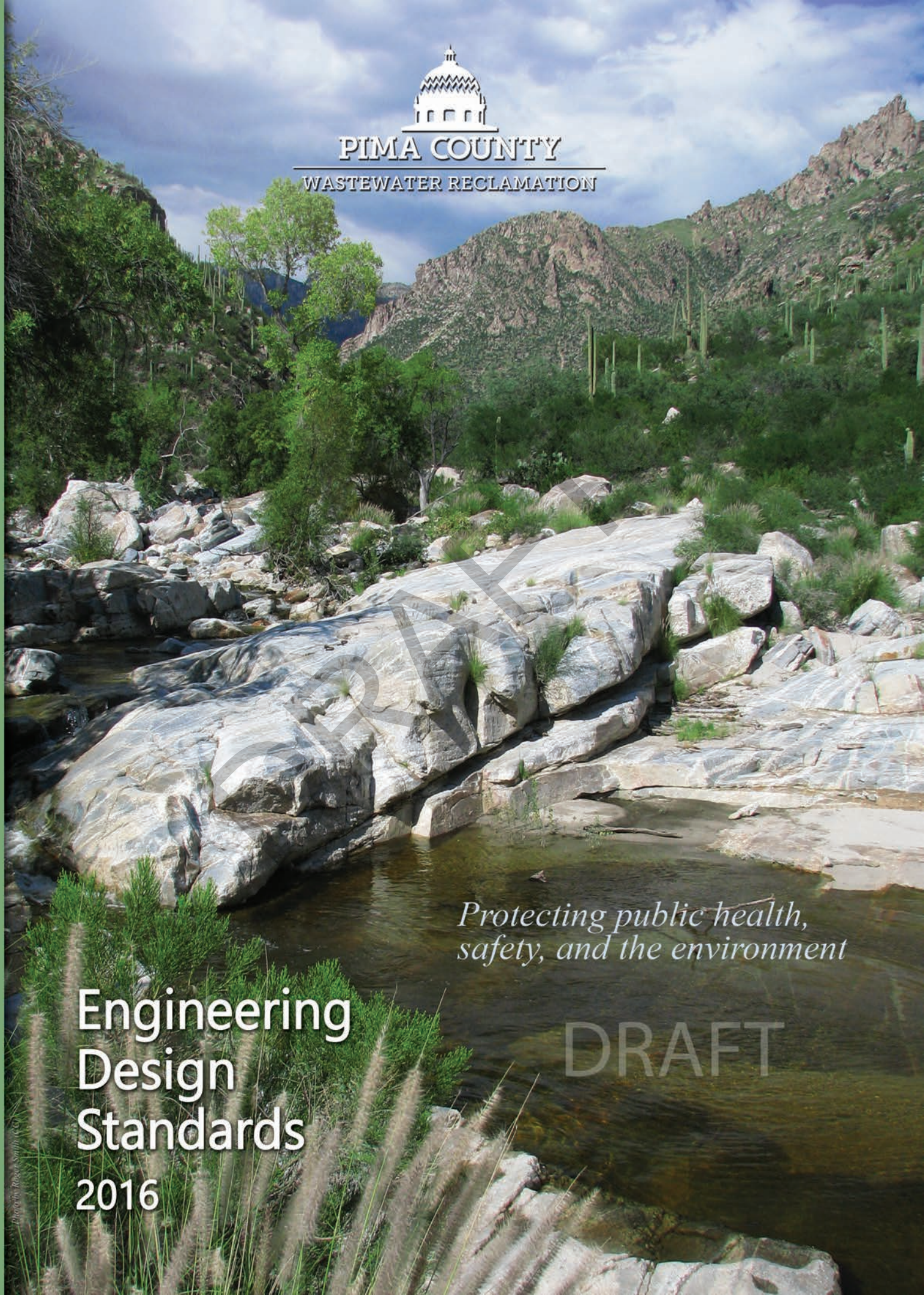

PIMA COUNTY
WASTEWATER RECLAMATION
DRAFT
Protecting public health,
safety, and the environment
Engineering
Design
Standards
2016
DRAFT

00 GENERAL CONTENTS

~~New in the *Engineering Design Standards 2012* i~~

General Contents ..... **~~i~~ii**

Acronyms and Abbreviations ..... **~~iv~~iii**

01 INTRODUCTION
Table of Contents
1.1 System Overview
1.2 Pima County Wastewater Service Areas
1.3 Definitions and Terms

02 REGULATIONS, POLICIES AND PROCEDURES
Table of Contents
2.1 Regulatory Drivers
2.2 Overview of the *Design Standards*
2.3 Variances
2.4 Customer Appeals Process and the Standards Committee
2.5 Revisions
2.6 Repairs and Rehabilitation of Existing Public Sewers
2.7 Special Projects
2.8 Wastewater Reclamation Facilities
2.9 Private Sewers
2.10 Gray Water Plumbing Systems

03 PRIVATE SEWERS
Table of Contents
3.1 Overview
3.2 Classification of Public or Private Sewers
3.3 Transferring Sewers from Private to Public
3.4 Using the *Design Standards* for Private Sewers
3.5 Pre-Treatment
3.6 Private Wastewater Pumping Systems

04 UTILITY COORDINATION
Table of Contents
4.1 Process Overview
4.2 Graphical Requirements for Utility Coordination Plans

05 GRAVITY SEWER DESIGN STANDARDS
Table of Contents
5.1 Sewer Lines
5.2 Manholes and Appurtenances
5.3 Service Laterals (HCS/BCS)

5.4 Graphical Requirements for Sewer Plans

06 **WASTEWATER PUMPING SYSTEMS**
Table of Contents
6.1 General Classifications
6.2 Planning and Design
6.3 Capacity Phasing
6.4 Site Requirements
6.5 Pumps
6.6 Wet Wells
6.7 Manifold Piping and Appurtenances
6.8 Force Mains and Appurtenances
6.9 Odor Control Measures
6.10 Electrical and Controls
6.11 Submittals
6.12 Exceptions for Minor Wastewater Pumping Systems

07 **EASEMENTS AND MAINTENANCE ACCESS**
Table of Contents
7.1 Requirements for Public Sewer Easements
7.2 Conveyance of Public Sewer Easements
7.3 Temporary Construction Easements
7.4 Abandonment of Public Sewers and Easements
7.5 Maintenance Access and Encroachments within Public Sewer Easements
7.6 Maintenance Access within Right-of-Way
7.7 Landscaping and Planting Guidelines for Public Sewers

APPENDICES

A SCOUR PROCEDURES AND GUIDELINES FOR SANITARY SEWER CROSSINGS OF ALLUVIAL WATERCOURSES

B DESIGN GUIDELINES FOR SIPHONS

Acronyms and Abbreviations

Wherever the following abbreviations are used in this document, they are construed to be the same as the respective expressions represented;

Term	Description
AAC	Arizona Administrative Code
AASHTO	American Association of State Highway and Transportation Officials
AC	Alternating Current
ACH	Air Changes Per Hour
ACI	American Concrete Institute
ACP	Asbestos Cement Pipe
ACPA	American Concrete Pipe Association
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
ADWF	Average Dry Weather Flow
ANSI	American National Standards Institute
APP	Aquifer Protection Permit
ARS	Arizona Revised Statutes
ARV	Air Relief Valve
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
AZPDES	Arizona Pollutant Discharge Elimination System
BADCT	Best Available Demonstrated Control Technology
BCS	Building Connection Sewer
BMPs	Best Management Practices
CA	Construction Authorization per R18-9-E301 – 4.01 General Permit
CCFRPM	Centrifugally Cast Fiberglass Reinforced Polymer Mortar
CCTV	Closed Circuit Television
cfs	Cubic Feet Per Second
CIP	Capital Improvement Program
CIPP	Cured in Place Pipe
CLSM	Controlled Low Strength Material
CMP	Corrugated Metal Pipe

Code	Pima County, Arizona, Code of Ordinances, specifically Title 13 – Public Services, Division II – Sewers
COT	City of Tucson
DA	Discharge Authorization per R18-9-E301 – 4.01 General Permit
dB	Decibels
Design Standards	The Pima County Regional Wastewater Reclamation Department's Engineering Design Standards ~~2012~~2016
dia	Diameter
DIP	Ductile Iron Pipe
DIPRA	Ductile Iron Pipe Research Association
DR	Dimension Ratio
DSD	Development Services Department
ECC	Engineer's Certificate of Completion
EPA	Environmental Protection Agency
EPDM	Ethylene Propylene Diene Monomer (rubber)
FCR	Final Compaction Report
FE	Field Engineering
Fed Spec	Federal Specifications
FEMA	Federal Emergency Management Agency
FMP	Flow Management Plan
ft	Feet
GFCI	Ground-Fault Circuit Interrupter
GIS	Geographical Information System
gpad	Gallons Per Acre Per Day
gpd	Gallons Per Day
gpm	Gallons Per Minute
HAZMAT	Hazardous Material
HCS	House Connection Sewer
HDPE	High Density Polyethylene
HMI	Human Machine Interface
HOA	Home Owners Association
Hz	Hertz
IBC	International Building Code

IMS	Infrastructure Management System (Hansen Asset Management Program)
in	Inch or Inches
IPC	International Plumbing Code
I&I	Infiltration and Inflow
LF	Linear Foot
max	Maximum
mgd	Million Gallons Per Day
MH	Manhole
min	Minimum
mil	1/1,000 of an Inch
mV	Millivolt
NASSCO	National Association of Sewer Service Companies
NCPI	National Clay Pipe Institute
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NPSHA	Net Positive Suction Head Available
NPSHR	Net Positive Suction Head Required
O&M	Operation and Maintenance
OEM	Original Equipment Manufacturer
ORP	Oxidation/Reduction Potential
OSHA	Occupational Safety and Health Administration
PAG	Pima Association of Governments
PCDSD	Pima County Development Services Department
PCRWRD	Pima County Regional Wastewater Reclamation Department
PDEQ	Pima County Department of Environmental Quality
PDWF	Peak Dry Weather Flow
P.E.	Professional Engineer
PE~~/FBE~~	Polyethylene (PE) ~~Fusion Bonded Epoxy (FBE)~~
PF	Peaking Factor
PMOC	Point and Method of Connection

PPI	Plastics Pipe Institute
psi	Pounds Per Square Inch
PUE	Public Utilities Easement
PVC	Polyvinyl Chloride
PVCPA	The PVC Pipe Association
PWWF	Peak Wet Weather Flow
RAP	Recycled Asphalt Product
RCP	Reinforced Concrete Pipe
rpm	Revolutions Per Minute
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
SDR	Standard Dimension Ratio
S.D.	Standard Detail
S.S.D.	Special Standard Detail
S.S.	Stainless Steel
sf	Square Foot
SPCS	State Plane Coordinate System
SSO	Sanitary Sewer Overflow
Standard Specifications and Details	The Pima County Regional Wastewater Reclamation Department's Standard Specifications and Details ~~2012~~2016
SWPPP	Storm Water Pollution Prevention Plan
TDH	Total Dynamic Head
UC	Utility Coordination
UBC	Uniform Building Code
v	Velocity
VCP	Vitrified Clay Pipe
WSS	Welded Steel Sewer

PIMA COUNTY
WASTEWATER RECLAMATION

SECTION 1
INTRODUCTION

Engineering Design Standards

TABLE OF CONTENTS

SECTION **PAGE**

1.1 System Overview 1-1

1.2 Pima County Wastewater Service Areas.....1-2

1.3 Definitions and Terms.....1-3

1.3.1 Interpretation of Terms 1-7

1.3.3 Titles and Headings.....1-7

1.3.4 Capitalization of Defined Terms 1-7

Section 01

Introduction

1.1 System Overview

The public sanitary sewer system of Pima County presently collects more than 70 mgd throughout the County's 370 square mile service area. The service area includes the Cities of Tucson and South Tucson; neighboring towns of Marana, Oro Valley and Sahuarita; and unincorporated communities, such as Summerhaven (Mt. Lemmon), Arivaca Junction, Avra Valley, Green Valley, Corona de Tucson and Catalina. See Subsection 1.2 for a general map of Pima County's sanitary sewer service areas.

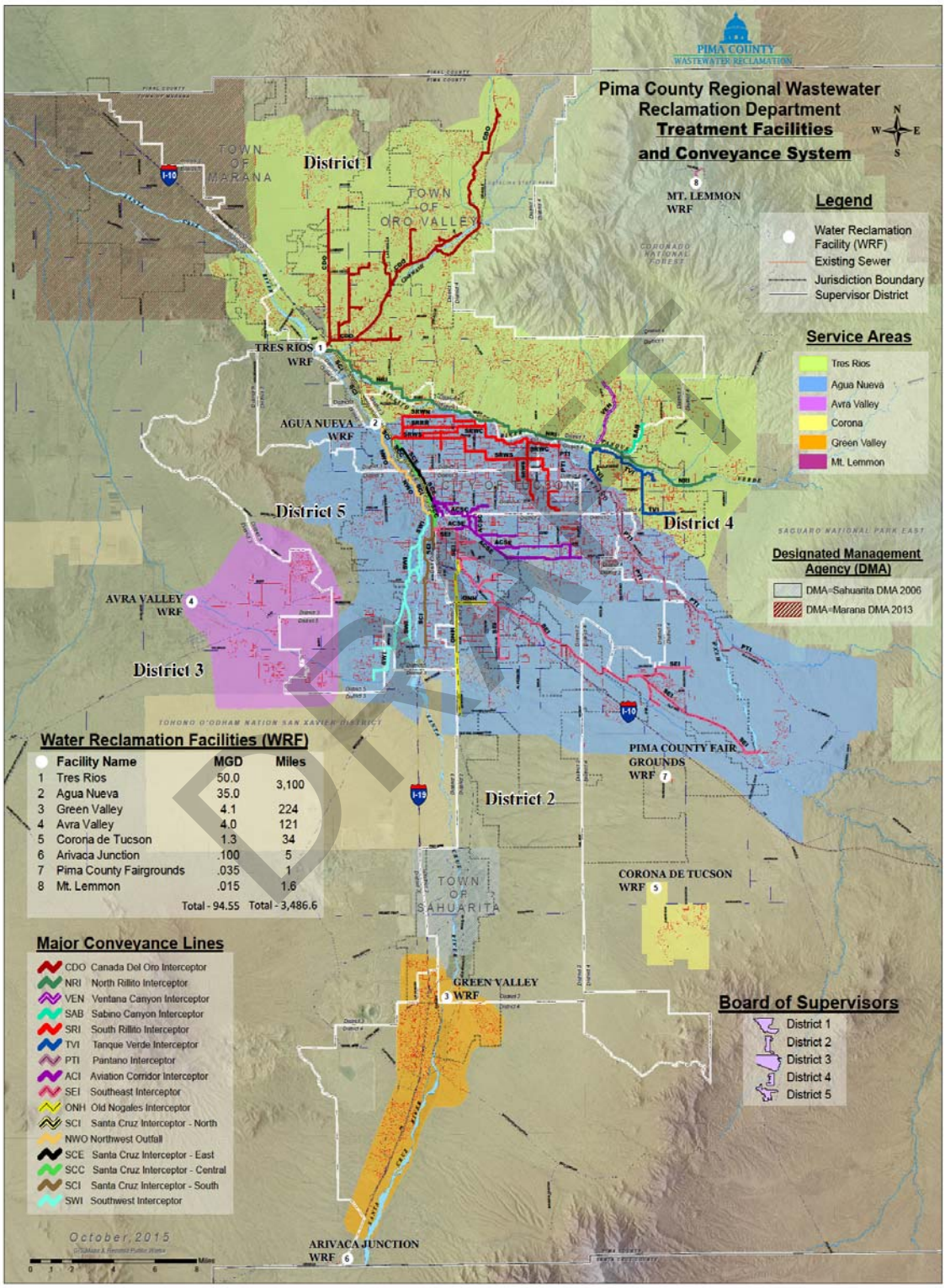
Pima County operates and maintains a conveyance system comprised of more than 3,300 miles of sanitary sewer lines, ranging in diameter from 6 to 78 inches. The existing sewer lines were built using various pipe materials, including reinforced concrete, asbestos cement, cast iron, ductile iron, glazed clay tile, vitrified clay, polyvinyl chloride, high density polyethylene and fiberglass reinforced. The conveyance system also consists of approximately 74,000 system features, including manholes, cleanouts and diversion structures. Other conveyance facilities include wastewater pumping systems, siphon facilities, metering equipment and odor control units.

Pima County also operates and maintains ~~ten~~eight wastewater reclamation facilities, varying in capacity ranging from 0.009 mgd to ~~41~~ 50 mgd. The major metropolitan facilities are ~~Roger Road~~Agua Nueva, ~~Ina Road~~ and Tres Rios ~~and Randolph Park~~. The ~~seven~~ six outlying facilities are Green Valley, Pima County Fairgrounds, Avra Valley, Corona de Tucson, Arivaca Junction, and Mt. Lemmon ~~and Rillito Vista~~. Wastewater reclamation processes include Bardenpho, ~~biofiltration, high purity oxygen activated sludge, air activated sludge with nutrient removal, oxygen ditch with and without nutrient removal, and bio-membrane reactor~~oxidation ditches with and without nutrient removal, and Facultative Lagoons with and without mechanical aeration.

The public sanitary sewer system of Pima County dates from 1900, when the City of Tucson purchased the Tucson Water Company for $110,000. The city's water and sewer department was created in August 1900. The area's first wastewater treatment facility was placed into service in 1928. Pima County Sanitation District #1 was formed to address the sanitary sewer needs of Pima County residents living outside the Tucson city limits. ~~The Roger Road Wastewater Treatment Facility was put online in 1951.~~ In 1978, the Pima County Department of Sanitation was renamed the Pima County Wastewater Management Department and assumed responsibility for the operation of all the region's public sanitary sewer facilities. The Pima County Wastewater Management Department was renamed the Pima County Regional Wastewater Reclamation Department (RWRD) in 2007. In 2012 RWRD completed major upgrades to the Ina Road facility (renamed Tres

Rios) and constructed the Agua Nueva facility which allowed the department to close the aging Roger Road facility.

1.2 Pima County Wastewater Service Areas



1.3 Definitions and Terms

Whenever the following terms are used in this document, the intent and meaning shall be interpreted as described in this subsection. Where there is a conflict between these definitions and those in the AAC and ARS, the AAC and ARS definitions shall apply for persons seeking a Discharge Authorization under a Type 4.01 General Permit.

100-Year Flood – A flood event that statistically has a 1 out of 100 (or one percent) chance of being equaled or exceeded on a specific watercourse in any given year.

Accept or Acceptance – Written notice from the Director or his/her authorized representative agreeing to the concept presented in the plans, studies or reports, and required as part of a review process.

Affidavit of Cost – Documentation of final construction costs.

Agency – The jurisdictional body for whom the construction is being done, either by Permit or Contract.

Aggregate – Inert material such as sand, gravel, broken stone, crushed stone, or a combination thereof.

Applicant – The owner or a representative of the owner of the property or unit requesting connection to the Public Sewer.

Approve or Approval – Written authorization from the Department for a submittal when it has been determined that it meets a County standard.

As-Built Plans or As-Builts – An annotated copy of the Sewer Plans providing the exact final location and layout of Public Sewer facilities, their positional verification and records that include deviations to the design.

Augmentation – The construction of sanitary sewer facilities adjacent to or in replacement of existing Public Sewer facilities for the purpose of increasing flow capacity.

Backfill – The material used to fill a trench from the top of shading to subgrade or finished grade.

Bedding – The material placed at the bottom of a trench and used to support the pipe prior to the placement of Shading and Backfill.

Bill of Sale – A written instrument showing the voluntary transfer of a right, interest, or title to personal property, either by way of security or absolutely, from one person to another without the actual physical possession of the property leaving the owner or being delivered to the other party.

Block-Out – An object, material or combination thereof used to fill the pipe opening and flow channel within the base of a manhole that facilitates for future removal and connection with a new pipe.

Building Connection Sewer (BCS) – The private sanitary sewer line between the commercial or industrial building and its connection to the Collection Sewer.

Calendar Day – Any day shown on the calendar, beginning at midnight, extending for a 24 hour period, and ending at midnight.

Cathodic Protection – A method for protecting metallic materials from damage caused by corrosive soils.

Code – Pima County, Arizona, Code of Ordinances; more specifically, Title 13 – Public Services, Division II – Sewers that includes ordinances governing wastewater management.

Collector or Collection Sewer – A sanitary sewer line that receives Wastewater from two or more Service Laterals.

Construction Acceptance – The Acceptance, by the Department, for the transfer of newly constructed or modified sanitary sewer assets to the Department.

Construction Permit – Written authorization from the Department to allow construction, modification or connection to Public Sewer facilities in accordance with the Sewer Plans. Also see Observation Permit.

Contractor – The individual, partnership, firm, corporation, or any acceptable combination thereof that is responsible for the construction of the Project in accordance with the Sewer Plans and Construction Permit.

Cover – The vertical distance from the top of a buried pipe to finished grade.

Crown – In a transverse cross section of pipe, the highest point of elevation on the interior surface.

d/D – Ratio of flow depth (d) to pipe diameter (D).

Day – Unless otherwise designated, day shall be understood to mean a Calendar Day.

Deficiency – Departure from, or noncompliance with, specified criteria.

Department – The Pima County Regional Wastewater Reclamation Department.

Design Drawings – The Sewer Plans prior to their Acceptance by the Department. Also see Sewer Plans.

Design Engineer – The Professional Engineer sealing the Design Drawings for a Project or design staff performing duties under his/her direct supervision.

Design Report – A document providing the supporting calculations, analysis, data, criteria and other material for a proposed special sewer facility. Also see Sewer Design Report.

Developer – One or more individuals or incorporated entities that desires to convert land from its present use to another.

Development – Any man-made improvement (change) to real property including but not limited to: buildings or structures, fencing, paving, grading, filling, excavation, trenching dredging mining, drilling, or storage of equipment or materials.

Director – The Director of the Department or his/her delegate.

Drop Manhole – A manhole ~~with modified inlet piping designed to transition flow from a higher elevation to a lower elevation.~~having an inlet pipe connection that is located above the bench.

Engineering Directive – The process used by the Department to clarify and improve the design and construction standards and details for Public Sewer facilities.

Excavation – Any man-made cut, cavity, trench, or depression in the earth's surface formed by earth removal.

Field Engineer – The Sanitary Engineering Manager's authorized representative assigned to make detailed inspections for the construction or modification of Public Sewer facilities.

Flow Through –That part of a Public Sewer intended for receiving existing or future Wastewater originating from outside a development or municipality and not from inside a development or municipality.

Force Main – A pressurized sanitary sewer discharge line extending from a Pump Station having a horizontal length greater than 10-feet.

Full Flow – A ratio of 1.0 d/D, where d is the hydraulic grade line of Wastewater flow in the pipe and D is the inside diameter of the pipe.

Geotechnical Engineer – An Arizona-Registered Professional Engineer (Civil) responsible for project soils characterization and construction backfill compaction quality control testing and certifications.

Grey Water – Residential wastewater collected separately that originates from clothes washers, bathtubs, showers and sinks. Grey water excludes wastewater from kitchen sinks, dishwashers and toilets.

Haunch – That portion of a pipe barrel extending from the bottom to the springline.

Holiday – (1) A legal holiday pursuant to A.R.S. 1-301, as amended. (2) Microscopic holes in liners and coatings detected by a Holiday Test.

Holiday Test – Electrical testing used to determine the presence and number of discontinuities in a coating film performed on a nonconductive coating applied to an electrically conductive surface in accordance with ASTM D5162 standards.

House Connection Sewer (HCS) – The private sanitary sewer line between the residence or building connection and its connection to the Collection Sewer.

Inspector – See Field Engineer.

Interceptor Sewer – A sanitary sewer line that receives Wastewater from a number of collector and trunk sewers.

Invert – In a transverse cross section of pipe, the lowest point of elevation on the interior surface.

Jetting – A soil compaction technique that forces pressurized water into the bedding or backfill material in order to saturate it and force the air out. Also referred to as flooding.

Lift Station – A sanitary sewer facility that pumps Wastewater to a higher elevation without the need for a Force Main. Also see Pump Station.

Observation Permit – Written authorization from the Department to allow access into Public Sewer manholes. Also see Construction Permit.

Over-sizing – The increase in capacity of sanitary sewer facilities to provide capacity for future flow from within or beyond the proposed design boundaries of a Project.

Permit – See Construction Permit and Observation Permit.

Pressure Sewer – See Force Main.

Project – The specific, coordinated design, construction or similar undertaking identified by a single Project number.

Public Sewer – The sanitary sewer assets of Pima County, specifically for the conveyance of Wastewater.

Pump Station – A sanitary sewer facility that pumps Wastewater to a higher elevation and requires the use of a Force Main. Also see Lift Station.

Record Drawings – See As-Built Plans.

Right-of-Way – A general term, denoting a strip of land, property or interest therein, acquired for or dedicated to transportation and other public works purposes.

Sanitary Sewage – See Wastewater.

Scour – A computed value for the potential depth that material, from the bed and banks of a Wash, will be removed due to the flow of water during a 100-year flood event.

Service Lateral – The private sanitary sewer line between a residential, commercial, or industrial building and its connection to the Collection Sewer. Also see House Connection Sewer and Building Connection Sewer.

Sewer Basin – All portions of the sanitary sewer collection system tributary to a common point such as a connection to an interceptor sewer or pump station. By definition, the sewers within a Sewer Basin are hydraulically linked.

Sewer Design Report – Documentation of the design flows for Public Sewers and the basis for calculating the design flows, in accordance with AAC R18-9-E301(C). Also see Design Report.

Sewer Plans – The Project's official construction documents, or reproductions thereof, Accepted by the Department, that show the location, character, dimensions and details for the extension, augmentation or modification of Public Sewers. These documents may include, however not limited to, public sewer improvement plans, development plans or public sewer modification plans. Also see Design Drawings.

Shading – The material that extends from the top of the Bedding to one foot (typically) above the top of pipe.

Siphon or Inverted Siphon – A sanitary sewer conveyance facility used to convey Wastewater underneath an obstruction, such as a Wash or drainage culvert, without pumping.

Special Approval – Written authorization from the Director or his/her delegate on a case-by-case basis, to proceed with the design of a specific concept for Public Sewers that is typically not Accepted by the Department.

Special Provisions – Additions and revisions to the *Standard Specifications and Details*, specifically Section 3, covering conditions and requirements peculiar to on individual project.

Springline – In a transverse cross section of pipe, the line of maximum horizontal dimension.

Storm Drain – A conduit or system of conduits that convey stormwater runoff, street drainage, and other wash waters or drainage but excludes Wastewater.

Stub-Out – An upstream length of pipe installed at a sanitary sewer manhole that is intended for future connection.

Trench – A narrow excavation for the installation of sanitary sewer facilities or other utilities.

Trunk Sewer – A sanitary sewer line that receives Wastewater from many Collector Sewers.

Variance – A waiver, issued in writing by the Department's Sanitary Engineering Manager, granting a one-time deviation from a specific design or construction standard for unique circumstances where full compliance is not realistically feasible.

Wash – A dry creek bed or gulch that temporarily fills with water after a heavy rain; an arroyo or an alluvial watercourse.

Wastewater – The wastes from toilets, baths, sinks, lavatories, laundries, drains, and other plumbing fixtures in residences, mobile homes, institutions, public and business buildings, industrial wastewaters and other places of human habitation, employment, or recreation.

Work – All labor, materials, equipment, and other incidentals necessary or convenient to the successful completion of Public Sewer construction and the carrying out of all the duties and obligations required by the Sewer Plans.

Working Day – Any Day, other than Saturday, Sunday or a Holiday, on which legal business can be conducted by Pima County.

1.3.1 Interpretation of Terms

When not inconsistent with the context, words used in the present tense include the future, words in the singular number include the plural, and words in the plural number include the singular.

1.3.2 Titles and Headings

The titles or headings of sections and subsections are intended for convenience of reference and shall not be considered as having any bearing on their interpretation.

1.3.3 Capitalization of Defined Terms

Defined terms within this document ~~that~~ are ~~intended to be~~ capitalized. The Director reserves the right to interpret words or phrases listed in Subsection 1.3 - Definitions and Terms, where the context warrants.

PIMA COUNTY
WASTEWATER RECLAMATION

SECTION 2
REGULATIONS, POLICIES AND PROCEDURES

Engineering Design Standards

TABLE OF CONTENTS

SECTION **PAGE**

2.1 Regulatory Drivers 1
2.1.1 State Regulations 1
2.1.2 County Regulations 1
2.2 Overview of the *Design Standards* 1
2.3 Variances 2
2.3.1 Requests for Design Variances 2
2.3.2 Variance Criteria 3
2.3.3 Variance Actions 3
2.4 Customer Appeals Process and the Standards Committee 3
2.5 Revisions 4
2.6 Repairs and Rehabilitation of Existing Public Sewers 5
2.7 Special Projects 5
2.8 Wastewater Reclamation Facilities 6
2.9 Private Sewers 6
2.10 Gray Water Plumbing Systems 6

Section 02

Regulations, Policies and Procedures

2.1 Regulatory Drivers

2.1.1 State Regulations

The Pima County Department of Environmental Quality (PDEQ), through a delegation agreement with the Arizona Department of Environmental Quality (ADEQ), has the authority to review the design of new sanitary sewer facilities for subsequent ~~the~~ issuance of a Construction Authorization (CA). When construction is complete, ADEQ receives the Engineer's Certificate of Completion (ECC) and Record Drawings for review and issuance of the Discharge Authorization (DA).

The Applicant is responsible for complying with all State regulations and requirements. Arizona Administrative Code (AAC) contains specific requirements for sanitary sewer facilities:

- AAC, Title 18 – Environmental Quality, Chapter 5 – Environmental Review and Certification;
- AAC, Title 18 – Environmental Quality, Chapter 9 – Water Pollution Control;
- AAC R18-9-101 through R18-9-403 and A.R.S. §§ 49-241 through 49-252 for statutes and rules related to the 1.11 General Aquifer Protection Permit.

When under AAC 4.01 general permit, it is the responsibility of the design engineer to process sewer submittals. The design engineer shall be responsible for making any required submittals to ADEQ or delegated authority. The design engineer and their client should never assume that RWRD is responsible for processing approvals from ADEQ.

2.1.2 County Regulations

The Applicant is also responsible for complying with the Pima County, Arizona, Code of Ordinances, Title 13 – Public Services, Divisions II – Sewers and Division III – Industrial Waste (Code). The Code establishes the general requirements and procedures for the planning, design, construction and modification of Public Sewer facilities. If a specific design requirement in the Code is more stringent than the AAC, the Code shall supersede the AAC.

2.2 Overview of the *Design Standards*

The *Design Standards* for Public Sewers in Pima County have three primary goals:

- To attain a 100-year Service Life for sanitary sewer conveyance facilities prior to rehabilitation or replacement;
- To access and maintain sanitary sewer conveyance facilities in a cost-effective manner; and

- To keep roots, grease and other obstructions out of sanitary sewer conveyance facilities.

The *Design Standards* are intended to provide specific and technical details that meet or exceed State and County regulations. These standards provide the minimum criteria for the design of Public Sewer conveyance facilities in Pima County. It is not intended that these standards be blindly applied in every application. There may be strong technical reasons why a particular standard is not appropriate for a given situation. In unique circumstances, creative engineering design, based on sound engineering principles, may meet the intent of the State and County regulations. Where necessary, either Special Approval or a design Variance, may be appropriate.

2.3 Variances

In some cases, strict compliance with the *Design Standards* may not be feasible and a Variance may be appropriate. In these cases, the Sanitary Engineering Manager of the Department may grant or deny a request for a Variance. It is the responsibility of the Sanitary Engineering Manager to administer, coordinate and execute the Variance process in coordination with the Development Liaison group.

A Variance may be considered either during the development of the construction documents or during the progress of construction, and limited to any of the following circumstances:

- Design slopes less than the standard minimums would eliminate the need for a pump station;
- A substitution for, or change in a standard material, results in the use of a material which can be clearly demonstrated to be of equal or superior quality;
- A strict adherence to standard specifications would be impractical or impossible because of an existing field conflict; or
- An emergency situation prohibits strict adherence to preliminary sewer layout requirements or standard specifications.

For other deviations from the *Design Standards* that do not fit any of these circumstances or for certain design concepts specified in the *Design Standards*, Special Approval shall be required and will be made by the Director or his/her delegate.

2.3.1 Requests for Design Variances

Requests for design Variances shall be submitted through the Development Liaison group for administrative processing. The Variance request shall be in a letter format and include the following elements:

- A reference to the specific standard(s) from which a Variance is being requested;

- A detailed explanation of how an extraordinary and unnecessary hardship or unusual topographic or other pre-existing physical condition of the land does not make strict adherence to the specific standard(s) feasible; and
- Any additional documentation and background information that may be helpful in assessing the request.

2.3.2 Variance Criteria

The Sanitary Engineering Manager may Approve a Variance request if all of the following criteria are met:

- The Variance does not violate State and County regulations;
- Strict application of the specific standard(s) would create an extraordinary and unnecessary hardship because of unique site conditions. The hardship shall not arise from a condition created by an action of the property owner;
- The Variance request meets the general intent and purpose of the *Design Standards*;
- The Variance will not adversely affect the rights of surrounding property owners and residents;
- The Variance will not compromise safety of the public and O&M staff;
- The Variance will not adversely impact the operation and maintenance of the system.

The Sanitary Engineering Manager shall not Approve a Variance request if any of the following conditions apply:

- Approval would solely increase economic return from the property;
- Approval would resolve the violation of a construction permit;
- Approval would resolve a misinterpretation or error in the design; or
- Approval has not been granted for comparable variances in the past.

2.3.3 Variance Actions

The Sanitary Engineering Manager will review the Variance request, and will, at his/her sole discretion, Approve or deny it. The Sanitary Engineering Manager may include conditions to an Approved Variance request if they are deemed reasonable and necessary to preserve the integrity of the Public Sewer and to ensure that the general purposes and intent of the *Design Standards* are preserved. The Sanitary Engineering Manager will notify the Applicant of the decision within 5 Working Days from the date the Variance request was received.

2.4 Customer Appeals Process and the Standards Committee

The Department has established a Standards Committee to review and address the following types of customer appeals:

- Denied Variance requests;
- Denied sewer construction permits; and

- Other issues escalated during the design-review process.

Members of the Standards Committee shall have knowledge and experience in the design and/or construction of sanitary sewers and be appointed by the Director. Each member will serve a term at the discretion of the Director. The Standards Committee will be comprised of the following members:

- The Sanitary Engineering Manager (committee chair/voting member);
- A representative from the Field Engineering group of the Department (voting member);
- A representative from the Conveyance Division (voting member);
- Two stakeholders of the construction and engineering profession (voting members); and
- One representative from the Development Liaison group of the Department (non-voting member).

A request for a review by the Standards Committee shall be submitted in writing directly to the Sanitary Engineering Manager. It is the responsibility of the Sanitary Engineering Manager to coordinate and schedule the activities of the Standards Committee. The Standards Committee will meet as necessary to conduct business, but not more frequently than twice per month. At least four voting members must be present for the Standards Committee to conduct business.

Customer appeals will be discussed and voted upon during the Standards Committee meeting. The Sanitary Engineering Manager will make a recommendation to the Director based on the results of the meeting. The Director shall be the final authority on all customer appeals and will Approve or deny the customer appeal request within 5 Working Days following the date of the meeting.

2.5 Revisions

The Sanitary Engineering Manager will be responsible for monitoring revisions to the *Design Standards* and to the *Standard Specifications and Details* to ensure that the standards:

- Are consistent with current and accepted engineering practices;
- Do not impose extraordinary burdens for typical development and improvement projects; and
- Do not conflict with Code, AAC or the public's interest.

When a specific standard requires immediate attention for clarification or improvement, the Sanitary Engineering Manager will make a request to the Standards Committee for review and Approval of an Engineering Directive. An Engineering Directive is a separate document that describes new standards, or modifications, until such revisions can be incorporated in the *Design Standards* or the *Standard Specifications and Details*. Any errors to the current standards should be brought to the attention of the Sanitary Engineering Manager, in writing.

The Department will keep users of the *Design Standards* informed of future updates through its website. Hard copy (printed) revisions will not be distributed. It is the holder's responsibility to keep the document current by periodically checking the Department's website for updates.

2.6 Repairs and Rehabilitation of Existing Public Sewers

Pursuant to AAC R18-9-E301(H), the repair and/or rehabilitation of any existing Public Sewer facility is not considered an extension, upsizing or realignment that requires a notice of intent to discharge from ADEQ. Repair and/or rehabilitation includes work performed in response to the deterioration of existing sanitary sewer facilities with the intent to maintain or restore the system to its original operational characteristics.

2.7 Special Projects

Pursuant to Code, specifically 13.24.035, projects involving the design and construction of special facilities by another governmental entity or private developer shall be considered as Special Projects. Special Projects are not to be included with the Capital Improvements Program (CIP) of the Department. Special Projects shall include, but are not limited to:

- Oversized Public Sewer facilities (sewer lines with diameters greater than 18 inches);
- Public wastewater pumping systems;
- Public wastewater reclamation facilities; and
- Expansions of existing public wastewater reclamation facilities.

The Department may impose the following additional requirements for Special Projects:

- The Department reserves the right to participate in and/or to approve (in advance) the selection of the qualified design engineer/consultant being retained by the Developer to design the facility. In certain instances, a special agreement between the developer and the Department may supersede this requirement; and
- A pre-design meeting shall be held in order to clarify the design issues/considerations, that may be unique to the Special Project.

The Department may also require the Developer, as the specific case dictates, to be responsible for completing any or all of the following tasks:

- Amending the Regional 208 Water Quality Plan;
- Developing an acceptable facility plan for the new sewer facility;
- Developing an approved method/means for disposal of the treated effluent and/or solids generated by the facility; and
- Attending any required public meetings and/or hearings and answering all questions related to the design/integrity of the proposed facility.

Where applicable, the design of Special Projects shall conform to the requirements of AAC R18-9-E301.

2.8 Wastewater Reclamation Facilities

The design of Wastewater Reclamation Facilities is unique unto its intended location, ownership and purpose. Specific requirements and criteria will be established between the Department and the Design Engineer prior to the start of any design effort.

The design of Wastewater Reclamation Facilities and selection of treatment processes and/or components will be based on:

- Compliance with all applicable regulatory standards;
- The ability to meet the projected capacity needs;
- Maximum reliability;
- Construction and operating costs; and
- Best Available Demonstrated Control Technology (BADCT).

2.9 Private Sewers

The Department encourages residential developments, in general, to be served by Public Sewers. The use of private sanitary sewers must be Approved by the Director of the Department or his/her delegate.

In accordance with Code, specifically 13.20.035, private sanitary sewers may connect to Public Sewers only at a location and in a manner approved by the Department. Private sanitary sewers shall be designed and constructed in accordance with AAC R18-5 – Environmental Reviews and Certification and AAC R18-9 – Water Pollution Control and applicable adopted plumbing code (see Section 4 for more information).

2.10 Gray Water Plumbing Systems

Effective June 1, 2010, the City of Tucson and the Town of Oro Valley require Gray Water plumbing in all new residential homes. Developments that utilize Gray Water systems may result in reduced wastewater flows, particularly in terminal sewer reaches. In order to maintain self-cleansing sewer velocities, the Department reserves the right to modify the *Design Standards* for new developments that may utilize Gray Water systems on a case-by-case basis.

PIMA COUNTY
WASTEWATER RECLAMATION

SECTION 3
PRIVATE SEWERS

Engineering Design Standards

TABLE OF CONTENTS

SECTION **PAGE**

3.1 Overview 1
3.2 Classification of Public or Private Sewers.....1
3.3 Transferring Sewers from Private to Public.....1
3.4 Using the *Design Standards* for Private Sewers 2
3.5 Pre-Treatment.....2
3.6 Private Wastewater Pumping Systems 2

Section 03

Private Sewers

3.1 Overview

Private sewers are privately-owned sanitary sewer facilities that are operated and maintained at the expense of the property owner or homeowners' association they serve. Private sewers are located within private property and private streets without Right-of-Way or Public Sewer easements. Service Laterals (HCS/BCS) are also considered to be private sewers, even when located within Right-of-Way or a Public Sewer easement.

The connection of private sewers to the Pubic sewer system and associated fees for service are regulated under Code, specifically 13.20.40. The Department must review the plans and/or documentation that provide the location and method of connection, which are also used to determine the required connection fees.

3.2 Classification of Public or Private Sewers

The appropriate classification (public or private) for new sanitary sewer facilities will be made by the Director during the planning/subdivision review process. It is recommended that the Applicant meet with the Development Liason group of the Department to discuss the new development and project details early in the planning phase.

The Department encourages residential developments, in general, to be served by Public Sewers that conform to the Department's latest design and construction standards. The Department encourages commercial developments, in general, to be served by on-site private sewers that conform to the applicable AAC R18-9-E301 or building/plumbing codes. However, if a flow-through sewer is necessary to service adjacent parcels, the Department will require the design and construction of Public Sewers, with appropriate Public Sewer easements, for the new development.

3.3 Transferring Sewers from Private to Public

Any proposal to convert an existing private sewer to a Public Sewer shall conform to the requirements of AAC R18-9-A304(B) and requires Approval from the Director. For the Department to allow a private sewer to transfer to Public Sewer, a compelling justification must be made to accept such assets and maintenance responsibilities. For the Department to consider such a proposal, sufficient documentation shall be provided that the private sewer was designed and constructed in accordance with the *Design Standards* and that all necessary Public Sewer easements for maintenance vehicle access were dedicated.

3.4 Using the *Design Standards* for Private Sewers

The plans (construction documents) for private sewers shall be forwarded by the applicable building codes Agency to the Department for a conformance review when it is intended to transfer such facilities to public in the future. The Department will conduct a review to determine if the private sewer was designed in accordance with the *Design Standards*. This review must occur prior to issuance of the building permit by the local Agency having jurisdiction. If the review indicates conformance with the *Design Standards*, construction of the private sewer shall be inspected by the Department and As-built Plans furnished when available.

3.5 Pre-Treatment

Pursuant to Code, specifically 13.36, commercial facilities, such as metal finishers, car washes, auto repair shops, photo developers, military facilities and hospitals, that discharge regulated wastes into the sewers must have industrial discharge permits. The Pima County Development Services Department and the Industrial Wastewater Control Section will determine on a case-by-case basis if a new commercial development will require such a permit. The user shall comply with all applicable codes and regulations, whether or not contained in the permit.

3.6 Private Wastewater Pumping Systems

Private wastewater pumping systems shall be designed and operated in accordance with the latest wastewater industry standards and best management practices to prevent negative impacts to downstream Public Sewers and to the community. PDEQ is the regulating authority for private pump stations per AAC R-18-9-E301 – 4.01 General Permit.

It shall be the responsibility of the Design Engineer to recommend best management practices for odor control with the design of private wastewater pumping systems. A statement such as the following shall be included with the plans for private wastewater pumping systems:

"A Best Management Practice for Odor Control Systems may be installed at some time in the future if the installed wastewater pumping system is found to cause odor problems".

Pursuant to Code, specifically 13.20.035 and 13.20.40, the location and method of connection for private wastewater pumping systems to Public Sewers shall conform to the following requirements:

- The manhole where a private force main discharges into shall be private;
- A private gravity sewer line shall be used to connect the private discharge manhole to a Public Sewer manhole, per S.D. RWRD-300 or -301; and
- For an individual residence or a commercial establishment, with average wastewater flows less than 3,000 gpd and no manhole connection to the Public Sewer, the private force main shall connect to the service lateral (HCS/BCS) at the property line.

PIMA COUNTY
WASTEWATER RECLAMATION

SECTION 4
UTILITY COORDINATION

Engineering Design Standards

TABLE OF CONTENTS

SECTION **PAGE**

4.1 Process Overview 1

4.1.1 Submittal Requirements 1

4.1.2 Conformance Review Process 2

4.2 Graphical Requirements for Utility Coordination Plans 3

4.2.1 Landscape, Planting and Irrigation Plans 3

4.2.2 Stormwater Drainage Plans 4

4.2.3 Street Lighting and Signage Plans 4

4.2.4 Water and Reclaimed Water Plans 4

4.2.5 Sewer Modification Plans 4

Section 04

Utility Coordination

4.1 Process Overview

The plans (construction documents) for any public utility or public improvement project that is located within Right-of-Way, shall be submitted as early as possible to the Department's Utility Coordination (UC) group, where existing Public Sewers are located within the project's limits of construction. The plans, will be reviewed for conformance with the Department's standards for design and maintenance access as they relate to existing Public Sewers. Upon Acceptance of the 100%-sealed plan submittal, the Department will issue a Letter of Clearance. The Letter of Clearance is required prior to the issuance of a sewer Construction Permit by the Department if Public Sewer construction is required. The Letter of Clearance is valid for two years from the date that it is issued.

The UC group will review the plans for such projects to ensure design conformance with:

- Arizona Administrative Code Title 18, Chapter 9;
- Pima County, Arizona, Code of Ordinances Title 13 – Public Services Division II, Sewers;
- The *Design Standards*; and
- The *Standard Specifications and Details*.

4.1.1 Submittal Requirements

The typical requirements for a complete first submittal to the UC group are described in the following:

- A transmittal sheet identifying the Project Manager(s) and contact information. All submittals from City of Tucson Engineering Division must be submitted through the City of Tucson's utility coordinator. For all other jurisdictions, the Design Engineer may submit directly; however, a Letter from the jurisdiction's Project Manager must authorize their Design Engineer to submit construction documents directly to the UC group.
- 3 full sets of black line plans with a minimum scale of 1 inch = 40 feet.
- 1 set of Special Provisions. If there are no Special Provisions for the project, please identify this fact on the transmittal sheet.
- 1 itemized cost estimate. Either a cost estimate shall be provided at a 75% or greater submittal or a statement shall be provided on the transmittal sheet stating that the Department will not be financially responsible for this project.
- 1 cd-pdf containing a full set of plans as well as copies of all other documentation being provided.

The UC group may request additional information to be included with the submittal, depending on the complexity of the project. The requirements for subsequent

submittals for each project may vary. Incomplete submittals will be rejected and the owner will be notified in a timely manner.

Submittals should be processed by the project owner, typically a public agency or public utility company. Direct submittals by the Design Engineer, on behalf of the project owner, shall include written authorization for that submittal by the owner.

For projects impacting existing Public Sewers, recommendations for wastewater flow management shall also be included with the submittal. See Subsection 2.2 of the *Standard Specifications and Details* for more information.

4.1.2 Conformance Review Process

When a complete submittal is received by the UC group, the project owner will receive a notification letter confirming that the review period has begun. Within 30 working days of the notification letter date, the UC group will respond to the project owner with the results of the review.

A. Non-Conformance

When the results of the review indicate non-conformance with the Department's standards (i.e. the *Design Standards* and the *Standard Specifications and Details*), the response will typically include:

- One transmittal letter outlining all items being returned and all items required for the next submittal;
- A review comments and resolution letter from the required reviewing parties within the Department describing the details of non-conformance; and
- If necessary, any additional attachments for clarification.

B. Conformance for Unsealed Plans

If the results of the review indicate conformance with the Department's standards, but, the submittal contains unsealed plans, the UC will issue a Letter of Understanding to the project owner.

The Letter of Understanding is not an Acceptance of the project by the Department, but is rather an acknowledgement that the submittal is in conformance with Department's standards.

A final submittal of the 100%-sealed plans is required after a Letter of Understanding is issued to obtain a Letter of Clearance. The final submittal will be reviewed for new revisions and the conformance of these revisions with the Department's standards. Additional review comments will be forthcoming for any non-conformance issues on subsequent submittals.

C. Conformance for Sealed Plans

The UC group will issue a Letter of Clearance to the project owner after the 100%-sealed plan submittal is reviewed and meets the following requirements:

- The plan submittal must be sealed by the Design Engineer;
- The submittal must be complete;
- The results of the review must indicate conformance with all applicable design and construction standards; and
- When a sewer modification plan is included with the submittal, the mylar cover sheet must be included for signature by the Department.

4.2 Graphical Requirements for Utility Coordination Plans

Public utility and public improvement projects can vary tremendously in size and scope; therefore, the types of plans included in a submittal can also vary. The following requirements are provided as guidance for plans when existing Public Sewers are located within the limits of proposed construction:

- Show the Department's utility coordination tracking number (e.g. UPC-20XX-XXX) on the cover sheet of the project plans (typically assigned by the UC group after the first submittal);
- Label each existing Public Sewer manhole and cleanout with the Department's unique manhole identification number and clearly indicate if it will remain undisturbed, modified, abandoned, etc.;
- Show and label existing service laterals (HCS/BCS) that were installed after December 31, 2005;
- Label existing Public Sewer lines and force mains with the Department's plan tracking number (e.g. G-20XX-XXX), pipe diameter, material and direction of flow;
- For each existing manhole and cleanout to be adjusted, show the existing and proposed rim elevations and clearly specify the sewer modifications required;
- Clearly label horizontal and vertical clearances of existing sewer with new public utility lines and structures to the nearest hundredth of a foot; and
- For non-typical designs, the Design Engineer should contact the UC supervisor to determine what pertinent information should be shown on the plans with existing Public Sewers.

The following subsections provide more detailed requirements for specific types of plans that may be included with the submittal.

4.2.1 Landscape, Planting and Irrigation Plans

In cases where existing Public Sewer lines are located in the vicinity of new landscape and planting areas, such as in roadway medians and shoulders, the plans should provide sufficient information to show design conformance with the

requirements of Subsections 7.5, 7.6 and 7.7. The landscape, planting and irrigation plans should include the following:

- Show the location of Public Sewer lines and manholes located within the vicinity of new landscape and planting areas; and
- Provide a certification statement as required per Subsection 7.7.

4.2.2 Stormwater Drainage Plans

When new stormwater drainage facilities will be installed across or in close vicinity to existing Public Sewers, the plans for such facilities should include the following:

- In profile view or in a separate detail, label the vertical clearances of existing sewer with new stormwater drainage culverts to the nearest hundredth of a foot.

4.2.3 Street Lighting and Signage Plans

When new street light poles or street signs will be installed in close vicinity to existing Public Sewers, the plans for such infrastructure should include the following:

- In plan view, show the location of Public Sewer lines and manholes with new poles and signs; and
- If necessary, provide a separate profile detail for specific poles or sign foundations with existing sewer, showing applicable clearances will be met.

4.2.4 Water and Reclaimed Water Plans

When a water or reclaimed water plan is included with the submittal package, the plans for such infrastructure should include the following:

- Show all sewer-related modifications resulting from water or reclaimed water construction (e.g. sewer replacement per S.D. RWRD-108); and
- In plan or profile view, provide vertical clearance information for each crossing of a new water main or reclaimed main with an existing sewer line to the hundredth of a foot.

4.2.5 Sewer Modification Plans

For Projects requiring the relocation or reconfiguration of existing Public Sewers, the sewer modification plans shall be included with submittal package. The following graphical requirements shall apply to sewer modification plans:

- Show the Department's sewer project tracking number (e.g. G-20XX-XXX) on the cover sheet of the sewer plans;
- Provide the Department's Approved signature block on the cover sheet of the sewer plans;
- Clearly identify all existing utilities that are to be abandoned-in-place and those that are to be abandoned-and-removed; and
- All applicable requirements for Sewer Plans per Subsection 5.4.

The sewer modification plans may require regulatory approval from the appropriate agency (PDEQ or ADEQ) after Acceptance (Letter of Clearance) by the Department. The Project Manager is responsible for obtaining regulatory approvals of the sewer modification plan.