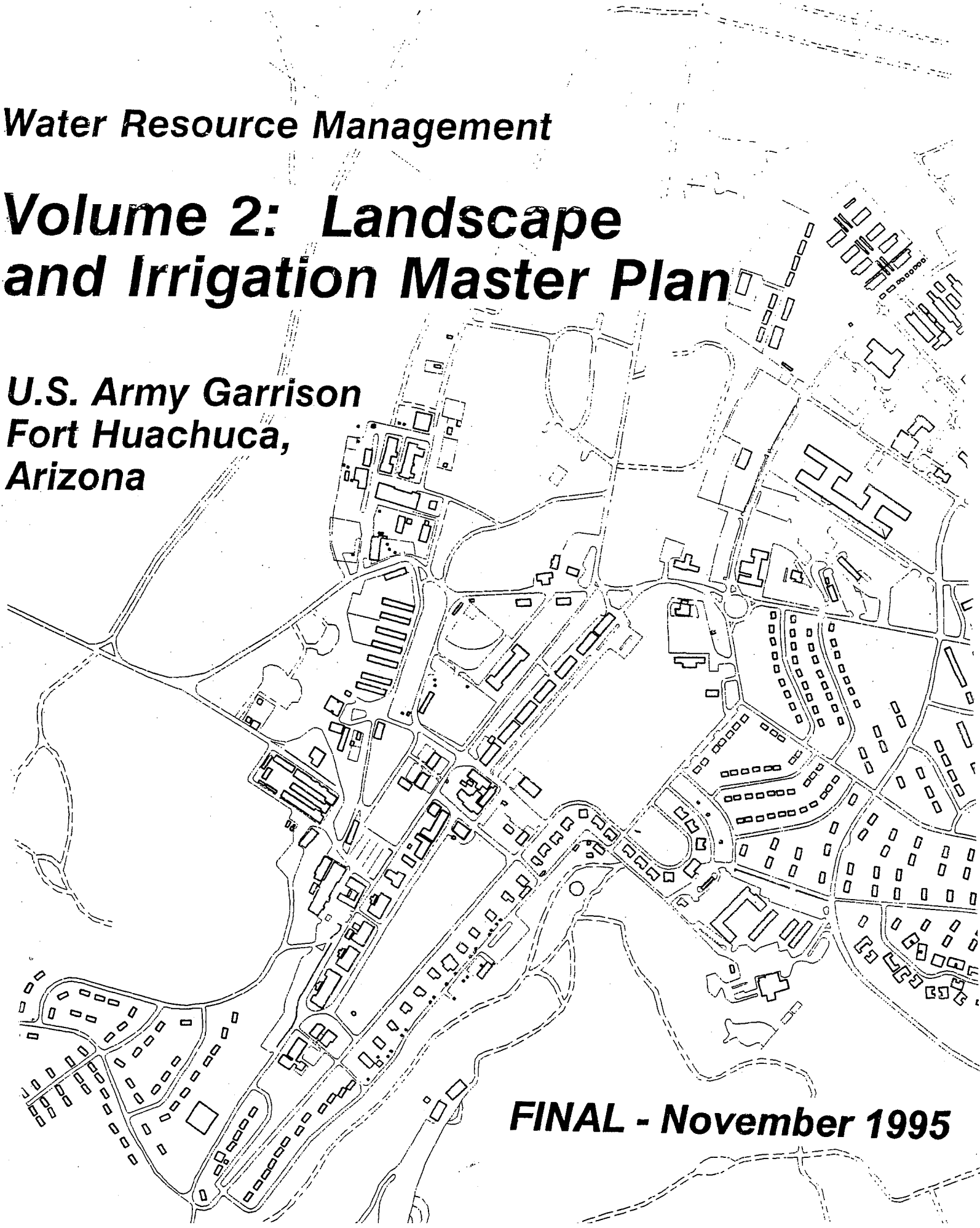
Water Resource Management

Volume 2: Landscape and Irrigation Master Plan

U.S. Army Garrison Fort Huachuca, Arizona



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Authorization:

The preparation of this Landscape and Irrigation Master Plan for Fort Huachuca was authorized by ATZS-EHE Memorandum dated 19 May, 1994 and implemented under Contract DACA05-92-C-0117. This Landscape and Irrigation Master Plan is a component of the Fort Huachuca Water Resource Management Program.

Purpose of This Document:

This Master Plan is intended to provide policies and standards for the planning, design, construction, and maintenance of landscape and irrigation improvements associated with new facilities to be constructed at the fort. The Master Plan is also intended to be utilized in conjunction with the phased redevelopment and upgrading of existing landscape and irrigation facilities at Fort Huachuca.

Related Documents:

This Landscape and Irrigation Master Plan is to be utilized in conjunction with other documents, plans, and directives regulating fort development. Related documents include, but are not limited to:

- *The Fort Huachuca Installation Design Guide (IDG), Revised April 1993.*
- *The Fort Huachuca Fort Master Plan dated 1993.*
- *Presidential Memorandum dated 26 April, 1994 entitled "Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds."*

Pertinent sections of these related documents should be consulted when utilizing this Landscape and Irrigation Master Plan.

Goals of the Landscape and Irrigation Master Plan:

The principal goals of the Fort Huachuca Landscape and Irrigation Master Plan are:

- *To create landscapes on the fort that are compatible with the climatic and other environmental conditions present at Fort Huachuca.*
- *To create and maintain functional and attractive landscapes that support the missions that have been assigned to Fort Huachuca.*
- *To utilize whenever and wherever appropriate, drought tolerant native or naturalized plant species in conjunction with fort landscape developments.*
- *To create and foster a water conservation ethic within the Fort Huachuca community.*
- *To minimize the consumptive use of water for the irrigation of fort landscape plantings.*

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Goals of the Landscape and Irrigation Master Plan (Continued):

In addition to the principal goals noted above, which apply to all areas of Fort Huachuca, supplementary goals and objectives associated with individual areas and zones of the fort have also been developed. These site or zone specific supplementary goals are included in the subsequent sections of this document which address individually, the landscape and irrigation treatments within each zone present on the fort.

General Policies for Landscape and Irrigation Development:

The following general policies apply to all areas and zones within Fort Huachuca.

- *All new projects at the fort shall be implemented in accordance with the recommendations and guidelines included herein.*
- *Disturbances to fort areas exhibiting natural plant communities shall be avoided except as required for the development of essential facilities and/or as required for wildland fire management.*
- *Undeveloped fort lands, previously cleared but not developed or needed for essential fort facilities or functions, shall be allowed to return or actively restored to natural conditions with native plant communities.*
- *The palette of plant materials used for fort landscape development shall emphasize native, naturalized, and other drought tolerant species.*
- *The use of irrigated turf grass areas shall be limited to historic zones, parade grounds, primary and secondary school campuses, recreation areas, and physical training facilities.*
- *Consistent with applicable State, Federal, and U.S. Army standards, reclaimed water (treated effluent) shall be utilized to the greatest extent feasible for the irrigation of fort landscape plantings.*
- *Except as may be mandated by applicable regulations, the use of potable water for irrigation shall be minimized and restricted through administrative controls.*

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Plan Implementation:

The recommendations included herein will necessarily be implemented over a period of years. When completed, the prescribed drought tolerant landscape treatments and the efficient reclaimed water irrigation systems will be in place.

During and after the implementation of these recommendations, water conservation will continue to be an imperative at Fort Huachuca. As such, current administrative regulations and controls related to such items as irrigation with potable water will need to remain in place.

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Organization of Landscape and Irrigation Master Plan:

Fort Huachuca is an extensive self-contained community. As such various areas on the fort are utilized for activities and land uses ranging from residential to industrial. To address the landscape and irrigation treatments appropriate to each of these varied land uses, this Master Plan has divided the fort into eight different zones. These zones are:

- *The Historic Zone*
- *The Vehicular Circulation Zone*
- *The Community Zone*
- *The School Zone*
- *The Housing Zone*
- *The Industrial Zone*
- *The Mission Zone, and*
- *The Community Park and Open Space Zone*

These zones are consistent with the Visual Zones described in the Installation Design Guideline (IDG) although the zone boundaries are not identical. Minor variations to the Visual Zone boundaries were introduced to group together facilities with similar landscape treatments and irrigation requirements.

Information Provided for Each Zone:

An overview of existing conditions is provided for each zone. Also noted are significant new development projects and proposed demolition and/or facility relocation work.

Specific objectives are identified for the landscape and irrigation improvements within each zone and the policies needed for the accomplishment of these objectives are listed. Also provided are prescriptions for landscape and irrigation developments and a list of plants suitable for use within the subject zone.

Water Use Information:

Provided in Section 10 (Water Use Information) of this Master Plan is data related to projected irrigation water use at Fort Huachuca.

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Overview of Existing Conditions:

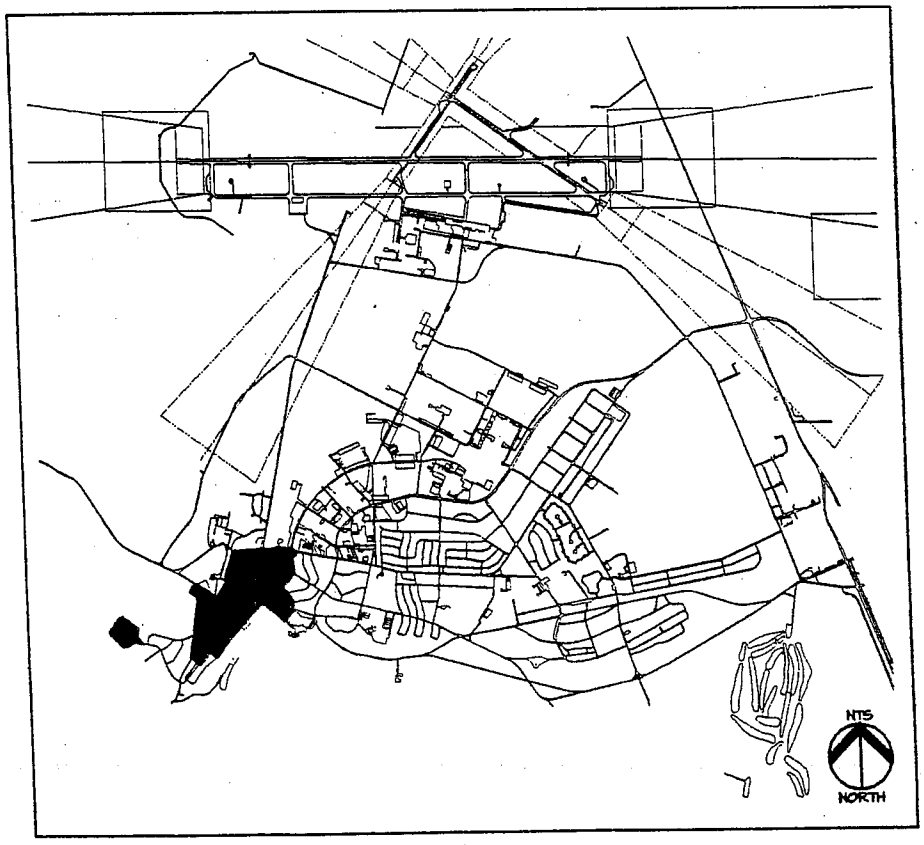
The Historic Zone covers approximately 147 acres and is located at the mouth of Huachuca Canyon. Brown Field, a large turf grass parade ground is at the center of the zone and is surrounded by historic stone and wood structures used for officer housing and administrative offices. These facilities form an historic district listed on the National Register of Historic Places.

Surrounding the Historic District are structures of various ages, parking areas, service buildings, and other miscellaneous facilities. The Post Cemetery is also located in this area.

Proposed New Development, Demolition, and Relocations:

Located at the northeast end of this zone is a residential subdivision, which consists of homes that are newer and architecturally incompatible with the Historic District structures. Per the "Installation Design Guidelines" (IDG), this subdivision may be demolished in the future. Other existing facilities to be moved to new locations outside of the Historic Zone include a service station and an auto parts store.

Location Map:



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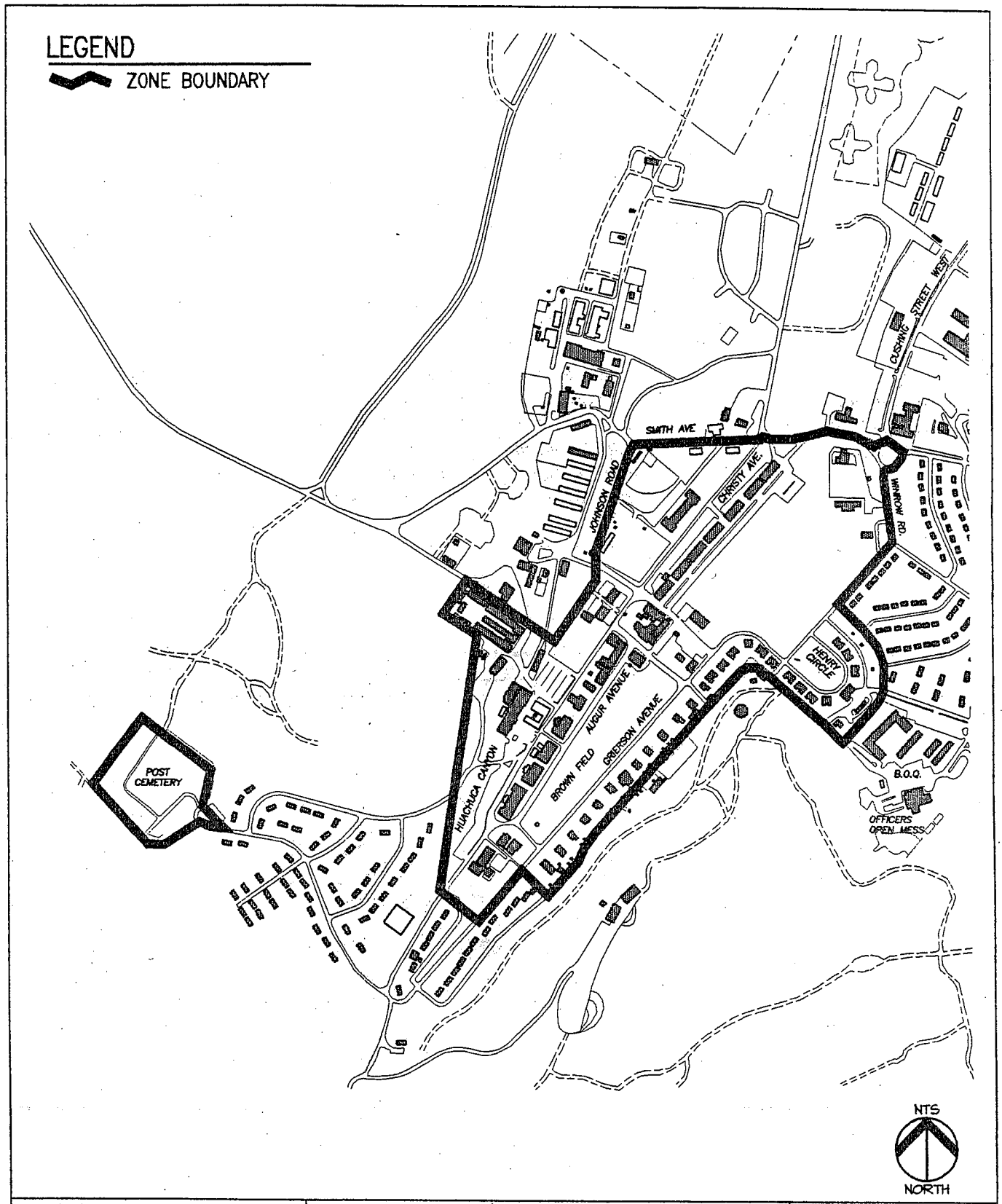

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WATER RESOURCE /REUSE STUDY, FORT HUACHUCA

FIGURE 2-A
HISTORIC ZONE
SITE PLAN

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2.1 Historic Zone - Landscape / Irrigation Objectives and Policies

Objectives:

The principal objectives of the landscape and irrigation improvements within the Historic Zone are:

1. *To retain the historic character of the landscape within the Historic District including the maintenance of turf grass fields and lawns.*

2. *To provide street trees, parking lot screen plantings, and building entry plantings at new or redeveloped facilities per the IDG Design Guidelines.*

3. *To restore unused or vacated parcels to non-irrigated native landscapes.*

4. *To preserve native vegetation and habitat along the Huachuca Canyon riparian corridor.*

5. *To minimize consumptive water use for the irrigation of landscape plantings.*

Policies:

To accomplish the objectives noted above, the following policies shall apply to landscape and irrigation developments within the historic zone.

1. *All large turf areas shall be irrigated with reclaimed water. (Implementation of this policy to occur after extension of the reclaimed water distribution system to this portion of the fort.)*

2. *The irrigation of turf areas with potable water shall be limited to the cemetery where the irrigation will be infrequent (to avoid damage to the native oak trees) and where the volume of potable water used will be controlled by administrative restrictions.*

3. *All new plantings within the Historic Zone shall utilize plant species included on the approved Plant List for this zone.*

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Proposed Landscape Treatments:

The following prescriptions are provided for the landscape improvements associated within the Historic Zone.

1. *Retain the existing turf grass areas and street tree plantings at Brown Field and Henry Circle.*

2. *Retain the existing turf, shrub, and street tree landscapes associated with the front yards of historic residential structures along Grierson Avenue and Henry Circle.*

3. *Retain the existing Baseball Field (Brock Field) at the corner of Smith Avenue and Johnson Street.*

4. *Install new sycamore, ash, or walnut tree plantings and appropriate shrub plantings along Augur Avenue after the removal of on-street parking in this location.*

5. *Revegetate the Mills Circle Cavalry Park 5 subdivision area, if demolished, to recreate a native oak grassland landscape.*

6. *Install street trees, screening shrubs, and non-irrigated native grass ground cover in open areas created by the relocation of the service station and other facilities identified in the IDG.*

7. *Maintain or restore non-irrigated grass ground cover along the shoulders of secondary roads and at other perimeter open space areas. Non-irrigated grass cover to utilize native grasses wherever possible but non-irrigated bermuda grass cover may be retained where it is currently established.*

8. *Install decomposed granite or similar aggregate surfacing adjacent to concrete drainage channels along Christy Avenue. (Aggregate surfacing to be of sufficient size so as not to be displaced by stormwater runoff.)*

9. *Preserve existing native vegetation along Huachuca Canyon.*

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Proposed Irrigation Systems:

The following prescriptions are provided for the irrigation systems and related improvements within the Historic Zone.

1. *Extend the reclaimed water distribution system to this zone.*

2. *Upgrade or install water efficient (reclaimed water) spray irrigation systems at Brown Field, Henry Circle, and Brock Field located at Smith Avenue and Johnson Street.*

3. *Install water efficient (reclaimed water) spray irrigation systems at the front and side yards of the historic residences along Grierson Street and Henry Circle.*

4. *Connect the irrigation controllers for Brown Field, Henry Circle, Brock Field, and the front yards of residences along Grierson Street and Henry Circle to the overall fort irrigation water management control system.*

5. *Provide a new reclaimed water, drip irrigation system for new tree and shrub plantings along Augur Avenue and Christy Avenue.*

6. *Provide a temporary, reclaimed water, drip irrigation system to trees planted within revegetated areas if the Mills Circle Cavalry Park 5 subdivision is demolished.*

7. *Rely on natural precipitation for the irrigation of turf grass within the Post Cemetery, except for periods of prolonged drought during which periodic irrigation with potable water may be considered. (The recommended application not to exceed 1.0 Ac.Ft./ Ac./Yr. or +/-(24) 1/2" applications per year.)*

8. *Rely solely on natural precipitation for the irrigation of areas with native grass or non-irrigated bermuda grass ground cover.*

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Background / Street Trees:	*Cedrus deodora*	*Deodar Cedar*
	Cupressus arizonica	*Arizona Cypress*
	Fraxinus velutina 'Modesto'	*Modesto Ash*
	Juglans major	*Arizona Walnut*
	Ligustrum lucidum	*Glossy Privet*
	Pinus thunbergii	*Japanese Black Pine*
	Pistacia atlantica	*Mt. Atlas Pistache*
	Pistacia chinensis	*Chinese Pistache*
	Platanus acerifolia 'Bloodgood'	*London Plane Tree*
	Platanus wrightii	*Arizona Sycamore*
	Prunus caroliniana	*Carolina Laurel Cherry*
	Quercus emoryi	*Emory Oak*
	Quercus ilex	*Holly Oak*
	Quercus suber	*Cork Oak*
	Quercus virginiana 'Heritage'	*Heritage Live Oak*
Accent Trees:	*Arbutus unedo*	*Strawberry Tree*
	Prunus blireiana	*Flowering Plum*
	Prunus cerasifera 'Atropurpurea'	*Purple Leaf Plum*
	Pyrus kawakamii	*Evergreen Pear*
Shrubs and Accent Plants:	*Abelia grandiflora*	*Glossy Abelia*
	Buxus microphylla japonica	*Japanese Boxwood*
	Cotoneaster glaucophyllus	*Bright-bead Cotoneaster*
	Cotoneaster lacteus	*Red Clusterberry*
	Heteromeles arbutifolia	*Toyon*
	Juniperus species	*Juniper*
	Ligustrum japonicum	*Waxleaf Privet*
	Mahonia aquifolium	*Oregon Grape*
	Nandina domestica	*Heavenly Bamboo*
	Pennisetum sectaceum 'Cupreum'	*Fountain Grass*
	Photinia fraseri	*Fraser's Photinia*
	Pyracantha species	*Firethorn*
	Raphiolepis indica	*Indian Hawthorn*
	Rhus ovata	*Sugar Bush*
	Rosmarinus officinalis	*Rosemary*
	Sophora arizonica	*Arizona Mescal Bean*
	Sophora secundiflora	*Mescal Bean*
	Xylosma congestum	*Xylosma*

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Ground Covers:

Convolulus mauritanicus	*Ground Morning Glory*
Cynodon dactylon	*Bermuda Grass*
Juniperus species	*Juniper*
Mahonia nevinii	*Nevin Mahonia*
Verbena peruviana	*Peruvian Verbena*
Pyracantha species	*Firethorn*
Rosmarinus officinalis	*Rosemary*
Trachelospermum jasminiodes	*Star Jasmine*
Vinca major	*Periwinkle*

Vines:

Gelsemium sempervirens	*Carolina jessamine*
Macfadyena unguis-cati	*Cat's-claw Vine*
Trachelospermum jasminoides	*Star Jasmine*

Hydroseed: *Native Grassland Mix*

Note: Some of the species listed above may not be suitable for all locations within the Historic Zone. Only cold hardy plant species should be utilized in low lying or other unprotected areas.

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Overview of Existing Conditions:

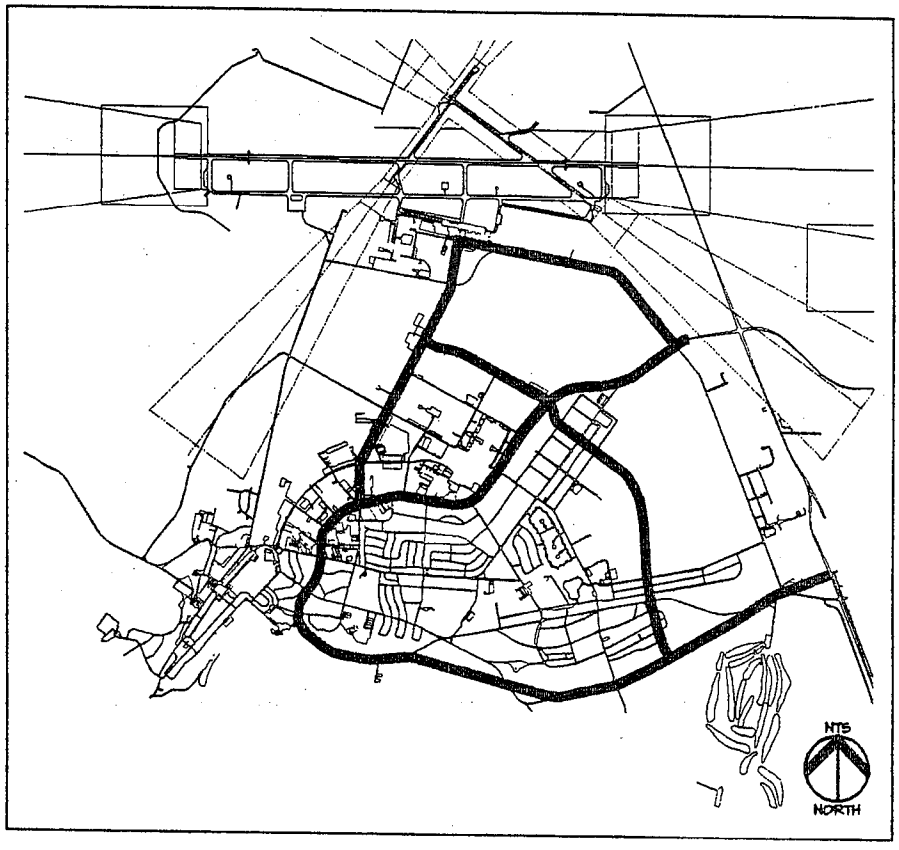
The Vehicular Circulation Zone extends along approximately 12 miles of roadway including a proposed boulevard (6.5 miles) and other primary fort roads (5.5 miles). At the present time, the boulevard does not exist but when completed it will extend through the fort from the Buffalo Soldier (Main Gate) to the Van Demen (East Gate).

With the exception of a few limited areas, there are no constructed landscape improvements along the proposed boulevard route or other primary roadways on the fort. At both the Buffalo Soldier and Van Demen Gates, there are existing buildings, some of which have historic significance.

Proposed New Development, Demolition, and Relocations:

The proposed boulevard will consist of a four-lane roadway with adjacent bicycle lanes. Portions of the roadway will be divided with a landscaped median. The shoulders of the road will be revegetated with non-irrigated, native plant species. More formal irrigated plantings will be installed at key intersections. Sound abatement walls will be provided adjacent to residential neighborhoods. Also planned are small pull-outs along the boulevard with exhibits interpreting the history of Fort Huachuca.

Location Map:



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WATER RESOURCE / REUSE STUDY, FORT HUACHUCA

FIGURE 3-A
VEHICULAR CIRCULATION ZONE
SITE PLAN

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Objectives:

The principal objectives of the landscape and irrigation improvements within the Vehicular Circulation Corridor Zone are:

1. *To enhance visual quality and to provide visual continuity along the major thoroughfares.*
2. *To exhibit the native plant materials common to the life zones present at different elevations on the fort.*
3. *To enhance user safety on fort roadways.*
4. *To minimize consumptive water use for the irrigation of landscape plantings.*

Policies:

To accomplish the objectives noted above, the following policies shall apply to landscape and irrigation developments within the Vehicular Circulation Zone.

1. *Turf or other spray irrigated ground covers shall not be utilized within roadway medians or along roadway shoulders.*
2. *In undeveloped areas of the fort, plantings shall be designed to survive without supplemental irrigation after initial plant establishment. Temporary drip irrigation systems may be utilized during the establishment period.*
3. *In developed central areas of the fort, roadside and median plantings may be designed with permanent drip irrigation systems.*
4. *Reclaimed water shall be used for the irrigation of roadside and median plantings. Potable water shall not be utilized on a permanent basis for the irrigation of roadside or median plantings.*
5. *All new plantings within the Vehicular Circulation Corridor Zone shall utilize only those plant species listed on the approved plant list for this zone.*

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Proposed Landscape Treatments:

The following prescriptions are provided for landscape improvements associated with the proposed boulevard and primary roadways within the Vehicular Circulation Zone:

1. *Maintain and supplement the existing tree and shrub plantings in the vicinity of the Van Demen and Buffalo Soldier Gate utilizing species that reinforce the historic character of these gateways.*

2. *In undeveloped portions of the fort, reseed all areas disturbed by roadway construction with native grass species. Implement seeding work immediately following completion of construction so as to minimize the establishment of invasive and noxious plant species such as Desert Broom. Where appropriate, such as interpretive pull-outs, supplement seeding work with tree plantings.*

3. *In developed central areas of the fort, reseed areas disturbed by roadway construction with native grass species or install inert ground covers such as decomposed granite or river rock. Where appropriate, supplement ground covers with tree and shrub plantings.*

4. *Provide set-backs between the edge of travel lanes and all new tree plantings. Setbacks to be in accordance with applicable national standards for the street cross-sections and design speeds utilized in the design of fort roadways.*

5. *Design planting schemes so as to create unobstructed sight visibility triangles at all fort intersections.*

6. *Install trees between primary roadways and fort residential areas for visual screening and sound attenuation. (The tree plantings to supplement the proposed sound attenuation walls.)*

7. *Design median tree and shrub plantings with attention given to the screening of glare from on-coming head-lights.*

8. *To the greatest extent possible, preserve existing native trees along new or improved roadway corridors.*

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Proposed Irrigation Systems:

The following prescriptions are provided for the irrigation systems and related improvements within the Vehicular Circulation Zone.

1. *To the greatest extent possible, utilize the proposed boulevard corridor as the alignment for the reclaimed water main extension.*
2. *Provide stub-outs from the reclaimed water main at regular intervals along the boulevard corridor for future irrigation system connections.*
3. *Utilize reclaimed water (temporary or permanent) drip irrigation systems only for the irrigation of median and roadside plantings.*
4. *Provide automatic controllers with manual over-ride capability for all median and roadside irrigation systems.*
5. *Where applicable, rely solely on natural precipitation for the irrigation of native grass areas within medians or along roadway shoulders.*

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Trees:	*Acacia constricta*	*Whitethorn Acacia*
	Acacia smallii	*Southwestern Sweet Acacia*
	Cupressus arizonica	*Arizona Cypress*
	Fraxinus velutina "Modesto"	*Modesto Ash*
	Fraxinus velutina	*Arizona Ash*
	Juniperus monosperma	*Juniper*
	Pinus edulis	*Pinon Pine*
	Populus fremontii *	*Cottonwood*
	Prosopis alba	*Argentine Mesquite*
	Prosopis chilensis	*Chilean Mesquite*
	Prosopis velutina	*Honey Mesquite*
	Quercus emoryi	*Emory Oak*
	Quercus ilex	*Holly Oak*
	Quercus suber	*Cork Oak*
	Quercus virginiana 'Heritage'	*Heritage Live Oak*
Shrubs and Accent Plants:	*Caesalpinia gilliesii*	*Yellow-Bird of Paradise*
	Cassia wislizeni	*Shrubby Senna*
	Dalea frutescens	*Black Dalea*
	Fouquieria splendens	*Ocotillo*
	Larrea tridentata	*Creosote*
	Leucophyllum frutescens	*Texas Ranger*
	Leucophyllum laevigatum	*Texas Ranger*
	Nolina microcarpa	*Bear Grass*
	Rhus ovata	*Sugar Bush*
	Sophora arizonica	*Arizona Mescal Bean*
	Vauquelinia californica	*Arizona Rosewood*
	Yucca species	*Yucca*
Hydroseed:	*Native Grassland Mix*	

** Cottonwood to be used within undeveloped portions of the fort at natural drainages and washes only. Cottonwood should not be planted where litter is a concern or where continuous supplemental irrigation will be required.*

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Overview of Existing Conditions:

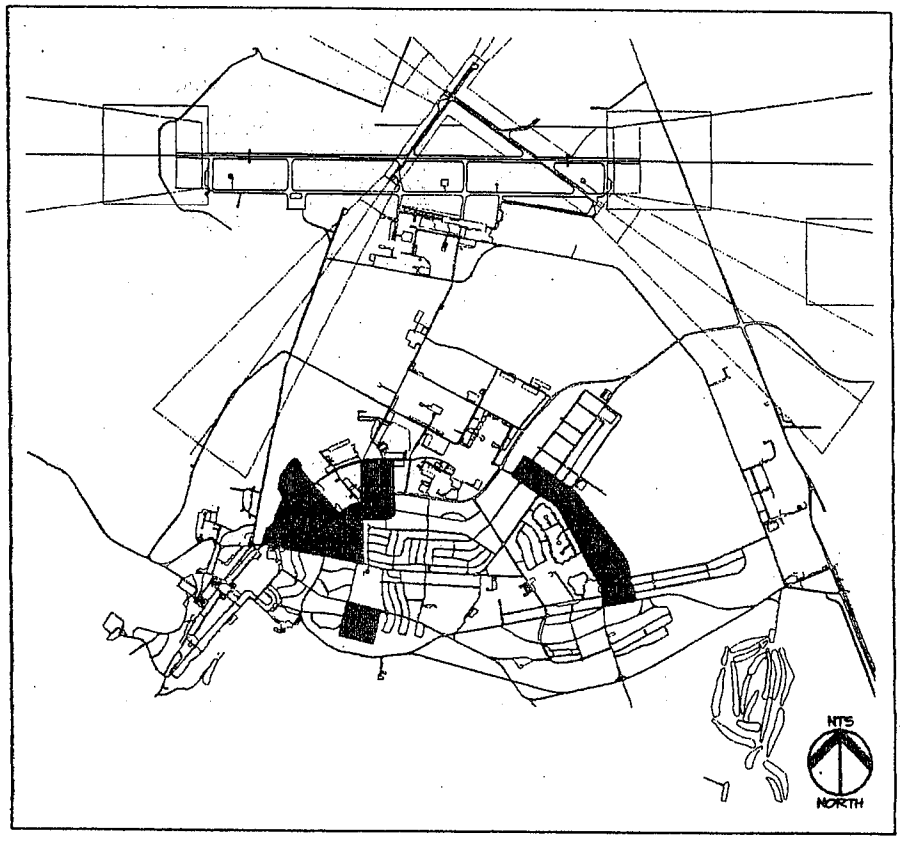
The Community Zone consists of three separate areas encompassing approximately 280 acres. Facilities located within this zone include: the Hospital, Barnes Field House, the Barnes Field House running track, the Commissary, PX, theater, bowling alley, shops, chapel, library, bank, post office, craft building, swimming pool, NCO club, and other similar facilities. Associated with these community facilities are several large and poorly organized parking lots.

A portion of the Hospital site consists of irrigated bermuda grass turf. Irrigated turf is also present within the running track at the Barnes Field House. The balance of the landscape development within the Community Zone typically consists of plantings adjacent to buildings and non-irrigated grass ground cover within perimeter areas.

Proposed New Development, Demolition, and Relocations:

All of the principal facilities within the Community Zone will remain in their current location with minor additions and modifications. The most significant changes to this area will be site improvements. The IDG recommends significant improvements to the parking lots, internal roadways, and pedestrian corridors.

Location Map:



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4.1 Community Zone - Landscape / Irrigation Objectives and Policies

Objectives:

The principal objectives of the landscape and irrigation improvements within the Community Zone are:

1. *To mitigate the visual and environmental impacts of the large parking lots and other paved areas within this zone.*
2. *To enhance the visual character of the existing and proposed pedestrian corridors throughout this zone.*
3. *To reinforce and enhance the proposed "town square" and other pedestrian nodes within this zone.*
4. *To screen the necessary (but visually unattractive) service and delivery areas within this zone.*
5. *To minimize consumptive water use for the irrigation of landscape plantings.*

Policies:

To accomplish the objectives noted above, the following policies shall apply to landscape and irrigation developments within the Community Zone.

1. *Turf areas shall be used sparingly, if at all, and only when the proposed turf area is an integral part of a significant outdoor pedestrian node.*
2. *Turf areas, if utilized, shall be irrigated with reclaimed water and shall not be overseeded with cool season grasses.*
3. *Except as noted above, new irrigation systems installed within the Community Zone shall be limited to reclaimed water, drip irrigation systems.*
4. *As facilities within this zone are replaced or upgraded, existing potable water irrigation systems shall be replaced with reclaimed water, drip irrigation systems.*
5. *Potable water use through existing irrigation systems shall be controlled through administrative restrictions.*
6. *All new plantings within the Community Zone shall utilize only those plant species listed on the Approved Plant List for this zone.*

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Proposed Landscape Treatments:

The following prescriptions are provided for the landscape improvements within the Community Zone.

1. *To the greatest extent possible, maintain significant existing trees within the Community Zone and incorporate these trees into new site developments.*

2. *Maintain the irrigated bermuda grass athletic / recreation field at the Barnes Field House running track.*

3. *Maintain limited areas of irrigated bermuda grass turf at the entrance to the Hospital.*

4. *Provide new parking lot trees and shrub screen plantings as per the design guidelines included in the IDG.*

5. *Provide new tree plantings along pedestrian corridors and within public plazas to reinforce sight lines, provide spatial definition, and enhance user comfort.*

6. *Use "walk-on" aggregate surfacing such as decomposed granite in landscaped areas adjacent to pedestrian corridors and parking lots. Minimize the use of large cobbles or river rock that can be hazardous and uninviting to pedestrian traffic.*

7. *Maintain or restore non-irrigated grass ground cover in perimeter locations and other areas not subject to heavy pedestrian traffic. Non-irrigated grass cover shall utilize native grasses whenever possible but non-irrigated bermuda grass cover may be retained where it is currently established.*

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Proposed Irrigation Systems:

The following prescriptions are provided for the irrigation systems within the Community Zone.

1. *To the greatest extent possible, harvest storm water run-off from roofs and paved surfaces and direct this water to planted areas for the irrigation of trees and shrubs.*

2. *Provide stub-outs from the new reclaimed water main(s) at regular intervals where the main passes through the Community Zone for future irrigation system connections.*

3. *Connect the irrigation system for the Barnes Field House Running Track athletic / recreation field to the reclaimed water system.*

4. *Connect the controllers for the Barnes Field House Running Track athletic / recreation field to the overall fort water management system.*

5. *Utilize reclaimed water, drip irrigation systems for all new irrigation systems within the Community Zone.*

6. *Provide automatic controllers with manual over-ride capability for all new irrigation systems within the Community Zone.*

7. *Where existing irrigation systems are utilizing potable water, control potable water use through administrative restrictions.*

8. *Rely solely on natural precipitation for the irrigation of native grass areas and non-irrigated bermuda grass areas.*

USF200003452

Background / Street Trees:

Acacia smallii	Southwestern Sweet Acacia
Cedrus deodora	Deodar Cedar
Chilopsis linearis	Desert Willow
Cupressus arizonica	Arizona Cypress
Fraxinus velutina 'Modesto'	Modesto Ash
Pinus edulis	Pinon Pine
Pinus eldarica	Afghan Pine
Pinus halepensis	Aleppo Pine
Pinus thunbergii	Japanese Black Pine
Pistacia atlantica	Mt. Atlas Pistache
Pistacia chinensis	Chinese Pistache
Platanus acerifolia 'Bloodgood'	London Plane Tree
Prosopis alba	Argentine Mesquite
Prosopis glandulosa	Honey Mesquite
Prunus caroliniana	Carolina Laurel Cherry
Quercus ilex	Holly Oak
Quercus suber	Cork Oak
Quercus virginiana 'Heritage'	Heritage Live Oak

Accent Trees:

Acacia constricta	Whitethorn Acacia
Arbutus unedo	Strawberry Tree
Prunus blireiana	Flowering Plum
Prunus cerasifera 'Atropurpurea'	Purple Leaf Plum
Pyrus kawakamii	Evergreen Pear

Shrubs and Accent Plants:

Abelia grandiflora	Glossy Abelia
Agave species	Agave
Caesalpinia gilliesii	Yellow Bird-of-Paradise
Calliandra eriophylla	Fairy Duster
Cotoneaster glaucophyllus	Bright-bead Cotoneaster
Cotoneaster lacteus	Red Clusterberry
Dasylirion wheeleri	Desert Spoon
Fouquieria splendens	Ocotillo
Heteromeles arbutifolia	Toyon
Juniperus species	Juniper
Leucophyllum frutescens	Texas Ranger
Leucophyllum laevigatum	Texas Ranger
Ligustrum japonicum	Waxleaf Privet
Mahonia aquifolium	Oregon Grape
Nandina domestica	Heavenly Bamboo
Photinia fraseri	Fraser's Photinia
Pyracantha species	Firethorn
Pennisetum sectaceum 'Cupreum'	Fountain Grass

USF200003453

Shrubs and Accent Plants (Continued):	*Raphiolepis indica*	*Indian Hawthorn*
	Rosmarinus officinalis	*Rosemary*
	Salvia greggii	*Red Sage*
	Vauquelinia californica	*Arizona Rosewood*
	Xylosma congestum	*Xylosma*
	Yucca species	*Yucca*
Ground Covers:	*Cynodon dactylon*	*Bermuda Grass*
	Juniperus species	*Juniper*
	Mahonia nevinii	*Nevin Mahonia*
	Pyracantha species	*Firethorn*
	Rosmarinus officinalis	*Rosemary*
	Trachelospermum jasminiodes	*Star Jasmine*
	Verbena peruviana	*Peruvian Verbena*
	Vinca major	*Periwinkle*
Vines:	*Gelsemium sempervirens*	*Carolina Jessamine*
	Macfadyena unguis-cati	*Cat's-claw Vine*
	Trachelospermum jasminoides	*Star Jasmine*
Hydroseed:	*Native Grassland Mix*	

Note: Some species listed above may not be suitable for all locations with the Community Zone. Plant species should be selected for local, site specific condtions.

USF200003454

Overview of Existing Conditions:

There are three existing schools at Fort Huachuca that are attended by the dependent children of fort personnel. The 25 acre General Myer Elementary School campus includes an athletic field / running track, multipurpose courts, and several acres of open play field. The campus fields have a non-irrigated bermuda grass surface.

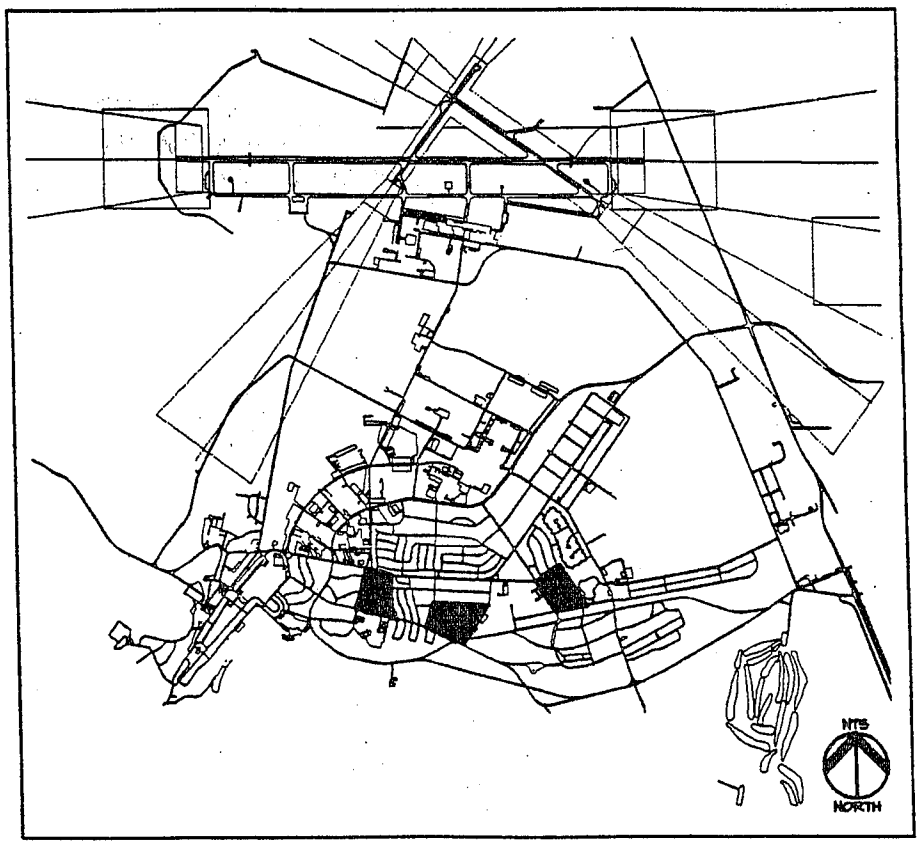
The 28 acre Colonel Johnson Elementary School campus includes a multipurpose court, and approximately 26 acres of non-irrigated bermuda grass play fields.

The Colonel Smith Middle School campus encompasses 24 acres. Campus facilities include an athletic field / running track, tennis courts, volleyball courts, and several areas of non-irrigated bermuda grass fields.

Proposed New Development, Demolition, and Relocations:

The three fort schools for dependents will remain in their present locations. There are no significant changes or new uses proposed for the school buildings or campuses.

Location Map:



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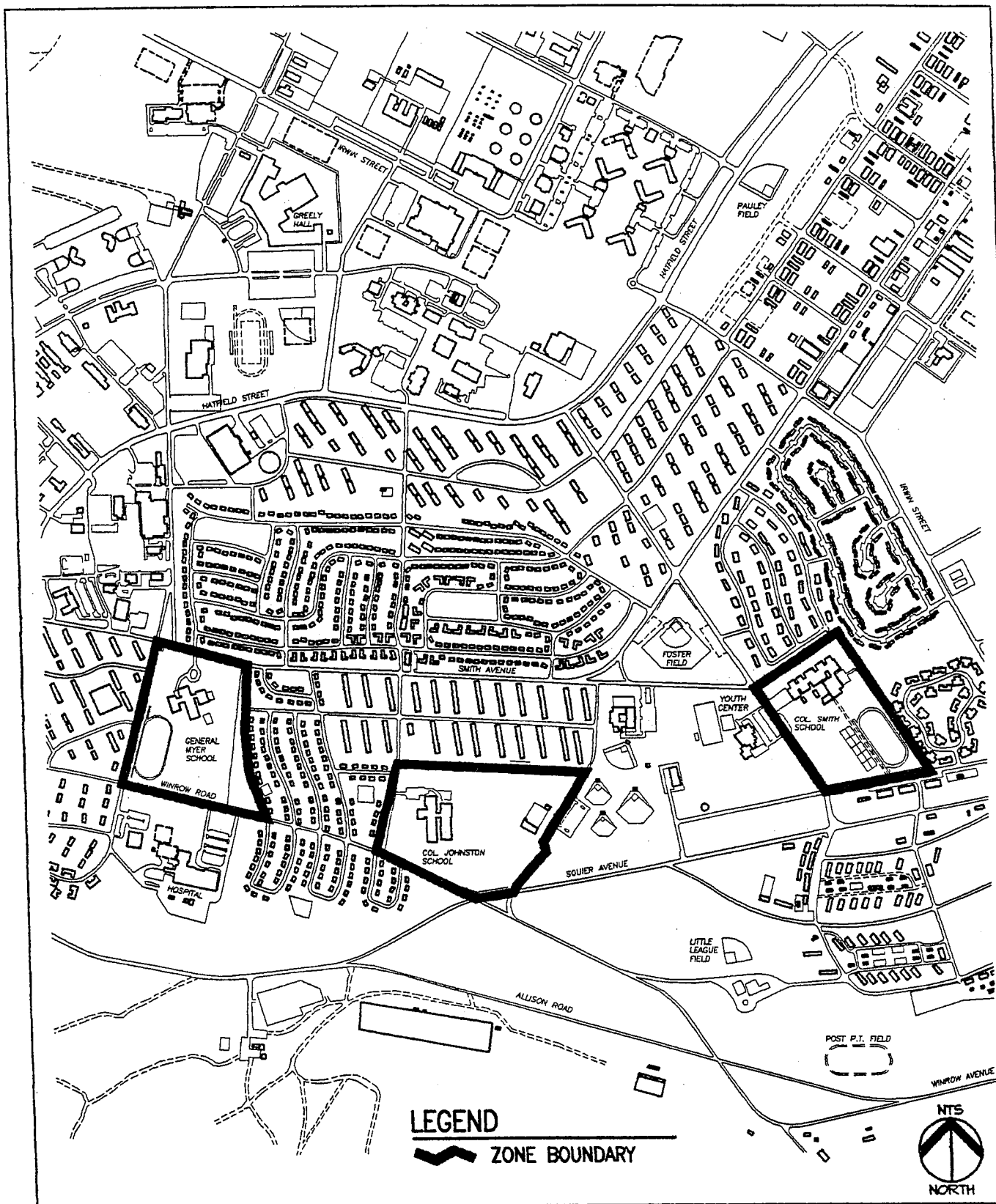

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WATER RESOURCE /REUSE STUDY, FORT HUACHUCA

FIGURE 5-A
SCHOOL CAMPUS ZONE
SITE PLAN

USF200003456

Introduction:

The elementary schools and middle school located on the fort are administered and staffed by the Sierra Vista Public School District. Implementation of the policies noted below and construction of the landscape and irrigation improvements identified herein are subject to School District Board approval.

Objectives:

The principal objectives of the landscape and irrigation improvements within the School Campus Zone are:

1. *To provide safe and usable field areas for student recreation, physical education, and athletic programs.*
2. *To provide comfortable outdoor spaces for student, faculty, and community use.*
3. *To stabilize graded field areas as required for dust control and soil erosion.*

Policies:

To accomplish the objectives noted above, the following policies shall apply to landscape and irrigation developments within the School Campus Zone.

1. *A portion of each school campus, not to exceed 3.5 acres, may consist of irrigated turf grass fields. A non-irrigated grass condition shall be maintained within the balance of the play field areas on each campus.*
2. *Irrigated school fields shall not be overseeded with cool season grasses and intensively irrigated during the winter months.*
3. *Irrigated school fields and other landscape improvements shall be irrigated with reclaimed water.*
4. *All new plantings within the School Campus Zone shall utilize only those plant species listed on the Approved Plant List for this zone.*

USF200003457

5.2 School Campus Zone - Proposed Landscape Treatments

Proposed Landscape Treatments:

The following prescriptions are provided for the landscape improvements within the School Campus Zone.

1. *The 2.3 acre grass infield of the running track plus an additional 1.2 acres of play field on the General Myer Elementary School campus shall be renovated and replanted with hybrid bermuda grass.*

2. *Additional trees shall be planted on the General Myer Elementary School campus to create shaded areas for passive recreational and educational activities.*

3. *An area of approximately 3.5 acres on the Colonel Johnson Elementary School campus shall be renovated and replanted with hybrid bermuda grass.*

4. *Additional trees shall be planted on the Colonel Johnson Elementary School campus to create shaded areas for passive recreational and educational activities.*

5. *The 2.3 acre grass infield of the running track plus an additional 1.2 acres of playfield on the Colonel Smith Middle School campus shall be renovated and replanted with hybrid bermuda grass.*

6. *Additional trees shall be planted on the Colonel Smith Middle School campus to create shaded areas for passive recreational and educational activities.*

7. *Non-irrigated grass areas on each of the school campuses that have become worn and eroded shall be renovated and replanted with a native grass seed mix.*

USF200003458

Proposed Irrigation Systems:

The following prescriptions are provided for the irrigation systems within the School Campus Zone.

1. *Extend the reclaimed water distribution system to each of the three school campuses.*
2. *Install water efficient spray irrigation systems for the new turf grass areas at each of the three school campuses.*
3. *Connect the irrigation controllers at each of the three school campuses to the overall fort irrigation water management system.*
4. *Install new drip irrigation systems to the new tree plantings at each of the three school campuses.*
5. *Rely solely on natural precipitation for the irrigation of areas with native grass or non-irrigated bermuda grass ground cover.*

USF200003459

Trees:	*Fraxinus velutina 'Modesto'*	*Modesto Ash*
	Pinus edulis	*Pinon Pine*
	Pinus eldarica	*Afghan Pine*
	Pinus halepensis	*Aleppo Pine*
	Pistacia atlantica	*Mt. Atlas Pistache*
	Pistacia chinensis	*Chinese Pistache*
	Platanus acerifolia 'Bloodgood'	*London Plane Tree*
	Prunus caroliniana	*Carolina Laurel Cherry*
	Quercus emoryi	*Emory Oak*
	Quercus ilex	*Holly Oak*
	Quercus virginiana 'Heritage'	*Heritage Live Oak*
Shrubs and Accent Plants:	*Cotoneaster lacteus*	*Red Clusterberry*
	Dasylirion wheeleri	*Desert Spoon*
	Juniperus species	*Juniper*
	Nandina domestica	*Heavenly Bamboo*
	Photinia fraseri	*Fraser's Photinia*
	Pyracantha species	*Firethorn*
	Raphiolepis indica	*Indian Hawthorn*
	Rosmarinus officinalis	*Rosemary*
	Xylosma congestum	*Xylosma*
	Yucca species	*Yucca*
Ground Covers:	*Cynodon dactylon*	*Bermuda Grass*
	Juniperus species	*Juniper*
Hydroseed:	*Native Grassland Mix*	

Note: Some of the species listed above, such as Desert Spoon and Yucca, may not be suitable for all locations on the fort's school campuses. Plants species should be selected for user safety and for local, site specific conditions.

USF200003460

Overview of Existing Conditions:

The existing housing at the fort includes: Family Housing units, Bachelor Officer Quarters (BOQ), and Bachelor Enlisted Quarters (BEQ). In total, the Housing Zone encompasses 786 acres.

The family housing consists of twenty-seven different subdivisions with a total of 1,954 individual dwelling units. The type and extent of landscape development within the family housing areas is varied but typically consists of street trees, minimal foundation plantings at individual units, and bermuda grass yards. The bermuda grass yards are currently irrigated by the unit occupant using potable water. (The amount of water applied is currently restricted through administrative controls). Landscape development at the perimeter of the family housing areas and between subdivisions generally consists of non-irrigated bermuda grass.

Present within the family housing subdivisions are two developed neighborhood parks, one proposed neighborhood park, and several small tot-lots with playground equipment. The service area for these neighborhood parks consists of the adjacent neighborhood or subdivision. As such, they are discussed here in conjunction with the Housing Zone rather than with the Community Parks and Open Space Zone, Section 9 of this document.

The BOQ facilities consist of four apartment style buildings and an associated Dining Hall / Officers Club. Also present is a small lake. This lake serves as a visual amenity and receives significant recreational (fishing) use.

The BOQ area includes a few relatively large bermuda grass turf areas. Tree and shrub plantings are minimal. Some of the bermuda grass turf areas are irrigated while others are not.

The BEQ housing facilities consist of 10 Barrack structures with associated dining facilities and support buildings. Within the BEQ barracks area are several large open fields with non-irrigated bermuda grass surfacing. These open fields are used for recreation as are the ramadas and courtyards present in the barracks area.

USF200003461

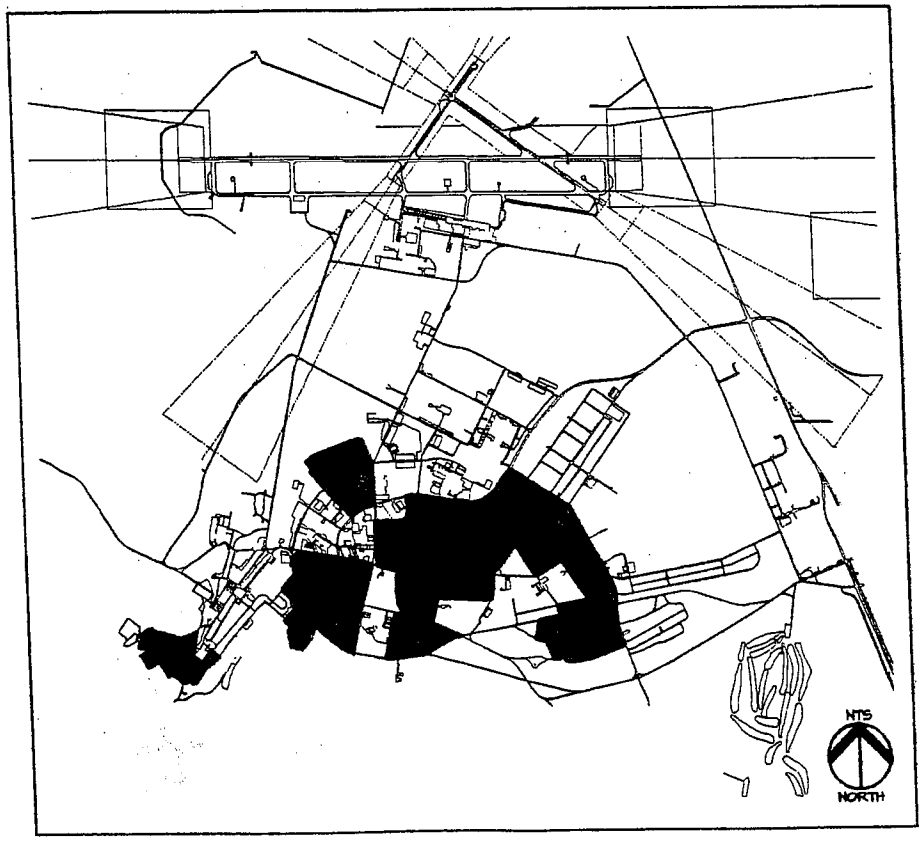
Proposed New Development, Demolition, and Relocations (Continued):

Perhaps more than any other area of the fort, the housing areas will undergo the most significant changes during the next decade. The Army has adopted the policy of "renovation-by-replacement" which calls for the replacement of housing units after the cost of renovation exceeds 70% of the cost of new construction. As nearly all of the housing on the fort meets this criteria, it will be replaced in the future.

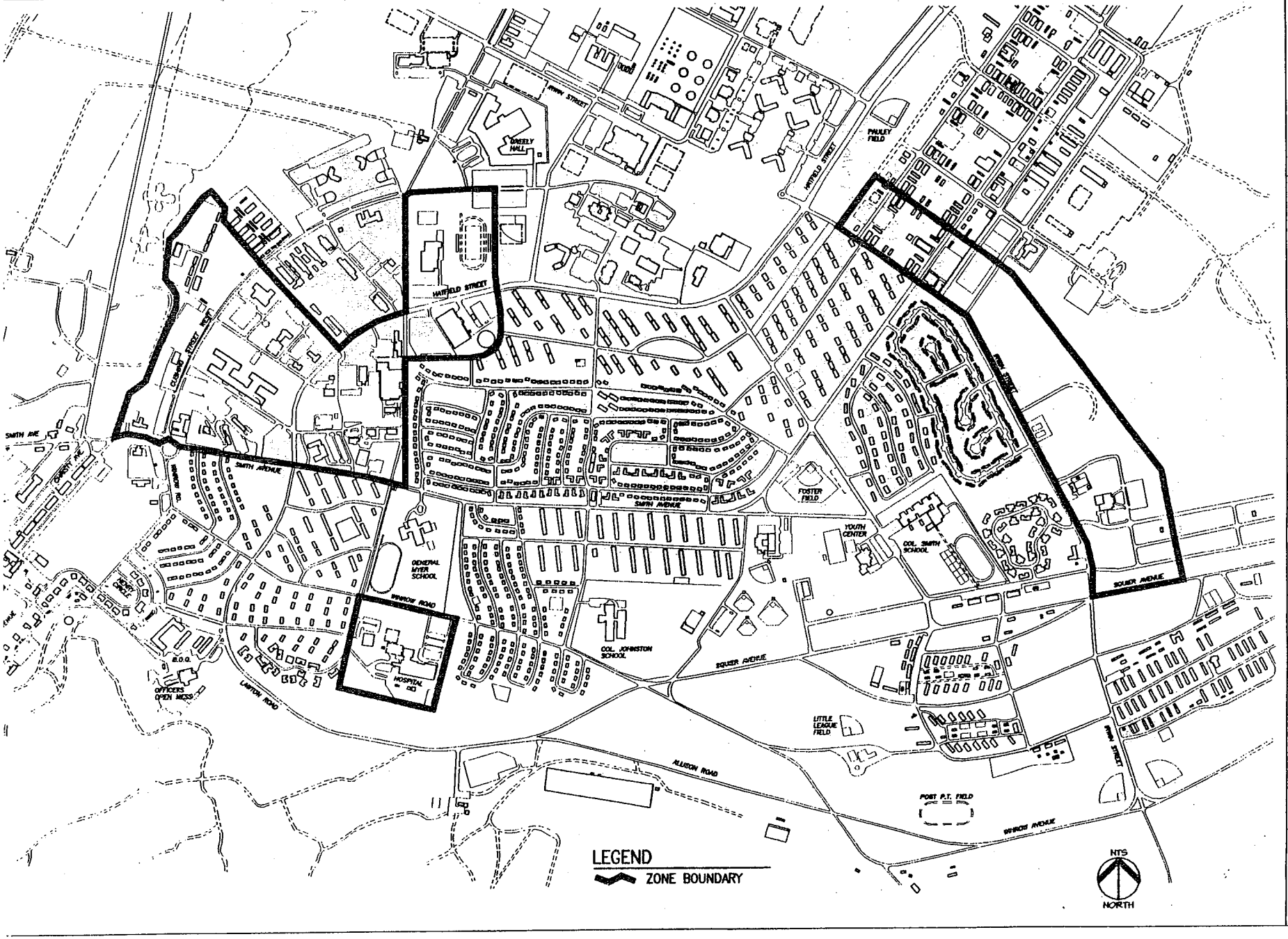
It should be noted that historic residential structures, such as the houses present along Grierson Avenue and Henry Circle are exempt from this policy. These historic structures will be retained.

It is anticipated that the renovate-by-replacement concept will be implemented utilizing turn-key projects. Using this approach, entire subdivisions will be demolished, redesigned, and reconstructed in accordance with specifications to be established by the fort. This concept will allow for significant changes to type and extent of the irrigation systems, and to the volume of water used for landscape irrigation within the residential areas of the fort. It will also facilitate the infrastructure changes needed to begin irrigating landscapes in the housing areas with reclaimed water.

Location Map:



USF200003462



WATER RESOURCE / REUSE STUDY, FORT HUACHUCA

FIGURE 4-A
COMMUNITY ZONE
SITE PLAN

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USF200003463

6.1 Housing Zone - Landscape / Irrigation Objectives and Policies

Objectives:

The principal objectives of the landscape and irrigation improvements within the Housing Zone are:

1. *To provide comfortable, attractive, and usable outdoor spaces within all housing areas at the fort.*
2. *To consolidate and locate turf grass areas in locations where they can be utilized by the maximum number of residents.*
3. *To minimize the irrigation of landscape plantings with potable water.*
4. *To utilize, to the greatest extent practical, reclaimed water for the irrigation of landscape plantings.*
5. *To restore to a native plant community those open spaces located between housing unit clusters and subdivisions.*

Policies:

To accomplish the objectives noted above, the following policies shall apply to all landscape and irrigation developments within the Housing Zone.

1. *Until such time as individual subdivisions or areas are redeveloped, administrative restrictions on potable water use for irrigation shall be maintained and enforced.*
2. *Housing units and subdivisions shall, over time, be redeveloped with water conservation included as a principal design criteria.*
3. *When replaced, family housing units shall be clustered with common turf areas and with no turf grass lawns at individual units.*
4. *Within each redeveloped housing subdivision, the extent of the common turf areas shall not exceed 1,000 S.F. per dwelling unit.*
5. *Administration restrictions on irrigation water use, consistent with this master plan, should be adopted and enforced upon completion of each renovated subdivision.*
6. *Reclaimed water shall be used for the irrigation of neighborhood parks and common turf grass play areas.*
7. *All new plantings within the Housing Zone shall utilize only those plants listed on the Approved Plant List for this zone.*

USF200003464

Proposed Landscape Treatments:

The following prescriptions are provided for the landscape and irrigation improvements included within the Housing Zone.

1. *The landscaping in new Family Housing subdivisions shall consist of; patios with limited plantings at individual units, common turf grass areas for housing clusters, and non-irrigated native plant perimeter areas. Patios may be enclosed where appropriate.*

2. *Neighborhood parks shall be provided in the vicinity of all housing subdivisions. Neighborhood parks shall include irrigated turf grass areas in useable locations and configurations. Non-irrigated grasses and inorganic surfacing materials shall be used where appropriate in the redeveloped neighborhood parks.*

3. *Prior to the redevelopment of each subdivision, the existing trees within the impacted area shall be inventoried and inspected. Those trees that are healthy and of an appropriate species and age shall be maintained within the new subdivision. Supplemental tree plantings shall also be installed in conjunction with each redeveloped subdivision.*

4. *Multi-purpose, irrigated turf grass fields shall be provided within the BEQ area. Non-irrigated bermuda grass surfacing shall be retained in secondary use areas.*

5. *Multi-purpose, irrigated turf grass fields shall be provided within the BOQ area. Existing irrigation systems in perimeter areas shall be removed or deactivated. Non-irrigated bermuda grass surfacing shall be maintained or native plant communities restored in these locations.*

6. *Within the BEQ and BOQ areas, existing tree plantings shall be maintained, protected during new construction projects, and supplemented with new tree plantings.*

USF200003465

Proposed Irrigation Systems:

The following prescriptions are provided for irrigation systems and related improvements within the Housing Zone.

1. *Extend the reclaimed water distribution system to the individual subdivisions within the Family Housing area and to the BEQ and BOQ areas.*

2. *Install new reclaimed water irrigation systems in all common areas and neighborhood parks within each redeveloped subdivision. Water efficient spray irrigation systems shall be used for all turf areas. Drip irrigation systems shall be installed for all new street tree plantings.*

3. *Connect the irrigation controllers for all large turf areas within the Housing Zone to the overall fort irrigation water management system.*

4. *Install a simple, water efficient, manually operated irrigation system for the irrigation of patio plants at each redeveloped family housing unit. This irrigation system shall be connected to the potable water supply to each unit along with appropriate cross-connection control. (This system might be as simple as a (frost proof) hose bib for small patio areas. Larger units might receive a simple, manually operated bubbler system.)*

5. *Install water-efficient, reclaimed water, spray irrigation systems at the multipurpose turf grass fields within the BEQ. Connect the controllers for these fields to the overall fort irrigation water management system.*

6. *Install a water-efficient, reclaimed water, spray irrigation system(s) at the multipurpose turf grass fields within the BOQ. Connect the controllers for these fields to the overall fort irrigation water management system.*

USF200003466

Background / Street Trees:

Eucalyptus microtheca	Tiny Capsule Eucalyptus
Fraxinus velutina 'Modesto'	Modesto Ash
Ligustrum lucidum	Glossy Privet
Pinus edulis	Pinon Pine
Pinus eldarica	Afghan Pine
Pinus halepensis	Aleppo Pina
Pistacia atlantica	Mt. Atlas Pistache
Pistacia chinensis	Chinese Pistache
Platanus acerifolia 'Bloodgood'	London Plane Tree
Prosopis alba	Argentine Mesquite
Prosopis chilensis	Chilean Mesquite
Prosopis velutina	Honey Mesquite
Prunus caroliniana	Carolina Laurel Cherry
Quercus ilex	Holly Oak
Quercus suber	Cork Oak
Quercus virginiana "Heritage"	Heritage Live Oak

Accent Trees:

Acacia smallii	Southwestern Sweet Acacia
Arbutus unedo	Strawberry Tree
Cercis occidentalis	Western Redbud
Prunus blireiana	Flowering Plum
Prunus cerasifera 'Atropurpurea'	Purple Leaf Plum
Pyrus kawakamii	Evergreen Pear

Shrubs and Accent Plants:

Abelia grandiflora	Glossy Abelia
Agave species	Agave
Buxus microphylla japonica	Japanese Boxwood
Caesalpinia gilliesii	Yellow-Bird-of-Paradise
Dasylirion wheeleri	Desert Spoon
Hesperaloe parvifolia	Red Yucca
Leucophyllum frutescens	Texas Ranger
Leucophyllum laevigatum	Chihuahuan Sage
Pennisetum sectaceum 'Cupreum'	Fountain Grass
Pyracantha species	Firethorn
Raphiolepis species	Indian Hawthorn
Yucca species	Yucca

USF200003467

Vines:	*Gelsemium sempervirens*	*Carolina Jessamine*
	Macfadyena unguis-cati	*Cat's-claw Vine*
	Trachelospermum jasminoides	*Star Jasmine*
Ground Covers:	*Cynodon dactylon*	*Bermuda Grass*
	Juniperus speices	*Juniper*
	Mahonia nevinii	*Nevin Mahonia*
	Rosmarinus officinalis	*Rosemary*
	Vinca major	*Periwinkle*
Hydroseed:	*Native Grassland Mix*	

USF200003468

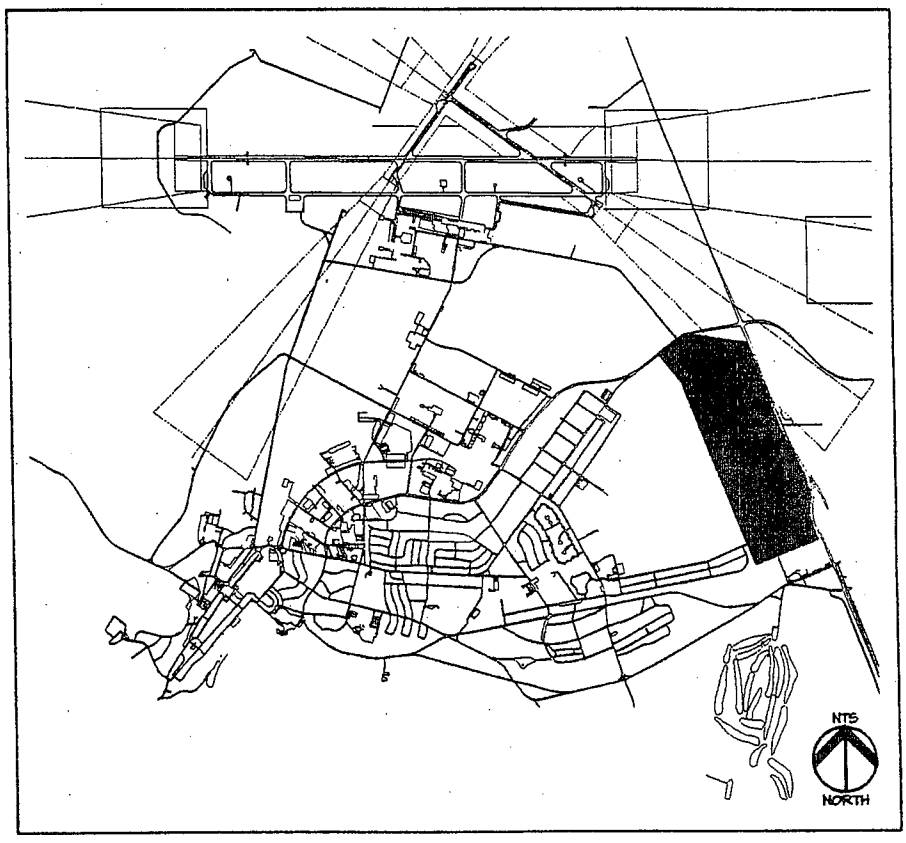
Overview of Existing Conditions:

The Industrial Zone covers approximately 360 acres and is located at the eastern edge of the fort between the Buffalo Soldier (Main) Gate and the Van Demen (East) Gate. The zone includes the sewage treatment plants, a commercial laundry, a radio station, warehouses, shops, and miscellaneous storage yards. Undeveloped areas within this zone exhibit a native mesquite grassland plant community. There are no constructed landscape improvements or irrigation systems within this zone.

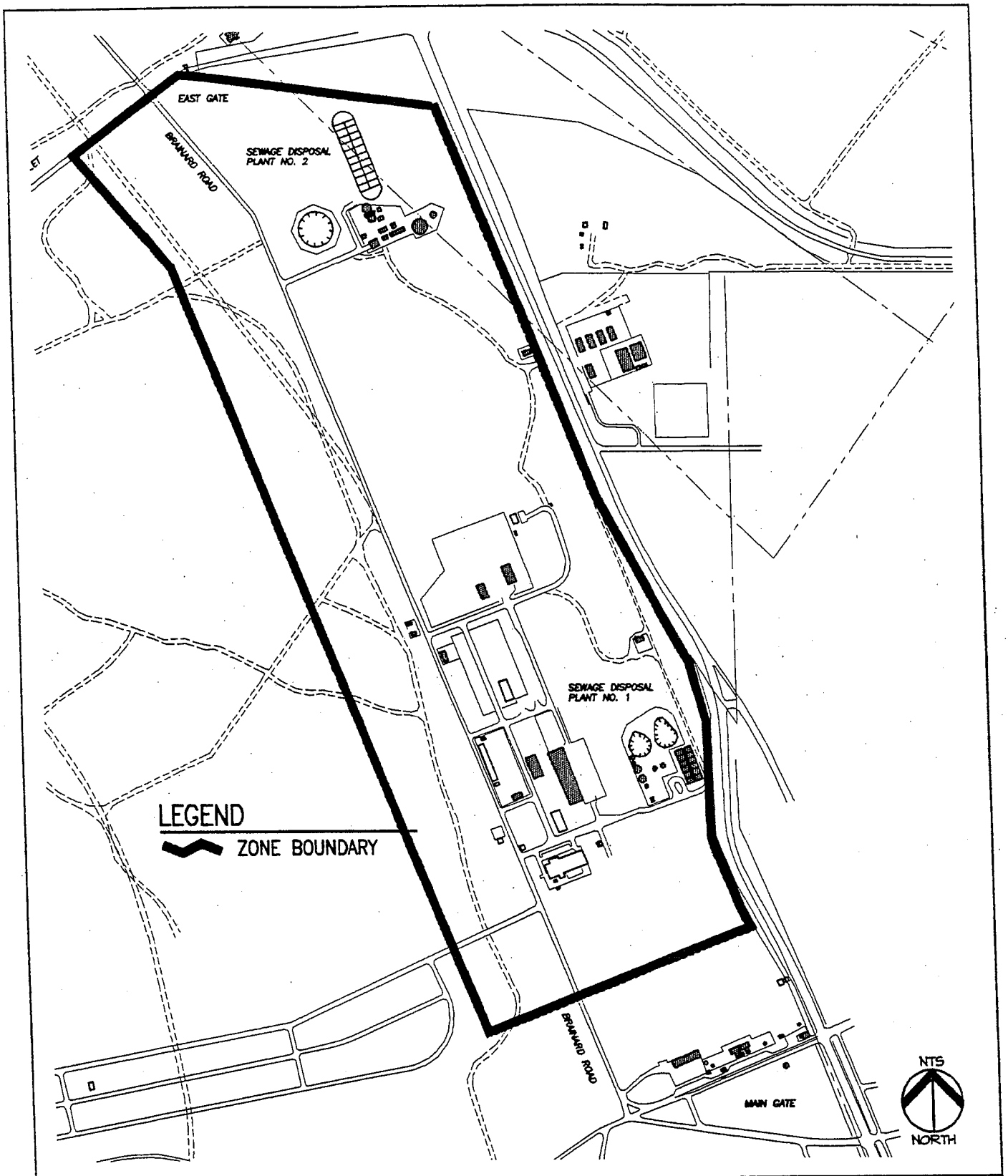
Proposed New Development, Demolition, and Relocation:

Over time, it is anticipated that some of the existing facilities will be replaced or expanded and that new facilities will be constructed within this zone. The new or expanded facilities will accommodate industrial uses and activities.

Location Map:



USF200003469



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WATER RESOURCE /REUSE STUDY, FORT HUACHUCA

FIGURE 7-A
INDUSTRIAL ZONE
SITE PLAN

USF200003470

7.1 Industrial Zone - Landscape / Irrigation Objectives and Policies

Objectives:

The principal objectives of the landscape and irrigation improvements within the Industrial Zone are:

1. *To maintain a native mesquite grassland plant cover as required to prevent soil erosion and blowing dust.*
2. *Where appropriate, to use native trees to shade occupied buildings and minimize building heating and cooling energy requirements.*
3. *To screen industrial and warehouse facilities from off-site vantage points such as along Buffalo Soldier Trail.*

Policies:

To accomplish the objectives noted above, the following policies shall apply to landscape and irrigation developments within the Industrial Zone.

1. *Landscape developments shall be limited to plantings required for erosion control, energy conservation (shading of occupied buildings), and visual screening.*
2. *All landscape plantings shall be designed to survive without supplemental irrigation after initial plant establishment.*
3. *Irrigation systems installed within the Industrial Zone shall be limited to temporary drip systems required for initial plant establishment.*
4. *All new plantings within the Industrial Zone shall utilize only those plants listed on the Industrial Zone Plant List.*

USF200003471

Proposed Landscape Treatments:

The following prescriptions are provided for the landscape improvements within the Industrial Zone.

1. *Existing native plant cover shall be maintained except as required for new facility construction.*

2. *Areas disturbed by new construction shall be revegetated using hydroseeding techniques. Work shall be implemented immediately following completion of construction so as to minimize the establishment of invasive species such as Desert Broom.*

3. *Trees shall be planted to screen new industrial facilities that are visible from; off-site vantage points, the Van Demen (East) Gate, or the Buffalo Soldier (Main) Gate.*

USF200003472

Proposed Irrigation Systems:

The following prescriptions are provided for the irrigation systems and related improvements within the Industrial Zone.

1. *To the greatest extent possible, harvest storm water run-off from roofs and paved surfaces and direct this water to planted areas for the irrigation of native trees.*

2. *Install temporary drip irrigation systems for the establishment of trees planted for visual screening or shading of buildings. Discontinue use of the temporary drip irrigation system after the initial establishment period. (Approximately 3 growing seasons.)*

3. *Supply irrigation water to temporary drip irrigation systems from potable water services to the associated building. Utilize reclaimed water for this purpose only if there is a reclaimed water main in the immediate vicinity of the project.*

4. *Rely solely on natural precipitation for the irrigation of seeded native grass areas.*

USF200003473

Trees:	*Acacia constricta*	*Whitethorn Acacia*
	Chilopsis linearis	*Desert Willow*
	Prosopis alba	*Argentine Mesquite*
	Prosopis chilensis	*Chilean Mesquite*
	Prosopis glandulosa	*Honey Mesquite*
	Prosopis velutina	*Velvet Mesquite*
Shrubs:	*Agave* species	*Agave*
	Atriplex canescens	*Four-Wing Salt Bush*
	Atriplex lentiformis	*Quail Bush*
	Atriplex lentiformis 'Breweri'	*Brewer Salt Bush*
	Cassia wislizeni	*Shrubby Senna*
	Dasylirion wheeleri	*Desert Spoon*
	Ferocactus species	*Barrel Cactus*
	Fouquieria splendens	*Ocotillo*
	Larrea tridentata	*Creosote Bush*
	Opuntia species	*Prickly Pear*
	Yucca species	*Yucca*
Hydroseed:	*Native Grassland Mix*	

USF200003474

Overview of Existing Conditions:

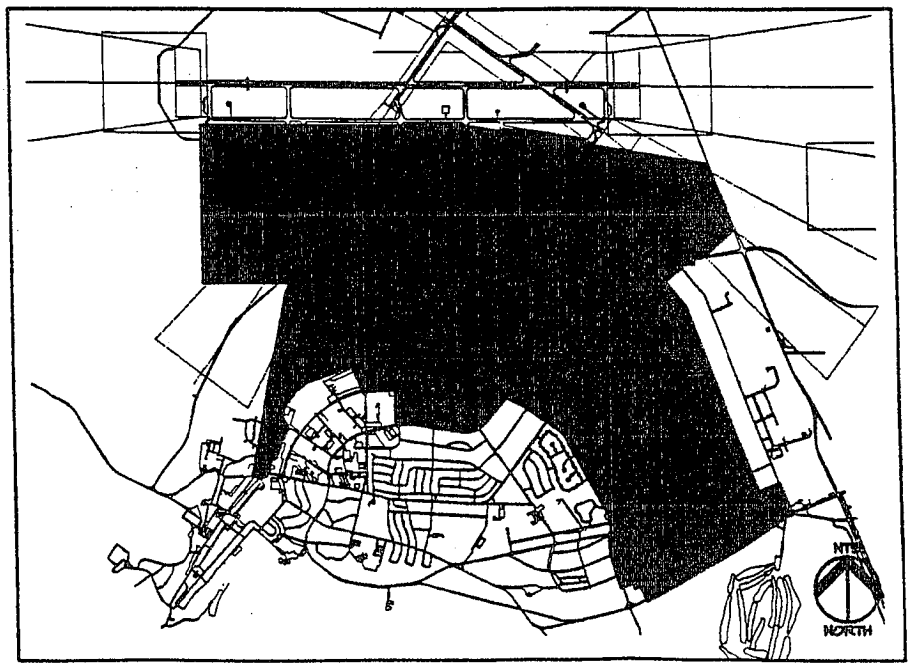
The Mission Zone encompasses approximately 3,150 acres and includes; Greely Hall, the Intelligence Center, the Electronic Proving Grounds, the Joint Interoperability Test Center, the Air National Guard facilities, and Libby Army Air Field. Supporting these mission oriented facilities are several large barracks, physical training facilities, a field house, an outdoor sports complex, and Chaffee Field (a large turf grass parade ground).

The existing landscaping within the Mission Zone ranges from irrigated turf grass lawns, such as at the entrance to Greely Hall, to undisturbed natural desert, such as is present in the areas surrounding Libby Army Air Field. The landscape surrounding newer facilities within the Mission Zone is characterized by areas of irrigated bermuda grass turf interspersed with a more xeric treatment of trees and inorganic ground covers. At the present time reclaimed water is used for the irrigation of Chaffee Field and several new buildings constructed within this zone. The sports complex, currently under construction, will also utilize reclaimed water.

Proposed New Development, Demolition, and Relocations:

There are several new facilities under construction or scheduled for construction within the Mission Zone. When completed, the administrative, academic, residential, recreational, and support facilities required for the missions currently assigned to Fort Huachuca will be in place.

Location Map:



USF200003475

WATER RESOURCE / REUSE STUDY, FORT HUACHUCA

FIGURE 6-A
HOUSING ZONE
SITE PLAN

McGANN & ASSOCIATES
AAAT ENVIRONMENTAL CONSULTANTS
SAGUARO ENVIRONMENTAL SERVICES

USF200003476

8.1 Mission Zone - Landscape / Irrigation Objectives and Policies

Objectives:

The principal objectives of the landscape and irrigation improvements within the Mission Zone include:

1. *To provide appropriate facilities, such as athletic fields and a parade ground, as required for physical training and active recreation.*
2. *To provide comfortable and attractive passive recreation areas (oases) for individuals residing within the Mission Zone.*
3. *To reinforce significant pedestrian corridors and sight lines.*
4. *To mitigate the visual and environmental impact of large parking lots, paved surfaces, and service areas.*
5. *To preserve the existing natural vegetation in perimeter areas and in all areas not required for facility construction.*
6. *To minimize consumptive water use for the irrigation of landscape plantings.*

Policies:

To accomplish these objectives, the following polices shall apply to all landscape and irrigation developments within the Mission Zone.

1. *Irrigated turf grass shall be utilized only in instances where it is necessary for the intended use or activity, such as on physical training fields, athletic fields, or active recreation areas.*
2. *All large turf grass areas shall be irrigated with reclaimed water.*
3. *Existing and new drip irrigation systems to trees and shrubs shall be connected to the reclaimed water system when it is extended to additional locations within this zone.*
4. *Potable water use through existing irrigation systems shall be controlled through administrative restrictions.*
5. *All new plantings within the Community Zone shall utilize only those plant species listed on the Approved Plant List for this zone.*

USF200003477

Proposed Landscape Treatments:

The following prescriptions are provided for the landscape improvements within the Mission Zone.

1. *Modify the landscaping in front of Greely Hall to reduce the amount of irrigated turf grass and to introduce trees and shrubs as required to articulate the formal building entry configuration.*

2. *Discontinue the irrigation of selected turf grass areas in the vicinity of the new barracks. Retain these tracts as non-irrigated bermuda grass areas. (Selected area shall be areas not used for physical training, athletics, or active recreation.)*

3. *Complete and maintain the irrigated turf grass fields associated with the new outdoor recreation center and Chaffee Field. Irrigation systems are to utilize reclaimed water.*

4. *Install additional tree plantings for visual enhancement in areas such as the open pie-shaped field at the intersection of Cushing and Arizona streets and the large expanses of aggregate surfacing near the Intelligence Center.*

5. *Use "walk-on" aggregate surfacing such as decomposed granite in conjunction with new landscape developments adjacent to pedestrian entries and parking lots.*

6. *Maintain or restore non-irrigated grass ground cover in perimeter locations and other areas not subject to pedestrian traffic. Non-irrigated grass ground cover shall utilize native grasses whenever possible but non-irrigated bermuda grass may be retained where it is currently established.*

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Proposed Irrigation Systems:

The following prescriptions are provided for the irrigation systems within the Mission Zone.

1. *Extend the reclaimed water distribution system to all locations within the Mission Zone where there are large irrigated turf grass fields.*

2. *Continue the irrigation of the outdoor recreation complex and Chaffee Field with reclaimed water.*

3. *Connect the irrigation system controllers for all large irrigated turf grass fields within the Mission Zone to the overall fort water management system.*

4. *Provide new reclaimed water, drip irrigation systems to all new tree plantings. Convert existing drip irrigation systems to reclaimed water wherever practical.*

5. *Where existing irrigation systems are utilizing potable water, control potable water use through administrative restrictions.*

6. *Rely solely on natural precipitation for the watering of native grass areas and non-irrigated bermuda grass areas.*

USF200003479

Background / Street Trees:	*Cupressus arizonica*	*Arizona Cypress*
	Fraxinus velutina 'Modesto'	*Velvet Ash*
	Pinus eldarica	*Afghan Pine*
	Pinus halepensis	*Aleppo Pine*
	Pistacia atlantica	*Mt. Atlas Pistache*
	Prosopis alba	*Argentine Mesquite*
	Prosopis chilensis	*Chilean Mesquite*
	Prosopis velutina	*Velvet Mesquite*
	Quercus ilex	*Holly Oak*
	Quercus suber	*Cork Oak*
Accent Trees:	*Acacia constricta*	*Whitethorn Acacia*
	Arbutus unedo	*Strawberry Tree*
	Cercis occidentalis	*Western Redbud*
	Pyrus kawakamii	*Evergreen Pear*
Shrubs and Accent Plants:	*Agave species*	*Agave*
	Caesalpinia gillesii	*Yellow-Bird-of-Paradise*
	Calliandra eriophylla	*Fairy Duster*
	Cotoneaster glaucophyllus	*Bright-bead Cotoneaster*
	Cotoneaster lacteus	*Red Clusterberry*
	Dasylirion wheeleri	*Desert Spoon*
	Hesperaloe parviflora	*Red Yucca*
	Heteromeles arbutifolia	*Toyon*
	Juniperus species	*Juniper*
	Larrea tridentata	*Creosote Bush*
	Mahonia aquifolium	*Oregon Grape*
	Pennisetum sectaceum 'Cupreum'	*Fountain Grass*
	Pyracantha species	*Firethorn*
	Raphiolepis species	*Indian Hawthorn*
	Rhus ovata	*Sugar Bush*
	Rosmarinus officinalis	*Rosemary*
	Sophora arizonica	*Arizona Mescal Bean*
	Sophora secundiflora	*Mescal Bean*
	Salvia greggii	*Red Sage*
	Xylosma congestum	*Xylosma*
	Yucca species	*Yucca*

USF200003480

Ground Covers:	*Cynodon dactylon*	*Bermuda Grass*
	Juniperus species	*Juniper*
	Mahonia nevinii	*Nevin Mahonia*
	Rosmarinus officinalis	*Rosemary*
Vines:	*Gelsemium sempervirens*	*Carolina Jessamine*
	Macfadyena unguis-cati	*Cat's-claw Vine*
Hydroseed:	*Native Grassland Mix*	

USF200003481

9.0 Community Parks and Open Space Zone - Introduction

Overview of Existing Conditions:

Included within this 672 acre zone are: the Golf Course, the Youth Center, Foster Field, Youth Baseball and Little League Fields, the Reservoir Hill Overlook, and the Huachuca Creek Natural Area. These park and open space areas serve the entire fort community.

(Note: Additional parks occur within the Housing Zone and are addressed in Section 6 of this document. Additional athletic fields and physical training facilities occur within the Mission Zone and are addressed in Section 8 of this document.)

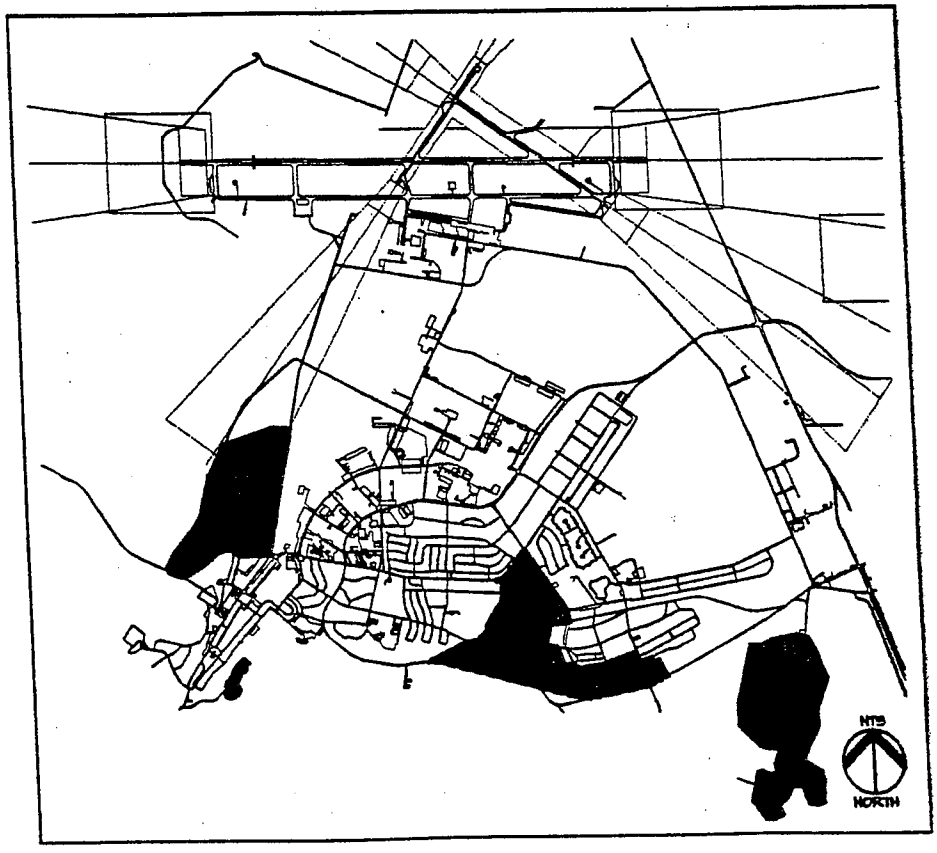
Proposed New Development, Demolition, and Relocations:

The existing fort golf course is scheduled to be reconstructed to add additional holes and to reduce the amount of turf associated with the existing holes. When completed there will be no net increase in the acreage of turf grass.

An expanded RV park is proposed for the Huachuca Creek area. To the greatest extent possible, the existing native vegetation will be retained around this expanded facility.

The existing ballfields and Youth Center will remain with no significant expansions or modifications proposed.

Location Map:



USF200003482

WATER RESOURCE / REUSE STUDY, FORT HUACHUCA

FIGURE 8-A
MISSION ZONE
SITE PLAN

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USF200003483

9.1 Community Parks and Open Space Zone Landscape / Irrigation Objectives and Policies

Objectives:

The principal objectives of the landscape and irrigation improvements within the Community Parks and Open Space Zone are:

1. *To provide safe and usable field areas and other facilities for community recreation, athletic, and fitness programs.*
2. *To provide comfortable outdoor areas to be used by fort personnel and their dependents for passive recreation.*
3. *To provide accessible natural areas for the use and enjoyment of fort personnel and their dependents.*
4. *To maximize the efficiency of the irrigation systems used to apply water to large turf recreation fields.*

Policies:

To accomplish the objectives noted above, the following policies shall apply to all landscape and irrigation developments within the Community Parks and Open Space Zone:

1. *Reclaimed water shall be used for the irrigation of the golf course and for the irrigation of all turf grass ball fields and recreation areas.*
2. *Reclaimed water shall be used for the irrigation of other landscape plantings (trees, shrubs, etc.) that are part of developed recreational sites.*
3. *Within developed recreational sites, perimeter areas and other areas not utilized for recreational activities shall not be irrigated and, where feasible, restored to a native plant community.*
4. *Existing native vegetation shall be retained in all natural areas with irrigation in these locations limited to temporary systems as may be required for the revegetation of previously disturbed areas.*
5. *All new plantings within the Community Parks and Open Space Zone shall utilize only those plants listed on the Approved Plant List for this zone.*

USF200003484

Proposed Landscape Treatments:

The following prescriptions are provided for the landscape improvements included within the Community Parks and Open Space Zone.

1. *Reconstruct the Golf Course to add additional holes and to reduce the existing turf area so that there is no net increase in the acreage of turf.*

2. *Maintain and improve the existing turf grass ball fields and turf grass play areas.*

3. *Eliminate irrigated turf grass from unused perimeter areas within parks and recreation sites and, where feasible, restore these areas to a native plant community.*

4. *Maintain and supplement existing tree plantings within and adjacent to playgrounds and spectator areas associated with community parks.*

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Proposed Irrigation Systems:

The following prescriptions are provided for the irrigation systems and related improvements within the Community Parks and Open Space Zone.

1. *Install a new water efficient irrigation system for the reconstructed and expanded golf course.*
2. *Continue to use reclaimed water for golf course irrigation.*
3. *Extend the reclaimed water distribution system to all existing turf grass ballfields and play areas.*
4. *Upgrade or install new water efficient spray irrigation systems at all existing turf grass ball fields and play areas.*
5. *Connect the irrigation controllers for the golf course and for each of the turf grass ball fields / play areas to the overall fort irrigation water management system.*
6. *Install temporary (reclaimed water) drip irrigation systems to recreation area tree plantings as required for plant establishment.*
7. *Rely solely on natural precipitation for the watering of native grass or non-irrigated bermuda grass ground cover.*

USF200003486

9.4 Community Parks and Open Space Zone - Plant List

Background / Street Trees:	*Acacia smallii*	*Southwestern Sweet Acacia*
	Cedrus deodora	*Deodar Cedar*
	Chilopsis linearis	*Desert Willow*
	Cupressus arizonica	*Arizona Cypress*
	Fraxinus velutina 'Modesto'	*Modesto Ash*
	Juglans major	*Arizona Walnut*
	Pinus edulis	*Pinon Pine*
	Pinus eldarica	*Afghan Pine*
	Pinus halepensis	*Aleppo Pine*
	Pistacia atlantica	*Mt. Atlas Pistache*
	Pistacia chinensis	*Chinese Pistache*
	Platanus acerifolia 'Bloodgood'	*London Plane Tree*
	Platanus wrightii	*Arizona Sycamore*
	Prosopis alba	*Argentine Mesquite*
	Prosopis chilensis	*Chilean Mesquite*
	Prosopis velutina	*Velvet Mesquite*
	Quercus emoryi	*Emory Oak*
	Quercus ilex	*Holly Oak*
	Quercus suber	*Cork Oak*
	Quercus virginiana 'Heritage'	*Heritage Live Oak*
Accent Trees:	*Acacia constricta*	*Whitethorn Acacia*
	Arbutus unedo	*Strawberry Tree*
	Cercis canadensis	*Eastern Redbud*
Shrubs and Accent Plants:	*Caesalpinia gilliessi*	*Yellow Bird-of-Paradise*
	Calliandra eriophylla	*Fairy Duster*
	Cotoneaster glaucophyllus	*Bright-bead Cotoneaster*
	Cotoneaster lacteus	*Red Clusterberry*
	Hesperaloe parviflora	*Hesperaloe*
	Heteromeles arbutifolia	*Toyon*
	Juniperus species	*Juniper*
	Mahonia aquifolium	*Oregon Grape*
	Pennisetum sectaceum 'Cupreum'	*Fountain Grass*
	Photinia fraseri	*Fraser's Photinia*
	Raphiolepis species	*Indian Hawthorn*
	Rhus ovata	*Sugar Bush*
	Rosmarinus officinalis	*Rosemary*
	Sophora arizonica	*Arizona Mescal Bean*
	Sophora secundiflora	*Mescal Bean*
	Xylosma congestum	*Xylosma*
	Yucca species	*Yucca*

USF200003487

9.4 Community Parks and Open Space Zone - Plant List (Continued)

Ground Covers:	*Cynodon dactylon*	*Bermuda Grass*
	Juniperus species	*Juniper*
	Mahonia nevinii	*Nevin Mahonia*
	Rosmarinus officinalis	*Rosemary*
	Trachelospermum jasminiodes	*Star Jasmine*
Hydroseed:	*Native Grassland Mix*	

USF200003488

10.0 Irrigation Water Use - Summary

Introduction:

Provided below is a summary of estimated annual irrigation water use after implementation of the recommendations included in previous sections of this Master Plan document. Separate worksheets outlining reclaimed and potable water use in each Landscape Zone are provided on the following pages.

Landscape Zone	Estimated Annual Irrigation Water Use
Reclaimed Water	
Historic Zone	20.66 M.G.
Vehicular Circulation Zone	9.58 M.G.
Community Zone	4.89 M.G.
School Zone	10.85 M.G.
Housing Zone	71.33 M.G.
Industrial Zone	0.00 M.G.
Mission Zone	19.37 M.G.
Community Parks and Open Space Zone	132.68 M.G.
Total - Reclaimed Water	**269.36 M.G.**
Potable Water	
Historic Zone	3.13 M.G.
Vehicular Circulation Zone	0.00 M.G.
Community Zone	0.65 M.G.
School Zone	0.00 M.G.
Housing Zone	40.00 M.G.
Industrial Zone	0.00 M.G.
Mission Zone	0.00 M.G.
Open Space Zone	0.00 M.G.
Total - Potable Water	**43.78 M.G.**

When the recommendations of the Master Plan have been fully implemented, the total fort irrigation water demand will be approximately 313.14 M.G. per year. About eighty-six percent (86%) of this demand will be met with reclaimed water.

USF200003489

Application Rate for Turf Grass Areas:

The amount of water to be applied to turf grass areas annually is based on consumptive water use data included in the "Application for Reclaimed Water Reuse Permit" prepared by GLHN Architects and Engineers for the U.S. Army Corps of Engineers (1992). Based on this document, the optimum rate of water application for turf grass is 49.72" per year. This rate is in addition to natural precipitation.

While 49.72" per year is the "optimum" rate for turf grass, it will not be necessary for the adequate maintenance of turf grass under average use conditions. Where less than the optimum rate will suffice a lower rate of 36" per year can be utilized. These rates should be considered as the maximum amounts of supplemental irrigation water to be applied . Actual applications may be less, particularly during wet years when natural precipitation will provide a greater portion of the turf grass plant water demand. The proposed water management system (See Section 10.3) will ensure that over-irrigation does not occur during wetter periods. Additionally, administrative restrictions can be implemented, if needed, to reduce the application rate.

The 36" annual application rate (or 3 acre-feet / acre / year) was established to be consistent with the overall goal of water conservation. It is significantly less than the 49.72" optimum application rate presented in the "Application for Reclaimed Water Reuse Permit" document prepared by GLHN Architects and Engineers for approval by the Arizona Department of Environmental Quality. In this application, empirical data is presented that indicates that bermuda turf grass can effectively utilize supplemental irrigation water at a rate of 49.72" per year. The 49.72" / year rate is also consistent with the current Arizona Department of Water Resources (ADWR) regulations for golf courses which allow for an irrigation rate of 48" per year. Appropriate rate selection will be based on the desired target level of turf growth for different functions and uses.

Also considered in the selection of the 36" per year application rate was the drought tolerance of the turf grass species utilized at the fort. Bermuda grass (Cynodon dactylon) and its many hybrid varieties are extremely drought tolerant and persistent. If necessary, the supplemental irrigation of this species can be suspended for extended periods of time. During these periods the aesthetic quality of the turf and its ability to function as a safe and resilient play surface will be diminished. The turf grass will, however, remain viable and will recover when a normal irrigation regime is reestablished.

USF200003490

Application Rate for Areas with Tree Plantings:

Estimated water use for drip irrigated tree plantings is based on an average planting density of 20 trees per acre and an application rate of 3,260 gallons per tree per year. On a per acre basis this application rate is equal to 0.20 acre feet per acre per year.

Assuming an average tree will have a 20 ft. diameter canopy at maturity, the 3,260 gallons per tree per year corresponds to an application rate of approximately 16.5 inches of supplemental irrigation per year within the area covered by the tree canopy.

It is acknowledged that there are several variables such as; the use of shrubs in addition to trees, plant density, and the drought tolerance of the plant species installed, that will impact actual irrigation water use in a given location. The 0.20 acre feet per acre per year figure is intended to be an average that reflects fort-wide irrigation water use in drip irrigated, non-turf areas.

Estimated Turf Grass Area in Redeveloped Housing Areas:

With the planned replacement / redevelopment of the fort's family housing subdivisions, it was necessary to estimate the area of irrigated turf grass that will be provided per dwelling unit. The area of irrigated turf grass allowed or budgeted was 1,000 square feet per dwelling unit. This allowance is in addition to the turf grass present in the existing and planned neighborhood parks located with within the family housing subdivisions.

The allowance of 1,000 square feet of irrigated turf per dwelling unit does not suggest that each unit will receive this amount of turf adjacent to the residential structure. Rather, it is proposed that the turf allocations be combined to create larger, usable common turf areas located within clusters of residential units. (See Section 6 - Housing Zone.) The use of reclaimed water for the irrigation of patio areas at of each of the proposed 2000 family housing units at the fort would result in a requirement for 2000 small irrigation (sub)systems. It would also require maintenance personnel to enter the yards or patios of individual dwelling units to service and repair these systems. The conditions that would be created by this approach were determined to be unacceptable. Consequently, reclaimed water will not be delivered to individual family housing units at the fort.

To simplify the irrigation system(s) within the Housing Zone the patio area associated with individual dwelling units in each new subdivision will be irrigated with potable water. The potable water will be applied to the landscape plantings using a manual irrigation system operated by the unit occupant. While this approach significantly reduces the complexity and maintenance requirements of the irrigation system

USF200003491

WATER RESOURCE / REUSE STUDY, FORT HUACHUCA

FIGURE 9-A
COMMUNITY PARKS AND OPEN SPACE ZONE
SITE PLAN

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Estimated Turf Grass Area in Redeveloped Housing Areas:

within the Housing Zone, it also makes control of irrigation water use much more difficult.

For purposes of this report, it is estimated that potable water use for the irrigation of patios and similar areas associated with individual family housing units will be approximately 20,000 gallons per unit per year. This volume corresponds to approximately 55 gallons per dwelling unit per day. This estimate of potable water use in the family housing areas may be high. Administrative controls are recommended and may be sufficient to substantially reduce this estimated amount. For purposes of this document, the estimated 20,000 gallons per unit per year was not reduced due the fact that it will be difficult to monitor and control water use at each of the 2,000 family housing units at the fort.

USF200003493

Historic Zone:

RECLAIMED WATER	SPRAY IRRIGATED TURF GRASS ANNUAL APPLICATION RATE: 36.00 IN/YR		
FACILITY / AREA	AREA (AC)	AC FT / YR	MG / YR
BROWN FIELD	11.0	33.00	10.75
BASEBALL FIELD	1.5	4.50	1.47
HENRY CIRCLE	2.1	6.30	2.05
FRONT YARDS - HENRY CIRCLE & GRIERSON AVE.	6.4	19.20	6.26
SPRAY SUBTOTAL		63.00	20.53
	DRIP IRRIGATED LANDSCAPE ANNUAL APPLICATION RATE: 2.40 IN/YR		
AUGUR / CHRISTY	2.0	0.40	0.13
		0.00	0.00
		0.00	0.00
		0.00	0.00
DRIP SUBTOTAL		0.40	0.13
RECLAIMED WATER TOTAL		63.40	20.66

POTABLE WATER	SPRAY IRRIGATED TURF GRASS ANNUAL APPLICATION RATE: 12.00 IN/YR		
FACILITY / AREA	AREA (AC)	AC FT / YR	MG / YR
POST CEMETERY	9.6	9.60	3.13
		0.00	0.00
		0.00	0.00
		0.00	0.00
SPRAY SUBTOTAL		9.60	3.13
	DRIP IRRIGATED LANDSCAPE ANNUAL APPLICATION RATE: 2.40 IN/YR		
		0.00	0.00
		0.00	0.00
		0.00	0.00
		0.00	0.00
DRIP SUBTOTAL		0.00	0.00
POTABLE WATER TOTAL		9.60	3.13

USF200003494

Vehicular Circulation Zone:

RECLAIMED WATER	SPRAY IRRIGATED TURF GRASS ANNUAL APPLICATION RATE: 36.00 IN/YR		
FACILITY / AREA	AREA (AC)	AC FT / YR	MG / YR
		0.00	0.00
		0.00	0.00
		0.00	0.00
		0.00	0.00
SPRAY SUBTOTAL		**0.00**	**0.00**
	DRIP IRRIGATED LANDSCAPE ANNUAL APPLICATION RATE: 2.40 IN/YR		
EAST / MAIN GATES	2.0	0.40	0.13
BOULEVARD	86.0	17.20	5.60
PRIMARY STREETS	50.0	10.00	3.26
INTERSECTIONS	9.0	1.80	0.59
DRIP SUBTOTAL		**29.40**	**9.58**
RECLAIMED WATER TOTAL		**29.40**	**9.58**

POTABLE WATER	SPRAY IRRIGATED TURF GRASS ANNUAL APPLICATION RATE: N/A		
FACILITY / AREA	AREA (AC)	AC FT / YR	MG / YR
		0.00	0.00
		0.00	0.00
		0.00	0.00
		0.00	0.00
SPRAY SUBTOTAL		**0.00**	**0.00**
	DRIP IRRIGATED LANDSCAPE ANNUAL APPLICATION RATE: 2.40 IN/YR		
		0.00	0.00
		0.00	0.00
		0.00	0.00
		0.00	0.00
DRIP SUBTOTAL		**0.00**	**0.00**
POTABLE WATER TOTAL		**0.00**	**0.00**

USF200003495

Community Zone:

RECLAIMED WATER	SPRAY IRRIGATED TURF GRASS ANNUAL APPLICATION RATE: 36.00 IN/YR		
FACILITY / AREA	AREA (AC)	AC FT / YR	MG / YR
TRAINING FIELD (BUJALSKI)	2.6	7.80	2.54
		0.00	0.00
		0.00	0.00
		0.00	0.00
SPRAY SUBTOTAL		7.80	2.54
	DRIP IRRIGATED LANDSCAPE ANNUAL APPLICATION RATE: 2.40 IN/YR		
DOWNTOWN	30.0	6.00	1.96
HOSPITAL / MEDICAL	4.0	0.80	0.26
NCO	2.0	0.40	0.13
		0.00	0.00
DRIP SUBTOTAL		7.20	2.35
RECLAIMED WATER TOTAL		15.00	4.89

POTABLE WATER	SPRAY IRRIGATED TURF GRASS ANNUAL APPLICATION RATE: N/A		
FACILITY / AREA	AREA (AC)	AC FT / YR	MG / YR
		0.00	0.00
		0.00	0.00
		0.00	0.00
		0.00	0.00
SPRAY SUBTOTAL		0.00	0.00
	DRIP IRRIGATED LANDSCAPE ANNUAL APPLICATION RATE: 2.40 IN/YR		
TOWN SQUARE AREA AND MISC.	10.0	2.00	0.65
		0.00	0.00
		0.00	0.00
		0.00	0.00
DRIP SUBTOTAL		2.00	0.65
POTABLE WATER TOTAL		2.00	0.65

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Schools Zone:

RECLAIMED WATER	SPRAY IRRIGATED TURF GRASS ANNUAL APPLICATION RATE: 36.00 IN/YR		
FACILITY / AREA	AREA (AC)	AC FT / YR	MG / YR
GENERAL MYER	3.5	10.50	3.42
COLONEL JOHNSTON	3.5	10.50	3.42
COLONEL SMITH	3.5	10.50	3.42
		0.00	0.00
SPRAY SUBTOTAL		31.50	10.26
	DRIP IRRIGATED LANDSCAPE ANNUAL APPLICATION RATE: 2.40 IN/YR		
GENERAL MYER	3.0	0.60	0.20
COLONEL JOHNSTON	3.0	0.60	0.20
COLONEL SMITH	3.0	0.60	0.20
		0.00	0.00
DRIP SUBTOTAL		1.80	0.60
RECLAIMED WATER TOTAL		33.30	10.86

POTABLE WATER	SPRAY IRRIGATED TURF GRASS ANNUAL APPLICATION RATE: N/A		
FACILITY / AREA	AREA (AC)	AC FT / YR	MG / YR
		0.00	0.00
		0.00	0.00
		0.00	0.00
		0.00	0.00
SPRAY SUBTOTAL		0.00	0.00
	DRIP IRRIGATED LANDSCAPE ANNUAL APPLICATION RATE: 2.40 IN/YR		
		0.00	0.00
		0.00	0.00
		0.00	0.00
		0.00	0.00
DRIP SUBTOTAL		0.00	0.00
POTABLE WATER TOTAL		0.00	0.00

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Housing Zone:

RECLAIMED WATER	SPRAY IRRIGATED TURF GRASS ANNUAL APPLICATION RATE: 36.00 IN/YR		
FACILITY / AREA	AREA (AC)	AC FT / YR	MG / YR
NEIGHBORHOOD PARKS	13.3	39.90	13.00
COMMON AREAS	46.0	138.00	44.96
BEQ	6.3	18.90	6.16
BOQ	0.7	2.10	0.68
SPRAY SUBTOTAL		**198.90**	**64.80**
	DRIP IRRIGATED LANDSCAPE ANNUAL APPLICATION RATE: 2.40 IN/YR		
STREETSCAPE	100.0	20.00	6.52
		0.00	0.00
		0.00	0.00
		0.00	0.00
DRIP SUBTOTAL		**20.00**	**6.52**
RECLAIMED WATER TOTAL		**218.90**	**71.32**

POTABLE WATER	SPRAY IRRIGATED TURF GRASS ANNUAL APPLICATION RATE: N/A		
FACILITY / AREA	AREA (AC)	AC FT / YR	MG / YR
		0.00	0.00
		0.00	0.00
		0.00	0.00
		0.00	0.00
SPRAY SUBTOTAL		**0.00**	**0.00**
	DRIP (BUBBLER) IRRIGATED LANDSCAPE		
HOUSING UNITS (2000) @ 20,000 GAL. / UNIT / YEAR	N/A	N/A	40.00
		0.00	0.00
		0.00	0.00
		0.00	0.00
DRIP SUBTOTAL		**0.00**	**40.00**
POTABLE WATER TOTAL		**0.00**	**40.00**

USF200003498

Industrial Zone:

RECLAIMED WATER	SPRAY IRRIGATED TURF GRASS ANNUAL APPLICATION RATE: 36.00 IN/YR		
FACILITY / AREA	AREA (AC)	AC FT / YR	MG / YR
		0.00	0.00
		0.00	0.00
		0.00	0.00
		0.00	0.00
SPRAY SUBTOTAL		0.00	0.00
	DRIP IRRIGATED LANDSCAPE ANNUAL APPLICATION RATE: 2.40 IN/YR		
		0.00	0.00
		0.00	0.00
		0.00	0.00
		0.00	0.00
DRIP SUBTOTAL		0.00	0.00
RECLAIMED WATER TOTAL		0.00	0.00

POTABLE WATER	SPRAY IRRIGATED TURF GRASS ANNUAL APPLICATION RATE: N/A		
FACILITY / AREA	AREA (AC)	AC FT / YR	MG / YR
		0.00	0.00
		0.00	0.00
		0.00	0.00
		0.00	0.00
SPRAY SUBTOTAL		0.00	0.00
	DRIP IRRIGATED LANDSCAPE ANNUAL APPLICATION RATE: 2.40 IN/YR		
		0.00	0.00
		0.00	0.00
		0.00	0.00
		0.00	0.00
DRIP SUBTOTAL		0.00	0.00
POTABLE WATER TOTAL		0.00	0.00

USF200003499

Mission Zone:

RECLAIMED WATER	SPRAY IRRIGATED TURF GRASS ANNUAL APPLICATION RATE: 36.00 IN/YR		
FACILITY / AREA	AREA (AC)	AC FT / YR	MG / YR
CHAFFEE PARADE FIELD	10.0	30.00	9.77
OUTDOOR REC. CENTER	8.9	26.70	8.70
		0.00	0.00
		0.00	0.00
SPRAY SUBTOTAL		56.70	18.47
	DRIP IRRIGATED LANDSCAPE ANNUAL APPLICATION RATE: 2.40 IN/YR		
GREELY HALL	2.2	0.44	0.14
TREES FOR UPGRADE	7.5	1.50	0.49
ENLISTED BARRACKS	4.0	0.80	0.26
		0.00	0.00
DRIP SUBTOTAL		2.74	0.89
RECLAIMED WATER TOTAL		59.44	19.36

POTABLE WATER	SPRAY IRRIGATED TURF GRASS ANNUAL APPLICATION RATE: N/A		
FACILITY / AREA	AREA (AC)	AC FT / YR	MG / YR
		0.00	0.00
		0.00	0.00
		0.00	0.00
		0.00	0.00
SPRAY SUBTOTAL		0.00	0.00
	DRIP IRRIGATED LANDSCAPE ANNUAL APPLICATION RATE: 2.40 IN/YR		
		0.00	0.00
		0.00	0.00
		0.00	0.00
		0.00	0.00
DRIP SUBTOTAL		0.00	0.00
POTABLE WATER TOTAL		0.00	0.00

USF200003500

Community Parks & Open Space Zone:

RECLAIMED WATER	SPRAY IRRIGATED TURF GRASS ANNUAL APPLICATION RATE: 36.00 IN/YR		
FACILITY / AREA	AREA (AC)	AC FT / YR	MG / YR
GOLF COURSE	88.5	366.69	119.48
FOSTER FIELD	3.5	10.50	3.42
YOUTH CENTER / BASEBALL	4.0	12.00	3.91
SMILEY / OTHER FIELDS	6.0	18.00	5.86
SPRAY SUBTOTAL		**407.19**	**132.67**
	DRIP IRRIGATED LANDSCAPE ANNUAL APPLICATION RATE: 2.40 IN/YR		
		0.00	0.00
		0.00	0.00
		0.00	0.00
		0.00	0.00
DRIP SUBTOTAL		**0.00**	**0.00**
RECLAIMED WATER TOTAL		**407.19**	**132.67**

POTABLE WATER	SPRAY IRRIGATED TURF GRASS ANNUAL APPLICATION RATE: N/A		
FACILITY / AREA	AREA (AC)	AC FT / YR	MG / YR
		0.00	0.00
		0.00	0.00
		0.00	0.00
		0.00	0.00
SPRAY SUBTOTAL		**0.00**	**0.00**
	DRIP IRRIGATED LANDSCAPE ANNUAL APPLICATION RATE: 2.40 IN/YR		
		0.00	0.00
		0.00	0.00
		0.00	0.00
		0.00	0.00
DRIP SUBTOTAL		**0.00**	**0.00**
POTABLE WATER TOTAL		**0.00**	**0.00**

USF200003501

10.3 Irrigation Water Management System

Introduction:

It is anticipated that over 80 percent of the irrigation water used at the fort will be applied to large turf grass fields. Precise control of the application of water to these large turf areas is essential. Minor over-applications of water, magnified by the extent of the turf grass areas on the fort, will have a significant impact on the total amount of water consumed.

To address this potential problem, it is recommended that an overall water management system be installed at the fort. Key elements of this system include:

- *A PC based computer control center with modem.*
- *Field interface units with modems and satellite controllers located at each large turf grass area.*
- *Non-dedicated telephone line connections between central computer and field interface units.*
- *A small weather station that can provide precipitation and related weather data to the central computer.*

These system components are available as integrated packages from several different manufacturers. Systems of this type have been in use for many years at a variety of large scale installations such as university campuses and municipal park systems.

System Capabilities:

The capabilities of the overall irrigation water management system installed at the base should include:

- *Ability to program / reprogram any and all field (satellite) controllers from the central computer.*
- *Ability to monitor and receive reports regarding field system operation at the central computer.*
- *Ability to override, from the central computer, programmed irrigation cycles to allow for special events such as parades during time periods when the field irrigation system would normally be operating.*
- *Ability to automatically adjust system run-time based on the season or current weather (temperature, cloud cover,etc.) conditions.*
- *Ability to automatically shut down the irrigation system from the central computer during rainy weather.*
- *Ability to detect system leaks with automatic shut-down of the field system from the central computer.*

USF200003502

Proposed Scope of Irrigation Water Management System:

Although it would be possible to control all of the irrigation zones / systems on the fort with the central irrigation water management system described above, it is recommended that only large turf areas be controlled in this manner. Drip irrigation systems should be controlled by stand-alone field units. This approach will significantly reduce the scope and complexity of the proposed water management system.

The amount of irrigation water used by drip irrigation systems, as a percentage of overall fort demand, will be quite low. The water savings that can be achieved by connecting the drip systems to the overall fort water management system will be small relative to the water saving that can be achieved by controlling the turf systems / zones in this manner.

System Advantages:

The principal advantage of the water management system described above is a reduction in water use. The precise control of system run times and the ability to automatically adjust system operation in response to weather conditions can result in a significant reduction in water use.

An additional advantage of the recommended water management system is a reduction in operational labor costs. One individual can very quickly reprogram all of the satellite controllers in the system from the central computer. It is also possible to receive at the central computer reports of malfunctioning field equipment even when the field equipment in question is operated at night when direct observation of the malfunction is unlikely. Maintenance personnel can be dispatched at the start of the next regular shift to correct the noted problem.

A third advantage of the water management system is optimization of the mainline network. The water management software utilized in conjunction with the hardware described above can facilitate the development of irrigation programs and schedules that maintain nearly uniform system flow rates. This is in contrast to a manually programmed system that, with an installation of this size, generally results in wide variations in system flow rates. With a manually programmed system the distribution mainlines must be designed to accommodate the peak flows. Oversizing of the mainline network is often the result.

USF200003503

11.0 Outline Specifications for Irrigation Systems

Introduction:

These outline specifications are for use by the landscape architects and engineers who develop the plans and specifications for new irrigation systems to be installed at the fort. They are intended to establish minimum standards and set forth consistent design guidelines for all new projects. Site and project specific conditions may warrant more stringent specifications in some instances.

General Design Criteria and Requirements:

A. **Water Conservation:** *All new fort irrigation systems shall be designed with water conservation as a principal design criteria.*

B. **Compliance with Master Plan:** *All new irrigation systems designed for the fort shall comply with the policies and prescriptions for the subject zone in which the new facility is to be developed. (See Sections 2 through 9.)*

C. **Points of Connection to Reclaimed Water and Potable Water Mains:** *All proposed points of connection to reclaimed and potable water mains shall be as approved by appropriate fort personnel.*

D. **Information to be provided by the Fort:** *Fort personnel shall provide the designer with the static water pressure and maximum flow rates for each approved point of connection.*

E. **System Water Velocity and Pressure Differential:** *All irrigation systems shall be designed so that pipeline water velocities do not exceed 5 feet per second. Systems shall also be designed so that the pressure differential between any two points in a given zone does not exceed 20%.*

F. **Metering:** *All irrigation systems installed at the fort shall be metered to record water use.*

G. **Distribution Uniformity:** *All new turf zones shall be designed to have a Distribution Uniformity (DU) Coefficient of not less than 65%.*

H. **Irrigation Drawings:** *Irrigation system drawings shall be complete and shall show the configuration, approximate location, type, and size of all points of connection, cross connection control devices, piping, valves, controllers, and outlets. Installation details and technical specifications shall also be provided. General performance specifications requiring the construction contractor to design the irrigation system shall not be utilized.*

USF200003504

Part One: General Construction Requirements

A. **Compliance with Applicable Federal Regulations:** *The project specifications shall require that all irrigation installation work be implemented in a manner that complies with applicable federal regulations regarding materials, methods of work, and disposal of excess and waste materials.*

B. **Color Coding of Pipe and Equipment for Reclaimed Water:** *All components of new irrigation systems utilizing reclaimed water, including but not limited to pipe, spray heads, and quick coupling valves shall be color coded purple to indicate the use of reclaimed water.*

C. **Reclaimed Water Identification Signs:** *Turf grass fields and other landscaped areas irrigated with reclaimed water shall be identified with signs as may be required by the Reclaimed Water Reuse Permit issued by the Arizona Department of Environmental Quality.*

D. **As-Built Drawings:** *All irrigation project specifications shall require the maintenance of as-built drawings during construction and the submittal of a complete and accurate set of as-built record drawings at the end of the construction contract.*

Part Two: Materials and Equipment

A. **Water Management System Components:** *The components of the irrigation water management system installed at the fort shall fully comply with the minimum system requirements identified in Section 10.3 of this Master Plan document. All components shall be fully compatible with other system components.*

B. **Backflow Preventers:** *Shall be of the reduced pressure backflow preventer type and shall comply with AWWA and other applicable specifications and standards.*

C. **Field Controllers:** *Shall be of the solid state electronic type, fully compatible with the water management system and the associated field interface units.*

D. **Remote Control Valves:** *Shall be of the 24 VAC solenoid type constructed of brass, bronze, or heavy duty reinforced plastic with non-corrosive internal parts. Remote control valves shall have a rated operating pressure of not less than 200 psi.*

USF200003505

Part Two: Materials and Equipment (Continued):

E. **Control Wire for Remote Control Valves:** *Shall be UL listed, Type UF, with solid copper conductor and shall be suitable for direct burial. Wire shall be #14 gauge minimum or as required for length of control wire runs.*

F. **Gate Valves:** *Shall be constructed of brass, bronze, or cast iron and shall have a rated operating pressure of not less than 200 psi. Valves 2" and smaller shall have threaded ends. Valves larger than 2" shall have threaded or flanged ends.*

G. **Quick Coupling Valves:** *Shall be constructed of brass or bronze and shall be of the one-piece or two-piece design.*

H. **Pressure Regulating Valves:** *Pressure regulating valves shall be constructed of brass or bronze. Valve type, design, and inlet / outlet pressure ranges shall be as appropriate for the specific project.*

I. **Drip Zone Pressure Regulators:** *Shall be constructed of high strength, non-corrosive plastic and shall be of the pre-assembled type with pre-set outlet pressure.*

J. **Mainline Pipe and Fittings:** *Pipe shall be Schedule 40 PVC, color coded purple if connected to reclaimed water. Fittings for remote control valve assemblies shall be Schedule 80 PVC. Other mainline fittings shall be Schedule 40 PVC.*

K. **Lateral Line Pipe and Fittings:** *Pipe shall be Class 200 PVC for sizes 3/4" and larger and Class 315 for 1/2" size. Pipe shall be color coded purple if connected to reclaimed water. Fittings shall be Schedule 40 PVC.*

L. **Polyethylene Drip Tubing:** *Shall be .580" I.D. (minimum) tubing with a wall thickness of not less than 0.6".*

M. **Sprinkler Heads for Small Turf Areas:** *Shall be of the pop-up spray type with matched precipitation rate nozzles.*

N. **Sprinkler Heads for Large Turf Areas:** *Shall be of the pop-up gear driven type with replaceable nozzles. Nozzles shall be sized to provide for matched precipitation rates from all heads within a given zone.*

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Part Two: Materials and Equipment (Continued):

O. **Bubblers:** *Shall be of the pressure compensating, low-flow type.*

P. **Drip Emitters:** *Shall be of the permanently assembled, pressure compensating, self-flushing type. Emitters shall be of either the single or multiple outlet type.*

Q. **Emitter Distribution Tubing:** *Shall be constructed of flexible polyvinyl or polyethylene material and shall be fully compatible with the specified emitters.*

R. **Filters:** *Filters shall be of the in-line, screen type with removable filter screen. Screen shall be 200 mesh or as required for the specified emitters.*

S. **Mainline Marking Tape:** *Shall include metallic wires or foil encased in durable plastic material. The tape, when buried above the pipeline, shall enable location of the pipe using standard metal detection equipment. Tape color and marking shall be as appropriate for the pipeline being identified.*

Part Three: Execution of the Work

A. **Installation of Controllers and Water Management System Components:** *The installation of controllers, the installation of water management system components, and the routing of communication (telephone) cable and control wiring shall be as detailed and as approved by the Contracting Officer.*

B. **Backflow Preventers:** *Shall be installed at all irrigation system connections to potable water mains. Backflow preventers and above ground risers shall be insulated. Devices shall be tested by a certified tester prior to acceptance of the work.*

C. **Layout and Staking of System:** *The Contractor shall stake the layout of the system to be installed, and shall obtain the Contracting Officer's approval prior to the start of trenching work.*

D. **Trenching:** *The depth of trenching shall be sufficient to provide the following minimum cover on installed pipes and wires. Mainlines and Control Wires = 24", Lateral Lines = 12", Polyethylene Drip Tubing = 6".*

D. **Pipe and Fitting Installation:** *Solvent weld and gasketed joints shall be made in accordance with the pipe and fitting manufacturer's written instructions.*

USF200003507

Part Three: Execution of the Work (Continued):

E. **Polyethylene Tubing:** *Shall be installed as detailed on the project drawings. Length of tubing runs shall not exceed 150'.*

F. **Valves:** *Gate valves, remote control valves, quick-coupling valves, and pressure regulating valves shall be installed in access boxes as detailed on the project drawings.*

F. **Sprinkler Heads:** *Shall be installed on Schedule 80 PVC swing joints as detailed on the project drawings.*

G. **Bubblers:** *Shall be installed on Schedule 80 PVC risers as detailed on the project drawings.*

H. **Emitters:** *Emitters with threaded inlets shall be installed on PVC risers as detailed. Emitters with barbed inlets shall be installed on polyethylene tubing as detailed and in accordance with the emitter and tubing manufacturers' written instructions.*

I. **Emitter Distribution Tubing:** *Shall be installed as detailed. Length of distribution tubing shall not exceed five feet.*

J. **Filters:** *Shall be installed downstream of each drip zone remote control valve as detailed on the project drawings.*

K. **Marking Tape:** *Shall be installed above all mainlines as detailed on the project drawings.*

L. **Pressure Testing:** *Shall be performed on all mainlines at a pressure of not less than 100 psi for a period of 2 hours. Testing shall be performed with pipes center-loaded and joints exposed.*

M. **Operational Testing:** *Shall be performed prior to acceptance of the work and shall demonstrate that all system components are operating correctly and that all landscape plantings are receiving appropriate amounts of irrigation water.*

N. **Water Audit:** *The completed irrigation system shall be audited by the construction contractor to verify that the Distribution Uniformity (DU) Coefficient is equal to or greater than 65%.*

O. **System Guarantee:** *The contractor shall guarantee all materials and workmanship for a period of one year and shall repair or replace all defective installations, at no additional cost to the Owner, during the guarantee period.*

USF200003508

Introduction:

These outline specifications are intended for use by the landscape architects who will develop the plans and specifications for landscape improvements to be constructed at the fort. They are intended to establish minimum standards and to set forth consistent design guidelines for all new projects. Site and project specific conditions may warrant more stringent specifications in some instances.

General Design Criteria and Requirements:

A. **Compliance with Master Plan:** *All new landscape improvements designed for the fort shall comply with the policies and prescriptions for the subject zone in which the new facility is to be developed. (See Sections 2 through 9.)*

B. **Compliance with Installation Design Guidelines:** *All new landscape improvements designed for the fort shall comply with the recommendations of the Fort Huachuca Installation Design Guidelines.*

C. **Soil Testing:** *During the project design phase, the testing of on-site soils shall be performed to determine the soil's horticultural properties. The soil test results shall be utilized in the development of specifications for soil preparation and soil amendments.*

D. **Landscape Improvement Drawings:** *Landscape improvement plans shall be complete and shall show the location, size, species, and variety of all new plant materials to be installed. Existing plants to be retained on the project site shall also be identified. The extent and type of other landscape improvements, such as inorganic surfacing, shall be identified. Installation details and technical specifications shall also be provided.*

Part One: General Construction Requirements:

A. **Compliance with Applicable Federal Regulations:** *The project specifications shall require that all landscape work be implemented in a manner that complies with applicable federal regulations regarding materials, methods of work, and disposal of excess and waste materials.*

B. **Seasonal Limitations:** *Appropriate seasonal limitations for landscape planting work shall be included in project specifications.*

USF200003509

Part Two: Landscape Materials

A. **Plant Materials:** *Shall comply with the American Association of Nurserymen's "American Standard for Nursery Stock" or the Arizona Nursery Association "Grower's Committee Recommended Tree Specifications", whichever is the more stringent specification. All plants shall be normally developed specimens of their species and shall conform to grades of sound, first quality nursery stock. All plants shall be free of disease, insects, insect eggs and larvae, and animal damage.*

B. **Seed for Revegetation of Disturbed Areas:** *Shall be State certified seed of the latest season's crop and shall be delivered to the site in the original unopened containers bearing the supplier's guaranteed statement of analysis for; species composition, purity, germination, weed content, and inert material content. Seed mix(es) shall be as specified.*

C. **Mulch for Hydroseeding Slurry:** *Shall be virgin or recycled wood fiber.*

D. **Topsoil:** *Topsoil shall be native soil or imported material as determined by the testing of on-site soils. Topsoil shall have a pH of 6.5 to 8.0, total soluble salts of less than 1000 ppm in saturation extract, and a Plasticity Index (PI) between 5 and 20. Topsoil shall not contain caliche, cobbles, gravel, large roots, debris, or other extraneous matter which could be a hinderance to plant growth and/or planting operations.*

D. **Prepared Soil Backfill for Tree / Shrub Planting Pits and Turf Grass Areas:** *Shall consist of a mixture of topsoil, fertilizer, and other soil amendments. The type and amount of fertilizer and other soil amendments shall be as determined by the testing of the on-site soil.*

C. **Inorganic Surfacing Materials:** *Inorganic surfacing materials shall consist of decomposed granite, crushed aggregate, river rock, or other native stone material. Material and gradations shall be selected for its appropriateness for the intended use of the area. Materials such as river rock, which can be very difficult to walk on, should not be used in areas with significant amounts of pedestrian traffic.*

C. **Other Landscape Materials:** *Other landscape materials, including but not limited to: edgers, boulders, special pavements, tree staking materials, mulches, and horticultural chemicals shall be as detailed or specified.*

USF200003510

Part Three: Execution of the Work

A. ***Installation of Trees and Shrubs:*** *Shall be performed in a manner that prevents damage to the root system, trunk, limbs, or foliage of the plant.*

B. ***Soil Preparation in Turf Areas:*** *Shall consist of cultivation, raking, etc. as appropriate for the pre-construction site conditions. Where necessary for healthy turf establishment, imported soil shall be placed in areas to be planted with turf grass. Fertilizer and other soil amendments shall be incorporated into the top 4" to 6" of prepared native and/or imported soil. Specifications for the type and amount of soil amendments shall be as determined by soil testing.*

C. ***Installation of Turf Grass:*** *Shall be accomplished by sodding or sprigging as appropriate and as specified.*

D. ***Soil Preparation in Areas to be Hydroseeded with Native Plant Seed:*** *Shall consist of cultivation, raking, etc. as appropriate for the slopes and other pre-construction site conditions present.*

E. ***Hydroseeding with Native Plant Seed:*** *Shall be performed as required to provide uniform coverage of the specified seed mix, fertilizer, and mulch. Mulch shall be applied at a rate of 1,700 to 2,000 lbs per acre.*

F. ***Installation of Miscellaneous Landscape Items:*** *Shall be accomplished as detailed and specified on the project drawings.*

G. ***Initial Maintenance of Landscape Improvements:*** *Shall be the responsibility of the construction contractor during construction and for a period of 30 to 180 days (as specified) after acceptance of the work.*

H. ***Plant Guarantee:*** *The construction contractor shall guarantee all plant materials installed for a period of one year from the date of final acceptance. All plants that die or become diseased during the maintenance period, for reasons other than neglect or causes deliberate as determined by the Contracting Officer, shall be replaced by the Contractor at no additional cost.*

USF200003511

GLHN Architects and Engineers, September 1992. Application for Reclaimed Wastewater Reuse Permit. 59 pp.

TAMS Consultants Inc., March 1991, Revised April 1993. Fort Huachuca Installation Design Guide. 112 pp.

Zillgens, Hermann and Associates, Undated. Installation Master Plan, Fort Huachuca, Arizona (Summary Drawing)

Zillgens, Hermann and Associates, May 1989. Fort Huachuca Master Plan Basic Information Maps. (Various Drawings)

Zillgens, Hermann and Associates, October 1991. Fort Huachuca Master Plan - Future Development Plan (Various Drawings)

Zillgens, Hermann and Associates, June 1993, Fort Huachuca Aerial Photography Orthophoto Maps.

Appendix 1
Computer Run Print-outs

1

```
*****************************************************************************
*                                                                           *
*        ONE-DIMENSIONAL CONVECTIVE-DISPERSIVE EQUATION                     *
*                                                                           *
*        SEMI-INFINITE PROFILE                                              *
*        NO PRODUCTION AND DECAY                                            *
*        LINEAR ADSORPTION (R)                                              *
*        CONSTANT INITIAL CONCENTRATION (CI)                                *
*        INPUT CONCENTRATION = CO (T.LE.TO)                                 *
*                            =  0 (T.GT.TO)                                 *
*                                                                           *
*        FT HUACHUCA CONCEPTUAL RECHARGE BASINS - NITRATE CONC. RUN 1       *
*                                                                           *
*****************************************************************************
```

INPUT PARAMETERS
==========

V =	1.2600	D =	.1000
R =	1.5000	TO =	365.0000
CI =	.0000	CO =	22.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	.0000	.0000	.0000	.0000
25.0000	.0000	.0000	.0000	.0000
50.0000	.0000	.0000	.0000	.0000
75.0000	.0000	.0000	.0000	.0000
100.0000	.0000	.0000	.0000	.0000
125.0000	.0000	.0000	.0000	.0000
150.0000	.0000	.0000	.0000	.0000
175.0000	.0000	.0000	.0000	.0000
200.0000	.0000	.0000	.0000	.0000
225.0000	.0000	.0000	.0000	.0000
250.0000	.0000	.0000	.0000	.0000
275.0000	.0000	.0000	.0000	.0000
300.0000	.0000	.0000	.0000	.0000
325.0000	.0000	.0000	.0000	.0000
350.0000	.0000	.0000	.0000	.0000
375.0000	.0000	.0000	.0000	.0000
400.0000	.0000	.0000	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	5.0000	.0000	22.0000	22.0000
25.0000	5.0000	.2520	.0000	.0000
50.0000	5.0000	.1260	.0000	.0000
75.0000	5.0000	.0840	.0000	.0000
100.0000	5.0000	.0630	.0000	.0000
125.0000	5.0000	.0504	.0000	.0000
150.0000	5.0000	.0420	.0000	.0000
175.0000	5.0000	.0360	.0000	.0000
200.0000	5.0000	.0315	.0000	.0000
225.0000	5.0000	.0280	.0000	.0000

275.0000	5.0000	.0229	.0000	.0000
300.0000	5.0000	.0210	.0000	.0000
325.0000	5.0000	.0194	.0000	.0000
350.0000	5.0000	.0180	.0000	.0000
375.0000	5.0000	.0168	.0000	.0000
400.0000	5.0000	.0158	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	10.0000	.0000	22.0000	22.0000
25.0000	10.0000	.5040	.0000	.0000
50.0000	10.0000	.2520	.0000	.0000
75.0000	10.0000	.1680	.0000	.0000
100.0000	10.0000	.1260	.0000	.0000
125.0000	10.0000	.1008	.0000	.0000
150.0000	10.0000	.0840	.0000	.0000
175.0000	10.0000	.0720	.0000	.0000
200.0000	10.0000	.0630	.0000	.0000
225.0000	10.0000	.0560	.0000	.0000
250.0000	10.0000	.0504	.0000	.0000
275.0000	10.0000	.0458	.0000	.0000
300.0000	10.0000	.0420	.0000	.0000
325.0000	10.0000	.0388	.0000	.0000
350.0000	10.0000	.0360	.0000	.0000
375.0000	10.0000	.0336	.0000	.0000
400.0000	10.0000	.0315	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	15.0000	.0000	22.0000	22.0000
25.0000	15.0000	.7560	.0000	.0000
50.0000	15.0000	.3780	.0000	.0000
75.0000	15.0000	.2520	.0000	.0000
100.0000	15.0000	.1890	.0000	.0000
125.0000	15.0000	.1512	.0000	.0000
150.0000	15.0000	.1260	.0000	.0000
175.0000	15.0000	.1080	.0000	.0000
200.0000	15.0000	.0945	.0000	.0000
225.0000	15.0000	.0840	.0000	.0000
250.0000	15.0000	.0756	.0000	.0000
275.0000	15.0000	.0687	.0000	.0000
300.0000	15.0000	.0630	.0000	.0000
325.0000	15.0000	.0582	.0000	.0000
350.0000	15.0000	.0540	.0000	.0000
375.0000	15.0000	.0504	.0000	.0000
400.0000	15.0000	.0473	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	20.0000	.0000	22.0000	22.0000
25.0000	20.0000	1.0080	.0000	.0000
50.0000	20.0000	.5040	.0000	.0000
75.0000	20.0000	.3360	.0000	.0000
100.0000	20.0000	.2520	.0000	.0000

125.0000	20.0000	.2016	.0000	.0000
150.0000	20.0000	.1680	.0000	.0000
175.0000	20.0000	.1440	.0000	.0000
200.0000	20.0000	.1260	.0000	.0000
225.0000	20.0000	.1120	.0000	.0000
250.0000	20.0000	.1008	.0000	.0000
275.0000	20.0000	.0916	.0000	.0000
300.0000	20.0000	.0840	.0000	.0000
325.0000	20.0000	.0775	.0000	.0000
350.0000	20.0000	.0720	.0000	.0000
375.0000	20.0000	.0672	.0000	.0000
400.0000	20.0000	.0630	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	25.0000	.0000	22.0000	22.0000
25.0000	25.0000	1.2600	.3446	.3102
50.0000	25.0000	.6300	.0000	.0000
75.0000	25.0000	.4200	.0000	.0000
100.0000	25.0000	.3150	.0000	.0000
125.0000	25.0000	.2520	.0000	.0000
150.0000	25.0000	.2100	.0000	.0000
175.0000	25.0000	.1800	.0000	.0000
200.0000	25.0000	.1575	.0000	.0000
225.0000	25.0000	.1400	.0000	.0000
250.0000	25.0000	.1260	.0000	.0000
275.0000	25.0000	.1145	.0000	.0000
300.0000	25.0000	.1050	.0000	.0000
325.0000	25.0000	.0969	.0000	.0000
350.0000	25.0000	.0900	.0000	.0000
375.0000	25.0000	.0840	.0000	.0000
400.0000	25.0000	.0788	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	30.0000	.0000	22.0000	22.0000
25.0000	30.0000	1.5120	12.2236	11.8765
50.0000	30.0000	.7560	.0000	.0000
75.0000	30.0000	.5040	.0000	.0000
100.0000	30.0000	.3780	.0000	.0000
125.0000	30.0000	.3024	.0000	.0000
150.0000	30.0000	.2520	.0000	.0000
175.0000	30.0000	.2160	.0000	.0000
200.0000	30.0000	.1890	.0000	.0000
225.0000	30.0000	.1680	.0000	.0000
250.0000	30.0000	.1512	.0000	.0000
275.0000	30.0000	.1375	.0000	.0000
300.0000	30.0000	.1260	.0000	.0000
325.0000	30.0000	.1163	.0000	.0000
350.0000	30.0000	.1080	.0000	.0000
375.0000	30.0000	.1008	.0000	.0000
400.0000	30.0000	.0945	.0000	.0000

(X)	(T)	(VVO)	FIRST-TYPE BC	THIRD-TYPE BC
.0000	35.0000	.0000	22.0000	22.0000
25.0000	35.0000	1.7640	21.5854	21.5450
50.0000	35.0000	.8820	.0000	.0000
75.0000	35.0000	.5880	.0000	.0000
100.0000	35.0000	.4410	.0000	.0000
125.0000	35.0000	.3528	.0000	.0000
150.0000	35.0000	.2940	.0000	.0000
175.0000	35.0000	.2520	.0000	.0000
200.0000	35.0000	.2205	.0000	.0000
225.0000	35.0000	.1960	.0000	.0000
250.0000	35.0000	.1764	.0000	.0000
275.0000	35.0000	.1604	.0000	.0000
300.0000	35.0000	.1470	.0000	.0000
325.0000	35.0000	.1357	.0000	.0000
350.0000	35.0000	.1260	.0000	.0000
375.0000	35.0000	.1176	.0000	.0000
400.0000	35.0000	.1103	.0000	.0000

DISTANCE	TIME	PORE VOLUME	CONCENTRATION	
(X)	(T)	(VVO)	FIRST-TYPE BC	THIRD-TYPE BC
.0000	40.0000	.0000	22.0000	22.0000
25.0000	40.0000	2.0160	21.9982	21.9979
50.0000	40.0000	1.0080	.0000	.0000
75.0000	40.0000	.6720	.0000	.0000
100.0000	40.0000	.5040	.0000	.0000
125.0000	40.0000	.4032	.0000	.0000
150.0000	40.0000	.3360	.0000	.0000
175.0000	40.0000	.2880	.0000	.0000
200.0000	40.0000	.2520	.0000	.0000
225.0000	40.0000	.2240	.0000	.0000
250.0000	40.0000	.2016	.0000	.0000
275.0000	40.0000	.1833	.0000	.0000
300.0000	40.0000	.1680	.0000	.0000
325.0000	40.0000	.1551	.0000	.0000
350.0000	40.0000	.1440	.0000	.0000
375.0000	40.0000	.1344	.0000	.0000
400.0000	40.0000	.1260	.0000	.0000

DISTANCE	TIME	PORE VOLUME	CONCENTRATION	
(X)	(T)	(VVO)	FIRST-TYPE BC	THIRD-TYPE BC
.0000	45.0000	.0000	22.0000	22.0000
25.0000	45.0000	2.2680	22.0000	22.0000
50.0000	45.0000	1.1340	.0000	.0000
75.0000	45.0000	.7560	.0000	.0000
100.0000	45.0000	.5670	.0000	.0000
125.0000	45.0000	.4536	.0000	.0000
150.0000	45.0000	.3780	.0000	.0000
175.0000	45.0000	.3240	.0000	.0000
200.0000	45.0000	.2835	.0000	.0000
225.0000	45.0000	.2520	.0000	.0000
250.0000	45.0000	.2268	.0000	.0000
275.0000	45.0000	.2062	.0000	.0000
300.0000	45.0000	.1890	.0000	.0000
325.0000	45.0000	.1745	.0000	.0000
350.0000	45.0000	.1620	.0000	.0000

375.0000	45.0000	.1512	.0000	.0000
400.0000	45.0000	.1418	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	50.0000	.0000	22.0000	22.0000
25.0000	50.0000	2.5200	22.0000	22.0000
50.0000	50.0000	1.2600	.0234	.0212
75.0000	50.0000	.8400	.0000	.0000
100.0000	50.0000	.6300	.0000	.0000
125.0000	50.0000	.5040	.0000	.0000
150.0000	50.0000	.4200	.0000	.0000
175.0000	50.0000	.3600	.0000	.0000
200.0000	50.0000	.3150	.0000	.0000
225.0000	50.0000	.2800	.0000	.0000
250.0000	50.0000	.2520	.0000	.0000
275.0000	50.0000	.2291	.0000	.0000
300.0000	50.0000	.2100	.0000	.0000
325.0000	50.0000	.1938	.0000	.0000
350.0000	50.0000	.1800	.0000	.0000
375.0000	50.0000	.1680	.0000	.0000
400.0000	50.0000	.1575	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	55.0000	.0000	22.0000	22.0000
25.0000	55.0000	2.7720	22.0000	22.0000
50.0000	55.0000	1.3860	1.8582	1.7622
75.0000	55.0000	.9240	.0000	.0000
100.0000	55.0000	.6930	.0000	.0000
125.0000	55.0000	.5544	.0000	.0000
150.0000	55.0000	.4620	.0000	.0000
175.0000	55.0000	.3960	.0000	.0000
200.0000	55.0000	.3465	.0000	.0000
225.0000	55.0000	.3080	.0000	.0000
250.0000	55.0000	.2772	.0000	.0000
275.0000	55.0000	.2520	.0000	.0000
300.0000	55.0000	.2310	.0000	.0000
325.0000	55.0000	.2132	.0000	.0000
350.0000	55.0000	.1980	.0000	.0000
375.0000	55.0000	.1848	.0000	.0000
400.0000	55.0000	.1733	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	60.0000	.0000	22.0000	22.0000
25.0000	60.0000	3.0240	22.0000	22.0000
50.0000	60.0000	1.5120	12.4817	12.2377
75.0000	60.0000	1.0080	.0000	.0000
100.0000	60.0000	.7560	.0000	.0000
125.0000	60.0000	.6048	.0000	.0000
150.0000	60.0000	.5040	.0000	.0000
175.0000	60.0000	.4320	.0000	.0000

225.0000	60.0000	.3360	.0000	.0000
250.0000	60.0000	.3024	.0000	.0000
275.0000	60.0000	.2749	.0000	.0000
300.0000	60.0000	.2520	.0000	.0000
325.0000	60.0000	.2326	.0000	.0000
350.0000	60.0000	.2160	.0000	.0000
375.0000	60.0000	.2016	.0000	.0000
400.0000	60.0000	.1890	.0000	.0000

DISTANCE	TIME	PORE VOLUME	CONCENTRATION	
(X)	(T)	(VVO)	FIRST-TYPE BC	THIRD-TYPE BC
.0000	65.0000	.0000	22.0000	22.0000
25.0000	65.0000	3.2760	22.0000	22.0000
50.0000	65.0000	1.6380	20.7730	20.7033
75.0000	65.0000	1.0920	.0000	.0000
100.0000	65.0000	.8190	.0000	.0000
125.0000	65.0000	.6552	.0000	.0000
150.0000	65.0000	.5460	.0000	.0000
175.0000	65.0000	.4680	.0000	.0000
200.0000	65.0000	.4095	.0000	.0000
225.0000	65.0000	.3640	.0000	.0000
250.0000	65.0000	.3276	.0000	.0000
275.0000	65.0000	.2978	.0000	.0000
300.0000	65.0000	.2730	.0000	.0000
325.0000	65.0000	.2520	.0000	.0000
350.0000	65.0000	.2340	.0000	.0000
375.0000	65.0000	.2184	.0000	.0000
400.0000	65.0000	.2048	.0000	.0000

DISTANCE	TIME	PORE VOLUME	CONCENTRATION	
(X)	(T)	(VVO)	FIRST-TYPE BC	THIRD-TYPE BC
.0000	70.0000	.0000	22.0000	22.0000
25.0000	70.0000	3.5280	22.0000	22.0000
50.0000	70.0000	1.7640	21.9602	21.9566
75.0000	70.0000	1.1760	.0000	.0000
100.0000	70.0000	.8820	.0000	.0000
125.0000	70.0000	.7056	.0000	.0000
150.0000	70.0000	.5880	.0000	.0000
175.0000	70.0000	.5040	.0000	.0000
200.0000	70.0000	.4410	.0000	.0000
225.0000	70.0000	.3920	.0000	.0000
250.0000	70.0000	.3528	.0000	.0000
275.0000	70.0000	.3207	.0000	.0000
300.0000	70.0000	.2940	.0000	.0000
325.0000	70.0000	.2714	.0000	.0000
350.0000	70.0000	.2520	.0000	.0000
375.0000	70.0000	.2352	.0000	.0000
400.0000	70.0000	.2205	.0000	.0000

DISTANCE	TIME	PORE VOLUME	CONCENTRATION	
(X)	(T)	(VVO)	FIRST-TYPE BC	THIRD-TYPE BC
.0000	75.0000	.0000	22.0000	22.0000
25.0000	75.0000	3.7800	22.0000	22.0000
50.0000	75.0000	1.8900	21.9996	21.9996

75.0000	75.0000	1.2600	.0018	.0016
100.0000	75.0000	.9450	.0000	.0000
125.0000	75.0000	.7560	.0000	.0000
150.0000	75.0000	.6300	.0000	.0000
175.0000	75.0000	.5400	.0000	.0000
200.0000	75.0000	.4725	.0000	.0000
225.0000	75.0000	.4200	.0000	.0000
250.0000	75.0000	.3780	.0000	.0000
275.0000	75.0000	.3436	.0000	.0000
300.0000	75.0000	.3150	.0000	.0000
325.0000	75.0000	.2908	.0000	.0000
350.0000	75.0000	.2700	.0000	.0000
375.0000	75.0000	.2520	.0000	.0000
400.0000	75.0000	.2363	.0000	.0000

DISTANCE	TIME	PORE VOLUME	CONCENTRATION	
(X)	(T)	(VVO)	FIRST-TYPE BC	THIRD-TYPE BC
.0000	80.0000	.0000	22.0000	22.0000
25.0000	80.0000	4.0320	22.0000	22.0000
50.0000	80.0000	2.0160	22.0000	22.0000
75.0000	80.0000	1.3440	.1978	.1856
100.0000	80.0000	1.0080	.0000	.0000
125.0000	80.0000	.8064	.0000	.0000
150.0000	80.0000	.6720	.0000	.0000
175.0000	80.0000	.5760	.0000	.0000
200.0000	80.0000	.5040	.0000	.0000
225.0000	80.0000	.4480	.0000	.0000
250.0000	80.0000	.4032	.0000	.0000
275.0000	80.0000	.3665	.0000	.0000
300.0000	80.0000	.3360	.0000	.0000
325.0000	80.0000	.3102	.0000	.0000
350.0000	80.0000	.2880	.0000	.0000
375.0000	80.0000	.2688	.0000	.0000
400.0000	80.0000	.2520	.0000	.0000
.0000	85.0000	.0000	22.0000	22.0000
25.0000	85.0000	4.2840	22.0000	22.0000
50.0000	85.0000	2.1420	22.0000	22.0000
75.0000	85.0000	1.4280	3.2479	3.1311
100.0000	85.0000	1.0710	.0000	.0000
125.0000	85.0000	.8568	.0000	.0000
150.0000	85.0000	.7140	.0000	.0000
175.0000	85.0000	.6120	.0000	.0000
200.0000	85.0000	.5355	.0000	.0000
225.0000	85.0000	.4760	.0000	.0000
250.0000	85.0000	.4284	.0000	.0000
275.0000	85.0000	.3895	.0000	.0000
300.0000	85.0000	.3570	.0000	.0000
325.0000	85.0000	.3295	.0000	.0000
350.0000	85.0000	.3060	.0000	.0000
375.0000	85.0000	.2856	.0000	.0000
400.0000	85.0000	.2678	.0000	.0000
.0000	90.0000	.0000	22.0000	22.0000
25.0000	90.0000	4.5360	22.0000	22.0000
50.0000	90.0000	2.2680	22.0000	22.0000
75.0000	90.0000	1.5120	12.7114	12.5132
100.0000	90.0000	1.1340	.0000	.0000
125.0000	90.0000	.9072	.0000	.0000

175.0000	90.0000	.6480	.0000	.0000
200.0000	90.0000	.5670	.0000	.0000
225.0000	90.0000	.5040	.0000	.0000
250.0000	90.0000	.4536	.0000	.0000
275.0000	90.0000	.4124	.0000	.0000
300.0000	90.0000	.3780	.0000	.0000
325.0000	90.0000	.3489	.0000	.0000
350.0000	90.0000	.3240	.0000	.0000
375.0000	90.0000	.3024	.0000	.0000
400.0000	90.0000	.2835	.0000	.0000
.0000	95.0000	.0000	22.0000	22.0000
25.0000	95.0000	4.7880	22.0000	22.0000
50.0000	95.0000	2.3940	22.0000	22.0000
75.0000	95.0000	1.5960	20.1294	20.0506
100.0000	95.0000	1.1970	.0000	.0000
125.0000	95.0000	.9576	.0000	.0000
150.0000	95.0000	.7980	.0000	.0000
175.0000	95.0000	.6840	.0000	.0000
200.0000	95.0000	.5985	.0000	.0000
225.0000	95.0000	.5320	.0000	.0000
250.0000	95.0000	.4788	.0000	.0000
275.0000	95.0000	.4353	.0000	.0000
300.0000	95.0000	.3990	.0000	.0000
325.0000	95.0000	.3683	.0000	.0000
350.0000	95.0000	.3420	.0000	.0000
375.0000	95.0000	.3192	.0000	.0000
400.0000	95.0000	.2993	.0000	.0000
.0000	100.0000	.0000	22.0000	22.0000
25.0000	100.0000	5.0400	22.0000	22.0000
50.0000	100.0000	2.5200	22.0000	22.0000
75.0000	100.0000	1.6800	21.8588	21.8497
100.0000	100.0000	1.2600	.0001	.0001
125.0000	100.0000	1.0080	.0000	.0000
150.0000	100.0000	.8400	.0000	.0000
175.0000	100.0000	.7200	.0000	.0000
200.0000	100.0000	.6300	.0000	.0000
225.0000	100.0000	.5600	.0000	.0000
250.0000	100.0000	.5040	.0000	.0000
275.0000	100.0000	.4582	.0000	.0000
300.0000	100.0000	.4200	.0000	.0000
325.0000	100.0000	.3877	.0000	.0000
350.0000	100.0000	.3600	.0000	.0000
375.0000	100.0000	.3360	.0000	.0000
400.0000	100.0000	.3150	.0000	.0000
.0000	105.0000	.0000	22.0000	22.0000
25.0000	105.0000	5.2920	22.0000	22.0000
50.0000	105.0000	2.6460	22.0000	22.0000
75.0000	105.0000	1.7640	21.9958	21.9954
100.0000	105.0000	1.3230	.0189	.0177
125.0000	105.0000	1.0584	.0000	.0000
150.0000	105.0000	.8820	.0000	.0000
175.0000	105.0000	.7560	.0000	.0000
200.0000	105.0000	.6615	.0000	.0000
225.0000	105.0000	.5880	.0000	.0000
250.0000	105.0000	.5292	.0000	.0000
275.0000	105.0000	.4811	.0000	.0000
300.0000	105.0000	.4410	.0000	.0000
325.0000	105.0000	.4071	.0000	.0000
350.0000	105.0000	.3780	.0000	.0000
375.0000	105.0000	.3528	.0000	.0000

400.0000	105.0000	.3308	.0000	.0000
.0000	110.0000	.0000	22.0000	22.0000
25.0000	110.0000	5.5440	22.0000	22.0000
50.0000	110.0000	2.7720	22.0000	22.0000
75.0000	110.0000	1.8480	21.9999	21.9999
100.0000	110.0000	1.3860	.5436	.5182
125.0000	110.0000	1.1088	.0000	.0000
150.0000	110.0000	.9240	.0000	.0000
175.0000	110.0000	.7920	.0000	.0000
200.0000	110.0000	.6930	.0000	.0000
225.0000	110.0000	.6160	.0000	.0000
250.0000	110.0000	.5544	.0000	.0000
275.0000	110.0000	.5040	.0000	.0000
300.0000	110.0000	.4620	.0000	.0000
325.0000	110.0000	.4265	.0000	.0000
350.0000	110.0000	.3960	.0000	.0000
375.0000	110.0000	.3696	.0000	.0000
400.0000	110.0000	.3465	.0000	.0000
.0000	115.0000	.0000	22.0000	22.0000
25.0000	115.0000	5.7960	22.0000	22.0000
50.0000	115.0000	2.8980	22.0000	22.0000
75.0000	115.0000	1.9320	22.0000	22.0000
100.0000	115.0000	1.4490	4.3575	4.2355
125.0000	115.0000	1.1592	.0000	.0000
150.0000	115.0000	.9660	.0000	.0000
175.0000	115.0000	.8280	.0000	.0000
200.0000	115.0000	.7245	.0000	.0000
225.0000	115.0000	.6440	.0000	.0000
250.0000	115.0000	.5796	.0000	.0000
275.0000	115.0000	.5269	.0000	.0000
300.0000	115.0000	.4830	.0000	.0000
325.0000	115.0000	.4458	.0000	.0000
350.0000	115.0000	.4140	.0000	.0000
375.0000	115.0000	.3864	.0000	.0000
400.0000	115.0000	.3623	.0000	.0000
.0000	120.0000	.0000	22.0000	22.0000
25.0000	120.0000	6.0480	22.0000	22.0000
50.0000	120.0000	3.0240	22.0000	22.0000
75.0000	120.0000	2.0160	22.0000	22.0000
100.0000	120.0000	1.5120	12.9150	12.7442
125.0000	120.0000	1.2096	.0000	.0000
150.0000	120.0000	1.0080	.0000	.0000
175.0000	120.0000	.8640	.0000	.0000
200.0000	120.0000	.7560	.0000	.0000
225.0000	120.0000	.6720	.0000	.0000
250.0000	120.0000	.6048	.0000	.0000
275.0000	120.0000	.5498	.0000	.0000
300.0000	120.0000	.5040	.0000	.0000
325.0000	120.0000	.4652	.0000	.0000
350.0000	120.0000	.4320	.0000	.0000
375.0000	120.0000	.4032	.0000	.0000
400.0000	120.0000	.3780	.0000	.0000
.0000	125.0000	.0000	22.0000	22.0000
25.0000	125.0000	6.3000	22.0000	22.0000
50.0000	125.0000	3.1500	22.0000	22.0000
75.0000	125.0000	2.1000	22.0000	22.0000
100.0000	125.0000	1.5750	19.6551	19.5746
125.0000	125.0000	1.2600	.0000	.0000
150.0000	125.0000	1.0500	.0000	.0000

200.0000	125.0000	.7875	.0000	.0000
225.0000	125.0000	.7000	.0000	.0000
250.0000	125.0000	.6300	.0000	.0000
275.0000	125.0000	.5727	.0000	.0000
300.0000	125.0000	.5250	.0000	.0000
325.0000	125.0000	.4846	.0000	.0000
350.0000	125.0000	.4500	.0000	.0000
375.0000	125.0000	.4200	.0000	.0000
400.0000	125.0000	.3938	.0000	.0000
.0000	130.0000	.0000	22.0000	22.0000
25.0000	130.0000	6.5520	22.0000	22.0000
50.0000	130.0000	3.2760	22.0000	22.0000
75.0000	130.0000	2.1840	22.0000	22.0000
100.0000	130.0000	1.6380	21.7169	21.7023
125.0000	130.0000	1.3104	.0017	.0016
150.0000	130.0000	1.0920	.0000	.0000
175.0000	130.0000	.9360	.0000	.0000
200.0000	130.0000	.8190	.0000	.0000
225.0000	130.0000	.7280	.0000	.0000
250.0000	130.0000	.6552	.0000	.0000
275.0000	130.0000	.5956	.0000	.0000
300.0000	130.0000	.5460	.0000	.0000
325.0000	130.0000	.5040	.0000	.0000
350.0000	130.0000	.4680	.0000	.0000
375.0000	130.0000	.4368	.0000	.0000
400.0000	130.0000	.4095	.0000	.0000
.0000	135.0000	.0000	22.0000	22.0000
25.0000	135.0000	6.8040	22.0000	22.0000
50.0000	135.0000	3.4020	22.0000	22.0000
75.0000	135.0000	2.2680	22.0000	22.0000
100.0000	135.0000	1.7010	21.9837	21.9826
125.0000	135.0000	1.3608	.0725	.0686
150.0000	135.0000	1.1340	.0000	.0000
175.0000	135.0000	.9720	.0000	.0000
200.0000	135.0000	.8505	.0000	.0000
225.0000	135.0000	.7560	.0000	.0000
250.0000	135.0000	.6804	.0000	.0000
275.0000	135.0000	.6185	.0000	.0000
300.0000	135.0000	.5670	.0000	.0000
325.0000	135.0000	.5234	.0000	.0000
350.0000	135.0000	.4860	.0000	.0000
375.0000	135.0000	.4536	.0000	.0000
400.0000	135.0000	.4253	.0000	.0000
.0000	140.0000	.0000	22.0000	22.0000
25.0000	140.0000	7.0560	22.0000	22.0000
50.0000	140.0000	3.5280	22.0000	22.0000
75.0000	140.0000	2.3520	22.0000	22.0000
100.0000	140.0000	1.7640	21.9995	21.9995
125.0000	140.0000	1.4112	.9904	.9532
150.0000	140.0000	1.1760	.0000	.0000
175.0000	140.0000	1.0080	.0000	.0000
200.0000	140.0000	.8820	.0000	.0000
225.0000	140.0000	.7840	.0000	.0000
250.0000	140.0000	.7056	.0000	.0000
275.0000	140.0000	.6415	.0000	.0000
300.0000	140.0000	.5880	.0000	.0000
325.0000	140.0000	.5428	.0000	.0000
350.0000	140.0000	.5040	.0000	.0000
375.0000	140.0000	.4704	.0000	.0000
400.0000	140.0000	.4410	.0000	.0000

.0000	145.0000	.0000	22.0000	22.0000
25.0000	145.0000	7.3080	22.0000	22.0000
50.0000	145.0000	3.6540	22.0000	22.0000
75.0000	145.0000	2.4360	22.0000	22.0000
100.0000	145.0000	1.8270	22.0000	22.0000
125.0000	145.0000	1.4616	5.2542	5.1326
150.0000	145.0000	1.2180	.0000	.0000
175.0000	145.0000	1.0440	.0000	.0000
200.0000	145.0000	.9135	.0000	.0000
225.0000	145.0000	.8120	.0000	.0000
250.0000	145.0000	.7308	.0000	.0000
275.0000	145.0000	.6644	.0000	.0000
300.0000	145.0000	.6090	.0000	.0000
325.0000	145.0000	.5622	.0000	.0000
350.0000	145.0000	.5220	.0000	.0000
375.0000	145.0000	.4872	.0000	.0000
400.0000	145.0000	.4568	.0000	.0000
.0000	150.0000	.0000	22.0000	22.0000
25.0000	150.0000	7.5600	22.0000	22.0000
50.0000	150.0000	3.7800	22.0000	22.0000
75.0000	150.0000	2.5200	22.0000	22.0000
100.0000	150.0000	1.8900	22.0000	22.0000
125.0000	150.0000	1.5120	13.0988	12.9468
150.0000	150.0000	1.2600	.0000	.0000
175.0000	150.0000	1.0800	.0000	.0000
200.0000	150.0000	.9450	.0000	.0000
225.0000	150.0000	.8400	.0000	.0000
250.0000	150.0000	.7560	.0000	.0000
275.0000	150.0000	.6873	.0000	.0000
300.0000	150.0000	.6300	.0000	.0000
325.0000	150.0000	.5815	.0000	.0000
350.0000	150.0000	.5400	.0000	.0000
375.0000	150.0000	.5040	.0000	.0000
400.0000	150.0000	.4725	.0000	.0000
.0000	155.0000	.0000	22.0000	22.0000
25.0000	155.0000	7.8120	22.0000	22.0000
50.0000	155.0000	3.9060	22.0000	22.0000
75.0000	155.0000	2.6040	22.0000	22.0000
100.0000	155.0000	1.9530	22.0000	22.0000
125.0000	155.0000	1.5624	19.3017	19.2220
150.0000	155.0000	1.3020	.0002	.0001
175.0000	155.0000	1.1160	.0000	.0000
200.0000	155.0000	.9765	.0000	.0000
225.0000	155.0000	.8680	.0000	.0000
250.0000	155.0000	.7812	.0000	.0000
275.0000	155.0000	.7102	.0000	.0000
300.0000	155.0000	.6510	.0000	.0000
325.0000	155.0000	.6009	.0000	.0000
350.0000	155.0000	.5580	.0000	.0000
375.0000	155.0000	.5208	.0000	.0000
400.0000	155.0000	.4883	.0000	.0000
.0000	160.0000	.0000	22.0000	22.0000
25.0000	160.0000	8.0640	22.0000	22.0000
50.0000	160.0000	4.0320	22.0000	22.0000
75.0000	160.0000	2.6880	22.0000	22.0000
100.0000	160.0000	2.0160	22.0000	22.0000
125.0000	160.0000	1.6128	21.5595	21.5405
150.0000	160.0000	1.3440	.0085	.0080
175.0000	160.0000	1.1520	.0000	.0000

225.0000	160.0000	.8960	.0000	.0000
250.0000	160.0000	.8064	.0000	.0000
275.0000	160.0000	.7331	.0000	.0000
300.0000	160.0000	.6720	.0000	.0000
325.0000	160.0000	.6203	.0000	.0000
350.0000	160.0000	.5760	.0000	.0000
375.0000	160.0000	.5376	.0000	.0000
400.0000	160.0000	.5040	.0000	.0000
.0000	165.0000	.0000	22.0000	22.0000
25.0000	165.0000	8.3160	22.0000	22.0000
50.0000	165.0000	4.1580	22.0000	22.0000
75.0000	165.0000	2.7720	22.0000	22.0000
100.0000	165.0000	2.0790	22.0000	22.0000
125.0000	165.0000	1.6632	21.9612	21.9590
150.0000	165.0000	1.3860	.1733	.1656
175.0000	165.0000	1.1880	.0000	.0000
200.0000	165.0000	1.0395	.0000	.0000
225.0000	165.0000	.9240	.0000	.0000
250.0000	165.0000	.8316	.0000	.0000
275.0000	165.0000	.7560	.0000	.0000
300.0000	165.0000	.6930	.0000	.0000
325.0000	165.0000	.6397	.0000	.0000
350.0000	165.0000	.5940	.0000	.0000
375.0000	165.0000	.5544	.0000	.0000
400.0000	165.0000	.5197	.0000	.0000
.0000	170.0000	.0000	22.0000	22.0000
25.0000	170.0000	8.5680	22.0000	22.0000
50.0000	170.0000	4.2840	22.0000	22.0000
75.0000	170.0000	2.8560	22.0000	22.0000
100.0000	170.0000	2.1420	22.0000	22.0000
125.0000	170.0000	1.7136	21.9981	21.9980
150.0000	170.0000	1.4280	1.4805	1.4339
175.0000	170.0000	1.2240	.0000	.0000
200.0000	170.0000	1.0710	.0000	.0000
225.0000	170.0000	.9520	.0000	.0000
250.0000	170.0000	.8568	.0000	.0000
275.0000	170.0000	.7789	.0000	.0000
300.0000	170.0000	.7140	.0000	.0000
325.0000	170.0000	.6591	.0000	.0000
350.0000	170.0000	.6120	.0000	.0000
375.0000	170.0000	.5712	.0000	.0000
400.0000	170.0000	.5355	.0000	.0000
.0000	175.0000	.0000	22.0000	22.0000
25.0000	175.0000	8.8200	22.0000	22.0000
50.0000	175.0000	4.4100	22.0000	22.0000
75.0000	175.0000	2.9400	22.0000	22.0000
100.0000	175.0000	2.2050	22.0000	22.0000
125.0000	175.0000	1.7640	21.9999	21.9999
150.0000	175.0000	1.4700	5.9978	5.8789
175.0000	175.0000	1.2600	.0000	.0000
200.0000	175.0000	1.1025	.0000	.0000
225.0000	175.0000	.9800	.0000	.0000
250.0000	175.0000	.8820	.0000	.0000
275.0000	175.0000	.8018	.0000	.0000
300.0000	175.0000	.7350	.0000	.0000
325.0000	175.0000	.6785	.0000	.0000
350.0000	175.0000	.6300	.0000	.0000
375.0000	175.0000	.5880	.0000	.0000
400.0000	175.0000	.5513	.0000	.0000

25.0000	180.0000	9.0720	22.0000	22.0000
50.0000	180.0000	4.5360	22.0000	22.0000
75.0000	180.0000	3.0240	22.0000	22.0000
100.0000	180.0000	2.2680	22.0000	22.0000
125.0000	180.0000	1.8144	22.0000	22.0000
150.0000	180.0000	1.5120	13.2670	13.1290
175.0000	180.0000	1.2960	.0000	.0000
200.0000	180.0000	1.1340	.0000	.0000
225.0000	180.0000	1.0080	.0000	.0000
250.0000	180.0000	.9072	.0000	.0000
275.0000	180.0000	.8247	.0000	.0000
300.0000	180.0000	.7560	.0000	.0000
325.0000	180.0000	.6978	.0000	.0000
350.0000	180.0000	.6480	.0000	.0000
375.0000	180.0000	.6048	.0000	.0000
400.0000	180.0000	.5670	.0000	.0000
.0000	185.0000	.0000	22.0000	22.0000
25.0000	185.0000	9.3240	22.0000	22.0000
50.0000	185.0000	4.6620	22.0000	22.0000
75.0000	185.0000	3.1080	22.0000	22.0000
100.0000	185.0000	2.3310	22.0000	22.0000
125.0000	185.0000	1.8648	22.0000	22.0000
150.0000	185.0000	1.5540	19.0329	18.9553
175.0000	185.0000	1.3320	.0009	.0009
200.0000	185.0000	1.1655	.0000	.0000
225.0000	185.0000	1.0360	.0000	.0000
250.0000	185.0000	.9324	.0000	.0000
275.0000	185.0000	.8476	.0000	.0000
300.0000	185.0000	.7770	.0000	.0000
325.0000	185.0000	.7172	.0000	.0000
350.0000	185.0000	.6660	.0000	.0000
375.0000	185.0000	.6216	.0000	.0000
400.0000	185.0000	.5828	.0000	.0000
.0000	190.0000	.0000	22.0000	22.0000
25.0000	190.0000	9.5760	22.0000	22.0000
50.0000	190.0000	4.7880	22.0000	22.0000
75.0000	190.0000	3.1920	22.0000	22.0000
100.0000	190.0000	2.3940	22.0000	22.0000
125.0000	190.0000	1.9152	22.0000	22.0000
150.0000	190.0000	1.5960	21.4019	21.3794
175.0000	190.0000	1.3680	.0256	.0243
200.0000	190.0000	1.1970	.0000	.0000
225.0000	190.0000	1.0640	.0000	.0000
250.0000	190.0000	.9576	.0000	.0000
275.0000	190.0000	.8705	.0000	.0000
300.0000	190.0000	.7980	.0000	.0000
325.0000	190.0000	.7366	.0000	.0000
350.0000	190.0000	.6840	.0000	.0000
375.0000	190.0000	.6384	.0000	.0000
400.0000	190.0000	.5985	.0000	.0000
.0000	195.0000	.0000	22.0000	22.0000
25.0000	195.0000	9.8280	22.0000	22.0000
50.0000	195.0000	4.9140	22.0000	22.0000
75.0000	195.0000	3.2760	22.0000	22.0000
100.0000	195.0000	2.4570	22.0000	22.0000
125.0000	195.0000	1.9656	22.0000	22.0000
150.0000	195.0000	1.6380	21.9288	21.9253
175.0000	195.0000	1.4040	.3205	.3082
200.0000	195.0000	1.2285	.0000	.0000

250.0000	195.0000	.9828	.0000	.0000
275.0000	195.0000	.8935	.0000	.0000
300.0000	195.0000	.8190	.0000	.0000
325.0000	195.0000	.7560	.0000	.0000
350.0000	195.0000	.7020	.0000	.0000
375.0000	195.0000	.6552	.0000	.0000
400.0000	195.0000	.6143	.0000	.0000
.0000	200.0000	.0000	22.0000	22.0000
25.0000	200.0000	10.0800	22.0000	22.0000
50.0000	200.0000	5.0400	22.0000	22.0000
75.0000	200.0000	3.3600	22.0000	22.0000
100.0000	200.0000	2.5200	22.0000	22.0000
125.0000	200.0000	2.0160	22.0000	22.0000
150.0000	200.0000	1.6800	21.9949	21.9946
175.0000	200.0000	1.4400	1.9804	1.9266
200.0000	200.0000	1.2600	.0000	.0000
225.0000	200.0000	1.1200	.0000	.0000
250.0000	200.0000	1.0080	.0000	.0000
275.0000	200.0000	.9164	.0000	.0000
300.0000	200.0000	.8400	.0000	.0000
325.0000	200.0000	.7754	.0000	.0000
350.0000	200.0000	.7200	.0000	.0000
375.0000	200.0000	.6720	.0000	.0000
400.0000	200.0000	.6300	.0000	.0000
.0000	205.0000	.0000	22.0000	22.0000
25.0000	205.0000	10.3320	22.0000	22.0000
50.0000	205.0000	5.1660	22.0000	22.0000
75.0000	205.0000	3.4440	22.0000	22.0000
100.0000	205.0000	2.5830	22.0000	22.0000
125.0000	205.0000	2.0664	22.0000	22.0000
150.0000	205.0000	1.7220	21.9998	21.9998
175.0000	205.0000	1.4760	6.6293	6.5139
200.0000	205.0000	1.2915	.0000	.0000
225.0000	205.0000	1.1480	.0000	.0000
250.0000	205.0000	1.0332	.0000	.0000
275.0000	205.0000	.9393	.0000	.0000
300.0000	205.0000	.8610	.0000	.0000
325.0000	205.0000	.7948	.0000	.0000
350.0000	205.0000	.7380	.0000	.0000
375.0000	205.0000	.6888	.0000	.0000
400.0000	205.0000	.6457	.0000	.0000
.0000	210.0000	.0000	22.0000	22.0000
25.0000	210.0000	10.5840	22.0000	22.0000
50.0000	210.0000	5.2920	22.0000	22.0000
75.0000	210.0000	3.5280	22.0000	22.0000
100.0000	210.0000	2.6460	22.0000	22.0000
125.0000	210.0000	2.1168	22.0000	22.0000
150.0000	210.0000	1.7640	22.0000	22.0000
175.0000	210.0000	1.5120	13.4229	13.2957
200.0000	210.0000	1.3230	.0001	.0001
225.0000	210.0000	1.1760	.0000	.0000
250.0000	210.0000	1.0584	.0000	.0000
275.0000	210.0000	.9622	.0000	.0000
300.0000	210.0000	.8820	.0000	.0000
325.0000	210.0000	.8142	.0000	.0000
350.0000	210.0000	.7560	.0000	.0000
375.0000	210.0000	.7056	.0000	.0000
400.0000	210.0000	.6615	.0000	.0000
.0000	215.0000	.0000	22.0000	22.0000

50.0000	215.0000	5.4180	22.0000	22.0000
75.0000	215.0000	3.6120	22.0000	22.0000
100.0000	215.0000	2.7090	22.0000	22.0000
125.0000	215.0000	2.1672	22.0000	22.0000
150.0000	215.0000	1.8060	22.0000	22.0000
175.0000	215.0000	1.5480	18.8249	18.7496
200.0000	215.0000	1.3545	.0034	.0032
225.0000	215.0000	1.2040	.0000	.0000
250.0000	215.0000	1.0836	.0000	.0000
275.0000	215.0000	.9851	.0000	.0000
300.0000	215.0000	.9030	.0000	.0000
325.0000	215.0000	.8335	.0000	.0000
350.0000	215.0000	.7740	.0000	.0000
375.0000	215.0000	.7224	.0000	.0000
400.0000	215.0000	.6773	.0000	.0000
.0000	220.0000	.0000	22.0000	22.0000
25.0000	220.0000	11.0880	22.0000	22.0000
50.0000	220.0000	5.5440	22.0000	22.0000
75.0000	220.0000	3.6960	22.0000	22.0000
100.0000	220.0000	2.7720	22.0000	22.0000
125.0000	220.0000	2.2176	22.0000	22.0000
150.0000	220.0000	1.8480	22.0000	22.0000
175.0000	220.0000	1.5840	21.2515	21.2265
200.0000	220.0000	1.3860	.0575	.0550
225.0000	220.0000	1.2320	.0000	.0000
250.0000	220.0000	1.1088	.0000	.0000
275.0000	220.0000	1.0080	.0000	.0000
300.0000	220.0000	.9240	.0000	.0000
325.0000	220.0000	.8529	.0000	.0000
350.0000	220.0000	.7920	.0000	.0000
375.0000	220.0000	.7392	.0000	.0000
400.0000	220.0000	.6930	.0000	.0000
.0000	225.0000	.0000	22.0000	22.0000
25.0000	225.0000	11.3400	22.0000	22.0000
50.0000	225.0000	5.6700	22.0000	22.0000
75.0000	225.0000	3.7800	22.0000	22.0000
100.0000	225.0000	2.8350	22.0000	22.0000
125.0000	225.0000	2.2680	22.0000	22.0000
150.0000	225.0000	1.8900	22.0000	22.0000
175.0000	225.0000	1.6200	21.8886	21.8837
200.0000	225.0000	1.4175	.5072	.4902
225.0000	225.0000	1.2600	.0000	.0000
250.0000	225.0000	1.1340	.0000	.0000
275.0000	225.0000	1.0309	.0000	.0000
300.0000	225.0000	.9450	.0000	.0000
325.0000	225.0000	.8723	.0000	.0000
350.0000	225.0000	.8100	.0000	.0000
375.0000	225.0000	.7560	.0000	.0000
400.0000	225.0000	.7088	.0000	.0000
.0000	230.0000	.0000	22.0000	22.0000
25.0000	230.0000	11.5920	22.0000	22.0000
50.0000	230.0000	5.7960	22.0000	22.0000
75.0000	230.0000	3.8640	22.0000	22.0000
100.0000	230.0000	2.8980	22.0000	22.0000
125.0000	230.0000	2.3184	22.0000	22.0000
150.0000	230.0000	1.9320	22.0000	22.0000
175.0000	230.0000	1.6560	21.9894	21.9889
200.0000	230.0000	1.4490	2.4723	2.4131
225.0000	230.0000	1.2880	.0000	.0000

275.0000	230.0000	1.0538	.0000	.0000
300.0000	230.0000	.9660	.0000	.0000
325.0000	230.0000	.8917	.0000	.0000
350.0000	230.0000	.8280	.0000	.0000
375.0000	230.0000	.7728	.0000	.0000
400.0000	230.0000	.7245	.0000	.0000
.0000	235.0000	.0000	22.0000	22.0000
25.0000	235.0000	11.8440	22.0000	22.0000
50.0000	235.0000	5.9220	22.0000	22.0000
75.0000	235.0000	3.9480	22.0000	22.0000
100.0000	235.0000	2.9610	22.0000	22.0000
125.0000	235.0000	2.3688	22.0000	22.0000
150.0000	235.0000	1.9740	22.0000	22.0000
175.0000	235.0000	1.6920	21.9994	21.9993
200.0000	235.0000	1.4805	7.1763	7.0645
225.0000	235.0000	1.3160	.0000	.0000
250.0000	235.0000	1.1844	.0000	.0000
275.0000	235.0000	1.0767	.0000	.0000
300.0000	235.0000	.9870	.0000	.0000
325.0000	235.0000	.9111	.0000	.0000
350.0000	235.0000	.8460	.0000	.0000
375.0000	235.0000	.7896	.0000	.0000
400.0000	235.0000	.7403	.0000	.0000
.0000	240.0000	.0000	22.0000	22.0000
25.0000	240.0000	12.0960	22.0000	22.0000
50.0000	240.0000	6.0480	22.0000	22.0000
75.0000	240.0000	4.0320	22.0000	22.0000
100.0000	240.0000	3.0240	22.0000	22.0000
125.0000	240.0000	2.4192	22.0000	22.0000
150.0000	240.0000	2.0160	22.0000	22.0000
175.0000	240.0000	1.7280	22.0000	22.0000
200.0000	240.0000	1.5120	13.5685	13.4501
225.0000	240.0000	1.3440	.0004	.0004
250.0000	240.0000	1.2096	.0000	.0000
275.0000	240.0000	1.0996	.0000	.0000
300.0000	240.0000	1.0080	.0000	.0000
325.0000	240.0000	.9305	.0000	.0000
350.0000	240.0000	.8640	.0000	.0000
375.0000	240.0000	.8064	.0000	.0000
400.0000	240.0000	.7560	.0000	.0000
.0000	245.0000	.0000	22.0000	22.0000
25.0000	245.0000	12.3480	22.0000	22.0000
50.0000	245.0000	6.1740	22.0000	22.0000
75.0000	245.0000	4.1160	22.0000	22.0000
100.0000	245.0000	3.0870	22.0000	22.0000
125.0000	245.0000	2.4696	22.0000	22.0000
150.0000	245.0000	2.0580	22.0000	22.0000
175.0000	245.0000	1.7640	22.0000	22.0000
200.0000	245.0000	1.5435	18.6616	18.5887
225.0000	245.0000	1.3720	.0090	.0086
250.0000	245.0000	1.2348	.0000	.0000
275.0000	245.0000	1.1225	.0000	.0000
300.0000	245.0000	1.0290	.0000	.0000
325.0000	245.0000	.9498	.0000	.0000
350.0000	245.0000	.8820	.0000	.0000
375.0000	245.0000	.8232	.0000	.0000
400.0000	245.0000	.7717	.0000	.0000
.0000	250.0000	.0000	22.0000	22.0000
25.0000	250.0000	12.6000	22.0000	22.0000
50.0000	250.0000	6.3000	22.0000	22.0000

75.0000	250.0000	4.2000	22.0000	22.0000
100.0000	250.0000	3.1500	22.0000	22.0000
125.0000	250.0000	2.5200	22.0000	22.0000
150.0000	250.0000	2.1000	22.0000	22.0000
175.0000	250.0000	1.8000	22.0000	22.0000
200.0000	250.0000	1.5750	21.1117	21.0847
225.0000	250.0000	1.4000	.1071	.1030
250.0000	250.0000	1.2600	.0000	.0000
275.0000	250.0000	1.1455	.0000	.0000
300.0000	250.0000	1.0500	.0000	.0000
325.0000	250.0000	.9692	.0000	.0000
350.0000	250.0000	.9000	.0000	.0000
375.0000	250.0000	.8400	.0000	.0000
400.0000	250.0000	.7875	.0000	.0000
.0000	255.0000	.0000	22.0000	22.0000
25.0000	255.0000	12.8520	22.0000	22.0000
50.0000	255.0000	6.4260	22.0000	22.0000
75.0000	255.0000	4.2840	22.0000	22.0000
100.0000	255.0000	3.2130	22.0000	22.0000
125.0000	255.0000	2.5704	22.0000	22.0000
150.0000	255.0000	2.1420	22.0000	22.0000
175.0000	255.0000	1.8360	22.0000	22.0000
200.0000	255.0000	1.6065	21.8427	21.8365
225.0000	255.0000	1.4280	.7250	.7035
250.0000	255.0000	1.2852	.0000	.0000
275.0000	255.0000	1.1684	.0000	.0000
300.0000	255.0000	1.0710	.0000	.0000
325.0000	255.0000	.9886	.0000	.0000
350.0000	255.0000	.9180	.0000	.0000
375.0000	255.0000	.8568	.0000	.0000
400.0000	255.0000	.8033	.0000	.0000
.0000	260.0000	.0000	22.0000	22.0000
25.0000	260.0000	13.1040	22.0000	22.0000
50.0000	260.0000	6.5520	22.0000	22.0000
75.0000	260.0000	4.3680	22.0000	22.0000
100.0000	260.0000	3.2760	22.0000	22.0000
125.0000	260.0000	2.6208	22.0000	22.0000
150.0000	260.0000	2.1840	22.0000	22.0000
175.0000	260.0000	1.8720	22.0000	22.0000
200.0000	260.0000	1.6380	21.9814	21.9805
225.0000	260.0000	1.4560	2.9475	2.8844
250.0000	260.0000	1.3104	.0000	.0000
275.0000	260.0000	1.1913	.0000	.0000
300.0000	260.0000	1.0920	.0000	.0000
325.0000	260.0000	1.0080	.0000	.0000
350.0000	260.0000	.9360	.0000	.0000
375.0000	260.0000	.8736	.0000	.0000
400.0000	260.0000	.8190	.0000	.0000
.0000	265.0000	.0000	22.0000	22.0000
25.0000	265.0000	13.3560	22.0000	22.0000
50.0000	265.0000	6.6780	22.0000	22.0000
75.0000	265.0000	4.4520	22.0000	22.0000
100.0000	265.0000	3.3390	22.0000	22.0000
125.0000	265.0000	2.6712	22.0000	22.0000
150.0000	265.0000	2.2260	22.0000	22.0000
175.0000	265.0000	1.9080	22.0000	22.0000
200.0000	265.0000	1.6695	21.9985	21.9984
225.0000	265.0000	1.4840	7.6577	7.5497
250.0000	265.0000	1.3356	.0000	.0000

300.0000	265.0000	1.1130	.0000	.0000
325.0000	265.0000	1.0274	.0000	.0000
350.0000	265.0000	.9540	.0000	.0000
375.0000	265.0000	.8904	.0000	.0000
400.0000	265.0000	.8348	.0000	.0000
.0000	270.0000	.0000	22.0000	22.0000
25.0000	270.0000	13.6080	22.0000	22.0000
50.0000	270.0000	6.8040	22.0000	22.0000
75.0000	270.0000	4.5360	22.0000	22.0000
100.0000	270.0000	3.4020	22.0000	22.0000
125.0000	270.0000	2.7216	22.0000	22.0000
150.0000	270.0000	2.2680	22.0000	22.0000
175.0000	270.0000	1.9440	22.0000	22.0000
200.0000	270.0000	1.7010	21.9999	21.9999
225.0000	270.0000	1.5120	13.7055	13.5944
250.0000	270.0000	1.3608	.0013	.0012
275.0000	270.0000	1.2371	.0000	.0000
300.0000	270.0000	1.1340	.0000	.0000
325.0000	270.0000	1.0468	.0000	.0000
350.0000	270.0000	.9720	.0000	.0000
375.0000	270.0000	.9072	.0000	.0000
400.0000	270.0000	.8505	.0000	.0000
.0000	275.0000	.0000	22.0000	22.0000
25.0000	275.0000	13.8600	22.0000	22.0000
50.0000	275.0000	6.9300	22.0000	22.0000
75.0000	275.0000	4.6200	22.0000	22.0000
100.0000	275.0000	3.4650	22.0000	22.0000
125.0000	275.0000	2.7720	22.0000	22.0000
150.0000	275.0000	2.3100	22.0000	22.0000
175.0000	275.0000	1.9800	22.0000	22.0000
200.0000	275.0000	1.7325	22.0000	22.0000
225.0000	275.0000	1.5400	18.5321	18.4616
250.0000	275.0000	1.3860	.0195	.0187
275.0000	275.0000	1.2600	.0000	.0000
300.0000	275.0000	1.1550	.0000	.0000
325.0000	275.0000	1.0662	.0000	.0000
350.0000	275.0000	.9900	.0000	.0000
375.0000	275.0000	.9240	.0000	.0000
400.0000	275.0000	.8663	.0000	.0000
.0000	280.0000	.0000	22.0000	22.0000
25.0000	280.0000	14.1120	22.0000	22.0000
50.0000	280.0000	7.0560	22.0000	22.0000
75.0000	280.0000	4.7040	22.0000	22.0000
100.0000	280.0000	3.5280	22.0000	22.0000
125.0000	280.0000	2.8224	22.0000	22.0000
150.0000	280.0000	2.3520	22.0000	22.0000
175.0000	280.0000	2.0160	22.0000	22.0000
200.0000	280.0000	1.7640	22.0000	22.0000
225.0000	280.0000	1.5680	20.9834	20.9551
250.0000	280.0000	1.4112	.1756	.1695
275.0000	280.0000	1.2829	.0000	.0000
300.0000	280.0000	1.1760	.0000	.0000
325.0000	280.0000	1.0855	.0000	.0000
350.0000	280.0000	1.0080	.0000	.0000
375.0000	280.0000	.9408	.0000	.0000
400.0000	280.0000	.8820	.0000	.0000
.0000	285.0000	.0000	22.0000	22.0000
25.0000	285.0000	14.3640	22.0000	22.0000
50.0000	285.0000	7.1820	22.0000	22.0000
75.0000	285.0000	4.7880	22.0000	22.0000

100.0000	285.0000	3.5910	22.0000	22.0000
125.0000	285.0000	2.8728	22.0000	22.0000
150.0000	285.0000	2.3940	22.0000	22.0000
175.0000	285.0000	2.0520	22.0000	22.0000
200.0000	285.0000	1.7955	22.0000	22.0000
225.0000	285.0000	1.5960	21.7932	21.7858
250.0000	285.0000	1.4364	.9659	.9401
275.0000	285.0000	1.3058	.0000	.0000
300.0000	285.0000	1.1970	.0000	.0000
325.0000	285.0000	1.1049	.0000	.0000
350.0000	285.0000	1.0260	.0000	.0000
375.0000	285.0000	.9576	.0000	.0000
400.0000	285.0000	.8977	.0000	.0000
.0000	290.0000	.0000	22.0000	22.0000
25.0000	290.0000	14.6160	22.0000	22.0000
50.0000	290.0000	7.3080	22.0000	22.0000
75.0000	290.0000	4.8720	22.0000	22.0000
100.0000	290.0000	3.6540	22.0000	22.0000
125.0000	290.0000	2.9232	22.0000	22.0000
150.0000	290.0000	2.4360	22.0000	22.0000
175.0000	290.0000	2.0880	22.0000	22.0000
200.0000	290.0000	1.8270	22.0000	22.0000
225.0000	290.0000	1.6240	21.9708	21.9695
250.0000	290.0000	1.4616	3.4022	3.3362
275.0000	290.0000	1.3287	.0000	.0000
300.0000	290.0000	1.2180	.0000	.0000
325.0000	290.0000	1.1243	.0000	.0000
350.0000	290.0000	1.0440	.0000	.0000
375.0000	290.0000	.9744	.0000	.0000
400.0000	290.0000	.9135	.0000	.0000
.0000	295.0000	.0000	22.0000	22.0000
25.0000	295.0000	14.8680	22.0000	22.0000
50.0000	295.0000	7.4340	22.0000	22.0000
75.0000	295.0000	4.9560	22.0000	22.0000
100.0000	295.0000	3.7170	22.0000	22.0000
125.0000	295.0000	2.9736	22.0000	22.0000
150.0000	295.0000	2.4780	22.0000	22.0000
175.0000	295.0000	2.1240	22.0000	22.0000
200.0000	295.0000	1.8585	22.0000	22.0000
225.0000	295.0000	1.6520	21.9971	21.9970
250.0000	295.0000	1.4868	8.0872	7.9827
275.0000	295.0000	1.3516	.0002	.0002
300.0000	295.0000	1.2390	.0000	.0000
325.0000	295.0000	1.1437	.0000	.0000
350.0000	295.0000	1.0620	.0000	.0000
375.0000	295.0000	.9912	.0000	.0000
400.0000	295.0000	.9293	.0000	.0000
.0000	300.0000	.0000	22.0000	22.0000
25.0000	300.0000	15.1200	22.0000	22.0000
50.0000	300.0000	7.5600	22.0000	22.0000
75.0000	300.0000	5.0400	22.0000	22.0000
100.0000	300.0000	3.7800	22.0000	22.0000
125.0000	300.0000	3.0240	22.0000	22.0000
150.0000	300.0000	2.5200	22.0000	22.0000
175.0000	300.0000	2.1600	22.0000	22.0000
200.0000	300.0000	1.8900	22.0000	22.0000
225.0000	300.0000	1.6800	21.9998	21.9998
250.0000	300.0000	1.5120	13.8350	13.7302
275.0000	300.0000	1.3745	.0032	.0030

325.0000	300.0000	1.1631	.0000	.0000
350.0000	300.0000	1.0800	.0000	.0000
375.0000	300.0000	1.0080	.0000	.0000
400.0000	300.0000	.9450	.0000	.0000
.0000	305.0000	.0000	22.0000	22.0000
25.0000	305.0000	15.3720	22.0000	22.0000
50.0000	305.0000	7.6860	22.0000	22.0000
75.0000	305.0000	5.1240	22.0000	22.0000
100.0000	305.0000	3.8430	22.0000	22.0000
125.0000	305.0000	3.0744	22.0000	22.0000
150.0000	305.0000	2.5620	22.0000	22.0000
175.0000	305.0000	2.1960	22.0000	22.0000
200.0000	305.0000	1.9215	22.0000	22.0000
225.0000	305.0000	1.7080	22.0000	22.0000
250.0000	305.0000	1.5372	18.4287	18.3606
275.0000	305.0000	1.3975	.0365	.0351
300.0000	305.0000	1.2810	.0000	.0000
325.0000	305.0000	1.1825	.0000	.0000
350.0000	305.0000	1.0980	.0000	.0000
375.0000	305.0000	1.0248	.0000	.0000
400.0000	305.0000	.9608	.0000	.0000
.0000	310.0000	.0000	22.0000	22.0000
25.0000	310.0000	15.6240	22.0000	22.0000
50.0000	310.0000	7.8120	22.0000	22.0000
75.0000	310.0000	5.2080	22.0000	22.0000
100.0000	310.0000	3.9060	22.0000	22.0000
125.0000	310.0000	3.1248	22.0000	22.0000
150.0000	310.0000	2.6040	22.0000	22.0000
175.0000	310.0000	2.2320	22.0000	22.0000
200.0000	310.0000	1.9530	22.0000	22.0000
225.0000	310.0000	1.7360	22.0000	22.0000
250.0000	310.0000	1.5624	20.8667	20.8375
275.0000	310.0000	1.4204	.2627	.2544
300.0000	310.0000	1.3020	.0000	.0000
325.0000	310.0000	1.2018	.0000	.0000
350.0000	310.0000	1.1160	.0000	.0000
375.0000	310.0000	1.0416	.0000	.0000
400.0000	310.0000	.9765	.0000	.0000
.0000	315.0000	.0000	22.0000	22.0000
25.0000	315.0000	15.8760	22.0000	22.0000
50.0000	315.0000	7.9380	22.0000	22.0000
75.0000	315.0000	5.2920	22.0000	22.0000
100.0000	315.0000	3.9690	22.0000	22.0000
125.0000	315.0000	3.1752	22.0000	22.0000
150.0000	315.0000	2.6460	22.0000	22.0000
175.0000	315.0000	2.2680	22.0000	22.0000
200.0000	315.0000	1.9845	22.0000	22.0000
225.0000	315.0000	1.7640	22.0000	22.0000
250.0000	315.0000	1.5876	21.7418	21.7333
275.0000	315.0000	1.4433	1.2231	1.1935
300.0000	315.0000	1.3230	.0000	.0000
325.0000	315.0000	1.2212	.0000	.0000
350.0000	315.0000	1.1340	.0000	.0000
375.0000	315.0000	1.0584	.0000	.0000
400.0000	315.0000	.9923	.0000	.0000
.0000	320.0000	.0000	22.0000	22.0000
25.0000	320.0000	16.1280	22.0000	22.0000
50.0000	320.0000	8.0640	22.0000	22.0000
75.0000	320.0000	5.3760	22.0000	22.0000
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

125.0000	320.0000	3.2256	22.0000	22.0000
150.0000	320.0000	2.6880	22.0000	22.0000
175.0000	320.0000	2.3040	22.0000	22.0000
200.0000	320.0000	2.0160	22.0000	22.0000
225.0000	320.0000	1.7920	22.0000	22.0000
250.0000	320.0000	1.6128	21.9578	21.9561
275.0000	320.0000	1.4662	3.8350	3.7670
300.0000	320.0000	1.3440	.0000	.0000
325.0000	320.0000	1.2406	.0000	.0000
350.0000	320.0000	1.1520	.0000	.0000
375.0000	320.0000	1.0752	.0000	.0000
400.0000	320.0000	1.0080	.0000	.0000
.0000	325.0000	.0000	22.0000	22.0000
25.0000	325.0000	16.3800	22.0000	22.0000
50.0000	325.0000	8.1900	22.0000	22.0000
75.0000	325.0000	5.4600	22.0000	22.0000
100.0000	325.0000	4.0950	22.0000	22.0000
125.0000	325.0000	3.2760	22.0000	22.0000
150.0000	325.0000	2.7300	22.0000	22.0000
175.0000	325.0000	2.3400	22.0000	22.0000
200.0000	325.0000	2.0475	22.0000	22.0000
225.0000	325.0000	1.8200	22.0000	22.0000
250.0000	325.0000	1.6380	21.9950	21.9948
275.0000	325.0000	1.4891	8.4746	8.3735
300.0000	325.0000	1.3650	.0005	.0005
325.0000	325.0000	1.2600	.0000	.0000
350.0000	325.0000	1.1700	.0000	.0000
375.0000	325.0000	1.0920	.0000	.0000
400.0000	325.0000	1.0238	.0000	.0000
.0000	330.0000	.0000	22.0000	22.0000
25.0000	330.0000	16.6320	22.0000	22.0000
50.0000	330.0000	8.3160	22.0000	22.0000
75.0000	330.0000	5.5440	22.0000	22.0000
100.0000	330.0000	4.1580	22.0000	22.0000
125.0000	330.0000	3.3264	22.0000	22.0000
150.0000	330.0000	2.7720	22.0000	22.0000
175.0000	330.0000	2.3760	22.0000	22.0000
200.0000	330.0000	2.0790	22.0000	22.0000
225.0000	330.0000	1.8480	22.0000	22.0000
250.0000	330.0000	1.6632	21.9996	21.9995
275.0000	330.0000	1.5120	13.9582	13.8588
300.0000	330.0000	1.3860	.0067	.0065
325.0000	330.0000	1.2794	.0000	.0000
350.0000	330.0000	1.1880	.0000	.0000
375.0000	330.0000	1.1088	.0000	.0000
400.0000	330.0000	1.0395	.0000	.0000
.0000	335.0000	.0000	22.0000	22.0000
25.0000	335.0000	16.8840	22.0000	22.0000
50.0000	335.0000	8.4420	22.0000	22.0000
75.0000	335.0000	5.6280	22.0000	22.0000
100.0000	335.0000	4.2210	22.0000	22.0000
125.0000	335.0000	3.3768	22.0000	22.0000
150.0000	335.0000	2.8140	22.0000	22.0000
175.0000	335.0000	2.4120	22.0000	22.0000
200.0000	335.0000	2.1105	22.0000	22.0000
225.0000	335.0000	1.8760	22.0000	22.0000
250.0000	335.0000	1.6884	22.0000	22.0000
275.0000	335.0000	1.5349	18.3458	18.2799
300.0000	335.0000	1.4070	.0613	.0592

350.0000	335.0000	1.2060	.0000	.0000
375.0000	335.0000	1.1256	.0000	.0000
400.0000	335.0000	1.0553	.0000	.0000
.0000	340.0000	.0000	22.0000	22.0000
25.0000	340.0000	17.1360	22.0000	22.0000
50.0000	340.0000	8.5680	22.0000	22.0000
75.0000	340.0000	5.7120	22.0000	22.0000
100.0000	340.0000	4.2840	22.0000	22.0000
125.0000	340.0000	3.4272	22.0000	22.0000
150.0000	340.0000	2.8560	22.0000	22.0000
175.0000	340.0000	2.4480	22.0000	22.0000
200.0000	340.0000	2.1420	22.0000	22.0000
225.0000	340.0000	1.9040	22.0000	22.0000
250.0000	340.0000	1.7136	22.0000	22.0000
275.0000	340.0000	1.5578	20.7610	20.7311
300.0000	340.0000	1.4280	.3673	.3568
325.0000	340.0000	1.3182	.0000	.0000
350.0000	340.0000	1.2240	.0000	.0000
375.0000	340.0000	1.1424	.0000	.0000
400.0000	340.0000	1.0710	.0000	.0000
.0000	345.0000	.0000	22.0000	22.0000
25.0000	345.0000	17.3880	22.0000	22.0000
50.0000	345.0000	8.6940	22.0000	22.0000
75.0000	345.0000	5.7960	22.0000	22.0000
100.0000	345.0000	4.3470	22.0000	22.0000
125.0000	345.0000	3.4776	22.0000	22.0000
150.0000	345.0000	2.8980	22.0000	22.0000
175.0000	345.0000	2.4840	22.0000	22.0000
200.0000	345.0000	2.1735	22.0000	22.0000
225.0000	345.0000	1.9320	22.0000	22.0000
250.0000	345.0000	1.7388	22.0000	22.0000
275.0000	345.0000	1.5807	21.6897	21.6802
300.0000	345.0000	1.4490	1.4912	1.4581
325.0000	345.0000	1.3375	.0000	.0000
350.0000	345.0000	1.2420	.0000	.0000
375.0000	345.0000	1.1592	.0000	.0000
400.0000	345.0000	1.0868	.0000	.0000
.0000	350.0000	.0000	22.0000	22.0000
25.0000	350.0000	17.6400	22.0000	22.0000
50.0000	350.0000	8.8200	22.0000	22.0000
75.0000	350.0000	5.8800	22.0000	22.0000
100.0000	350.0000	4.4100	22.0000	22.0000
125.0000	350.0000	3.5280	22.0000	22.0000
150.0000	350.0000	2.9400	22.0000	22.0000
175.0000	350.0000	2.5200	22.0000	22.0000
200.0000	350.0000	2.2050	22.0000	22.0000
225.0000	350.0000	1.9600	22.0000	22.0000
250.0000	350.0000	1.7640	22.0000	22.0000
275.0000	350.0000	1.6036	21.9426	21.9405
300.0000	350.0000	1.4700	4.2462	4.1768
325.0000	350.0000	1.3569	.0001	.0001
350.0000	350.0000	1.2600	.0000	.0000
375.0000	350.0000	1.1760	.0000	.0000
400.0000	350.0000	1.1025	.0000	.0000
.0000	355.0000	.0000	22.0000	22.0000
25.0000	355.0000	17.8920	22.0000	22.0000
50.0000	355.0000	8.9460	22.0000	22.0000
75.0000	355.0000	5.9640	22.0000	22.0000
100.0000	355.0000	4.4730	22.0000	22.0000

150.0000	355.0000	2.9820	22.0000	22.0000
175.0000	355.0000	2.5560	22.0000	22.0000
200.0000	355.0000	2.2365	22.0000	22.0000
225.0000	355.0000	1.9880	22.0000	22.0000
250.0000	355.0000	1.7892	22.0000	22.0000
275.0000	355.0000	1.6265	21.9922	21.9918
300.0000	355.0000	1.4910	8.8272	8.7293
325.0000	355.0000	1.3763	.0011	.0011
350.0000	355.0000	1.2780	.0000	.0000
375.0000	355.0000	1.1928	.0000	.0000
400.0000	355.0000	1.1183	.0000	.0000
.0000	360.0000	.0000	22.0000	22.0000
25.0000	360.0000	18.1440	22.0000	22.0000
50.0000	360.0000	9.0720	22.0000	22.0000
75.0000	360.0000	6.0480	22.0000	22.0000
100.0000	360.0000	4.5360	22.0000	22.0000
125.0000	360.0000	3.6288	22.0000	22.0000
150.0000	360.0000	3.0240	22.0000	22.0000
175.0000	360.0000	2.5920	22.0000	22.0000
200.0000	360.0000	2.2680	22.0000	22.0000
225.0000	360.0000	2.0160	22.0000	22.0000
250.0000	360.0000	1.8144	22.0000	22.0000
275.0000	360.0000	1.6495	21.9992	21.9992
300.0000	360.0000	1.5120	14.0757	13.9810
325.0000	360.0000	1.3957	.0126	.0122
350.0000	360.0000	1.2960	.0000	.0000
375.0000	360.0000	1.2096	.0000	.0000
400.0000	360.0000	1.1340	.0000	.0000
.0000	365.0000	.0000	22.0000	22.0000
25.0000	365.0000	18.3960	22.0000	22.0000
50.0000	365.0000	9.1980	22.0000	22.0000
75.0000	365.0000	6.1320	22.0000	22.0000
100.0000	365.0000	4.5990	22.0000	22.0000
125.0000	365.0000	3.6792	22.0000	22.0000
150.0000	365.0000	3.0660	22.0000	22.0000
175.0000	365.0000	2.6280	22.0000	22.0000
200.0000	365.0000	2.2995	22.0000	22.0000
225.0000	365.0000	2.0440	22.0000	22.0000
250.0000	365.0000	1.8396	22.0000	22.0000
275.0000	365.0000	1.6724	21.9999	21.9999
300.0000	365.0000	1.5330	18.2793	18.2155
325.0000	365.0000	1.4151	.0948	.0918
350.0000	365.0000	1.3140	.0000	.0000
375.0000	365.0000	1.2264	.0000	.0000
400.0000	365.0000	1.1498	.0000	.0000

```
*****************************************************************************
*                                                                           *
*        ONE-DIMENSIONAL CONVECTIVE-DISPERSIVE EQUATION                     *
*                                                                           *
*        SEMI-INFINITE PROFILE                                              *
*        NO PRODUCTION AND DECAY                                            *
*        LINEAR ADSORPTION (R)                                              *
*        CONSTANT INITIAL CONCENTRATION (CI)                                *
*        INPUT CONCENTRATION = CO (T.LE.TO)                                 *
*                            =  0 (T.GT.TO)                                 *
*                                                                           *
*        FT HUACHUCA CONCEPTUAL RECHARGE BASINS - NITRATE CONC. RUN 2       *
*                                                                           *
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INPUT PARAMETERS
==========

V =	1.2600	D =	.1000
R =	1.5000	TO =	750.0000
CI =	.0000	CO =	22.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	.0000	.0000	.0000	.0000
50.0000	.0000	.0000	.0000	.0000
100.0000	.0000	.0000	.0000	.0000
150.0000	.0000	.0000	.0000	.0000
200.0000	.0000	.0000	.0000	.0000
250.0000	.0000	.0000	.0000	.0000
300.0000	.0000	.0000	.0000	.0000
350.0000	.0000	.0000	.0000	.0000
400.0000	.0000	.0000	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	30.0000	.0000	22.0000	22.0000
50.0000	30.0000	.7560	.0000	.0000
100.0000	30.0000	.3780	.0000	.0000
150.0000	30.0000	.2520	.0000	.0000
200.0000	30.0000	.1890	.0000	.0000
250.0000	30.0000	.1512	.0000	.0000
300.0000	30.0000	.1260	.0000	.0000
350.0000	30.0000	.1080	.0000	.0000
400.0000	30.0000	.0945	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	60.0000	.0000	22.0000	22.0000
50.0000	60.0000	1.5120	12.4817	12.2377
100.0000	60.0000	.7560	.0000	.0000
150.0000	60.0000	.5040	.0000	.0000

250.0000	60.0000	.3024	.0000	.0000
300.0000	60.0000	.2520	.0000	.0000
350.0000	60.0000	.2160	.0000	.0000
400.0000	60.0000	.1890	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	90.0000	.0000	22.0000	22.0000
50.0000	90.0000	2.2680	22.0000	22.0000
100.0000	90.0000	1.1340	.0000	.0000
150.0000	90.0000	.7560	.0000	.0000
200.0000	90.0000	.5670	.0000	.0000
250.0000	90.0000	.4536	.0000	.0000
300.0000	90.0000	.3780	.0000	.0000
350.0000	90.0000	.3240	.0000	.0000
400.0000	90.0000	.2835	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	120.0000	.0000	22.0000	22.0000
50.0000	120.0000	3.0240	22.0000	22.0000
100.0000	120.0000	1.5120	12.9150	12.7442
150.0000	120.0000	1.0080	.0000	.0000
200.0000	120.0000	.7560	.0000	.0000
250.0000	120.0000	.6048	.0000	.0000
300.0000	120.0000	.5040	.0000	.0000
350.0000	120.0000	.4320	.0000	.0000
400.0000	120.0000	.3780	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	150.0000	.0000	22.0000	22.0000
50.0000	150.0000	3.7800	22.0000	22.0000
100.0000	150.0000	1.8900	22.0000	22.0000
150.0000	150.0000	1.2600	.0000	.0000
200.0000	150.0000	.9450	.0000	.0000
250.0000	150.0000	.7560	.0000	.0000
300.0000	150.0000	.6300	.0000	.0000
350.0000	150.0000	.5400	.0000	.0000
400.0000	150.0000	.4725	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	180.0000	.0000	22.0000	22.0000
50.0000	180.0000	4.5360	22.0000	22.0000
100.0000	180.0000	2.2680	22.0000	22.0000
150.0000	180.0000	1.5120	13.2670	13.1290
200.0000	180.0000	1.1340	.0000	.0000
250.0000	180.0000	.9072	.0000	.0000
300.0000	180.0000	.7560	.0000	.0000
350.0000	180.0000	.6480	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	210.0000	.0000	22.0000	22.0000
50.0000	210.0000	5.2920	22.0000	22.0000
100.0000	210.0000	2.6460	22.0000	22.0000
150.0000	210.0000	1.7640	22.0000	22.0000
200.0000	210.0000	1.3230	.0001	.0001
250.0000	210.0000	1.0584	.0000	.0000
300.0000	210.0000	.8820	.0000	.0000
350.0000	210.0000	.7560	.0000	.0000
400.0000	210.0000	.6615	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	240.0000	.0000	22.0000	22.0000
50.0000	240.0000	6.0480	22.0000	22.0000
100.0000	240.0000	3.0240	22.0000	22.0000
150.0000	240.0000	2.0160	22.0000	22.0000
200.0000	240.0000	1.5120	13.5685	13.4501
250.0000	240.0000	1.2096	.0000	.0000
300.0000	240.0000	1.0080	.0000	.0000
350.0000	240.0000	.8640	.0000	.0000
400.0000	240.0000	.7560	.0000	.0000
.0000	270.0000	.0000	22.0000	22.0000
50.0000	270.0000	6.8040	22.0000	22.0000
100.0000	270.0000	3.4020	22.0000	22.0000
150.0000	270.0000	2.2680	22.0000	22.0000
200.0000	270.0000	1.7010	21.9999	21.9999
250.0000	270.0000	1.3608	.0013	.0012
300.0000	270.0000	1.1340	.0000	.0000
350.0000	270.0000	.9720	.0000	.0000
400.0000	270.0000	.8505	.0000	.0000
.0000	300.0000	.0000	22.0000	22.0000
50.0000	300.0000	7.5600	22.0000	22.0000
100.0000	300.0000	3.7800	22.0000	22.0000
150.0000	300.0000	2.5200	22.0000	22.0000
200.0000	300.0000	1.8900	22.0000	22.0000
250.0000	300.0000	1.5120	13.8350	13.7302
300.0000	300.0000	1.2600	.0000	.0000
350.0000	300.0000	1.0800	.0000	.0000
400.0000	300.0000	.9450	.0000	.0000
.0000	330.0000	.0000	22.0000	22.0000
50.0000	330.0000	8.3160	22.0000	22.0000
100.0000	330.0000	4.1580	22.0000	22.0000
150.0000	330.0000	2.7720	22.0000	22.0000
200.0000	330.0000	2.0790	22.0000	22.0000
250.0000	330.0000	1.6632	21.9996	21.9995
300.0000	330.0000	1.3860	.0067	.0065
350.0000	330.0000	1.1880	.0000	.0000
400.0000	330.0000	1.0395	.0000	.0000
.0000	360.0000	.0000	22.0000	22.0000
50.0000	360.0000	9.0720	22.0000	22.0000
100.0000	360.0000	4.5360	22.0000	22.0000
150.0000	360.0000	3.0240	22.0000	22.0000

250.0000	360.0000	1.8144	22.0000	22.0000
300.0000	360.0000	1.5120	14.0757	13.9810
350.0000	360.0000	1.2960	.0000	.0000
400.0000	360.0000	1.1340	.0000	.0000
.0000	390.0000	.0000	22.0000	22.0000
50.0000	390.0000	9.8280	22.0000	22.0000
100.0000	390.0000	4.9140	22.0000	22.0000
150.0000	390.0000	3.2760	22.0000	22.0000
200.0000	390.0000	2.4570	22.0000	22.0000
250.0000	390.0000	1.9656	22.0000	22.0000
300.0000	390.0000	1.6380	21.9986	21.9986
350.0000	390.0000	1.4040	.0216	.0208
400.0000	390.0000	1.2285	.0000	.0000
.0000	420.0000	.0000	22.0000	22.0000
50.0000	420.0000	10.5840	22.0000	22.0000
100.0000	420.0000	5.2920	22.0000	22.0000
150.0000	420.0000	3.5280	22.0000	22.0000
200.0000	420.0000	2.6460	22.0000	22.0000
250.0000	420.0000	2.1168	22.0000	22.0000
300.0000	420.0000	1.7640	22.0000	22.0000
350.0000	420.0000	1.5120	14.2960	14.2092
400.0000	420.0000	1.3230	.0000	.0000
.0000	450.0000	.0000	22.0000	22.0000
50.0000	450.0000	11.3400	22.0000	22.0000
100.0000	450.0000	5.6700	22.0000	22.0000
150.0000	450.0000	3.7800	22.0000	22.0000
200.0000	450.0000	2.8350	22.0000	22.0000
250.0000	450.0000	2.2680	22.0000	22.0000
300.0000	450.0000	1.8900	22.0000	22.0000
350.0000	450.0000	1.6200	21.9968	21.9967
400.0000	450.0000	1.4175	.0511	.0496
.0000	480.0000	.0000	22.0000	22.0000
50.0000	480.0000	12.0960	22.0000	22.0000
100.0000	480.0000	6.0480	22.0000	22.0000
150.0000	480.0000	4.0320	22.0000	22.0000
200.0000	480.0000	3.0240	22.0000	22.0000
250.0000	480.0000	2.4192	22.0000	22.0000
300.0000	480.0000	2.0160	22.0000	22.0000
350.0000	480.0000	1.7280	22.0000	22.0000
400.0000	480.0000	1.5120	14.5000	14.4196
.0000	510.0000	.0000	22.0000	22.0000
50.0000	510.0000	12.8520	22.0000	22.0000
100.0000	510.0000	6.4260	22.0000	22.0000
150.0000	510.0000	4.2840	22.0000	22.0000
200.0000	510.0000	3.2130	22.0000	22.0000
250.0000	510.0000	2.5704	22.0000	22.0000
300.0000	510.0000	2.1420	22.0000	22.0000
350.0000	510.0000	1.8360	22.0000	22.0000
400.0000	510.0000	1.6065	21.9939	21.9937
.0000	540.0000	.0000	22.0000	22.0000
50.0000	540.0000	13.6080	22.0000	22.0000
100.0000	540.0000	6.8040	22.0000	22.0000
150.0000	540.0000	4.5360	22.0000	22.0000
200.0000	540.0000	3.4020	22.0000	22.0000
250.0000	540.0000	2.7216	22.0000	22.0000
300.0000	540.0000	2.2680	22.0000	22.0000
350.0000	540.0000	1.9440	22.0000	22.0000
400.0000	540.0000	1.7010	22.0000	22.0000
.0000	570.0000	.0000	22.0000	22.0000

100.0000	570.0000	7.1820	22.0000	22.0000
150.0000	570.0000	4.7880	22.0000	22.0000
200.0000	570.0000	3.5910	22.0000	22.0000
250.0000	570.0000	2.8728	22.0000	22.0000
300.0000	570.0000	2.3940	22.0000	22.0000
350.0000	570.0000	2.0520	22.0000	22.0000
400.0000	570.0000	1.7955	22.0000	22.0000
.0000	600.0000	.0000	22.0000	22.0000
50.0000	600.0000	15.1200	22.0000	22.0000
100.0000	600.0000	7.5600	22.0000	22.0000
150.0000	600.0000	5.0400	22.0000	22.0000
200.0000	600.0000	3.7800	22.0000	22.0000
250.0000	600.0000	3.0240	22.0000	22.0000
300.0000	600.0000	2.5200	22.0000	22.0000
350.0000	600.0000	2.1600	22.0000	22.0000
400.0000	600.0000	1.8900	22.0000	22.0000
.0000	630.0000	.0000	22.0000	22.0000
50.0000	630.0000	15.8760	22.0000	22.0000
100.0000	630.0000	7.9380	22.0000	22.0000
150.0000	630.0000	5.2920	22.0000	22.0000
200.0000	630.0000	3.9690	22.0000	22.0000
250.0000	630.0000	3.1752	22.0000	22.0000
300.0000	630.0000	2.6460	22.0000	22.0000
350.0000	630.0000	2.2680	22.0000	22.0000
400.0000	630.0000	1.9845	22.0000	22.0000
.0000	660.0000	.0000	22.0000	22.0000
50.0000	660.0000	16.6320	22.0000	22.0000
100.0000	660.0000	8.3160	22.0000	22.0000
150.0000	660.0000	5.5440	22.0000	22.0000
200.0000	660.0000	4.1580	22.0000	22.0000
250.0000	660.0000	3.3264	22.0000	22.0000
300.0000	660.0000	2.7720	22.0000	22.0000
350.0000	660.0000	2.3760	22.0000	22.0000
400.0000	660.0000	2.0790	22.0000	22.0000
.0000	690.0000	.0000	22.0000	22.0000
50.0000	690.0000	17.3880	22.0000	22.0000
100.0000	690.0000	8.6940	22.0000	22.0000
150.0000	690.0000	5.7960	22.0000	22.0000
200.0000	690.0000	4.3470	22.0000	22.0000
250.0000	690.0000	3.4776	22.0000	22.0000
300.0000	690.0000	2.8980	22.0000	22.0000
350.0000	690.0000	2.4840	22.0000	22.0000
400.0000	690.0000	2.1735	22.0000	22.0000
.0000	720.0000	.0000	22.0000	22.0000
50.0000	720.0000	18.1440	22.0000	22.0000
100.0000	720.0000	9.0720	22.0000	22.0000
150.0000	720.0000	6.0480	22.0000	22.0000
200.0000	720.0000	4.5360	22.0000	22.0000
250.0000	720.0000	3.6288	22.0000	22.0000
300.0000	720.0000	3.0240	22.0000	22.0000
350.0000	720.0000	2.5920	22.0000	22.0000
400.0000	720.0000	2.2680	22.0000	22.0000
.0000	750.0000	.0000	22.0000	22.0000
50.0000	750.0000	18.9000	22.0000	22.0000
100.0000	750.0000	9.4500	22.0000	22.0000
150.0000	750.0000	6.3000	22.0000	22.0000
200.0000	750.0000	4.7250	22.0000	22.0000
250.0000	750.0000	3.7800	22.0000	22.0000
300.0000	750.0000	3.1500	22.0000	22.0000

400.0000 750.0000 2.3625 22.0000 22.0000

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*                                                                             *
*        ONE-DIMENSIONAL CONVECTIVE-DISPERSIVE EQUATION                       *
*                                                                             *
*        SEMI-INFINITE PROFILE                                                *
*        NO PRODUCTION AND DECAY                                              *
*        LINEAR ADSORPTION (R)                                                *
*        CONSTANT INITIAL CONCENTRATION (CI)                                  *
*        INPUT CONCENTRATION = CO (T.LE.TO)                                   *
*                            =  0 (T.GT.TO)                                   *
*                                                                             *
*        FT HUACHUCA CONCEPTUAL RECHARGE BASINS - NITRATE CONC. RUN 3         *
*                                                                             *
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INPUT PARAMETERS
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V =	.4000	D =	.1000
R =	1.5000	TO =	2250.0000
CI =	.0000	CO =	22.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	.0000	.0000	.0000	.0000
50.0000	.0000	.0000	.0000	.0000
100.0000	.0000	.0000	.0000	.0000
150.0000	.0000	.0000	.0000	.0000
200.0000	.0000	.0000	.0000	.0000
250.0000	.0000	.0000	.0000	.0000
300.0000	.0000	.0000	.0000	.0000
350.0000	.0000	.0000	.0000	.0000
400.0000	.0000	.0000	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	90.0000	.0000	22.0000	22.0000
50.0000	90.0000	.7200	.0000	.0000
100.0000	90.0000	.3600	.0000	.0000
150.0000	90.0000	.2400	.0000	.0000
200.0000	90.0000	.1800	.0000	.0000
250.0000	90.0000	.1440	.0000	.0000
300.0000	90.0000	.1200	.0000	.0000
350.0000	90.0000	.1029	.0000	.0000
400.0000	90.0000	.0900	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	180.0000	.0000	22.0000	22.0000
50.0000	180.0000	1.4400	7.9167	7.5038
[illegible]	[illegible]	.7200	.0000	.0000

150.0000	180.0000	.4800	.0000	.0000
200.0000	180.0000	.3600	.0000	.0000
250.0000	180.0000	.2880	.0000	.0000
300.0000	180.0000	.2400	.0000	.0000
350.0000	180.0000	.2057	.0000	.0000
400.0000	180.0000	.1800	.0000	.0000

DISTANCE	TIME	PORE VOLUME	CONCENTRATION	
(X)	(T)	(VVO)	FIRST-TYPE BC	THIRD-TYPE BC
.0000	270.0000	.0000	22.0000	22.0000
50.0000	270.0000	2.1600	21.9978	21.9974
100.0000	270.0000	1.0800	.0000	.0000
150.0000	270.0000	.7200	.0000	.0000
200.0000	270.0000	.5400	.0000	.0000
250.0000	270.0000	.4320	.0000	.0000
300.0000	270.0000	.3600	.0000	.0000
350.0000	270.0000	.3086	.0000	.0000
400.0000	270.0000	.2700	.0000	.0000

DISTANCE	TIME	PORE VOLUME	CONCENTRATION	
(X)	(T)	(VVO)	FIRST-TYPE BC	THIRD-TYPE BC
.0000	360.0000	.0000	22.0000	22.0000
50.0000	360.0000	2.8800	22.0000	22.0000
100.0000	360.0000	1.4400	6.4630	6.1947
150.0000	360.0000	.9600	.0000	.0000
200.0000	360.0000	.7200	.0000	.0000
250.0000	360.0000	.5760	.0000	.0000
300.0000	360.0000	.4800	.0000	.0000
350.0000	360.0000	.4114	.0000	.0000
400.0000	360.0000	.3600	.0000	.0000

DISTANCE	TIME	PORE VOLUME	CONCENTRATION	
(X)	(T)	(VVO)	FIRST-TYPE BC	THIRD-TYPE BC
.0000	450.0000	.0000	22.0000	22.0000
50.0000	450.0000	3.6000	22.0000	22.0000
100.0000	450.0000	1.8000	21.9030	21.8929
150.0000	450.0000	1.2000	.0013	.0012
200.0000	450.0000	.9000	.0000	.0000
250.0000	450.0000	.7200	.0000	.0000
300.0000	450.0000	.6000	.0000	.0000
350.0000	450.0000	.5143	.0000	.0000
400.0000	450.0000	.4500	.0000	.0000

DISTANCE	TIME	PORE VOLUME	CONCENTRATION	
(X)	(T)	(VVO)	FIRST-TYPE BC	THIRD-TYPE BC
.0000	540.0000	.0000	22.0000	22.0000
50.0000	540.0000	4.3200	22.0000	22.0000
100.0000	540.0000	2.1600	22.0000	22.0000
150.0000	540.0000	1.4400	5.4716	5.2702
200.0000	540.0000	1.0800	.0000	.0000
250.0000	540.0000	.8640	.0000	.0000

350.0000	540.0000	.6171	.0000	.0000
400.0000	540.0000	.5400	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	630.0000	.0000	22.0000	22.0000
50.0000	630.0000	5.0400	22.0000	22.0000
100.0000	630.0000	2.5200	22.0000	22.0000
150.0000	630.0000	1.6800	21.4919	21.4571
200.0000	630.0000	1.2600	.0058	.0052
250.0000	630.0000	1.0080	.0000	.0000
300.0000	630.0000	.8400	.0000	.0000
350.0000	630.0000	.7200	.0000	.0000
400.0000	630.0000	.6300	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	720.0000	.0000	22.0000	22.0000
50.0000	720.0000	5.7600	22.0000	22.0000
100.0000	720.0000	2.8800	22.0000	22.0000
150.0000	720.0000	1.9200	21.9998	21.9998
200.0000	720.0000	1.4400	4.7135	4.5530
250.0000	720.0000	1.1520	.0000	.0000
300.0000	720.0000	.9600	.0000	.0000
350.0000	720.0000	.8229	.0000	.0000
400.0000	720.0000	.7200	.0000	.0000
.0000	810.0000	.0000	22.0000	22.0000
50.0000	810.0000	6.4800	22.0000	22.0000
100.0000	810.0000	3.2400	22.0000	22.0000
150.0000	810.0000	2.1600	22.0000	22.0000
200.0000	810.0000	1.6200	20.7067	20.6423
250.0000	810.0000	1.2960	.0127	.0117
300.0000	810.0000	1.0800	.0000	.0000
350.0000	810.0000	.9257	.0000	.0000
400.0000	810.0000	.8100	.0000	.0000
.0000	900.0000	.0000	22.0000	22.0000
50.0000	900.0000	7.2000	22.0000	22.0000
100.0000	900.0000	3.6000	22.0000	22.0000
150.0000	900.0000	2.4000	22.0000	22.0000
200.0000	900.0000	1.8000	21.9974	21.9972
250.0000	900.0000	1.4400	4.1037	3.9716
300.0000	900.0000	1.2000	.0000	.0000
350.0000	900.0000	1.0286	.0000	.0000
400.0000	900.0000	.9000	.0000	.0000
.0000	990.0000	.0000	22.0000	22.0000
50.0000	990.0000	7.9200	22.0000	22.0000
100.0000	990.0000	3.9600	22.0000	22.0000
150.0000	990.0000	2.6400	22.0000	22.0000
200.0000	990.0000	1.9800	22.0000	22.0000
250.0000	990.0000	1.5840	19.6401	19.5492
300.0000	990.0000	1.3200	.0203	.0189
350.0000	990.0000	1.1314	.0000	.0000
400.0000	990.0000	.9900	.0000	.0000
.0000	1080.0000	.0000	22.0000	22.0000
50.0000	1080.0000	8.6400	22.0000	22.0000

150.0000	1080.0000	2.8800	22.0000	22.0000
200.0000	1080.0000	2.1600	22.0000	22.0000
250.0000	1080.0000	1.7280	21.9843	21.9831
300.0000	1080.0000	1.4400	3.5990	3.4881
350.0000	1080.0000	1.2343	.0000	.0000
400.0000	1080.0000	1.0800	.0000	.0000
.0000	1170.0000	.0000	22.0000	22.0000
50.0000	1170.0000	9.3600	22.0000	22.0000
100.0000	1170.0000	4.6800	22.0000	22.0000
150.0000	1170.0000	3.1200	22.0000	22.0000
200.0000	1170.0000	2.3400	22.0000	22.0000
250.0000	1170.0000	1.8720	22.0000	22.0000
300.0000	1170.0000	1.5600	18.4095	18.2988
350.0000	1170.0000	1.3371	.0274	.0257
400.0000	1170.0000	1.1700	.0000	.0000
.0000	1260.0000	.0000	22.0000	22.0000
50.0000	1260.0000	10.0800	22.0000	22.0000
100.0000	1260.0000	5.0400	22.0000	22.0000
150.0000	1260.0000	3.3600	22.0000	22.0000
200.0000	1260.0000	2.5200	22.0000	22.0000
250.0000	1260.0000	2.0160	22.0000	22.0000
300.0000	1260.0000	1.6800	21.9435	21.9399
350.0000	1260.0000	1.4400	3.1735	3.0790
400.0000	1260.0000	1.2600	.0000	.0000
.0000	1350.0000	.0000	22.0000	22.0000
50.0000	1350.0000	10.8000	22.0000	22.0000
100.0000	1350.0000	5.4000	22.0000	22.0000
150.0000	1350.0000	3.6000	22.0000	22.0000
200.0000	1350.0000	2.7000	22.0000	22.0000
250.0000	1350.0000	2.1600	22.0000	22.0000
300.0000	1350.0000	1.8000	21.9999	21.9999
350.0000	1350.0000	1.5429	17.1090	16.9850
400.0000	1350.0000	1.3500	.0334	.0315
.0000	1440.0000	.0000	22.0000	22.0000
50.0000	1440.0000	11.5200	22.0000	22.0000
100.0000	1440.0000	5.7600	22.0000	22.0000
150.0000	1440.0000	3.8400	22.0000	22.0000
200.0000	1440.0000	2.8800	22.0000	22.0000
250.0000	1440.0000	2.3040	22.0000	22.0000
300.0000	1440.0000	1.9200	22.0000	22.0000
350.0000	1440.0000	1.6457	21.8526	21.8449
400.0000	1440.0000	1.4400	2.8100	2.7287
.0000	1530.0000	.0000	22.0000	22.0000
50.0000	1530.0000	12.2400	22.0000	22.0000
100.0000	1530.0000	6.1200	22.0000	22.0000
150.0000	1530.0000	4.0800	22.0000	22.0000
200.0000	1530.0000	3.0600	22.0000	22.0000
250.0000	1530.0000	2.4480	22.0000	22.0000
300.0000	1530.0000	2.0400	22.0000	22.0000
350.0000	1530.0000	1.7486	21.9995	21.9995
400.0000	1530.0000	1.5300	15.8031	15.6718
.0000	1620.0000	.0000	22.0000	22.0000
50.0000	1620.0000	12.9600	22.0000	22.0000
100.0000	1620.0000	6.4800	22.0000	22.0000
150.0000	1620.0000	4.3200	22.0000	22.0000
200.0000	1620.0000	3.2400	22.0000	22.0000
250.0000	1620.0000	2.5920	22.0000	22.0000
300.0000	1620.0000	2.1600	22.0000	22.0000
350.0000	1620.0000	1.8514	22.0000	22.0000

.0000	1710.0000	.0000	22.0000	22.0000
50.0000	1710.0000	13.6800	22.0000	22.0000
100.0000	1710.0000	6.8400	22.0000	22.0000
150.0000	1710.0000	4.5600	22.0000	22.0000
200.0000	1710.0000	3.4200	22.0000	22.0000
250.0000	1710.0000	2.7360	22.0000	22.0000
300.0000	1710.0000	2.2800	22.0000	22.0000
350.0000	1710.0000	1.9543	22.0000	22.0000
400.0000	1710.0000	1.7100	21.9979	21.9977
.0000	1800.0000	.0000	22.0000	22.0000
50.0000	1800.0000	14.4000	22.0000	22.0000
100.0000	1800.0000	7.2000	22.0000	22.0000
150.0000	1800.0000	4.8000	22.0000	22.0000
200.0000	1800.0000	3.6000	22.0000	22.0000
250.0000	1800.0000	2.8800	22.0000	22.0000
300.0000	1800.0000	2.4000	22.0000	22.0000
350.0000	1800.0000	2.0571	22.0000	22.0000
400.0000	1800.0000	1.8000	22.0000	22.0000
.0000	1890.0000	.0000	22.0000	22.0000
50.0000	1890.0000	15.1200	22.0000	22.0000
100.0000	1890.0000	7.5600	22.0000	22.0000
150.0000	1890.0000	5.0400	22.0000	22.0000
200.0000	1890.0000	3.7800	22.0000	22.0000
250.0000	1890.0000	3.0240	22.0000	22.0000
300.0000	1890.0000	2.5200	22.0000	22.0000
350.0000	1890.0000	2.1600	22.0000	22.0000
400.0000	1890.0000	1.8900	22.0000	22.0000
.0000	1980.0000	.0000	22.0000	22.0000
50.0000	1980.0000	15.8400	22.0000	22.0000
100.0000	1980.0000	7.9200	22.0000	22.0000
150.0000	1980.0000	5.2800	22.0000	22.0000
200.0000	1980.0000	3.9600	22.0000	22.0000
250.0000	1980.0000	3.1680	22.0000	22.0000
300.0000	1980.0000	2.6400	22.0000	22.0000
350.0000	1980.0000	2.2629	22.0000	22.0000
400.0000	1980.0000	1.9800	22.0000	22.0000
.0000	2070.0000	.0000	22.0000	22.0000
50.0000	2070.0000	16.5600	22.0000	22.0000
100.0000	2070.0000	8.2800	22.0000	22.0000
150.0000	2070.0000	5.5200	22.0000	22.0000
200.0000	2070.0000	4.1400	22.0000	22.0000
250.0000	2070.0000	3.3120	22.0000	22.0000
300.0000	2070.0000	2.7600	22.0000	22.0000
350.0000	2070.0000	2.3657	22.0000	22.0000
400.0000	2070.0000	2.0700	22.0000	22.0000
.0000	2160.0000	.0000	22.0000	22.0000
50.0000	2160.0000	17.2800	22.0000	22.0000
100.0000	2160.0000	8.6400	22.0000	22.0000
150.0000	2160.0000	5.7600	22.0000	22.0000
200.0000	2160.0000	4.3200	22.0000	22.0000
250.0000	2160.0000	3.4560	22.0000	22.0000
300.0000	2160.0000	2.8800	22.0000	22.0000
350.0000	2160.0000	2.4686	22.0000	22.0000
400.0000	2160.0000	2.1600	22.0000	22.0000
.0000	2250.0000	.0000	22.0000	22.0000
50.0000	2250.0000	18.0000	22.0000	22.0000
100.0000	2250.0000	9.0000	22.0000	22.0000
150.0000	2250.0000	6.0000	22.0000	22.0000
200.0000	2250.0000	4.5000	22.0000	22.0000

300.0000	2250.0000	3.0000	22.0000	22.0000
350.0000	2250.0000	2.5714	22.0000	22.0000
400.0000	2250.0000	2.2500	22.0000	22.0000

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*                                                                           *
*        ONE-DIMENSIONAL CONVECTIVE-DISPERSIVE EQUATION                     *
*                                                                           *
*        SEMI-INFINITE PROFILE                                              *
*        NO PRODUCTION AND DECAY                                            *
*        LINEAR ADSORPTION (R)                                              *
*        CONSTANT INITIAL CONCENTRATION (CI)                                *
*        INPUT CONCENTRATION = CO (T.LE.TO)                                 *
*                            =  0 (T.GT.TO)                                 *
*                                                                           *
*        FT HUACHUCA CONCEPTUAL RECHARGE BASINS - NITRATE CONC. RUN 4       *
*                                                                           *
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INPUT PARAMETERS
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V =	1.2600	D =	.1000
R =	1.0000	TO =	750.0000
CI =	.0000	CO =	22.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	.0000	.0000	.0000	.0000
50.0000	.0000	.0000	.0000	.0000
100.0000	.0000	.0000	.0000	.0000
150.0000	.0000	.0000	.0000	.0000
200.0000	.0000	.0000	.0000	.0000
250.0000	.0000	.0000	.0000	.0000
300.0000	.0000	.0000	.0000	.0000
350.0000	.0000	.0000	.0000	.0000
400.0000	.0000	.0000	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	30.0000	.0000	22.0000	22.0000
50.0000	30.0000	.7560	.0000	.0000
100.0000	30.0000	.3780	.0000	.0000
150.0000	30.0000	.2520	.0000	.0000
200.0000	30.0000	.1890	.0000	.0000
250.0000	30.0000	.1512	.0000	.0000
300.0000	30.0000	.1260	.0000	.0000
350.0000	30.0000	.1080	.0000	.0000
400.0000	30.0000	.0945	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	60.0000	.0000	22.0000	22.0000
50.0000	60.0000	1.5120	22.0000	22.0000
100.0000	60.0000	.7560	.0000	.0000
150.0000	60.0000	.5040	.0000	.0000

250.0000	60.0000	.3024	.0000	.0000
300.0000	60.0000	.2520	.0000	.0000
350.0000	60.0000	.2160	.0000	.0000
400.0000	60.0000	.1890	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	90.0000	.0000	22.0000	22.0000
50.0000	90.0000	2.2680	22.0000	22.0000
100.0000	90.0000	1.1340	21.9837	21.9826
150.0000	90.0000	.7560	.0000	.0000
200.0000	90.0000	.5670	.0000	.0000
250.0000	90.0000	.4536	.0000	.0000
300.0000	90.0000	.3780	.0000	.0000
350.0000	90.0000	.3240	.0000	.0000
400.0000	90.0000	.2835	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	120.0000	.0000	22.0000	22.0000
50.0000	120.0000	3.0240	22.0000	22.0000
100.0000	120.0000	1.5120	22.0000	22.0000
150.0000	120.0000	1.0080	13.2670	13.1290
200.0000	120.0000	.7560	.0000	.0000
250.0000	120.0000	.6048	.0000	.0000
300.0000	120.0000	.5040	.0000	.0000
350.0000	120.0000	.4320	.0000	.0000
400.0000	120.0000	.3780	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	150.0000	.0000	22.0000	22.0000
50.0000	150.0000	3.7800	22.0000	22.0000
100.0000	150.0000	1.8900	22.0000	22.0000
150.0000	150.0000	1.2600	22.0000	22.0000
200.0000	150.0000	.9450	.5072	.4902
250.0000	150.0000	.7560	.0000	.0000
300.0000	150.0000	.6300	.0000	.0000
350.0000	150.0000	.5400	.0000	.0000
400.0000	150.0000	.4725	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	180.0000	.0000	22.0000	22.0000
50.0000	180.0000	4.5360	22.0000	22.0000
100.0000	180.0000	2.2680	22.0000	22.0000
150.0000	180.0000	1.5120	22.0000	22.0000
200.0000	180.0000	1.1340	21.9999	21.9999
250.0000	180.0000	.9072	.0013	.0012
300.0000	180.0000	.7560	.0000	.0000
350.0000	180.0000	.6480	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	210.0000	.0000	22.0000	22.0000
50.0000	210.0000	5.2920	22.0000	22.0000
100.0000	210.0000	2.6460	22.0000	22.0000
150.0000	210.0000	1.7640	22.0000	22.0000
200.0000	210.0000	1.3230	22.0000	22.0000
250.0000	210.0000	1.0584	21.7418	21.7333
300.0000	210.0000	.8820	.0000	.0000
350.0000	210.0000	.7560	.0000	.0000
400.0000	210.0000	.6615	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	240.0000	.0000	22.0000	22.0000
50.0000	240.0000	6.0480	22.0000	22.0000
100.0000	240.0000	3.0240	22.0000	22.0000
150.0000	240.0000	2.0160	22.0000	22.0000
200.0000	240.0000	1.5120	22.0000	22.0000
250.0000	240.0000	1.2096	22.0000	22.0000
300.0000	240.0000	1.0080	14.0757	13.9810
350.0000	240.0000	.8640	.0000	.0000
400.0000	240.0000	.7560	.0000	.0000
.0000	270.0000	.0000	22.0000	22.0000
50.0000	270.0000	6.8040	22.0000	22.0000
100.0000	270.0000	3.4020	22.0000	22.0000
150.0000	270.0000	2.2680	22.0000	22.0000
200.0000	270.0000	1.7010	22.0000	22.0000
250.0000	270.0000	1.3608	22.0000	22.0000
300.0000	270.0000	1.1340	22.0000	22.0000
350.0000	270.0000	.9720	2.0440	2.0051
400.0000	270.0000	.8505	.0000	.0000
.0000	300.0000	.0000	22.0000	22.0000
50.0000	300.0000	7.5600	22.0000	22.0000
100.0000	300.0000	3.7800	22.0000	22.0000
150.0000	300.0000	2.5200	22.0000	22.0000
200.0000	300.0000	1.8900	22.0000	22.0000
250.0000	300.0000	1.5120	22.0000	22.0000
300.0000	300.0000	1.2600	22.0000	22.0000
350.0000	300.0000	1.0800	21.9968	21.9967
400.0000	300.0000	.9450	.0511	.0496
.0000	330.0000	.0000	22.0000	22.0000
50.0000	330.0000	8.3160	22.0000	22.0000
100.0000	330.0000	4.1580	22.0000	22.0000
150.0000	330.0000	2.7720	22.0000	22.0000
200.0000	330.0000	2.0790	22.0000	22.0000
250.0000	330.0000	1.6632	22.0000	22.0000
300.0000	330.0000	1.3860	22.0000	22.0000
350.0000	330.0000	1.1880	22.0000	22.0000
400.0000	330.0000	1.0395	21.4435	21.4305
.0000	360.0000	.0000	22.0000	22.0000
50.0000	360.0000	9.0720	22.0000	22.0000
100.0000	360.0000	4.5360	22.0000	22.0000
150.0000	360.0000	3.0240	22.0000	22.0000

250.0000	360.0000	1.8144	22.0000	22.0000
300.0000	360.0000	1.5120	22.0000	22.0000
350.0000	360.0000	1.2960	22.0000	22.0000
400.0000	360.0000	1.1340	22.0000	22.0000
.0000	390.0000	.0000	22.0000	22.0000
50.0000	390.0000	9.8280	22.0000	22.0000
100.0000	390.0000	4.9140	22.0000	22.0000
150.0000	390.0000	3.2760	22.0000	22.0000
200.0000	390.0000	2.4570	22.0000	22.0000
250.0000	390.0000	1.9656	22.0000	22.0000
300.0000	390.0000	1.6380	22.0000	22.0000
350.0000	390.0000	1.4040	22.0000	22.0000
400.0000	390.0000	1.2285	22.0000	22.0000
.0000	420.0000	.0000	22.0000	22.0000
50.0000	420.0000	10.5840	22.0000	22.0000
100.0000	420.0000	5.2920	22.0000	22.0000
150.0000	420.0000	3.5280	22.0000	22.0000
200.0000	420.0000	2.6460	22.0000	22.0000
250.0000	420.0000	2.1168	22.0000	22.0000
300.0000	420.0000	1.7640	22.0000	22.0000
350.0000	420.0000	1.5120	22.0000	22.0000
400.0000	420.0000	1.3230	22.0000	22.0000
.0000	450.0000	.0000	22.0000	22.0000
50.0000	450.0000	11.3400	22.0000	22.0000
100.0000	450.0000	5.6700	22.0000	22.0000
150.0000	450.0000	3.7800	22.0000	22.0000
200.0000	450.0000	2.8350	22.0000	22.0000
250.0000	450.0000	2.2680	22.0000	22.0000
300.0000	450.0000	1.8900	22.0000	22.0000
350.0000	450.0000	1.6200	22.0000	22.0000
400.0000	450.0000	1.4175	22.0000	22.0000
.0000	480.0000	.0000	22.0000	22.0000
50.0000	480.0000	12.0960	22.0000	22.0000
100.0000	480.0000	6.0480	22.0000	22.0000
150.0000	480.0000	4.0320	22.0000	22.0000
200.0000	480.0000	3.0240	22.0000	22.0000
250.0000	480.0000	2.4192	22.0000	22.0000
300.0000	480.0000	2.0160	22.0000	22.0000
350.0000	480.0000	1.7280	22.0000	22.0000
400.0000	480.0000	1.5120	22.0000	22.0000
.0000	510.0000	.0000	22.0000	22.0000
50.0000	510.0000	12.8520	22.0000	22.0000
100.0000	510.0000	6.4260	22.0000	22.0000
150.0000	510.0000	4.2840	22.0000	22.0000
200.0000	510.0000	3.2130	22.0000	22.0000
250.0000	510.0000	2.5704	22.0000	22.0000
300.0000	510.0000	2.1420	22.0000	22.0000
350.0000	510.0000	1.8360	22.0000	22.0000
400.0000	510.0000	1.6065	22.0000	22.0000
.0000	540.0000	.0000	22.0000	22.0000
50.0000	540.0000	13.6080	22.0000	22.0000
100.0000	540.0000	6.8040	22.0000	22.0000
150.0000	540.0000	4.5360	22.0000	22.0000
200.0000	540.0000	3.4020	22.0000	22.0000
250.0000	540.0000	2.7216	22.0000	22.0000
300.0000	540.0000	2.2680	22.0000	22.0000
350.0000	540.0000	1.9440	22.0000	22.0000
400.0000	540.0000	1.7010	22.0000	22.0000
.0000	570.0000	.0000	22.0000	22.0000

100.0000	570.0000	7.1820	22.0000	22.0000
150.0000	570.0000	4.7880	22.0000	22.0000
200.0000	570.0000	3.5910	22.0000	22.0000
250.0000	570.0000	2.8728	22.0000	22.0000
300.0000	570.0000	2.3940	22.0000	22.0000
350.0000	570.0000	2.0520	22.0000	22.0000
400.0000	570.0000	1.7955	22.0000	22.0000
.0000	600.0000	.0000	22.0000	22.0000
50.0000	600.0000	15.1200	22.0000	22.0000
100.0000	600.0000	7.5600	22.0000	22.0000
150.0000	600.0000	5.0400	22.0000	22.0000
200.0000	600.0000	3.7800	22.0000	22.0000
250.0000	600.0000	3.0240	22.0000	22.0000
300.0000	600.0000	2.5200	22.0000	22.0000
350.0000	600.0000	2.1600	22.0000	22.0000
400.0000	600.0000	1.8900	22.0000	22.0000
.0000	630.0000	.0000	22.0000	22.0000
50.0000	630.0000	15.8760	22.0000	22.0000
100.0000	630.0000	7.9380	22.0000	22.0000
150.0000	630.0000	5.2920	22.0000	22.0000
200.0000	630.0000	3.9690	22.0000	22.0000
250.0000	630.0000	3.1752	22.0000	22.0000
300.0000	630.0000	2.6460	22.0000	22.0000
350.0000	630.0000	2.2680	22.0000	22.0000
400.0000	630.0000	1.9845	22.0000	22.0000
.0000	660.0000	.0000	22.0000	22.0000
50.0000	660.0000	16.6320	22.0000	22.0000
100.0000	660.0000	8.3160	22.0000	22.0000
150.0000	660.0000	5.5440	22.0000	22.0000
200.0000	660.0000	4.1580	22.0000	22.0000
250.0000	660.0000	3.3264	22.0000	22.0000
300.0000	660.0000	2.7720	22.0000	22.0000
350.0000	660.0000	2.3760	22.0000	22.0000
400.0000	660.0000	2.0790	22.0000	22.0000
.0000	690.0000	.0000	22.0000	22.0000
50.0000	690.0000	17.3880	22.0000	22.0000
100.0000	690.0000	8.6940	22.0000	22.0000
150.0000	690.0000	5.7960	22.0000	22.0000
200.0000	690.0000	4.3470	22.0000	22.0000
250.0000	690.0000	3.4776	22.0000	22.0000
300.0000	690.0000	2.8980	22.0000	22.0000
350.0000	690.0000	2.4840	22.0000	22.0000
400.0000	690.0000	2.1735	22.0000	22.0000
.0000	720.0000	.0000	22.0000	22.0000
50.0000	720.0000	18.1440	22.0000	22.0000
100.0000	720.0000	9.0720	22.0000	22.0000
150.0000	720.0000	6.0480	22.0000	22.0000
200.0000	720.0000	4.5360	22.0000	22.0000
250.0000	720.0000	3.6288	22.0000	22.0000
300.0000	720.0000	3.0240	22.0000	22.0000
350.0000	720.0000	2.5920	22.0000	22.0000
400.0000	720.0000	2.2680	22.0000	22.0000
.0000	750.0000	.0000	22.0000	22.0000
50.0000	750.0000	18.9000	22.0000	22.0000
100.0000	750.0000	9.4500	22.0000	22.0000
150.0000	750.0000	6.3000	22.0000	22.0000
200.0000	750.0000	4.7250	22.0000	22.0000
250.0000	750.0000	3.7800	22.0000	22.0000
300.0000	750.0000	3.1500	22.0000	22.0000

400.0000	750.0000	2.3625	22.0000	22.0000

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*                                                                           *
*        ONE-DIMENSIONAL CONVECTIVE-DISPERSIVE EQUATION                     *
*                                                                           *
*        SEMI-INFINITE PROFILE                                              *
*        NO PRODUCTION AND DECAY                                            *
*        LINEAR ADSORPTION (R)                                              *
*        CONSTANT INITIAL CONCENTRATION (CI)                                *
*        INPUT CONCENTRATION = CO (T.LE.TO)                                 *
*                            =  0 (T.GT.TO)                                 *
*                                                                           *
*        FT HUACHUCA CONCEPTUAL RECHARGE BASINS - NITRATE CONC. RUN 5       *
*                                                                           *
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INPUT PARAMETERS
==========

V =	1.2600	D =	.1000
R =	2.0000	TO =	750.0000
CI =	.0000	CO =	22.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	.0000	.0000	.0000	.0000
50.0000	.0000	.0000	.0000	.0000
100.0000	.0000	.0000	.0000	.0000
150.0000	.0000	.0000	.0000	.0000
200.0000	.0000	.0000	.0000	.0000
250.0000	.0000	.0000	.0000	.0000
300.0000	.0000	.0000	.0000	.0000
350.0000	.0000	.0000	.0000	.0000
400.0000	.0000	.0000	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	30.0000	.0000	22.0000	22.0000
50.0000	30.0000	.7560	.0000	.0000
100.0000	30.0000	.3780	.0000	.0000
150.0000	30.0000	.2520	.0000	.0000
200.0000	30.0000	.1890	.0000	.0000
250.0000	30.0000	.1512	.0000	.0000
300.0000	30.0000	.1260	.0000	.0000
350.0000	30.0000	.1080	.0000	.0000
400.0000	30.0000	.0945	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	60.0000	.0000	22.0000	22.0000
50.0000	60.0000	1.5120	.0000	.0000
100.0000	60.0000	.7560	.0000	.0000
150.0000	60.0000	.5040	.0000	.0000

250.0000	60.0000	.3024	.0000	.0000
300.0000	60.0000	.2520	.0000	.0000
350.0000	60.0000	.2160	.0000	.0000
400.0000	60.0000	.1890	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	90.0000	.0000	22.0000	22.0000
50.0000	90.0000	2.2680	21.7396	21.7204
100.0000	90.0000	1.1340	.0000	.0000
150.0000	90.0000	.7560	.0000	.0000
200.0000	90.0000	.5670	.0000	.0000
250.0000	90.0000	.4536	.0000	.0000
300.0000	90.0000	.3780	.0000	.0000
350.0000	90.0000	.3240	.0000	.0000
400.0000	90.0000	.2835	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	120.0000	.0000	22.0000	22.0000
50.0000	120.0000	3.0240	22.0000	22.0000
100.0000	120.0000	1.5120	.0000	.0000
150.0000	120.0000	1.0080	.0000	.0000
200.0000	120.0000	.7560	.0000	.0000
250.0000	120.0000	.6048	.0000	.0000
300.0000	120.0000	.5040	.0000	.0000
350.0000	120.0000	.4320	.0000	.0000
400.0000	120.0000	.3780	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	150.0000	.0000	22.0000	22.0000
50.0000	150.0000	3.7800	22.0000	22.0000
100.0000	150.0000	1.8900	1.7751	1.7095
150.0000	150.0000	1.2600	.0000	.0000
200.0000	150.0000	.9450	.0000	.0000
250.0000	150.0000	.7560	.0000	.0000
300.0000	150.0000	.6300	.0000	.0000
350.0000	150.0000	.5400	.0000	.0000
400.0000	150.0000	.4725	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	180.0000	.0000	22.0000	22.0000
50.0000	180.0000	4.5360	22.0000	22.0000
100.0000	180.0000	2.2680	21.9837	21.9826
150.0000	180.0000	1.5120	.0000	.0000
200.0000	180.0000	1.1340	.0000	.0000
250.0000	180.0000	.9072	.0000	.0000
300.0000	180.0000	.7560	.0000	.0000
350.0000	180.0000	.6480	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	210.0000	.0000	22.0000	22.0000
50.0000	210.0000	5.2920	22.0000	22.0000
100.0000	210.0000	2.6460	22.0000	22.0000
150.0000	210.0000	1.7640	.0013	.0012
200.0000	210.0000	1.3230	.0000	.0000
250.0000	210.0000	1.0584	.0000	.0000
300.0000	210.0000	.8820	.0000	.0000
350.0000	210.0000	.7560	.0000	.0000
400.0000	210.0000	.6615	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	240.0000	.0000	22.0000	22.0000
50.0000	240.0000	6.0480	22.0000	22.0000
100.0000	240.0000	3.0240	22.0000	22.0000
150.0000	240.0000	2.0160	13.2670	13.1290
200.0000	240.0000	1.5120	.0000	.0000
250.0000	240.0000	1.2096	.0000	.0000
300.0000	240.0000	1.0080	.0000	.0000
350.0000	240.0000	.8640	.0000	.0000
400.0000	240.0000	.7560	.0000	.0000
.0000	270.0000	.0000	22.0000	22.0000
50.0000	270.0000	6.8040	22.0000	22.0000
100.0000	270.0000	3.4020	22.0000	22.0000
150.0000	270.0000	2.2680	21.9989	21.9988
200.0000	270.0000	1.7010	.0000	.0000
250.0000	270.0000	1.3608	.0000	.0000
300.0000	270.0000	1.1340	.0000	.0000
350.0000	270.0000	.9720	.0000	.0000
400.0000	270.0000	.8505	.0000	.0000
.0000	300.0000	.0000	22.0000	22.0000
50.0000	300.0000	7.5600	22.0000	22.0000
100.0000	300.0000	3.7800	22.0000	22.0000
150.0000	300.0000	2.5200	22.0000	22.0000
200.0000	300.0000	1.8900	.5072	.4902
250.0000	300.0000	1.5120	.0000	.0000
300.0000	300.0000	1.2600	.0000	.0000
350.0000	300.0000	1.0800	.0000	.0000
400.0000	300.0000	.9450	.0000	.0000
.0000	330.0000	.0000	22.0000	22.0000
50.0000	330.0000	8.3160	22.0000	22.0000
100.0000	330.0000	4.1580	22.0000	22.0000
150.0000	330.0000	2.7720	22.0000	22.0000
200.0000	330.0000	2.0790	20.1883	20.1412
250.0000	330.0000	1.6632	.0000	.0000
300.0000	330.0000	1.3860	.0000	.0000
350.0000	330.0000	1.1880	.0000	.0000
400.0000	330.0000	1.0395	.0000	.0000
.0000	360.0000	.0000	22.0000	22.0000
50.0000	360.0000	9.0720	22.0000	22.0000
100.0000	360.0000	4.5360	22.0000	22.0000
150.0000	360.0000	3.0240	22.0000	22.0000

250.0000	360.0000	1.8144	.0013	.0012
300.0000	360.0000	1.5120	.0000	.0000
350.0000	360.0000	1.2960	.0000	.0000
400.0000	360.0000	1.1340	.0000	.0000
.0000	390.0000	.0000	22.0000	22.0000
50.0000	390.0000	9.8280	22.0000	22.0000
100.0000	390.0000	4.9140	22.0000	22.0000
150.0000	390.0000	3.2760	22.0000	22.0000
200.0000	390.0000	2.4570	22.0000	22.0000
250.0000	390.0000	1.9656	5.4894	5.4014
300.0000	390.0000	1.6380	.0000	.0000
350.0000	390.0000	1.4040	.0000	.0000
400.0000	390.0000	1.2285	.0000	.0000
.0000	420.0000	.0000	22.0000	22.0000
50.0000	420.0000	10.5840	22.0000	22.0000
100.0000	420.0000	5.2920	22.0000	22.0000
150.0000	420.0000	3.5280	22.0000	22.0000
200.0000	420.0000	2.6460	22.0000	22.0000
250.0000	420.0000	2.1168	21.7418	21.7333
300.0000	420.0000	1.7640	.0000	.0000
350.0000	420.0000	1.5120	.0000	.0000
400.0000	420.0000	1.3230	.0000	.0000
.0000	450.0000	.0000	22.0000	22.0000
50.0000	450.0000	11.3400	22.0000	22.0000
100.0000	450.0000	5.6700	22.0000	22.0000
150.0000	450.0000	3.7800	22.0000	22.0000
200.0000	450.0000	2.8350	22.0000	22.0000
250.0000	450.0000	2.2680	22.0000	22.0000
300.0000	450.0000	1.8900	.1579	.1528
350.0000	450.0000	1.6200	.0000	.0000
400.0000	450.0000	1.4175	.0000	.0000
.0000	480.0000	.0000	22.0000	22.0000
50.0000	480.0000	12.0960	22.0000	22.0000
100.0000	480.0000	6.0480	22.0000	22.0000
150.0000	480.0000	4.0320	22.0000	22.0000
200.0000	480.0000	3.0240	22.0000	22.0000
250.0000	480.0000	2.4192	22.0000	22.0000
300.0000	480.0000	2.0160	14.0757	13.9810
350.0000	480.0000	1.7280	.0000	.0000
400.0000	480.0000	1.5120	.0000	.0000
.0000	510.0000	.0000	22.0000	22.0000
50.0000	510.0000	12.8520	22.0000	22.0000
100.0000	510.0000	6.4260	22.0000	22.0000
150.0000	510.0000	4.2840	22.0000	22.0000
200.0000	510.0000	3.2130	22.0000	22.0000
250.0000	510.0000	2.5704	22.0000	22.0000
300.0000	510.0000	2.1420	21.9697	21.9686
350.0000	510.0000	1.8360	.0007	.0006
400.0000	510.0000	1.6065	.0000	.0000
.0000	540.0000	.0000	22.0000	22.0000
50.0000	540.0000	13.6080	22.0000	22.0000
100.0000	540.0000	6.8040	22.0000	22.0000
150.0000	540.0000	4.5360	22.0000	22.0000
200.0000	540.0000	3.4020	22.0000	22.0000
250.0000	540.0000	2.7216	22.0000	22.0000
300.0000	540.0000	2.2680	22.0000	22.0000
350.0000	540.0000	1.9440	2.0440	2.0051
400.0000	540.0000	1.7010	.0000	.0000
.0000	570.0000	.0000	22.0000	22.0000

100.0000	570.0000	7.1820	22.0000	22.0000
150.0000	570.0000	4.7880	22.0000	22.0000
200.0000	570.0000	3.5910	22.0000	22.0000
250.0000	570.0000	2.8728	22.0000	22.0000
300.0000	570.0000	2.3940	22.0000	22.0000
350.0000	570.0000	2.0520	19.5363	19.4917
400.0000	570.0000	1.7955	.0000	.0000
.0000	600.0000	.0000	22.0000	22.0000
50.0000	600.0000	15.1200	22.0000	22.0000
100.0000	600.0000	7.5600	22.0000	22.0000
150.0000	600.0000	5.0400	22.0000	22.0000
200.0000	600.0000	3.7800	22.0000	22.0000
250.0000	600.0000	3.0240	22.0000	22.0000
300.0000	600.0000	2.5200	22.0000	22.0000
350.0000	600.0000	2.1600	21.9968	21.9967
400.0000	600.0000	1.8900	.0511	.0496
.0000	630.0000	.0000	22.0000	22.0000
50.0000	630.0000	15.8760	22.0000	22.0000
100.0000	630.0000	7.9380	22.0000	22.0000
150.0000	630.0000	5.2920	22.0000	22.0000
200.0000	630.0000	3.9690	22.0000	22.0000
250.0000	630.0000	3.1752	22.0000	22.0000
300.0000	630.0000	2.6460	22.0000	22.0000
350.0000	630.0000	2.2680	22.0000	22.0000
400.0000	630.0000	1.9845	7.7383	7.6570
.0000	660.0000	.0000	22.0000	22.0000
50.0000	660.0000	16.6320	22.0000	22.0000
100.0000	660.0000	8.3160	22.0000	22.0000
150.0000	660.0000	5.5440	22.0000	22.0000
200.0000	660.0000	4.1580	22.0000	22.0000
250.0000	660.0000	3.3264	22.0000	22.0000
300.0000	660.0000	2.7720	22.0000	22.0000
350.0000	660.0000	2.3760	22.0000	22.0000
400.0000	660.0000	2.0790	21.4435	21.4305
.0000	690.0000	.0000	22.0000	22.0000
50.0000	690.0000	17.3880	22.0000	22.0000
100.0000	690.0000	8.6940	22.0000	22.0000
150.0000	690.0000	5.7960	22.0000	22.0000
200.0000	690.0000	4.3470	22.0000	22.0000
250.0000	690.0000	3.4776	22.0000	22.0000
300.0000	690.0000	2.8980	22.0000	22.0000
350.0000	690.0000	2.4840	22.0000	22.0000
400.0000	690.0000	2.1735	21.9997	21.9997
.0000	720.0000	.0000	22.0000	22.0000
50.0000	720.0000	18.1440	22.0000	22.0000
100.0000	720.0000	9.0720	22.0000	22.0000
150.0000	720.0000	6.0480	22.0000	22.0000
200.0000	720.0000	4.5360	22.0000	22.0000
250.0000	720.0000	3.6288	22.0000	22.0000
300.0000	720.0000	3.0240	22.0000	22.0000
350.0000	720.0000	2.5920	22.0000	22.0000
400.0000	720.0000	2.2680	22.0000	22.0000
.0000	750.0000	.0000	22.0000	22.0000
50.0000	750.0000	18.9000	22.0000	22.0000
100.0000	750.0000	9.4500	22.0000	22.0000
150.0000	750.0000	6.3000	22.0000	22.0000
200.0000	750.0000	4.7250	22.0000	22.0000
250.0000	750.0000	3.7800	22.0000	22.0000
300.0000	750.0000	3.1500	22.0000	22.0000

400.0000	750.0000	2.3625	22.0000	22.0000

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*                                                                           *
*        ONE-DIMENSIONAL CONVECTIVE-DISPERSIVE EQUATION                     *
*                                                                           *
*        SEMI-INFINITE PROFILE                                              *
*        NO PRODUCTION AND DECAY                                            *
*        LINEAR ADSORPTION (R)                                              *
*        CONSTANT INITIAL CONCENTRATION (CI)                                *
*        INPUT CONCENTRATION = CO (T.LE.TO)                                 *
*                            =  0 (T.GT.TO)                                 *
*                                                                           *
*        FT HUACHUCA CONCEPTUAL RECHARGE BASINS - NITRATE CONC. RUN 6       *
*                                                                           *
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INPUT PARAMETERS
==========

V =	1.2600	D =	.1000
R =	1.5000	TO =	750.0000
CI =	.0000	CO =	22.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	.0000	.0000	.0000	.0000
400.0000	.0000	.0000	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	30.0000	.0000	22.0000	22.0000
400.0000	30.0000	.0945	.0000	.0000
.0000	60.0000	.0000	22.0000	22.0000
400.0000	60.0000	.1890	.0000	.0000
.0000	90.0000	.0000	22.0000	22.0000
400.0000	90.0000	.2835	.0000	.0000
.0000	120.0000	.0000	22.0000	22.0000
400.0000	120.0000	.3780	.0000	.0000
.0000	150.0000	.0000	22.0000	22.0000
400.0000	150.0000	.4725	.0000	.0000
.0000	180.0000	.0000	22.0000	22.0000
400.0000	180.0000	.5670	.0000	.0000
.0000	210.0000	.0000	22.0000	22.0000
400.0000	210.0000	.6615	.0000	.0000
.0000	240.0000	.0000	22.0000	22.0000
400.0000	240.0000	.7560	.0000	.0000
.0000	270.0000	.0000	22.0000	22.0000
400.0000	270.0000	.8505	.0000	.0000
.0000	300.0000	.0000	22.0000	22.0000
400.0000	300.0000	.9450	.0000	.0000
.0000	330.0000	.0000	22.0000	22.0000
400.0000	330.0000	1.0395	.0000	.0000
.0000	360.0000	.0000	22.0000	22.0000
400.0000	360.0000	1.1340	.0000	.0000
.0000	390.0000	.0000	22.0000	22.0000

.0000	420.0000	.0000	22.0000	22.0000
400.0000	420.0000	1.3230	.0000	.0000
.0000	450.0000	.0000	22.0000	22.0000
400.0000	450.0000	1.4175	.0511	.0496
.0000	480.0000	.0000	22.0000	22.0000
400.0000	480.0000	1.5120	14.5000	14.4196
.0000	510.0000	.0000	22.0000	22.0000
400.0000	510.0000	1.6065	21.9939	21.9937
.0000	540.0000	.0000	22.0000	22.0000
400.0000	540.0000	1.7010	22.0000	22.0000
.0000	570.0000	.0000	22.0000	22.0000
400.0000	570.0000	1.7955	22.0000	22.0000
.0000	600.0000	.0000	22.0000	22.0000
400.0000	600.0000	1.8900	22.0000	22.0000
.0000	630.0000	.0000	22.0000	22.0000
400.0000	630.0000	1.9845	22.0000	22.0000
.0000	660.0000	.0000	22.0000	22.0000
400.0000	660.0000	2.0790	22.0000	22.0000
.0000	690.0000	.0000	22.0000	22.0000
400.0000	690.0000	2.1735	22.0000	22.0000
.0000	720.0000	.0000	22.0000	22.0000
400.0000	720.0000	2.2680	22.0000	22.0000
.0000	750.0000	.0000	22.0000	22.0000
400.0000	750.0000	2.3625	22.0000	22.0000

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*                                                                           *
*        ONE-DIMENSIONAL CONVECTIVE-DISPERSIVE EQUATION                     *
*                                                                           *
*        SEMI-INFINITE PROFILE                                              *
*        NO PRODUCTION AND DECAY                                            *
*        LINEAR ADSORPTION (R)                                              *
*        CONSTANT INITIAL CONCENTRATION (CI)                                *
*        INPUT CONCENTRATION = CO (T.LE.TO)                                 *
*                            =  0 (T.GT.TO)                                 *
*                                                                           *
*        FT HUACHUCA CONCEPTUAL RECHARGE BASINS - NITRATE CONC. RUN 7       *
*                                                                           *
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INPUT PARAMETERS
==========

V =	.4000	D =	.1000
R =	1.5000	TO =	2250.0000
CI =	.0000	CO =	22.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	.0000	.0000	.0000	.0000
400.0000	.0000	.0000	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	90.0000	.0000	22.0000	22.0000
400.0000	90.0000	.0900	.0000	.0000
.0000	180.0000	.0000	22.0000	22.0000
400.0000	180.0000	.1800	.0000	.0000
.0000	270.0000	.0000	22.0000	22.0000
400.0000	270.0000	.2700	.0000	.0000
.0000	360.0000	.0000	22.0000	22.0000
400.0000	360.0000	.3600	.0000	.0000
.0000	450.0000	.0000	22.0000	22.0000
400.0000	450.0000	.4500	.0000	.0000
.0000	540.0000	.0000	22.0000	22.0000
400.0000	540.0000	.5400	.0000	.0000
.0000	630.0000	.0000	22.0000	22.0000
400.0000	630.0000	.6300	.0000	.0000
.0000	720.0000	.0000	22.0000	22.0000
400.0000	720.0000	.7200	.0000	.0000
.0000	810.0000	.0000	22.0000	22.0000
400.0000	810.0000	.8100	.0000	.0000
.0000	900.0000	.0000	22.0000	22.0000
400.0000	900.0000	.9000	.0000	.0000
.0000	990.0000	.0000	22.0000	22.0000
400.0000	990.0000	.9900	.0000	.0000
.0000	1080.0000	.0000	22.0000	22.0000
400.0000	1080.0000	1.0800	.0000	.0000
.0000	1170.0000	.0000	22.0000	22.0000

.0000	1260.0000	.0000	22.0000	22.0000
400.0000	1260.0000	1.2600	.0000	.0000
.0000	1350.0000	.0000	22.0000	22.0000
400.0000	1350.0000	1.3500	.0334	.0315
.0000	1440.0000	.0000	22.0000	22.0000
400.0000	1440.0000	1.4400	2.8100	2.7287
.0000	1530.0000	.0000	22.0000	22.0000
400.0000	1530.0000	1.5300	15.8031	15.6718
.0000	1620.0000	.0000	22.0000	22.0000
400.0000	1620.0000	1.6200	21.6905	21.6765
.0000	1710.0000	.0000	22.0000	22.0000
400.0000	1710.0000	1.7100	21.9979	21.9977
.0000	1800.0000	.0000	22.0000	22.0000
400.0000	1800.0000	1.8000	22.0000	22.0000
.0000	1890.0000	.0000	22.0000	22.0000
400.0000	1890.0000	1.8900	22.0000	22.0000
.0000	1980.0000	.0000	22.0000	22.0000
400.0000	1980.0000	1.9800	22.0000	22.0000
.0000	2070.0000	.0000	22.0000	22.0000
400.0000	2070.0000	2.0700	22.0000	22.0000
.0000	2160.0000	.0000	22.0000	22.0000
400.0000	2160.0000	2.1600	22.0000	22.0000
.0000	2250.0000	.0000	22.0000	22.0000
400.0000	2250.0000	2.2500	22.0000	22.0000

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*                                                                             *
*        ONE-DIMENSIONAL CONVECTIVE-DISPERSIVE EQUATION                       *
*                                                                             *
*        SEMI-INFINITE PROFILE                                                *
*        NO PRODUCTION AND DECAY                                              *
*        LINEAR ADSORPTION (R)                                                *
*        CONSTANT INITIAL CONCENTRATION (CI)                                  *
*        INPUT CONCENTRATION = CO (T.LE.TO)                                   *
*                            =  0 (T.GT.TO)                                   *
*                                                                             *
*        FT HUACHUCA CONCEPTUAL RECHARGE BASINS - NITRATE CONC. RUN 8         *
*                                                                             *
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INPUT PARAMETERS
==========

V =	1.2600	D =	.1000
R =	1.0000	TO =	750.0000
CI =	.0000	CO =	22.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	.0000	.0000	.0000	.0000
400.0000	.0000	.0000	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	30.0000	.0000	22.0000	22.0000
400.0000	30.0000	.0945	.0000	.0000
.0000	60.0000	.0000	22.0000	22.0000
400.0000	60.0000	.1890	.0000	.0000
.0000	90.0000	.0000	22.0000	22.0000
400.0000	90.0000	.2835	.0000	.0000
.0000	120.0000	.0000	22.0000	22.0000
400.0000	120.0000	.3780	.0000	.0000
.0000	150.0000	.0000	22.0000	22.0000
400.0000	150.0000	.4725	.0000	.0000
.0000	180.0000	.0000	22.0000	22.0000
400.0000	180.0000	.5670	.0000	.0000
.0000	210.0000	.0000	22.0000	22.0000
400.0000	210.0000	.6615	.0000	.0000
.0000	240.0000	.0000	22.0000	22.0000
400.0000	240.0000	.7560	.0000	.0000
.0000	270.0000	.0000	22.0000	22.0000
400.0000	270.0000	.8505	.0000	.0000
.0000	300.0000	.0000	22.0000	22.0000
400.0000	300.0000	.9450	.0511	.0496
.0000	330.0000	.0000	22.0000	22.0000
400.0000	330.0000	1.0395	21.4435	21.4305
.0000	360.0000	.0000	22.0000	22.0000
400.0000	360.0000	1.1340	22.0000	22.0000
.0000	390.0000	.0000	22.0000	22.0000

.0000	420.0000	.0000	22.0000	22.0000
400.0000	420.0000	1.3230	22.0000	22.0000
.0000	450.0000	.0000	22.0000	22.0000
400.0000	450.0000	1.4175	22.0000	22.0000
.0000	480.0000	.0000	22.0000	22.0000
400.0000	480.0000	1.5120	22.0000	22.0000
.0000	510.0000	.0000	22.0000	22.0000
400.0000	510.0000	1.6065	22.0000	22.0000
.0000	540.0000	.0000	22.0000	22.0000
400.0000	540.0000	1.7010	22.0000	22.0000
.0000	570.0000	.0000	22.0000	22.0000
400.0000	570.0000	1.7955	22.0000	22.0000
.0000	600.0000	.0000	22.0000	22.0000
400.0000	600.0000	1.8900	22.0000	22.0000
.0000	630.0000	.0000	22.0000	22.0000
400.0000	630.0000	1.9845	22.0000	22.0000
.0000	660.0000	.0000	22.0000	22.0000
400.0000	660.0000	2.0790	22.0000	22.0000
.0000	690.0000	.0000	22.0000	22.0000
400.0000	690.0000	2.1735	22.0000	22.0000
.0000	720.0000	.0000	22.0000	22.0000
400.0000	720.0000	2.2680	22.0000	22.0000
.0000	750.0000	.0000	22.0000	22.0000
400.0000	750.0000	2.3625	22.0000	22.0000

1

```
*******************************************************************************
*                                                                             *
*        ONE-DIMENSIONAL CONVECTIVE-DISPERSIVE EQUATION                       *
*                                                                             *
*        SEMI-INFINITE PROFILE                                                *
*        NO PRODUCTION AND DECAY                                              *
*        LINEAR ADSORPTION (R)                                                *
*        CONSTANT INITIAL CONCENTRATION (CI)                                  *
*        INPUT CONCENTRATION = C0 (T.LE.T0)                                   *
*                            =  0 (T.GT.T0)                                   *
*                                                                             *
*        FT HUACHUCA CONCEPTUAL RECHARGE BASINS - NITRATE CONC. RUN 9         *
*                                                                             *
*******************************************************************************
```

INPUT PARAMETERS
==========

V =	1.2600	D =	.1000
R =	2.0000	T0 =	750.0000
CI =	.0000	C0 =	22.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	.0000	.0000	.0000	.0000
400.0000	.0000	.0000	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	30.0000	.0000	22.0000	22.0000
400.0000	30.0000	.0945	.0000	.0000
.0000	60.0000	.0000	22.0000	22.0000
400.0000	60.0000	.1890	.0000	.0000
.0000	90.0000	.0000	22.0000	22.0000
400.0000	90.0000	.2835	.0000	.0000
.0000	120.0000	.0000	22.0000	22.0000
400.0000	120.0000	.3780	.0000	.0000
.0000	150.0000	.0000	22.0000	22.0000
400.0000	150.0000	.4725	.0000	.0000
.0000	180.0000	.0000	22.0000	22.0000
400.0000	180.0000	.5670	.0000	.0000
.0000	210.0000	.0000	22.0000	22.0000
400.0000	210.0000	.6615	.0000	.0000
.0000	240.0000	.0000	22.0000	22.0000
400.0000	240.0000	.7560	.0000	.0000
.0000	270.0000	.0000	22.0000	22.0000
400.0000	270.0000	.8505	.0000	.0000
.0000	300.0000	.0000	22.0000	22.0000
400.0000	300.0000	.9450	.0000	.0000
.0000	330.0000	.0000	22.0000	22.0000
400.0000	330.0000	1.0395	.0000	.0000
.0000	360.0000	.0000	22.0000	22.0000
400.0000	360.0000	1.1340	.0000	.0000
.0000	390.0000	.0000	22.0000	22.0000

.0000	420.0000	.0000	22.0000	22.0000
400.0000	420.0000	1.3230	.0000	.0000
.0000	450.0000	.0000	22.0000	22.0000
400.0000	450.0000	1.4175	.0000	.0000
.0000	480.0000	.0000	22.0000	22.0000
400.0000	480.0000	1.5120	.0000	.0000
.0000	510.0000	.0000	22.0000	22.0000
400.0000	510.0000	1.6065	.0000	.0000
.0000	540.0000	.0000	22.0000	22.0000
400.0000	540.0000	1.7010	.0000	.0000
.0000	570.0000	.0000	22.0000	22.0000
400.0000	570.0000	1.7955	.0000	.0000
.0000	600.0000	.0000	22.0000	22.0000
400.0000	600.0000	1.8900	.0511	.0496
.0000	630.0000	.0000	22.0000	22.0000
400.0000	630.0000	1.9845	7.7383	7.6570
.0000	660.0000	.0000	22.0000	22.0000
400.0000	660.0000	2.0790	21.4435	21.4305
.0000	690.0000	.0000	22.0000	22.0000
400.0000	690.0000	2.1735	21.9997	21.9997
.0000	720.0000	.0000	22.0000	22.0000
400.0000	720.0000	2.2680	22.0000	22.0000
.0000	750.0000	.0000	22.0000	22.0000
400.0000	750.0000	2.3625	22.0000	22.0000

```
*******************************************************************************
*                                                                             *
*        ONE-DIMENSIONAL CONVECTIVE-DISPERSIVE EQUATION                       *
*                                                                             *
*        SEMI-INFINITE PROFILE                                                *
*        NO PRODUCTION AND DECAY                                              *
*        LINEAR ADSORPTION (R)                                                *
*        CONSTANT INITIAL CONCENTRATION (CI)                                  *
*        INPUT CONCENTRATION = CO (T.LE.TO)                                   *
*                            =  0 (T.GT.TO)                                   *
*                                                                             *
*        FT HUACHUCA CONCEPTUAL RECHARGE BASINS - NITRATE CONC. RUN 10        *
*                                                                             *
*******************************************************************************
```

INPUT PARAMETERS
==========

V =	1.2600	D =	2.0000
R =	3.0000	TO =	2250.0000
CI =	.0000	CO =	22.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	.0000	.0000	.0000	.0000
50.0000	.0000	.0000	.0000	.0000
100.0000	.0000	.0000	.0000	.0000
150.0000	.0000	.0000	.0000	.0000
200.0000	.0000	.0000	.0000	.0000
250.0000	.0000	.0000	.0000	.0000
300.0000	.0000	.0000	.0000	.0000
350.0000	.0000	.0000	.0000	.0000
400.0000	.0000	.0000	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	90.0000	.0000	22.0000	21.9985
50.0000	90.0000	2.2680	3.4997	2.8244
100.0000	90.0000	1.1340	.0000	.0000
150.0000	90.0000	.7560	.0000	.0000
200.0000	90.0000	.5670	.0000	.0000
250.0000	90.0000	.4536	.0000	.0000
300.0000	90.0000	.3780	.0000	.0000
350.0000	90.0000	.3240	.0000	.0000
400.0000	90.0000	.2835	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	180.0000	.0000	22.0000	22.0000
50.0000	180.0000	4.5360	21.1895	20.9634
100.0000	180.0000	2.2680	1.4901	1.2340
150.0000	180.0000	1.5120	.0000	.0000

250.0000	180.0000	.9072	.0000	.0000
300.0000	180.0000	.7560	.0000	.0000
350.0000	180.0000	.6480	.0000	.0000
400.0000	180.0000	.5670	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	270.0000	.0000	22.0000	22.0000
50.0000	270.0000	6.8040	21.9946	21.9922
100.0000	270.0000	3.4020	17.3230	16.7477
150.0000	270.0000	2.2680	.6889	.5766
200.0000	270.0000	1.7010	.0001	.0001
250.0000	270.0000	1.3608	.0000	.0000
300.0000	270.0000	1.1340	.0000	.0000
350.0000	270.0000	.9720	.0000	.0000
400.0000	270.0000	.8505	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	360.0000	.0000	22.0000	22.0000
50.0000	360.0000	9.0720	22.0000	22.0000
100.0000	360.0000	4.5360	21.8357	21.7954
150.0000	360.0000	3.0240	12.1146	11.4764
200.0000	360.0000	2.2680	.3308	.2785
250.0000	360.0000	1.8144	.0001	.0001
300.0000	360.0000	1.5120	.0000	.0000
350.0000	360.0000	1.2960	.0000	.0000
400.0000	360.0000	1.1340	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	450.0000	.0000	22.0000	22.0000
50.0000	450.0000	11.3400	22.0000	22.0000
100.0000	450.0000	5.6700	21.9979	21.9972
150.0000	450.0000	3.7800	20.9528	20.7936
200.0000	450.0000	2.8350	7.6849	7.1693
250.0000	450.0000	2.2680	.1624	.1372
300.0000	450.0000	1.8900	.0001	.0001
350.0000	450.0000	1.6200	.0000	.0000
400.0000	450.0000	1.4175	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	540.0000	.0000	22.0000	22.0000
50.0000	540.0000	13.6080	22.0000	22.0000
100.0000	540.0000	6.8040	22.0000	22.0000
150.0000	540.0000	4.5360	21.9641	21.9557
200.0000	540.0000	3.4020	18.8368	18.5213
250.0000	540.0000	2.7216	4.5986	4.2413
300.0000	540.0000	2.2680	.0809	.0685
350.0000	540.0000	1.9440	.0001	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	630.0000	.0000	22.0000	22.0000
50.0000	630.0000	15.8760	22.0000	22.0000
100.0000	630.0000	7.9380	22.0000	22.0000
150.0000	630.0000	5.2920	21.9994	21.9992
200.0000	630.0000	3.9690	21.7615	21.7219
250.0000	630.0000	3.1752	15.6752	15.2507
300.0000	630.0000	2.6460	2.6543	2.4268
350.0000	630.0000	2.2680	.0407	.0346
400.0000	630.0000	1.9845	.0000	.0000

DISTANCE (X)	TIME (T)	PORE VOLUME (VVO)	CONCENTRATION FIRST-TYPE BC	THIRD-TYPE BC
.0000	720.0000	.0000	22.0000	22.0000
50.0000	720.0000	18.1440	22.0000	22.0000
100.0000	720.0000	9.0720	22.0000	22.0000
150.0000	720.0000	6.0480	22.0000	22.0000
200.0000	720.0000	4.5360	21.9918	21.9900
250.0000	720.0000	3.6288	21.1187	21.0116
300.0000	720.0000	3.0240	12.1281	11.6786
350.0000	720.0000	2.5920	1.4969	1.3593
400.0000	720.0000	2.2680	.0207	.0176
.0000	810.0000	.0000	22.0000	22.0000
50.0000	810.0000	20.4120	22.0000	22.0000
100.0000	810.0000	10.2060	22.0000	22.0000
150.0000	810.0000	6.8040	22.0000	22.0000
200.0000	810.0000	5.1030	21.9998	21.9998
250.0000	810.0000	4.0824	21.9446	21.9350
300.0000	810.0000	3.4020	19.7790	19.5786
350.0000	810.0000	2.9160	8.8198	8.4136
400.0000	810.0000	2.5515	.8312	.7507
.0000	900.0000	.0000	22.0000	22.0000
50.0000	900.0000	22.6800	22.0000	22.0000
100.0000	900.0000	11.3400	22.0000	22.0000
150.0000	900.0000	7.5600	22.0000	22.0000
200.0000	900.0000	5.6700	22.0000	22.0000
250.0000	900.0000	4.5360	21.9981	21.9977
300.0000	900.0000	3.7800	21.7677	21.7361
350.0000	900.0000	3.2400	17.6924	17.4020
400.0000	900.0000	2.8350	6.0979	5.7689
.0000	990.0000	.0000	22.0000	22.0000
50.0000	990.0000	24.9480	22.0000	22.0000
100.0000	990.0000	12.4740	22.0000	22.0000
150.0000	990.0000	8.3160	22.0000	22.0000
200.0000	990.0000	6.2370	22.0000	22.0000
250.0000	990.0000	4.9896	22.0000	21.9999
300.0000	990.0000	4.1580	21.9870	21.9846
350.0000	990.0000	3.5640	21.3092	21.2351
400.0000	990.0000	3.1185	15.0548	14.7053
.0000	1080.0000	.0000	22.0000	22.0000
50.0000	1080.0000	27.2160	22.0000	22.0000
100.0000	1080.0000	13.6080	22.0000	22.0000
150.0000	1080.0000	9.0720	22.0000	22.0000
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

250.0000	1080.0000	5.4432	22.0000	22.0000
300.0000	1080.0000	4.5360	21.9996	21.9995
350.0000	1080.0000	3.8880	21.9403	21.9316
400.0000	1080.0000	3.4020	20.4077	20.2725
.0000	1170.0000	.0000	22.0000	22.0000
50.0000	1170.0000	29.4840	22.0000	22.0000
100.0000	1170.0000	14.7420	22.0000	22.0000
150.0000	1170.0000	9.8280	22.0000	22.0000
200.0000	1170.0000	7.3710	22.0000	22.0000
250.0000	1170.0000	5.8968	22.0000	22.0000
300.0000	1170.0000	4.9140	22.0000	22.0000
350.0000	1170.0000	4.2120	21.9969	21.9963
400.0000	1170.0000	3.6855	21.7994	21.7753
.0000	1260.0000	.0000	22.0000	22.0000
50.0000	1260.0000	31.7520	22.0000	22.0000
100.0000	1260.0000	15.8760	22.0000	22.0000
150.0000	1260.0000	10.5840	22.0000	22.0000
200.0000	1260.0000	7.9380	22.0000	22.0000
250.0000	1260.0000	6.3504	22.0000	22.0000
300.0000	1260.0000	5.2920	22.0000	22.0000
350.0000	1260.0000	4.5360	21.9999	21.9999
400.0000	1260.0000	3.9690	21.9849	21.9825
.0000	1350.0000	.0000	22.0000	22.0000
50.0000	1350.0000	34.0200	22.0000	22.0000
100.0000	1350.0000	17.0100	22.0000	22.0000
150.0000	1350.0000	11.3400	22.0000	22.0000
200.0000	1350.0000	8.5050	22.0000	22.0000
250.0000	1350.0000	6.8040	22.0000	22.0000
300.0000	1350.0000	5.6700	22.0000	22.0000
350.0000	1350.0000	4.8600	22.0000	22.0000
400.0000	1350.0000	4.2525	21.9993	21.9991
.0000	1440.0000	.0000	22.0000	22.0000
50.0000	1440.0000	36.2880	22.0000	22.0000
100.0000	1440.0000	18.1440	22.0000	22.0000
150.0000	1440.0000	12.0960	22.0000	22.0000
200.0000	1440.0000	9.0720	22.0000	22.0000
250.0000	1440.0000	7.2576	22.0000	22.0000
300.0000	1440.0000	6.0480	22.0000	22.0000
350.0000	1440.0000	5.1840	22.0000	22.0000
400.0000	1440.0000	4.5360	22.0000	22.0000
.0000	1530.0000	.0000	22.0000	22.0000
50.0000	1530.0000	38.5560	22.0000	22.0000
100.0000	1530.0000	19.2780	22.0000	22.0000
150.0000	1530.0000	12.8520	22.0000	22.0000
200.0000	1530.0000	9.6390	22.0000	22.0000
250.0000	1530.0000	7.7112	22.0000	22.0000
300.0000	1530.0000	6.4260	22.0000	22.0000
350.0000	1530.0000	5.5080	22.0000	22.0000
400.0000	1530.0000	4.8195	22.0000	22.0000
.0000	1620.0000	.0000	22.0000	22.0000
50.0000	1620.0000	40.8240	22.0000	22.0000
100.0000	1620.0000	20.4120	22.0000	22.0000
150.0000	1620.0000	13.6080	22.0000	22.0000
200.0000	1620.0000	10.2060	22.0000	22.0000
250.0000	1620.0000	8.1648	22.0000	22.0000
300.0000	1620.0000	6.8040	22.0000	22.0000
350.0000	1620.0000	5.8320	22.0000	22.0000
400.0000	1620.0000	5.1030	22.0000	22.0000
.0000	1710.0000	.0000	22.0000	22.0000

100.0000	1710.0000	21.5460	22.0000	22.0000
150.0000	1710.0000	14.3640	22.0000	22.0000
200.0000	1710.0000	10.7730	22.0000	22.0000
250.0000	1710.0000	8.6184	22.0000	22.0000
300.0000	1710.0000	7.1820	22.0000	22.0000
350.0000	1710.0000	6.1560	22.0000	22.0000
400.0000	1710.0000	5.3865	22.0000	22.0000
.0000	1800.0000	.0000	22.0000	22.0000
50.0000	1800.0000	45.3600	22.0000	22.0000
100.0000	1800.0000	22.6800	22.0000	22.0000
150.0000	1800.0000	15.1200	22.0000	22.0000
200.0000	1800.0000	11.3400	22.0000	22.0000
250.0000	1800.0000	9.0720	22.0000	22.0000
300.0000	1800.0000	7.5600	22.0000	22.0000
350.0000	1800.0000	6.4800	22.0000	22.0000
400.0000	1800.0000	5.6700	22.0000	22.0000
.0000	1890.0000	.0000	22.0000	22.0000
50.0000	1890.0000	47.6280	22.0000	22.0000
100.0000	1890.0000	23.8140	22.0000	22.0000
150.0000	1890.0000	15.8760	22.0000	22.0000
200.0000	1890.0000	11.9070	22.0000	22.0000
250.0000	1890.0000	9.5256	22.0000	22.0000
300.0000	1890.0000	7.9380	22.0000	22.0000
350.0000	1890.0000	6.8040	22.0000	22.0000
400.0000	1890.0000	5.9535	22.0000	22.0000
.0000	1980.0000	.0000	22.0000	22.0000
50.0000	1980.0000	49.8960	22.0000	22.0000
100.0000	1980.0000	24.9480	22.0000	22.0000
150.0000	1980.0000	16.6320	22.0000	22.0000
200.0000	1980.0000	12.4740	22.0000	22.0000
250.0000	1980.0000	9.9792	22.0000	22.0000
300.0000	1980.0000	8.3160	22.0000	22.0000
350.0000	1980.0000	7.1280	22.0000	22.0000
400.0000	1980.0000	6.2370	22.0000	22.0000
.0000	2070.0000	.0000	22.0000	22.0000
50.0000	2070.0000	52.1640	22.0000	22.0000
100.0000	2070.0000	26.0820	22.0000	22.0000
150.0000	2070.0000	17.3880	22.0000	22.0000
200.0000	2070.0000	13.0410	22.0000	22.0000
250.0000	2070.0000	10.4328	22.0000	22.0000
300.0000	2070.0000	8.6940	22.0000	22.0000
350.0000	2070.0000	7.4520	22.0000	22.0000
400.0000	2070.0000	6.5205	22.0000	22.0000
.0000	2160.0000	.0000	22.0000	22.0000
50.0000	2160.0000	54.4320	22.0000	22.0000
100.0000	2160.0000	27.2160	22.0000	22.0000
150.0000	2160.0000	18.1440	22.0000	22.0000
200.0000	2160.0000	13.6080	22.0000	22.0000
250.0000	2160.0000	10.8864	22.0000	22.0000
300.0000	2160.0000	9.0720	22.0000	22.0000
350.0000	2160.0000	7.7760	22.0000	22.0000
400.0000	2160.0000	6.8040	22.0000	22.0000
.0000	2250.0000	.0000	22.0000	22.0000
50.0000	2250.0000	56.7000	22.0000	22.0000
100.0000	2250.0000	28.3500	22.0000	22.0000
150.0000	2250.0000	18.9000	22.0000	22.0000
200.0000	2250.0000	14.1750	22.0000	22.0000
250.0000	2250.0000	11.3400	22.0000	22.0000
300.0000	2250.0000	9.4500	22.0000	22.0000

400.0000	2250.0000	7.0875	22.0000	22.0000

GLHN ARCHITECTS & ENGINEERS, INC.

Project: REUSE / RECHARGE
FORT HUACHUCA

Proj. No.: 9428.01
Date: SEPT 95
Computed: JCM
Checked:
Sheet 1 of

EFFECTIVE POPULATION

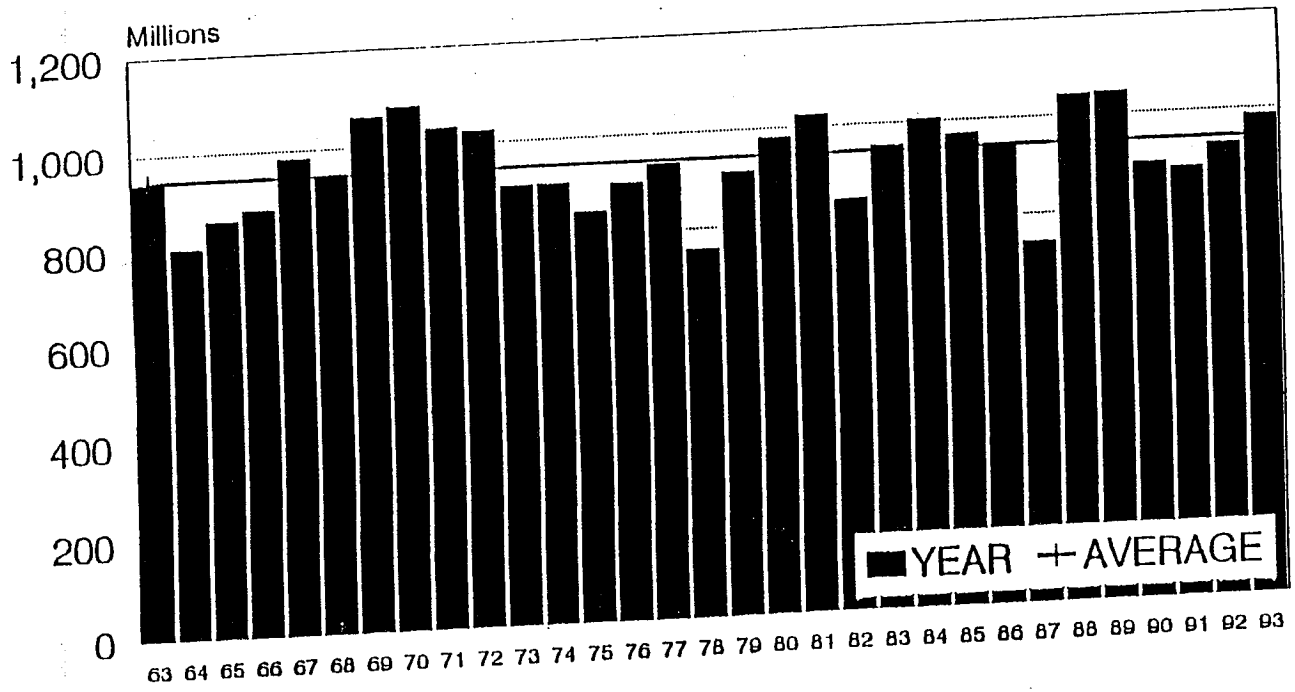
- CURRENT POPULATION PLUS BRAC 95
  = 12,396 + 300 = 12,700

WATER PRODUCTION - BASED ON THE FORT RECORDS

- 31 YEAR AVERAGE, 1963 - 1993, SEE ATTACHED GRAPH - 949,000,000 GAL/YR
  - 2,600,000 GAL/DAY
- REVIEWING YEARS 1978 THRU 1995
  - IN 1994, WATER USE RESTRICTIONS WERE EFFECTIVE
  - AVG 1978 THRU 1993
    - REFERING TO SHEET 3
    - AVG YEARLY WELL PRODUCTION - 934,558 K GAL
    - AVG PER CAPITA USE - 223 GAL/DAY
  - 1994 WITH WATER RESTRICTIONS EFFECTED
    - YEARLY WELL PRODUCTION - 837,223 K GAL
    - PER CAPITA USE - 185 GAL/DAY
  - 1995 (JAN - JULY 95)
    - PROJECTED YEARLY USE -
      (483,369 K GAL)(365/213) = 828,308 K GAL
    - PER CAPITA USE - 183 GAL
    - ALTHOUGH THE DATA FOR 1995 DOES NOT COVER THE ENTIRE YEAR, IT INDICATES A SIMILAR TREND AS FOR THE YEAR 1994 THUS THE DATA FOR 1994 WILL BE USED AS THE 94/95 AVG.
- COMPARING YEARS 1978 THRU 1993, WITH YEAR 1994/1995
  - WITH WATER RESTRICTIONS EFFECTED (94/95) A NET REDUCTION CAN BE OBSERVED
    - WELL PRODUCTION - (934,558 - 837,222) = 97,335 K
    - PER CAPITA USE - (223 - 185) = 38 GAL/DAY

PUMPAGE FIGURES

FORT HUACHUCA, ARIZONA



SHEET 2 OF

WATER RESOURCE MANAGEMENT
FORT HUACHUCA, AZ

WATER / WASTEWATER FLOWS....YEARLY BASIS

YEAR	ON-POST POPULATION	NOON-DAY POPULATION	EFFECTIVE POPULATION	WELL PRODUCTION (1000 GAL)	PER CAPITA USE (GPCD)	WWTP INFLUIENT (1000 GAL)	PER CAPITA USE (GPCD)
1995(1)	9,388	18,420	12,396	483,369	183	(2)	(2)
1994	9,388	18,420	12,396	837,223	185	648,689	143
1993	8,534	16,183	11,081	987,286	244	627,236	155
1992	8,163	16,386	10,901	927,874	233	601,531	151
1991	8,410	16,195	11,002	883,183	220	715,677	178
1990	9,210	17,075	11,829	895,491	207	778,682	180
1989	9,204	17,133	11,844	1,045,547	242	619,839	143
1988	9,142	16,687	11,654	1,043,198	245	724,409	170
1987	9,667	16,960	12,096	740,676	168	701,711	159
1986	8,918	16,563	11,464	944,207	226	656,652	157
1985	8,887	16,778	11,515	972,903	231	680,114	162
1984	9,022	16,341	11,459	1,006,780	241	539,029	129
1983	9,860	16,360	12,025	937,042	214	602,058	137
1982	9,433	15,840	11,567	891,502	211	489,493	116
1981	8,602	15,687	10,961	1,025,596	256	459,682	115
1980	9,301	16,311	11,635	981,586	231	579,905	137
1979	8,957	16,149	11,352	913,452	220	585,987	141
1978	9,446	16,705	11,863	756,602	175	620,827	143
AVG (78-93)	9,047	16,460	11,516	934,558	223	623,927	148

(1) JAN -JULY 95
(2) PLANT BEING UPGRADED DURING YHIS PERIOD, METER READINGS ARE NOT ACCURATE

SUBCT 3

9428\9428RE

USF200003576

GLHN ARCHITECTS & ENGINEERS, INC.

Project: REUSE / RECHARGE

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- REVIEWING WASTEWATER FLOWS
  - REDUCTION IN PER CAPITA DISCHARGE
    (148) - (143) = 5 GAL/DAY

  - YEARLY AVG
    (12,396 EFF. POP)(5 GPD)(365) = 22,623 KGAL/YEAR

- SAVINGS BASED ON ENACTMENT OF WATER USE RESTRICTIONS

  - TOTAL YEARLY - 97,335 K GAL
  - NON-CONSUMPTIVE USES: WATER USE WHICH RETURNS AS WASTEWATER FLOWS SUCH AS DOMESTIC USES ETC (SEE WASTEWATER CALCS ABOVE
    = 22,622 K GAL/YEAR

  - CONSUMPTIVE USES: WATER WHICH DOES NOT RETURN AS WASTEWATER FLOWS SUCH AS IRRIGATION, COOLING TOWERS, WASH DOWN WATER, ETC
    = 97,335 - 22,623 = 74,712 K GAL/

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GLHN ARCHITECTS & ENGINEERS, INC.

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- SUMMARY OF WATER PRODUCTION
  - 31 YEAR AVG - 946,000 K GAL
  - YEARS 78-93 AVG - 934,558 K GAL
  - YEARS 94-95 AVG - 837,223 K GAL

- PRODUCTION ESTIMATE FOR BRAC 95 POPULATION
  - 837,223,000 + 185(300) = 837,278,500 GAL/YEAR
  - FOR DESIGN FLOW USE 838,300,000 GA/YEAR*

* WITHOUT INCREASE REUSE

WATER USAGE REVIEW - USE FLOWRATES REFLECTIVE OF WATER REDUCTION MEASURES

(1) - WASTEWATER FLOWS
- 31 YEAR AVERAGE - RECORDS NOT AVAILABLE
- 1978 THRU 1993 AVG - SEE PAGE 3
  - 623,927,000 GAL/YEAR
  - 145 GAL/CAPITA/DAY
- 1994
  - 648,689,000 GAL/YEAR
  - 143 GAL/CAPITA/DAY
- TM 5-814-1 (ARMY TECHNICAL MANUAL)
  - 100 GPD PER CAPITA (DOMESTIC SEWAGE)
- PROJECTED AVERAGE DAILY FLOW FOR BRAC 95
  - (648,689,000 + (300)(100)) = 648,719,000 GAL/YE
- TOTAL WASTEWATER FLOWS = DOMESTIC SEWAGE PLUS DISCHARGES FROM WASH RACKS, COOLING TOWERS, LAUNDRY, ETC

(2) - COMPARING CONSUMPTIVE USAGES WITH NON-CONSUMPTIVE USAGES YEARS 94-95

- WE WILL USE THE DATA FROM THE 94/95 PERIOD FOR THIS REVIEW SINCE IT REFLECTS WATER RESTRICTIONS
- CONSUMPTIVE USAGES WILL BE CONSIDERED AS WATER USAGES ON THE POST WHICH DOES NOT RETURN AS A WASTEWATER (SEWAGE) FLOW

USF200003578

GLHN ARCHITECTS & ENGINEERS, INC.

Project: REUSE / RECLAIMED

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- WATER PRODUCTION 837,223,000 GAL/YEAR
- SEWER RETURN FLOW 648,689,000 GAL/YEAR
- CONSUMPTIVE USE 188,534,000 GAL/YEAR

- ESTIMATION OF BREAKDOWN OF CONSUMPTIVE USE

- THE FOLLOWING IS AN ESTIMATION OF THE VOLUME OF WATER UTILIZED FOR VARIOUS CONSUMPTIVE USAGES ON THE POST

(1) GENERAL REVIEW

- TM 5-813-1 INDICATES AN AVERAGE WATER OF 150 GPDPC (WITH MINOR IRRIGATION DEMANDS) AND TM 5-814-1 INDICATES THAT ONLY 100 GPDPC RETURNS AS WASTEWATER FLOWS. THUS TYPICAL FOR MILLITARY BASES THE CONSUMPTIVE USES ARE 50 GPDPC.
  - (50 GPDPC)(12,396) = 619,000 GAL/DAY
  - = 226,227,000 GAL/YEAR
- THUS WITH THE WATER REDUCTION MEASURES IN-PLACE, THE POST PERCENTAGE IS GOOD

(2) GENERAL USAGES

- EVAP COOLING (NOT INCLUDING CHILLED WATER), VEHICLE WASHING, MISC
  - (10 GPD)(9388 ON-POST POPULATION) = 93,880 GPD

ADJUSTED USE = 34,143 KGAL/YEAR

(3) IRRIGATION USAGE

- IT IS OUR UNDERSTANDING THAT THE GOLF COURSE DID NOT UTILIZE GROUNDWATER FOR IRRIGATION DURING THE PERIOD (94/95)
- LARGE TURF AREAS
  - ESTIMATED AT 49.72" PER ACRE PER YEAR FOR TURF AREAS (PER REUSE PERMIT APPLICATION)

USF200003579

US ARMY INTELLIGENCE CENTER AND FORT HUACHUCA
FORT HUACHUCA, ARIZONA

ESTIMATE OF EXISTING IRRIGATION DEMANDS – LARGE TURF AREAS (1994–1995)

LAND USE ZONE	EXISTING AREA IRRIGATED WITH RECLAIMED WATER (ACRE)	EXISTING AREA IRRIGATED WITH POTABLE WATER (ACRE)	RECLAIMED WATER DEMAND (2) (GAL PER YEAR)	POTABLE WATER DEMAND (1) (GAL PER YEAR)
HISTORIC	0.0	19.5		26,325,126
VEHICULAR CIRCULTION	0.0	1.0		1,350,006
COMMUNITY	0.0	2.6		3,510,017
SCHOOL	0.0	2.0		2,700,013
HOUSING	0.0	20.0		27,000,129
INDRUSTRIAL	0.0	0.0		0
MISSION	18.9	2.0		2,700,013
COMMUNITY	88.5	10.0		13,500,065
TOTAL(ACRES)	107.4	57.1		
TOTAL(GALLONS)			0	77,085,369

(1) EQUILIVALENT APPLICATION RATE @ 49.72" PER YEAR

GLHN ARCHITECTS & ENGINEERS, INC.

Project: RIDGE / RECREATION

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- IRRIGATION OF LARGE TURF AREAS, PARADE FIELDS, PT FIELDS, ETC
  - TOTAL ACREAGE IRRIGATED WITH POTABLE WATER - 57 ACRES
  - REFER TO ATTACHED PRINT OUT
    - YEARLY DEMAND = 77,085,369

- IRRIGATION OF HOUSING ZONE
  - ASSUME 55 GPD, PER DWELLING PER DAY
  - 2000 (55)(365) = 40,150,000 GALLON/YEAR

- TOTAL IRRIGATION DEMAND = 117,235,369 GAL/YEAR

USE = 116,823 K GAL/YEAR (ADJUSTED)

USF200003581

GLHN ARCHITECTS & ENGINEERS, INC.

Project: PEDDIE / RECHARGE

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(4) COOLING TOWERS

- WATER DEMAND - 1.6 GPH PER TON HOUR
  - INCLUDES EVAPORATION, BLOW DOWN, AND DRIFT
  - EFFECTIVE USAGE = PER RATED CAPACITY (TONS)

$(1.9\ GPH/TON\ HOUR)(8760\ HR/YEAR)(O.U)(L.P)$

- O.U = OPERATIONAL UTILIZATION = 0.65
- LP = LOAD PROFILE = 0.50

= 5409 GAL / YEAR / RATED CAPACITY

= 15 GAL / DAY / RATED CAPACITY

- SEASONAL VARIATION
  - PEAK DAY 120%
  - SUMMER 100%
  - WINTER 30%

- MAJOR COOLING TOWERS

GRELLY HALL	- 1020 TONS	
HOSPITAL	- 300 TONS	
BLDG 62701 CENTRAL PLANT	- 1200 TONS	(SOUTH PLANT)
MI SCHOOL CENTRAL PLANT	1200 TONS	(NORTH PLANT)
11TH SIGNAL BARRACKS	- 300 TONS	
COMMISSARY	- 200 TONS	
PX / MAIN EXCHANGE	- 250 TONS	
BKS	- 500 TONS	
MISC AROUND POST	- 2000 TONS	
	6970 TONS	

- WATER USAGE

$= (6970\ TONS)(5490\ GAL/TON/YEAR)$

$= 37,700,730\ GAL/YEAR$

ADJUSTED - USE = 37.768 V GAL/YEAR

USF200003582

GLHN ARCHITECTS & ENGINEERS, INC.

Project: BCOS / RECURRCL

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- ADJUSTING (ROUNDING) 94-95 ESTIMATION OF USES

GENERAL USAGE	34,266,200	GAL/YEAR
IRRIGATION	117,235,369	"
COOLING TOWERS	37,700,730	"
TOTAL	189,202,299	GAL/YEAR

- ESTIMATED CONSUMPTIVE USE BASED ON METER READINGS

188,534,000

Δ = 668,299 GAL OR 0.35% ✓

- ADJUSTED VALUES (EXISTING) IN K GAL/YEAR (1000 GAL/YEAR)

- WATER PRODUCTION = 837,233
- WASTEWATER FLOWS = 648,689
- CONSUMPTIVE USE = 188,534
  - GENERAL USE - 34,143
  - IRRIGATION - 116,823
  - COOLING TOWERS - 37,568

(3) REVIEW OF CONSUMPTIVE USAGES / NON-CONSUMPTIVE USAGES 78-93 PERIOD

AVG YEARLY WELL PRODUCTION	- 934,558 K GAL / YEAR
AVG WASTEWATER FLOW	- 623,927 K GAL / YEAR
CONSUMPTIVE USE (WELL PRODUCTION LESS WASTEWATER FLOW)	- 310,631 K GAL/YEAR
(4) COOLING TOWERS - SAME AS 93-94	- 37,568 K GAL/YEAR
(3) IRRIGATION - SEE PRINTOUT NEXT PAGE	- 233,293 K GAL/YEAR
(2) GENERAL (310,620 - CT - IRR)	- 39,770 K GAL/YEAR

USF200003583

US ARMY INTELLIGENCE CENTER AND FORT HUACHUCA
FORT HUACHUCA, ARIZONA

ESTIMATE OF EXISTING IRRIGATION DEMANDS – LARGE TURF AREAS (1978–1993)

LAND USE ZONE	EXISTING AREA IRRIGATED WITH RECLAIMED WATER (ACRE)	EXISTING AREA IRRIGATED WITH POTABLE WATER (ACRE)	RECLAIMED WATER DEMAND (2) (GAL PER YEAR)	POTABLE WATER DEMAND (1) (GAL PER YEAR)
HISTORIC	0.0	30.6		41,310,198
VEHICULAR CIRCULTION	0.0	2.0		2,700,013
COMMUNITY	0.0	5.0		6,750,032
SCHOOL	0.0	2.0		2,700,013
HOUSING	0.0	89.0		120,150,576
INDRUSTRIAL	0.0	0.1		135,001
MISSION	10.0	1.0	26,395,391	1,350,006
COMMUNITY	88.5	13.5	233,599,211	18,225,087
TOTAL(ACRES)	98.5	143.2		
TOTAL(GALLONS)			259,994,602	193,320,926

(1) EQUILIVALENT APPLICATION RATE @ 49.72" PER YEAR

SHEET 12

9428IRRF

USF200003584

GLHN ARCHITECTS & ENGINEERS, INC.

Project: REUSE / RECHARGE

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REVIEW OF EXISTING RECLAIMED WATER UTILIZATION / DISPOSAL

- WASTEWATER FLOW (94/95) 648,689 KGAL/YEAR
- RECLAIMED WATER USAGE
  - HISTORICAL RECORDS INDICATE THE HISTORICAL INDICATE THAT APPROXIMENTLY 260,000 K GAL PER YEAR IS UTILIZED FOR IRRIGATION OF THE GOLF COURSE, CHAFFEE FIELD
    - APPLICATION RATE 260,000,000 / 98.5 AC
      = 2,639,593 GAL/AC
      = 97 INCH/AC/YEAR
    - THIS APPLICATION RATE EXCEEDS THE BASIC CONSUMPTIVE USE FOR THE TURF AND INCLUDE LUXURIAN UPTAKE (KNEBCHE & PEPPER 1984) WHICH INDICATE THAT TURF CAN UPTAKE
  - EVAPOTRANSPIRATION
    - EAST RANGE LAGOONS (EVAPORATION)
      (60 AC)(66.5"/YEAR)/12 = 332.5 AF/YEAR
      = 108,338 K GAL/YEAR
    - EFFLUENT HOLDING PONDS (EVAPORATION)
      (5 AC)(66.5 INCH/YEAR)/12 = 27.7 AF/YR
      = 9,028 KGAL/YEAR
    - EVAPOTRANSPIRATION AROUND EAST RANGE LAGOONS
      (55 AC)(24.5 INCH/YEAR)/12 = 1123 AF/YEAR
      = 36,589 KGAL/YEAR
    - TOTAL - 153,955 K GAL/YEAR

GLHN ARCHITECTS & ENGINEERS, INC.

Project: REUSE / RECHARGE

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FUTURE WATER DEMAND
WITH PROPOSED REUSE ON THE POST

- WATER DEMAND
  - PROJECTED WELL PRODUCTION - 838,300 K GAL/YEAR
  - IRRIGATION USE REDUCTION - 77,085 K GAL/YEAR
  - COOLING TOWERS (MAJOR NOT INCLUDING MISC) (37,568 - 10,980) - 26,588 K GAL/YEAR

734,627 K GAL/YEAR

FUTURE REUSE / RECHARGE

- CONSUMPTIVE USE

GENERAL = 34,148 $\left(\frac{12,696 \text{ EFF POP}}{12,396 \text{ EFF POP}}\right)$ = 34,974 K GAL/YEAR

IRRIGATION = PER MASTER PLAN (VOLUME 2) = 43,730 KGAL/YEAR

COOLING TOWERS - ONLY 2000 TONS OF MISC

2000 (5490 GAL/TON/YEAR) = 10,980 KGAL/YEAR

- REUSE
  - IRRIGATION - 269,360
  - COOLING TOWER - 26,588
  - TOTAL 295,948 K GAL/YEAR

- RECHARGE
  - EVAPORATION
    - EFFLUENT HOLDING PONDS WILL BE COVERED = 0
    - RECHARGE SITE 50 AC, HALF IN DRY CYCLE
    - (25 AC)(66.5"/YEAR)/12 = 138.54 AF/YEAR
      = 45,141 K GAL YEAR
  - RECHARGE
    - PROJECTED WASTEWATER FLOW - 648,719
    - LOSSES - 45,141
    - REUSE - 295,940
    - RECHARGE 307,638

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GLHN ARCHITECTS & ENGINEERS, INC.

Project: FSUC RECLAIMED

Proj. No.: 9413.01
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RECLAIMED WATER DISTRIBUTION SYSTEM

IRRIGATION DEMANDS - FROM VOLUME 2

- TOTAL - (CHAPTER 10) - 269.4 MG/YEAR
- GOLF COURSE & MAIN GATE AREA - 120 MG/YEAR
- UPPER POST AREA - 149.4 MG/YEAR

COOLING TOWERS

- COOLING TOWER - 34.1 MG/YEAR

TOTAL

TOTAL = 269.36 + 34.1 = 303.5 MG/YEAR

DESIGN FLOWS

- IRRIGATION - REFER TO THE FOLLOWING WATER BALANCE
  - PEAK FLOW IN MAY = 15.61% TOTAL YEARLY
  - PEAK MONTH (MAY) = 269.4 (15.61%) = 42.00 MG
  - - TO GOLF COURSE & MAIN GATE - 19 MG
    - TO UPPER PORTION OF POST - 24 MG
- AVG. FLOW DAILY FLOW
  - TOTAL - 0.738 MGD
  - GOLF COURSE - 0.329 MGD
  - UPPER PORTION OF POST - 0.409 MGD
- PEAK MONTHLY
  - TOTAL - 1.414 MGD
  - GOLF COURSE - 0.625 MGD
  - UPPER PORTION - 0.789

US ARMY INTELLIGENCE CENTER AND FORT HUACHUCA
FORT HUACHUCA, ARIZONA

IRRIGATION DEMANDS BY AREA BASED ON THE LANDSCAPE AND IRRIGATION MASTER PLAN VOLUME 2

LAND USE ZONE (1)	PROPOSED (1)					
	RECLAIMED WATER			POTABLE WATER		
	AREA TURF (ACRE)	AREA DRIP IRRIGATIC (ACRE)	EQUIVALENT TURF AREA (ACRE)	AREA TURF (ACRE)	AREA DRIP IRRIGATIC (ACRE)	EQUIVALENT TURF AREA (ACRE)
HISTORIC	21.0	2.0	21.1	9.6	0.0	(4) 3.1
VEHICULAR	0.0	147.0	7.4	0.0	0.0	0.0
COMMUNITY	2.6	36.0	4.4	0.0	10.0	0.5
SCHOOL	10.5	9.0	11.0	0.0	0.0	0.0
HOUSING	66.3	100.0	71.3	0.0	0.0	(2)
INDRUSTRIAL	0.0	0.0	0.0	0.0	0.0	0.0
MISSION	18.9	13.7	19.6			0.0
COMMUNITY	102.0	0.0	102.0	0.0	0.0	0.0
TOTAL(ACRES)	221.3	307.7	236.7	9.6	10.0	3.1
TOTAL(MG) (3)			269.36			43.78

(1) PER MASTER LANDSCAPE PLAN
(2) ALLOW 40 MG PER YEAR
(3) BASED ON 49.72 INCH / ACRE / YEAR FOR GOLF COURSE, 36" OTHER TURF AREAS
(4) MINIMUM TURF IRRIGATION

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9428IRRD

USF200003588

U.S. ARMY INTELLIGENCE CENTER AND FORT HUACHUCA
FORT HUACHUCA, ARIZONA

IRRIGATION DEMANDS: BASE WIDE

IRRIGATED ACREAGE:	236.70 (ACRES)
AREA LAKES/PONDS:	0.95 (ACRES)
TOTAL:	237.65 (ACRES)

MONTH	I NET RAINFALL (1) (INCH)	II EVAPORATION (2) (INCH)	III CONSUMPTIVE USE (3) (INCHES/ACRE)	IV CONSUMPTIVE USE LESS RAINFALL (4) (M GALS PER ACRE)	V TOTAL(5) LANDSCAPE WATER DEMAND (MG)	VI NET(6) WATER DEMAND (MG)	VII PERCENT OF YEARLY DEMAND
JAN	0.99	2.02	3.30	0.0627	14.85	14.90	5.53
FEB	0.62	2.85	2.40	0.0483	11.44	11.51	4.27
MAR	0.72	4.6	3.20	0.0673	15.94	16.06	5.96
APR	0.22	6.07	5.10	0.1325	31.36	31.52	11.70
MAY	0.14	8.28	6.65	0.1768	41.84	42.05	15.61
JUNE	0.38	9.11	6.65	0.1702	40.30	40.53	15.04
JULY	3.31	9.11	7.40	0.1111	26.29	26.52	9.84
AUG	2.46	8.28	5.30	0.0771	18.25	18.47	6.85
SEPT	2.29	6.35	5.10	0.0763	18.06	18.22	6.76
OCT	1.57	4.88	4.50	0.0796	18.83	18.96	7.03
NOV	0.70	3.04	3.30	0.0706	16.71	16.79	6.23
DEC	1.14	2.02	3.30	0.0586	13.88	13.93	5.17
TOTAL (YEARLY)	14.54	66.61	56.20	1.1312	267.75	269.47	100.00

(1.) Total rainfall over project acreage including lakes (30 YEAR AVGERAGE RAINFALL DATA DATA FROM FORT HUACHUCA METEOLOGY DEPTARTMENT)
(2.) Evaporation from ponds / lakes only, based on ADHS Engineering Bulletin #11, p. VII–84
(3.) TURFGRASS : 36" PARKS AND OPEN SPACES
: 49.72" GOLF COURSE AND SPORTS
(4.) Column III Less Column I CONVERTED TO MG
(5.) Column IV Times Total Irrigated Acrage
(6.) Column V Plus Evaporation From Ponds

File: 9428WBT

GLHN ARCHITECTS & ENGINEERS, INC.

Project: RESOL / RECLAIMED

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- PEAK DAILY - (PEAK FACTOR = 1.5)
  - TOTAL - 2.121 MGD
  - GOLF COURSE / MAIN GATE - 0.938 MGD
  - UPPER PORTION OF POST - 1.183 MGD

COOLING TOWERS

- IN UPPER PORTION OF RECLAIMED WATER SYSTEM
  - AVG = 0.163 MGD
  - PEAK MONTH = 0.247 MGD
  - PEAK DAY = 0.370 MGD

DESIGN FLOWS FOR RECLAIMED WATER SYSTEM

- TOTAL SYSTEM
  - AVG DAILY = 0.841 MGD
  - PEAK MONTH = 1.661 MGD
  - PEAK DAY = 2.49 MGD