

**Interim Watercourse Maintenance Guidelines
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(IWMG)
For Field Application**

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INTERIM WATERCOURSE MAINTENANCE GUIDELINES (IWMG) FOR FIELD APPLICATION

1. PREAMBLE

A. Purpose

The Interim Watercourse Maintenance Guidelines (IWMG) have been developed for City-wide use during the performance of watercourse maintenance activities in the field by the Transportation Department, Streets and Traffic Maintenance Division. The IWMG's were developed as part of Phase II of the City's Watercourse Maintenance Demonstration Project (WMDP). Phase III of the WMDP will be conducted as part of the Tucson Stormwater Management Study (TSMS) The TSMS will develop products that provide for a comprehensive Maintenance Management Program (MMP). Until the TSMS completes the MMP and the MMP is implemented, the IWMG will be utilized for City-wide watercourse maintenance activities.

These guidelines are only intended to provide field guidance to maintenance workers to achieve consistent drainage maintenance City-wide. Maintenance practices contained in this document will achieve a balance between flood control considerations and wildlife and vegetation preservation. It is important to point out, however, that flood control considerations are the first priority in drainage maintenance; and, when deemed necessary by flood control experts, flood control maintenance needs will override other considerations. These guidelines are not intended to address comprehensive maintenance issues; the TSMS MMP is intended to address maintenance in a comprehensive manner including costs, budgeting, funding, maintenance types, needs and frequencies. The database that was developed during Phase II WMDP is being moved forward into TSMS to assist with the MMP development. The IWMG will be used on an interim basis until the TSMS MMP is implemented.

B. Project Limitations

The IWMG have been developed to be somewhat general in nature. It was learned during Phase II activities that each watercourse requires a specific maintenance application in the field. The IWMG provide a "common denominator" for watercourse maintenance activities, but the uniqueness of individual watercourses requires a more specific field application. For this reason, the IWMG include the formation of a Consulting Team that provides expertise in various disciplines related to watercourse maintenance. When maintenance activities cannot be readily identified, the Consulting Team should be utilized to assist in the determination of appropriate maintenance activities.

C. Budget Constraints

The application of these guidelines should not significantly affect Departmental budgets. However, it should be emphasized that under present conditions, funding for watercourse maintenance is extremely limited in involved Departments/Divisions. Because of budgetary limitations, these guidelines only address specific maintenance activities when maintenance is performed. In other words, the guidelines do not address maintenance frequencies or budgets; these activities will be conducted under the TSMS. It should also be clarified that due to staff/budget limitations, response time by involved Departments/Division may be less than optimum and, therefore, maintenance activities should be scheduled accordingly.

2. ADMINISTRATION

A. Responsibilities

Implementation of the IWMG in the field will be the responsibility of the Transportation Department, Streets and Traffic Maintenance Division. The Streets and Traffic Maintenance Division will determine the appropriate application of the IWMG to individual watercourses prior to the undertaking of maintenance activities with the assistance of the Consulting Team, as needed.

B. Consulting Team

Application of the IWMG may require additional expertise to determine the appropriate application in the field. Therefore, related expertise from other City Departments/ Divisions will be made available for consultation on an as-needed basis. Expertise from the other Departments/Divisions should be utilized whenever any doubt as to an application of the IWMG exists. The following Departments/Divisions will be available for consultation and their roles are briefly defined:

- Transportation Department - Engineering Division - Provide technical expertise regarding hydrologic/ hydraulic watercourse characteristics including needed conveyance capacity, floodplain impacts, erosion control and other engineering related issues. Provide designs of drainage facilities, as requested by the Streets and Traffic Maintenance Division, for field construction. The Engineering Division shall receive requests from the Streets and Traffic Maintenance Division for drainage projects to be included in the city's Capital Improvement Program.
- Transportation Department - Planning Division -Provide expertise related to WMDP documents and procedures including determination of watercourse classifications.
- Parks & Recreation Department - Provide expertise regarding all aspects horticultural maintenance. Provide resources/ manpower to perform tree pruning activities.

- Planning Department - Provide expertise related to public input/contact and neighborhood concerns.

Attachment A depicts specific personnel, listed by Department, assigned to provide consultation as listed above. This listing will be updated, as needed by the Streets and Traffic Maintenance Division, with the assistance of involved Departments / Divisions.

C. Watercourse Definitions

The guidelines are assembled according to three types of watercourses whose definitions are provided below.

"Natural Watercourse" - is a watercourse which is naturally vegetated, and which has not been appreciably altered by construction projects or urbanization. When left alone, the "Natural Watercourse" should remain in its natural condition without significant natural changes in vegetation density or diversity.

"Altered From Natural Watercourse" - is a watercourse which generally supports a relatively dense growth of native and exotic plant species, and which has only been partially modified by construction projects or affected by upstream urbanization. Usually the location and alignment of these watercourses have not been appreciably changed from that which occurred prior to local urbanization. Because of continued human activity within the watercourse or within the upstream watershed, "Altered From Natural Watercourses" are no longer in dynamic equilibrium with regard to geomorphic and ecological processes and, therefore will require continued maintenance in order to mitigate the adverse affects of changes to channel bed topography and vegetation.

"Constructed Channel" - is a watercourse which generally has little or no vegetation, and which has been completely constructed or relocated by construction projects such as total channelization, channel relocation or realignment, and/ or bank stabilization. "Constructed Channels" usually require some continued maintenance.

D. Locations of and Access for Maintenance Activities

Watercourse maintenance will only be performed, by City forces in drainage's specifically dedicated to the City via right-of-way or public drainage easement. Private drainage easements are the responsibility of the private property owner.

When the construction of access roads or ramps are necessary to achieve maintenance access to a drainageway, the roads or ramps shall be constructed to minimize impacts on existing vegetation or other natural features. Removal of ramps and roads shall be performed in such a manner as to minimize impacts to vegetation or other natural features.

E. Major Project Referral

Activities that require major expenditures and efforts beyond the scope of "routine" maintenance that are identified in the field by the Streets and Traffic Maintenance Division shall be referred to the Engineering Division for inclusion in the Capitol Program. The Streets and Traffic Maintenance Division shall be responsible for decision making as to when a necessary construction project is beyond the scope of maintenance and subsequent referral is necessary. Procedures presently in place shall be utilized for referrals. Interim measures, as appropriate, should be undertaken by the Streets and Traffic Maintenance Division to protect the watercourse integrity until such time as the problem is corrected.

F. Design Assistance

The Engineering Division will provide design assistance to the Streets and Traffic Maintenance Division for construction of drainage facilities, as needed. The design will effectively address hydraulic, environmental and aesthetic concerns.

G. Public Contact

Prior to scheduling recommended maintenance activities for a specific segment of watercourse, the Streets and Traffic Maintenance Division will determine if any controversy regarding maintenance has been recorded for the watercourse reach. If a maintenance controversy has been identified, the Streets and Traffic Maintenance Division will work through the appropriate Ward Offices(s) and with the concerned citizen(s) to address the proposed maintenance activities in question. If significant concerns with maintenance activities have been identified, it may be appropriate to conduct a more intensive citizen participation effort.

In all cases, prior to implementing the recommended maintenance activities for a specific reach of watercourse, the Streets and Traffic Maintenance Division will contact the appropriate Ward Office(s) a minimum of five days in advance of any maintenance work to be conducted in the watercourse by completing the required form per the procedure previously established by Mayor and Council. Specific maintenance details will be indicated on the form in order to provide a clear understanding of the proposed activities to the appropriate Council Office(s)

Emergency repairs responses need not follow these procedures, however, a follow-up telephone call to the appropriate Ward should be made.

3. MAINTENANCE GUIDELINES

3.1 Recommended maintenance Guidelines for "Natural Watercourses"

By definition, "Natural Watercourses" are in a state of dynamic equilibrium with regard to their shape and form, as well as the diversity and density of indigenous vegetation found along the banks of these watercourses. Litter and garbage clean-up are usually the major emphasis of maintenance within these watercourses since they are often located in remote areas on the outskirts of Tucson where wildcat dumping is prevalent. Natural vegetation and the wildlife habitat associated with these watercourses normally requires no maintenance to encourage the health of the vegetation, wildlife habitat value, or scenic and open space values.

Recommended Vegetation Management

1. Trees, shrubs, grasses, and other plant materials should be left in their natural state.
2. Cutting of trees, shrubs, and grass, when required to eliminate a hazard to public safety and health, should be limited to only that which is absolutely necessary. Preemptive or excessive cutting of existing vegetation shall not be included as part of regular maintenance of these watercourses.
3. Unless it has the potential for obstructing the flow of storm runoff, naturally occurring tree and plant litter, such as small branches and leaves, should be left on the ground for their soil-nutrient value, wildlife cover, seed-source value, and to maintain a natural appearance. However, wildcat dumps found in or near these watercourses should be removed in order to restore the natural appearance of the area and to discourage further wildcat dumping.
4. Trees and shrubs located within the channel bed should not be selectively pruned, unless leaving the vegetation would be a hazard to public safety or would retard the conveyance of floodwater. When pruning is deemed necessary, the pruning should be performed by the Parks and Recreation Department and conform to the pruning standards of the National Arborist Association.
5. Unless there is a hazard to public safety, trees and shrubs located along the channel banks should remain in their natural condition.
6. Trees and shrubs located within the over bank area should remain in their natural condition, unless there is a possible hazard to life or property caused by keeping the trees and shrubs in place.
7. Obstructions, such as low branches, may be removed from existing neighborhood paths and adjoining alleys, as determined by appropriate city representatives, to permit safe access, insure visibility, land surveillance.

Recommended Flood Control

1. Minor structural modifications will not be made to the shape and alignment of a "Natural Watercourse", unless there is an immediate concern for public safety, health, and welfare. These modifications should be carefully designed by the Engineering Division or other responsible entity in order to maintain the existing aesthetics, environmental quality, and long term effects of stream migration both laterally and vertically.
2. Existing stormwater conveyance structures, such as culverts, storm drains and spillways that discharge into a "Natural Watercourse", should be repaired, as needed, in order to prevent or minimize further damage to the existing structure and/or the adjacent channel.
3. Existing bank protection and erosion-control materials, such as gabions, rip-rap, soil cement or other drainage structures, which may be present near road crossings, should be repaired as needed. All repairs should be designed to maintain or enhance the existing aesthetic and environmental quality of the area.

Recommended Erosion Control

1. Scour holes located in the bed of a "Natural Watercourse", such as those found downstream from a grade-control structure of a dip crossing of a roadway, should not be routinely filled or leveled, unless there is a potential hazard to public safety or the integrity of the adjacent drainage structure is threatened.
2. Areas where ponding creates unsafe conditions or creates an environment suitable for mosquito propagation should be filled or reshaped, in response to neighborhood concerns.
3. Areas of local erosion such as riling, soil piping, etc., located along the bank and overbank of a "Natural Watercourse" should not be routinely filled or structurally protected from further erosion. The Consulting Team member from the Transportation Department, Engineering Division, shall determine if the erosion presents a safety issue; or if left unmaintained, a safety issue may occur.
4. Grading or leveling of the channel bottom should not be routinely undertaken.

Recommended Litter Control

1. Obstructions to the flow of floodwater caused by accumulation of man-made litter should be removed whenever encountered.

Man-made trash and other discarded debris such as construction materials, yard clippings, shopping carts, etc., should be removed from all areas of a "Natural Watercourse" and disposed of at an appropriate site.

2. The Department of Solid Waste Management should be contacted to enforce the City of Tucson Code, Chapter 15-16 through 19, that prohibits illegal dumping on public and private property.
 3. The Streets and Traffic Maintenance Division should install permanent barricades or request via the Traffic Engineering Division that appropriate signs be posted across public property in order to help prevent unwanted vehicular access and wildcat dumping.
- 3.2 Recommended Maintenance Guidelines for "Altered from Natural Watercourses"

"Altered from **Natural** Watercourses" will usually require a moderate amount of maintenance and management to insure continued safe and effective floodwater conveyance while maintaining the existing, ancillary benefits of open-space value, multi-use activities and habitat preservation. Within a typical urban setting, litter, trash, and debris often accumulates along the bed and banks of the watercourse because of illegal dumping. Consequently, the removal of these materials requires the largest portion of the overall annual maintenance budget allocated to these types of watercourses. Similarly, flood control and erosion control will also be substantial components of the maintenance operations, because of the channel bed degradation that usually occurs along these watercourses following upstream urbanization. Furthermore, "Altered from Natural Watercourses" may require special attention in order to promote healthy vegetation and its associated environment.

Recommended Vegetation Management

1. Trees, shrubs, grasses, and other plant materials shall be maintained, to encourage health of the existing plant material, wildlife-habitat value, and natural appearance.
2. Cutting of trees, shrubs, and grass, when required to maintain existing floodwater conveyance, should be limited to that which is necessary. Preemptive and additional cutting of existing vegetation may sometimes be included as part of regular maintenance of these watercourses, only if it is believed that the affected vegetation will someday grow large enough to cause a conveyance problem.
3. Naturally occurring tree and plant litter, such as small branches and leaves, should be left on the ground on the watercourse banks and over bank areas in order to provide a more natural appearance and to promote wildlife habitat value. However, standing dead trees and large limbs may be removed whenever there is concern that the tree may someday fall on nearby structures, pose a public-safety hazard, or may fall into the watercourse, thereby reducing floodwater conveyance.

4. Trees and shrubs located within the channel bed should be removed in order to eliminate possible obstructions that would retard the usual conveyance of floodwater, or would inhibit the existing maintenance use and access.
5. Trees and shrubs located along the channel banks should remain in their natural condition, except when it is determined that an obstruction to the flow of stormwater exists.
6. Trees and shrubs located within the over bank area should remain in their natural condition.
7. Obstructions, such as low branches, should be removed from existing neighborhood paths and alleys in order to help provide safe access, visibility, and surveillance.
8. When pruning is deemed necessary, it will be performed by the Parks and Recreation Department and conform to the pruning standards of the National Arborist Association.
9. Whenever maintenance of grasses is warranted, they should be mowed rather than removed or bladed.

Recommended Flood Control

1. Minor structural modifications may be made to the shape and alignment of an "Altered From Natural Watercourse" in order to maintain existing floodwater conveyance of "underfit" watercourses and/or to minimize possible flood damage to nearby structures. Modifications made to the shape and alignment of an "Altered From Natural Watercourse" should be designed so as to help minimize degradation of the existing aesthetic and environmental quality of the affected area.
2. Existing stormwater conveyance structures, such as culverts, storm drains and spillways that discharge into an "Altered From Natural Watercourse", should be repaired, as needed, to prevent or minimize further damage.
3. Existing bank protection and erosion-control material such as gabions, rip-rap, soil cement, etc., should be repaired as needed. All repairs should be designed so as to maintain, or even improve the aesthetic and environmental quality of the area.

Recommended Erosion Control

1. Scour holes and sandbars located in the beds of an "Altered From Natural Watercourse" should be routinely filled or leveled in order to accommodate existing pedestrian access.
2. Areas where ponding creates unsafe conditions, or an environment suitable for mosquito propagation, should be filled or reshaped, as needed.

3. Areas of local erosion such as riling, piping, etc., located along the bank and overbank of an "Altered From Natural Watercourse" should be routinely filled or structurally protected from further erosion in order to accommodate existing pedestrian access and protect the public safety.
4. Grading or leveling of the channel bottom should be routinely undertaken, when needed, to maintain floodwater conveyance.
5. Scour holes, such as those commonly found downstream from existing grade-control structures, may be filled in order to allow for continued pedestrian and equestrian movement along the bed of the watercourse.
6. Whenever fill is used to eliminate scour holes, piping or riling, the fill material should contain stolons of indigenous grasses (when available) to encourage the establishment of grasses as an erosion control measure.

Recommended Litter Control

1. Obstructions to the flow of floodwater caused by accumulation of natural and man-made litter should be removed whenever encountered.
2. Man-made trash and other discarded debris, such as construction materials, yard clippings, shopping carts, etc., should be removed from all areas of an "Altered From Natural Watercourse" and should be disposed of at an appropriate site.
3. The Department of Solid Waste Management should be contacted to enforce the City of Tucson Code Chapter 15-16 through 19, that prohibits illegal dumping on public and private property.
4. The Streets and Traffic Maintenance Division should install permanent barricades or request via the Traffic Engineering Division that appropriate signs be posted across public property in order to help prevent unwanted vehicular access and wildecat dumping.

3.3 Recommended Maintenance Guidelines For "Constructed Channels"

"Constructed Channels" are those watercourses that have been highly altered from their original natural state or have be entirely constructed. The use of bank stabilization materials such as concrete or soil cement, as well as the cutting of steep channel banks during construction, have usually resulted in the elimination of native vegetation along the affected watercourse. Consequently, many of the natural characteristics such as vegetative diversity, wildlife habitat, and open space value do not exist along these types of watercourses. Because of the limited amount of vegetation found along these types of watercourses, "Constructed Channels" normally require only minimal maintenance in order to maintain existing flood water conveyance or to provide for the

health, safety, and welfare to the general public. Flood control and erosion control are the principal components of maintenance. The overbanks of some earthen channels should be examined in order to provide an opportunity for volunteer vegetation to become established in those areas where it has been determined that vegetation will not significantly reduce floodwater conveyance.

Recommended Vegetation Management

1. Trees, shrubs, grasses, and other plant materials should be maintained, wherever possible, in such manner that encourages health of the existing plant material, wildlife-habitat value, and natural appearance.
2. Cutting of trees, shrubs, and grass should be done when required to improve and maintain existing floodwater conveyance. Preemptive and additional cutting of existing vegetation may be included as part of regular maintenance of these watercourses.
3. Naturally occurring tree and plant litter, such as branches and leaves, may be removed when determined that the litter will constitute an obstruction.
4. Trees and shrubs located within the channel bed should be removed in order to keep these obstructions from limiting the usual conveyance of floodwater, inhibiting the existing maintenance use and access or damaging flood control facilities, unless it can be determined that certain types of vegetation do not constitute an obstruction.
5. Trees and shrubs located along the channel banks should be removed in order to maintain existing floodwater conveyance unless it can be determined that introduction of volunteer vegetation will not decrease floodwater conveyance.
6. Trees and shrubs located within the overbank area should remain in their natural condition.
7. Obstructions, such as low branches, should be removed from existing neighborhood paths and adjoining alleys to permit safe access, insure visibility, and surveillance.
8. When pruning is deemed necessary it will be performed by the Parks and Recreation Department and conform to the pruning standards of the National Arborist Association.
9. Whenever maintenance of grasses is warranted, they should be mowed rather than removed or bladed.

Recommended Flood Control

1. Small-scale modifications may be made to the shape and alignment of "Constructed Channels" in order to maintain existing floodwater conveyance of "underfit"

watercourses and to minimize possible flood damage to nearby structures.

2. Existing stormwater conveyance structures, such as culverts, storm drains and spillways that discharge into a "Constructed Channel" should be repaired, as needed, in order to prevent or minimize further damage. All repairs should be designed with consideration of existing aesthetic and environmental quality of the area.
3. Existing bank protection and erosion-control materials such as gabions, rip-rap, soil cement, etc., should be repaired, as needed.

Recommended Erosion Control

1. Scour holes and sandbars located in the beds of "Constructed Channels" should be routinely filled or leveled in order to accommodate existing pedestrian access.
2. Areas where ponding creates unsafe conditions or an environment suitable for mosquito propagation, should be filled or reshaped, as needed.
3. Areas of local erosion such as riling, piping, etc., located along the bank and overbank of a "Constructed
4. Channel" should be routinely filled or structurally protected from further erosion in order to accommodate existing pedestrian access and protect public safety.
5. Grading or leveling of the channel bottom should be routinely undertaken when needed, to maintain floodwater conveyance.
6. Scour holes, such as those commonly found downstream from existing grade-control structures, may be filled in order to allow for continued pedestrian and equestrian movement along the bed of the watercourse.
7. Whenever fill is used to eliminate scour holes, piping or riling, the fill material should contain stolons of indigenous grasses (when available) to encourage to establishment of grasses as an erosion control measure.

Recommended Litter Control

1. Obstructions to the flow of floodwater caused by accumulation of natural and man-made litter should be removed whenever encountered.
2. Man-made trash and other discarded debris, such as construction materials, yard clippings, shopping carts, etc., should be removed from all areas of a "Constructed Channel" and should be disposed of at an appropriate site.

3. The Department of Solid Waste Management should be contacted to enforce the City of Tucson Code, Chapter 15-16 through 19, that prohibits illegal dumping on public and private property.
4. The Streets and Traffic Maintenance Division should install permanent barricades or request via the Traffic Engineering Division that appropriate signs be posted across public property in order to help prevent unwanted vehicular access and wildcat dumping.

IWMG City Consultant List

Attachment A

<u>Department/Division</u>	<u>Name</u>	<u>Extension</u>
Trans. – Engineering	Floodplain Inspector	4914
Trans. – Planning	Frank Sousa	4372
Parks & Recreation	Glenn Hicks	4874
Planning	Roger Howlett	4505