resources may be utilized as part of the trail opportunity.

2.10.8 Design for Shared Use:

Trails within the TOCC are open to all non-motorized uses unless otherwise stated. Decisions to prohibit any non-motorized use from trails must be based on coordinated planning efforts involving appropriate user groups and TOCC staff. Characteristics that



should be considered as part of this process included, but are not limited to the following:

1. Tread width.
2. Vertical and horizontal clearances.
3. Longitudinal and cross slopes.
4. Surface materials.
5. Line of sight.
6. Amount of use.
7. Sensitivity to surrounding environment.
8. Soil types.
9. Native plant and animal habitats.
10. Surrounding land uses.

The following means of preventing potential user conflicts should be considered when planning, designing, constructing and maintaining shared-use trails:

1. Separate user types at trailheads and along the first, most crowded stretches of the trail.
2. Provide adequate sight distances.
3. Build trails wide enough to accommodate expected intensity and types of use.
4. Build and maintain trails wide enough for safe passing and/or provide periodic turnouts.
5. Design trails to control speeds where necessary by varying the trail surface and avoiding long, straight downhill stretches.
6. Provide adequate trailhead facilities for all user types where practicable and necessary.



2.11.5 Interpretive Trails:

The objective for Interpretive Trails is to provide educational opportunities along a common theme. Education and interpretation can occur in a variety of forms including, but not limited to, signage and brochures.

Use by equestrians and bicyclists are prohibited. Motorized vehicles are only permitted for maintenance and emergency purposes, and where trail widths allow. These trails are generally established in areas of gentle topography; there, longitudinal grades range from easy to moderate. The trail tread should be wide enough to accommodate some side-by-side travel and 2-way traffic. Barrier-Free standards may be achieved with additional improvements.

2.11.6 Equestrian Trails:

The objective for Equestrian Trails is to provide safe and enjoyable equestrian opportunities where appropriate within the TOCC. Equestrian Trails are typically multi-use trails with specific equestrian design considerations. Typical design considerations include but are not limited to the following:

1. Avoidance of motorized road crossings whenever possible.
2. Avoidance of steep slopes
3. Provisions for adequate trailhead facilities to accommodate horse trailer and tow vehicle pull-through parking and/or turn-around areas.
4. Installation of hitching posts when deemed appropriate.
5. Establishment of watering troughs where feasible.
6. Construction of turn-outs where deemed necessary.

2.11.7 Primitive Trails:

The objective for Primitive Trails is to provide safe and enjoyable trail recreation opportunities within preserved open space areas of the TOCC, while having a minimum impact on the surrounding environment. Certain user groups may be prohibited if deemed appropriate. Use may be limited to foot traffic only, as widths and grades may not permit the safe use by equestrians and bicyclists. Motorized vehicles, excluding helicopters, may be unable to operate for maintenance or emergency purposes due to the narrow tread width. Primitive Trails traverse areas with rugged topography; therefore, longitudinal grades are steeper, more difficult and may require erosion-control structures. The trail tread is typically narrower and thus requires single file travel by users.

2.12 TRAIL STANDARDS:

2.12.1 Trail Classification – Standards Table:

**Town of Cave Creek
Technical Design Guidelines - Trails**



TRAIL CLASSIFICATION - STANDARDS

Trail Classification	Locations	Maximum Grade	Minimum Tread Width	Variable Easement Width	Vertical Vegetation Minimum Clearance	Horizontal Vegetation Maximum 3' Height Limit	Drainage	Surface Type
Primary Trail	Main Roadways, R.O.W.'s, P.U.E.'s, Open Space & Conservation Easements, Parks	8% (10% for wash crossing & dips)	5'	5' to 15'	10'	3' per side	3% to 5% Cross Slope	Compacted Natural Surface or Stabilized 1/4" Minus Decomposed Granite
Secondary Trail	Washes, R.O.W.'s, P.U.E.'s, Drainage, Open Space & Conservation Easements, Scenic Corridors	10% (15% for wash crossings & dips)	4'	5' to 10'	10'	2' per side	3% to 5% Cross Slope	Compacted Native Surface
Neighborhood Connector Trail (Local Trail)	Washes, R.O.W.'s, P.U.E.'s, Drainage, Open Space & Conservation Easements, Scenic Corridors	10% (15% for wash crossings & dips)	2' to 4'	5' to 10'	10'	2' per side	3% to 5% Cross Slope	Compacted Native Surface
Interpretive Trail	Dedicated Open Space, Scenic Corridors, Parks	ADA Compliant	5'	10' to 15'	10'	3' per side	1% to 3% Cross Slope	ADA Compliant
Equestrian Trail	Main Roadways, R.O.W.'s, P.U.E.'s, Conservation, Open Space & Drainage Easements, Dedicated Open Space, Parks	10% (15% For Arroyo Crossing & dips)	4' to 6'	5' to 10'	10'	2' per side	3% to 5% Cross Slope	Compacted Native Surface
Primitive Trail	Washes, Conservation, Open Space & Drainage Easements, Dedicated Open Space	20% (30% For Arroyo Crossing & dips)	2'	5' to 10'	10'	2' per side	3% to 5% Cross Slope	Native Surface

Figure 2.12-1



2.12.2 Tread Construction:

1. **Surface Materials:** Trail surface materials shall correspond to the specification for the appropriate trail classification as contained within Figure 2.12-1 of this document.
2. **Cross Slope:** The cross slope is the slope of the tread surface perpendicular to the longitudinal slope. The cross slope is a critical factor in the design, construction and maintenance of trails. The cross slope allows surface water to drain off the side of the trail rather than along the longitudinal slope. Three primary types of cross slopes are identified as follows:
 - a. **Outslope** is the most common type of cross slope used on trails that traverse the side slopes of hills, and occurs when the trail surface slopes downward from the uphill to the downhill edge of the trail.
 - b. **Inslope** is the most infrequent variety of cross slope used on trails that traverse the side slopes of hills, and occurs when the trail surface slopes downward from the downhill to the uphill edge of the trail.
 - c. **Crowned** is the most commonly used trail construction on trails that traverse relatively level ground. A crowned trail surface slopes downward from the centerline to each outside edge for the purpose of preventing surface water from pooling on the trail surface.
3. **Backslope:** The backslope is the area from which material is excavated on the uphill side of the trail tread. Backslopes range from steep to gentle depending on the side slope of the hill and the characteristics of the soil. As a general rule, the backslope should not be steeper than the soil's ability to remain in place under typical climatic conditions. Riprap on moderate backslopes and retaining walls on steeper backslopes may be needed to stabilize the backslope in areas with steep side slopes or unstable soils. The Backslope areas should be revegetated following construction to regain its natural appearance and to reduce the potential for erosion.
 - a. **Backslope Ratios:**

BACKSLOPE CUT RATIOS BY SOIL TYPE	
Soil Type	Backslope Cut Ratio (horizontal:vertical)
Sand	3 or 4:1
Moist Clay	2 or 3:1
Loose, gravelly soil or organic	1.5 or 2:1
Loose Rock	0.5:1
Stable Rock	0.25:1

Figure 2.12-2



4. **Fillslope:** A fillslope is created by adding material to build up and support the downhill edge of the trail tread. The material used is typically removed as part of the backslope or from nearby borrow pits. Riprap on moderate fillslopes and retaining walls on steeper fillslopes may be needed to support the Fillslope in areas with steep side slopes or loose soils. The Fillslope areas should be revegetated following construction to regain its natural appearance and to reduce the potential for erosion.
5. **Cross-Sections:** Typical trail cross-sections are as follows:
 - a. **Full Bench:** Full bench construction involves the greatest amount of soil removal, but provides the most stable trail surface. In this type of construction, soil is removed from the backslope and cast down the hill. The excavated material is not used as fill to support the trail tread. Instead, the entire trail tread is supported by the naturally occurring solid sub-soil. Full bench construction is best suited for trails on steep side slopes greater than 50% because fill material will erode easily.
 - b. **¾ Bench:** This type of trail construction should be used on side slopes of 30% to 50%. The soil excavated from the backslope should be used for the fillslope. The fillslope should represent the downhill ¼ of the trail width. The backslope and fillslope areas should be revegetated to restore their natural condition and reduce the potential for erosion.
 - c. **Balanced Section:** Balanced section trail construction should be utilized on side slopes of 10% to 30%. The soil excavated from the backslope should be used for the fillslope. The fillslope should represent the downhill ½ of the trail width. The backslope and fillslope areas should be revegetated to restore their natural condition and reduce the potential for erosion.
 - d. **Natural Slope:** Natural slope construction is used when side slopes are less than 10%. It involves no cutting or filling, resulting in no backslope or fillslope.

2.12.3 Vegetation Clearance:

Vegetation clearance is the removal of vegetation within specified clearing limits (see Figure 2.12-1 for specifications for each trail classification). The primary goal is to provide the specified vegetation clearance while maintaining the maximum amount of natural vegetation and characteristics of the area. Trails shall be aligned so as to prevent disturbance of protected plants as identified in the TOCC Technical Design Guideline No. 4 - Landscaping.



2.12.4 Surface Water Control:

The proper control of surface water is a crucial element in trail design, construction and maintenance. Improper surface water control will have a negative effect on the surrounding environment and will result in damage to the trail.

The need for surface water control structures depends on many different factors including, but not limited to soil type, longitudinal and cross slopes, and existing drainage patterns.

Typical surface water control design elements include the following:

1. **Grade Dips.**
2. **Waterbars.**
3. **Culverts.**

2.12.5 Special Structures:

1. **Retaining Walls:** Stone structures used to stabilize trails on steep side slopes. Rocks used in the construction should be derived from the surrounding area. If cement is used to provide additional stability, it shall be colored to match the native rock.
2. **Rip-Rap:** Rip-rap is used to stabilize steep slopes above and below the trail tread. The rip-rap should not impede the flow of surface water off the trail tread. Rip-rap shall be constructed of native rock. If cement is used to provide additional stability, it shall be colored to match the native rock.

2.12.6 Road Crossings:

1. **Bridges:** A bridge is a structure spanning a roadway, canal, wash, or other obstacle that serves as a crossing for a roadway as well as a shared-use trail. The Trails Coordinator shall be involved in the planning and design process, and must approve all bridge crossings with a shared-use trail prior to construction. The minimum width of a trail crossing a bridge is 8 feet and the minimum vertical clearance is 10 feet.
2. **Underpasses:** Underpasses are used to provide passage for trail users under roadways, and are typically constructed of pre-cast concrete box culverts. The width of a trail traveling through an underpass should not be less than ten (10) feet. Vertical clearance is an important concern, particularly for equestrian trail users. The minimum vertical clearance shall be twelve (12) feet. Sight distances approaching and exiting the underpass must be adequate, so as not to create a safety hazard.
3. **At-Grade Crossings:** At-grade crossing occurs where a trail passes across the surface of a roadway. Safety of trail users is the primary concern when planning at-grade trail crossings. Ideal locations for such crossings are at roadway intersections with light amounts of traffic that have existing stop signs, traffic lights, or designated pedestrian crossings. Crossings should be on level grades where both trail users and motorists have long sight distances. Additional safety precautions include installing



signs warning motorists of the trail crossing and signs warning the trail users of the road crossing.

2.12.7 Wash Crossings:

Wash crossings shall be kept to a minimum when evaluating all trail designs. Natural crossings are favored. When trails cross washes, the greatest concern is protecting the trail from flowing water. The trail segments approaching the crossing and the location where the trail meets each edge of the wash shall be stabilized with securely placed rocks. Ensure that the flowing water does not undercut these rocks.

2.12.8 Switchback & Climbing Turns:

These trail design elements are both used to change the direction of travel on a hillside and to gain elevation in a short distance.

These structures can be very difficult to construct, therefore careful planning should be conducted to avoid using them. The Trails Coordinator shall be consulted in situations where switchbacks may be necessary.

1. **Switchbacks:** Switchbacks have a near level landing at the turning point. Switchback turns are typically used on side slopes of 20% to 45%, but can be used on slopes up to 55% with the use of retaining walls.
2. **Climbing Turns:** Climbing turns maintain a consistent longitudinal slope through the turn. A climbing turn is built on the same slope as the hillside. Where the slope of the hillside turns, the climbing turn ascends at the same rate. Climbing turns shall not be constructed on side slopes greater than 20% due to erosion.

2.12.9 Steps:

The use of steps should be avoided due to unsuitability for equestrians and mountain bicyclists and excessive maintenance requirements. Steps should only be used on pedestrian-only trails when elevation must be gained rapidly over a short distance and there is no other option. Steps shall be constructed of rock collected from the surrounding area. Efforts should be made to prevent trail users from traveling around the steps.

2.12.10 Trail Safety Barriers:

1. **Location:** The location of safety barriers should not restrict sight distances for roadway traffic or trail users. Special attention to the design and construction of safety barriers is particularly important near intersections. Safety barriers shall be installed between a trail and a roadway if the trail is located within an unsafe distance to the roadway, or if the trail shares an underpass or overpass with a roadway. Safety barriers should also be installed if the trail is elevated above an adjacent roadway and the side slope is greater than 6:1, or where trails are in close proximity to other steep drop-offs. All safety barriers shall be at least 3' from the edge of the trail.



2. **Design Criteria:** Appropriate safety barriers include fences, railings, or suitably thick vegetation. Other types of materials may be suitable subsequent to their approval by the Trails Coordinator. The materials and character of the barrier shall be compatible with the adjacent natural area. The minimum height should be 4' for structural barriers and 5' for vegetation barriers.
3. **Trail Access Gates:** Trail access gates are designed to restrict motorized access to trails except as permitted for maintenance and emergency purposes. The gate design must permit equestrian passage without requiring the rider to dismount. These gates should be located at trailheads, where trails cross major roads, and at other points where motorized vehicles are likely to attempt to access a trail.

2.12.11 Barrier-Free Standards:

The objective of Barrier-Free Standards is to provide trail opportunities for persons with physical disabilities including mobility, visual and hearing impairments. The design of Barrier-Free Trails should provide access to viewpoints, activity areas and other points of interest, and should meet the standards of the ADA. Equestrians and bicyclists are not permitted on Barrier-Free Trails. Motorized vehicles (excluding electric wheelchairs and other types of mobility aids) are permitted only for maintenance and emergency purposes. Caution must be exercised when using vehicles to avoid damaging hardened surfaces.

Barrier-Free Trails are generally established in areas that are flat with very gentle topography and level longitudinal grades. The trail tread shall be wide enough to accommodate side-by-side travel and 2-way traffic, and is composed of a hardened or stabilized surface.

2.13 TRAIL ACCESS FACILITIES:

The planning, design and construction of trail access facilities shall be conducted on a case-by-case basis and will require various levels of Town review and approval beyond the scope of this guideline. Potential trailhead amenities include, but are not limited to the following:

1. Pull-through horse trailer parking spaces.
2. Regular vehicle parking spaces.
3. Potable drinking water.
4. Water troughs for horses.
5. Hitching posts or corrals.
6. Year-around natural shade areas.
7. Bike racks.
8. Informational, interpretive and directional signage.
9. Entrance gates.



10. Restrooms.
11. Shade ramadas.
12. Picnic tables.
13. Benches.
14. Handicap Parking Spaces.

2.14 TRAIL SIGNAGE & MARKERS:

2.14.1 General Sign Standards:

Trail signage should be created to perform some or all of the following functions:

1. **Direction:** On-street signs designed so as to direct trail users to trail access points. Location coordination with the Town's Engineering Department and compliance with the TOCC Technical Design Guideline No. 2 – Transportation requirements are mandatory.
2. **Trailhead:** Identify trail access points and parking areas.
3. **Information:** Included within this category are a variety of sign types as which include but are not limited as following:
 - a. Trail information (trail name, allowed usage, length, loop or non-loop elevation gain, degree of difficulty, facilities, etc.)
 - b. Places of access.
 - c. Trail rules.
 - d. Seasonal or maintenance/construction closures.
 - e. TOCC contact information (i.e., reporting of trail current conditions, maintenance needs, safety concerns, suggestions for improvements).
4. **Guideposts:** Small trail markers used to mark points of interest, and distances. Guideposts also serve to provide location information for emergency response.
5. **Regulatory:** Advance warning, crossing, stop, yield, curves, slow, dismount, dogs must be on leash, no bikes, etc.

2.14.2 Sign Locations:

Trail signage is important in maintaining the safety of trail users, preserving the natural environment and promoting the presence of the trail. The number and location of signs should be carefully considered, as a lack of signage or poorly located signs can create hazardous situations for trail users. An overabundance of signs can also detract from the aesthetics of the trail and decrease the quality of the trail user's experience. Contact the Trails Coordinator for guidance in the preparation of the proposed trails signage plan.



2.14.3 Sign Specifications:

These standard specifications for trail signage apply to all Primary Trail, and Interpretive Trail signs. Alternative standards for other trail classifications may be approved by the TOCC pending review and approval by the Trails Coordinator.

1. **Sign Blanks:** All sign blanks shall be manufactured with “ASTM D-4956-04 Type IV Sheeting” (3N 3930 Series or equivalent), which shall be attached to the standard signage aluminum plates of 0.080” thickness. Sign imaging shall be in compliance with the reflective sheeting manufactures matched component system. Sign imaging shall consist of an acrylic based electronic cuttable film (3M 1170 series or equivalent) or silk screened (depending on the quantity of signage) with standard highway colors.

In addition, if called out on plans to create a graffiti-protective coating, a protective overlay film 3M 1160 or equivalent shall be used, which is designed to comply with the underlying reflective sheeting and match the component system. All signs shall have the manufactures name and date they where manufactured along with “TOCC” screened into the margins.

2. **Lettering:**
 - a. Font shall be Garamond or similar style.
 - b. Point size shall be relative to the size and function of the sign.
3. **Colors:** The background color shall be dark brown with reflective white lettering and symbols. For regulatory signs such as the “No Motorized Vehicle” sign, there shall be a brown reflective background with white lettering.
4. **Sign Mounting Hardware:** 3/8” diameter, vandal resistant, steel drive rivets.
5. **Posts:** Posts shall be constructed out of 1 3/4” x 1 3/4”, 12-gauge, square steel tubing with 7/16”, pre-punched knockouts on 1” centers. Post lengths shall be 6’. All steel posts shall be galvanized. The Trails Coordinator shall approve color samples prior to fabrication.
6. **Sleeves and Anchors:** Sleeves and anchors shall be used in locations where it is possible for a vehicle to come into contact with the signpost, such as adjacent to a street. The use of the sleeve and anchor promote easy breaking-away of the sign post in the event of a collision and increase the ease at which the sign can be replaced.
 - a. **Anchors:** Anchors shall be 2” x 2” x 30”, 12-gauge galvanized square tubing with 7/16”, pre-punched knockouts on 1” centers.
 - b. **Sleeves:** Sleeves shall be 2 1/4” x 2 1/4” x 12”, 12-gauge galvanized square tubing, with 7/16”, pre punched knockout on 1” centers.
 - c. **Anchor Assemble Hardware:** 3/8”, vandal resistant, steel drive rivets.



- d. **Telescoping Properties:** The finished post, anchor and sleeve must be straight with a smooth uniform finish to allow each component to telescope with each consecutive larger or smaller piece.

2.14.4 Informational Signs:

Trails directories or kiosks are typically 2 or 4 sided structures placed in a visible location such as a trailhead, village center or park. They can accommodate a trail map, trail rules and regulation, and information on trail services and natural and cultural features along the trail corridor. Additional information that may be useful to include is an area map highlighting local destinations and services near the trail such as lodging, restaurants, bicycle shops, gas stations, emergency service providers and local attractions.

2.14.5 Interpretive Signs:

Interpretive signs are located at or within viewing distance of special features along the trail. Panels can be placed vertically and at eye level or they can be low-profile wayside exhibits which provide information without blocking critical views.

Fiberglass embedded and porcelain enamel sign panels can incorporate illustrations, photos and text to present information in a very graphic and dynamic format.

2.14.6 Sign Installation:

1. Signposts adjacent to streets shall be installed according to the Manual of Uniform Traffic Control Devices (MUTCD) and the TOCC Technical Design Guideline No. 2 – Transportation.
2. In non-roadside locations the signpost can be mounted directly into concrete. The finished height of the sign post should be 5'-6".
3. Various combination of signs can be mounted on a single post to address the management needs of the particular trail area.
4. All signs are to be mounted to the posts with 3/8", vandal resistant, steel driven rivets.

2.14.7 Developer-Provided Sign Standard:

Developers may provide their own signage consistent in color and theme with the surrounding development. At a minimum, these signs must accommodate the following required signage:

1. The triangular "Trail Courtesy" graphic.
2. The "TOCC Trail System" logo.
3. The standard hiker, equestrian and mountain bicycle icons.
4. The above noted required signage may be installed on the same post as the developer-provided signs. The required graphics may be incorporated directly into the developer-provided sign. The required graphics for the subject signs can be obtained by contacting the Trails Coordinator.



5. All Developer-Provided signposts adjacent to streets shall be installed according to the Manual of Uniform Traffic Control Devices (MUTCD) and the TOCC Technical Design Guideline No. 2 – Transportation.
6. All Developer-Provided signage shall be reviewed and approved prior to fabrication and installation by the Trails Coordinator.

2.14.8 Off-Road Trails:

Trails that are “Off-Road” (i.e., Secondary Trail, Neighborhood Connector Trails, Equestrian Trails and Primitive Trails) may be signed by a narrow sign brown in color manufactured out of weatherproof laminated plastic. Contact the Trails Coordinator for additional “Off-Road” signage specifications.

2.15 TRAIL MAINTENANCE:

2.15.1 Slough & Berm Removal:

1. **Slough:** The slough process causes trail users to travel along the outside edge of the trail. The tread eventually narrows and moves downhill from its original location resulting in an unsafe situation. The slough material must be removed to reestablish the proper backslope.

The excess material may be used to fill holes in the trail tread and to re-establish the outslope, or to build up the downhill side of Waterbars.

2. **Berms:** Berms prevent water from flowing off the side of the trail and allows water to channel down the trail causing erosion. Berms may also cause nuisance water to pool on the trail surface resulting in soil saturation. Saturated soil is damaged easily and forces trail users to detour around the area causing the trail to widen. Berms should never be constructed intentionally and should be eliminated whenever present.

2.15.2 . Vegetation Clearance Maintenance:

All plants encroaching into the vegetation clearance limits for the particular trail classification shall be cut back. Plants being removed must be cut flush with the ground and stumps must be removed to prevent safety hazards. All plants growing within the trail tread must be grubbed-out. All removed plant material shall be scattered in a location not visible from the trail. ISA Pruning Standards shall be followed at all times for trees and shrubs located adjacent to trails. See the TOCC Technical Design Guideline No. 4 – Landscaping or contact the Town’s Arborist @ 480-488-6606 for specific requirements.

2.15.3 Tread Maintenance:

In addition to slough and berm removal, the remaining trail tread should be restored to its original design condition. All loose rocks, rock points, stumps and roots protruding from the trail surface should be removed.

All holes should be filled to create a smooth, obstacle-free trail tread. Maintaining a proper outslope is critical to the long-term condition of the trail.



2.15.4 Drainage Maintenance:

Special attention should be directed to the maintenance of drainage structures. These structures are extremely important in protecting the trail from erosion. If they are not maintained properly, the trail will be prone to erosion and may become unsafe for public use and require extensive amounts of labor to repair. All repairs to drainage structures shall restore them to their original standard construction specifications.

2.15.5 Special Structure Maintenance:

Structures such as waterbars, culverts, switchbacks, retaining walls, wash crossings, and bridges, etc. are rather expensive and labor intensive to construct.

Proper maintenance will prolong the life of the subject structures and help prevent safety hazards. Structures should be inspected annually and maintenance performed as needed. All repairs to special structures shall restore them to their original standard construction specifications.

2.15.6 Sign Maintenance:

Sign maintenance includes replacing missing or damaged signs and assuring the accuracy of the information on the signs, as conditions may change over time. All signs that are damaged, weathered, or for any other reason do not serve their intended purpose shall be repaired or replaced according to the sign standards described herein.

2.15.7 Trail Inspection & Maintenance Schedule:

Trail Inspection & Maintenance Schedule		
<i>Trail Classification</i>	<i>Inspection Frequency</i>	<i>Maintenance Frequency</i>
Primary Trail	Quarterly	Quarterly
Secondary Trail	Every 6 months	As Needed
Neighborhood Connector Trail	Every 6 months	As Needed
Interpretive Trail	Quarterly	As Needed
Equestrian Trail	Quarterly	As Needed
Primitive Trail	Annually	Once a year

Figure 2.15-1



SECTION 3 – FINAL PLANS PREPARATION

3.1 REQUIREMENTS:

3.1.1 General Requirements:

Upon development of property for which connectivity to the TOCC trail system is desired/required and available, the developer/owner shall submit a plan for the Project's Trail System prepared by a civil engineer or designer with experience in trail design.

3.1.2 Design Policy:

Any waiver to the standards contained herein shall require written approval from the TOCC Trails Coordinator.

3.1.3 Design Standards:

Any project specific notes that apply to improvements to the TOCC Trails System are required on each set of Final Plans. This includes improvements to both the TOCC Trails System and the Project Trail System that is to be dedicated to the TOCC.

3.2 SPECIFIC TRAIL PLAN REQUIREMENTS:

3.2.1 Requirements for Trail System Improvement Plans:

1. For permitting purposes, include on the cover sheet of the Final Plans the quantities for all items of work within any public rights-of-way (ROW), private street tracts and public utility easements (PUEs).
2. Show in profile all trail centerlines along with line gradients and ground elevations.
3. Show trail cross-sections at every 50'.
4. Where trails cross roadways, show the relationship between the roadway and the trail in both plan and profile views along with all required signage, including sign types and locations.
5. Identify trail special structures and appurtenances along with their locations shown in profile views including stations and offsets.
6. Drawings shall show the relationship between the subject trail and all adjacent utility lines, easements, rights-of-way and other structural features.
7. Include on the Trail Plan the legal description of the trail easement centerline along the entire length or the trail including a note indicating the width of the trail easement.
8. Prepare a deed of gift for the dedication of the trail easement to the TOCC. Contact the Trails Coordinator for additional information.
9. Notate and show on the plan all existing trail easements located within adjacent tracts, lots or parcels, including Docket, Page and Maricopa County Recorder's Number.



10. All Final Plans shall contain the following note:

**THE CONTRACTOR SHALL VERIFY
THE LOCATION OF THE EXISTING
UTILITY LINES BEFORE
PROCEEDING WITH CONSTRUCTION.**

Figure 3.-1

SECTION 4 - REVIEWS & APPROVALS

4.1 *Submittal Requirements:*

1. All Final Plans that include connection to or extension of the TOCC Trail System, or on a system that is to be dedicated to the TOCC, shall be submitted to the TOCC for review and approval. All associated plan review fees shall be paid at the time of plan submittal.
2. No Final Plans shall be accepted by the TOCC for review by the TOCC Trails Coordinator unless accompanied by a copy of the accepted Basis of Design Report, Project Trails Plan and/or Design Reports.
3. No permits for public trail system construction shall be issued until the owner or developer has provided the necessary PTE and dedications. The instruments of dedication shall be approved and submitted to the TOCC for recording at the Maricopa County Recorder's Office.
4. All construction documents used for Building Permit purposes shall be prepared by a registered professional civil engineer licensed in the State of Arizona under the provisions of ARS 32:141-145.



SECTION 5 – TRAIL EASEMENT ABANDONMENT

5.1 PUBLIC TRAIL EASEMENT ABANDONMENT REQUIREMENTS:

5.1.1 Application Process:

When a property owner or developer believes an existing Trail Easement or portion thereof is no longer required by the TOCC, abandonment may be requested by completing and filing an Abandonment Application through the Planning Department.

5.1.2 Submittal Requirements:

The Abandonment Application submittal shall contain a letter from the property owner or developer requesting abandonment of the existing Trail Easement along with the reason for the abandonment with the following exhibits attached:

1. A detailed map highlighting the existing trail easement to be abandoned and the locations of other existing trails and rights-of-way shown in reference to the subject trail easement.
2. If an existing trail easement is to be abandoned, a detailed Landscape Plan prepared by a professional landscape architect licensed in the State of Arizona shall be supplied describing the method of abandonment (i.e., grading, recontouring) and revegetation of the area impacted by the subject trail easement. See Technical Design Guideline No. 4 – Landscaping for revegetation requirements. See Technical Design Guideline No. 1 – Grading & Drainage for additional requirements.

5.1.3 TOCC Planning Department Recommendation:

The Planning Department will issue a letter recommending approval or denial of the abandonment request and any stipulations that may be required in conjunction with the abandonment. This letter along with the attached application for the abandonment of the PUE will be forwarded by the Planning Department to the Town Council for possible action.

5.1.4 Replacement Rights:

Failure to comply with above process shall result in a denial of the request. Where replacement rights are requested by the TOCC, the TOCC shall not relinquish existing rights until the replacement rights have been granted.



SECTION 6 - TRAIL IDENTIFICATION PROCEDURE

6.1 STANDARD IDENTIFICATION:

The identification of public trails located within the Town of Cave Creek shall follow the following procedure except as provided for herein:

1. Primary Trails shall be identified by regional geographic, topographic or historic references.

6.2 HONORARY IDENTIFICATION:

Public Trails may be identified in honor of individuals and organizations subject to the following:

1. Requests for Honorary Trail identification shall be provided to the TOCC Planning Department in writing.
2. The subject request shall be reviewed by the TOCC Planning Department for recommendation to the TOCC Town Council.
3. The TOCC Town Council shall approve all Honorary Trail identification requests.

SECTION 7 – STANDARD DETAILS

7.1 SOLID EARTH TRAIL INSTALLATION INSTRUCTIONS:

The following instructions are provided to guide the installation of trails and pathways to ensure long term viability and reduced maintenance for the life of the improvement:

1. Prepare native subgrade in accordance with MAG 301.
2. Place 6 inches of ABC in accordance with MAG 310 and 702 and compact to 95%
3. Wet ABC and let sit for one (1) day.
4. Spread 4 inches of ¼" minus crushed granite over ABC. ¼" minus gradation shall be:

a. Size	% Passing
b. ¼"	100
c. #4	90-100
d. #8	65-70
e. #10	60-65
f. #16	45-55
g. #30	35-40
h. #40	30-35
i. #50	25-30



- j. #100 20-25
- k. #200 10-15

5. Apply Solid Earth Liquid Polymer to crushed granite. Review application procedures with polymer manufacturer or representative prior to scheduling work. *
6. Apply polymer in two continuous passes using an application rate of 1 gallon of polymer concentrate to every 20 sq. ft. using a diluted blend with a polymer to water ratio of 1:9.
7. Do not apply polymer during high winds or rain or within 24 hours of anticipated high winds or rain.
8. Do not apply or cure polymer in-temperatures lower than 50 degrees Fahrenheit.
9. Apply polymer blend to crushed granite until it visibly ponds on the surface during each application or pass.
10. Following the first pass verify that the product is penetrating through the top half of the granite by hand sampling. If it is not, rake blade, or till the granite.
11. Following the second pass verify that the product fully penetrated the granite down to the ABC by hand sampling. If it is not, rake blade, or till the granite.
12. 15-60 minutes following the final pass, verify the granite is at optimum moisture content and compact it using a 3-1/2 ton steel drum roller followed by a vibratory plate tamp.
13. Apply a final coat of Solid Earth Liquid Polymer using an application rate of 1 gallon of polymer concentrate to every 20 sq. ft. using a diluted blend with a polymer to water ration of 1:6.
14. Do not expose treated areas to disturbance or pedestrian traffic for 72 hours.

*Note: Contact TOCC Planning Department for Vinyl Acetate/ethylene copolymer Material Data Sheet @ (480) 488-6600



APPENDIX A

EDIT TRACKING LOG

EDIT DATE	SECTION AND EDIT
7/23/08	<p>Section 1.3 Disclaimer</p> <p>Edit: With the exception of requirements mandated by Town Codes and Ordinances, all guidelines provided are subject to change or variation at the discretion of the <u>Zoning Administrator and/or the</u> Town Manager.</p> <p>Deletion of last sentence which read: "All other exceptions will require approval by the Town Council."</p>
3/26/09	<p>Section 6 – Trail Identification Procedure – added to the Technical Design Guidelines</p>
3/06/18	<p>Table of Contents 1.2.1 Added Trail</p> <p>Section 1.2.1 Revised Standard Trail Specifications Added The applicable specifications for trail design and construction are as contained herein under Section 2.12.1</p> <p>Section 2.4 TOCC General Plan Trails Plan – Revised Map</p> <p>Section 2.9.1 General Requirements changed to read Trails shall be placed in a minimum 5' to a maximum 15' wide Public Trail Easement (PTE) located within a dedicated tract.</p> <p>Section 2.12.1 Trail Classification – Standards Table Revised the variable easement width of the Primary Trail to 5' - 15'; the Secondary Trail to 5' - 10'; the Neighborhood Connector Trail 5' - 10'; the Interpretive Trail to 10' - 15'; the Equestrian to 5' - 10' and the Primitive Trail to 5' - 10'.</p> <p>Section 2.15.7 Trail Inspection & Maintenance Schedule Figure 2.15.1 changed Inspection Frequency for Primary Trail from monthly to quarterly and the maintenance frequency from bi-monthly to quarterly. The Secondary Trail inspection frequency from every 3 months to every 6 months and the maintenance frequency from every 6 months to as needed.</p> <p>The neighborhood connector trail inspection frequency from every 3 months to every 6 months and maintenance frequency from every 6 months to as needed.</p>



	<p>The Interpretive trail inspection frequency from monthly to quarterly and the maintenance frequency from bi-monthly to as needed. The equestrian trail inspection frequency from every 3 months to quarterly; the maintenance frequency as needed and the primitive trail inspection frequency from every 5 months to annually.</p>
<p>03-15-2021</p>	<p>Section 1-1.4 Definitions: Paths & Trails: Trails and paths include on-street bicycle lanes, equestrian, multiple use paths and trails; pedestrian, equestrian and multiple use easements; and trailheads and staging areas. These facilities will continue to be publicly and privately owned and maintained. Trailheads may be privately or publicly owned and maintained, and may be constructed privately and dedicated to the Town.</p> <p>Changed Definition to:</p> <p>TRAILS & PATHWAYS: Trails and Pathways including on-street bicycle lanes; off-street bicycle trails; pedestrian and equestrian paths and trails; are multiple use non-motorized easements; trailheads; and staging areas within the Town of Cave Creek’s jurisdiction. Trails and Pathways may be located within the Town’s rights-of-way, or can be dedicated to the Town from private property owners. The Trails and Pathways within the Town provide safe alternative non-motorized transportation access and connectivity to Recreation and Town Core areas.</p>
<p>03-15-2021</p>	<p>Section 1.4 Definitions: (Add:)</p> <p>ADA: American with Disabilities Act: Passage of the Americans with Disabilities Act gives civil right protection to individuals with disabilities.</p> <p>ABA: Architectural Barriers Act</p> <p>Building Official: The Building Official of the TOCC The TOCC Building Official.</p> <p>Engineer: The TOCC Engineer</p>
	<p>HISTORIC TOWN CORE, HTC: The boundaries of the Historic Town Core are generally located starting south at between Spur Cross Road Carriage Drive Road and to Scopa Trail Road on the east, and the Grapevine Road alignment to the north and the Skyline Drive Road south, Basin Road Alignment east, and the</p>



	Conestoga Trail Alignment alignment to the south west.
03-15-2021	TCC: Town Core Commercial Zoning
	<p>Section 1-1.5 Standards Specifications & Details:</p> <p>Add: Uniform specifications and details are not a substitute for good engineering judgment. Unique conditions will arise that are outside the scope of these standards. When this happens, professional engineers and architects are required to use their judgment to amend these standards to best meet site-specific project needs in accordance with the rules set forth by the State of Arizona and policy statements made by the Arizona State Board of Technical Registration.</p>
3-15-2021	<p>Section 2.7-2.71 PROJECT TRAIL MAP CONTENT:</p> <p>4.Compliance with TOCC Trail Classification- Construction Standards as contain herein.</p>
9-23-2021	<p>Section 7 Standard Details – (Reserved)</p> <p>Add: 7.1 Solid Earth Trail Installation Instructions</p>
9-23-2021	Figure 2.4.1 Updated GP-Trails Framework Plan Map