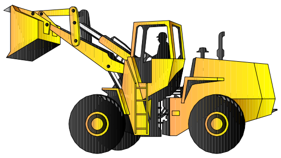

Cost Estimating Guide
for
Water, Wastewater, Roads, and Buildings

For Use in Preparing the Local Infrastructure Capital Improvement Plan (ICIP)

Revised June 2007

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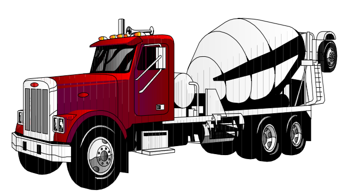

Use of This Document

This document is intended to aid communities in the preparation of the Infrastructure Capital Improvement Plan (ICIP) that is submitted annually to the Local Government Division of the Department of Finance and Administration. The plan includes a brief description of proposed infrastructure for the governmental entity along with estimated costs for those proposed projects. Medium to large cities and counties often have in-house expertise or the resources to hire consulting help to determine the costs of the proposed infrastructure. However, smaller cities, villages, counties, and others may lack the in-house expertise and may not have the financial resources to hire outside help. This Cost Estimating Guide is designed for those communities that do not have other ways of estimating infrastructure costs.

The guide is designed to be very simple to use with most estimates calculated on the basis of readily obtainable information, such as the number of houses to be served. Each section contains formulas and worksheets to take the user through the project estimating process. Given the necessity of simplicity and ease of use, many assumptions have been made which results in approximated costs estimates. These estimates are intended to provide an estimate of the magnitude of costs, whether a project is in the range of $10,000 rather than $1,000 or $100,000. It will not determine if the proposed project is $10,000 or $20,000. This estimating technique is not accurate enough for that type of cost estimating.

In summary, this guide should be used only in conjunction with the ICIP process by communities that do not have access to better cost-estimating techniques or resources. Any community that does have access to better information should use that information. This guide has been designed to be simple to use so that a community can complete the ICIP with reasonable infrastructure cost estimates without having to spend a lot of time or hire an outside consultant to complete the work.

Source of Information

The cost estimating guide was compiled from a variety of sources, but primarily from federal, state, and local governmental entities. The specific references are cited within each section.

Update of Previous Guides

This is the fourth cost-estimating guide prepared for the ICIP process. The most recent update was prepared in 2000. This guide supersedes the other guides; the other guides should be discarded and this guide used in their place. In most cases, the cost estimates from 2000 were updated to 2007 dollars (using standard engineering economics techniques) because that was the best data available. Given the inflation rate over the past 6 years and the availability of information to make the updates to 2007 dollars this approach is reasonable. The inflation rates used were as follows:

Year(s)	Prior to 2004	2004	2005-2006	2007
Rate	3%	5%	8%	5%

The higher rates were used to account for the fact that several construction materials have had significant price increases in the last few years. Specifically, plastics (PVC pipe, HDPE liners), concrete and steel prices have nearly doubled in the last 3 years.

Cost Projections

When using this guide to prepare cost estimates for future years, the inflation rate for each year between 2007 and the year being projected to should be added to the prices calculated using this guide. Inflation information can be found using the Consumer Price Index, specifically the Construction Price Index. This information can be obtained at the U.S. Department of Labor's webpage, http://www.bls.gov/cpi/

Document Preparers

This document was prepared by the New Mexico Environmental Finance Center (NM EFC), a program of the Institute for Engineering Research and Applications at New Mexico Tech. The EFC was established by the Environmental Protection Agency in 1992 to assist state, local, and tribal governments with the broad array of financial issues associated with environmental infrastructure and regulation. The NM EFC primarily serves EPA Region 6 - New Mexico, Texas, Oklahoma, Arkansas, and Louisiana - and is part of a national Network of 9 EFCs across the United States. The NM EFC is primarily focused on water and wastewater related issues, but has completed a wide variety of environmental projects for federal, state, tribal, and local governments. The NM EFC uses its connection to New Mexico Tech and to the other 8 EFCs to expand its areas of expertise.

Questions or Comments on the Document

If you have any comments on the approach used in the Cost Estimating Guide or suggestions on the improvement of the document please contact the Environmental Finance Center (EFC) using the contact information below. If you have questions on the use of the cost estimating guide, please also use the EFC contact information.

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Questions about the ICIP Process

If you have questions about the ICIP process in general, they should be directed to:

Local Government Division (LGD)
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Table of Contents

Section 1

Drinking Water Infrastructure

Cost Estimating

Drinking Water Infrastructure Cost Estimating

Introduction

This section was developed to assist communities in developing estimates for public drinking water system installations or rehabilitations. Most communities in New Mexico, particularly small, rural ones, rely on groundwater as the source for drinking water. The availability of groundwater in New Mexico is generally much greater than reliable surface water sources and it is much simpler to design, build and operate groundwater systems than surface water systems. This section does not contain costs for individual homeowner well systems.

There are four main components to providing drinking water to a community:

1. removing water from the source;
2. treating the water;
3. storing water for peak usage times and to accommodate fire flows, and other emergencies; and,
4. distributing water to the customers through a series of pipes in the ground.

For systems using groundwater, removing the water from the source and treating it generally involves a well, pump, and chlorination process. In the case of a surface water system, a filtration treatment plant is required.

Source of Data

The cost estimation techniques in this section were obtained from the New Mexico Environment Department (NMED) in the case of groundwater, and Rural Utilities Service (RUS) in the case of the surface water treatment plant and were updated to reflect 2007 prices as discussed in the introduction.

Basis of Cost Estimation

There are three options for the cost estimation of drinking water infrastructure. Each option includes a summary worksheet and is followed by an example of calculations. The three options are as follows:

1. For groundwater systems serving up to 300 households, use Part 1.
2. For groundwater systems serving over 300 households, use Part 2.
3. Part 3 provides cost estimates for surface water systems.

These cost estimates do not include costs for operations and maintenance for a water system. These cost estimates are for capital construction only. Costs for items such as electricity,

chemicals, spare parts, etc. should be considered when preparing a utility budget.
Select the appropriate Part as outlined below and turn to that section.

Part 1. Groundwater Systems – Up to 300 Households

Cost estimates for a groundwater system serving up to 300 households are based on the number of households. A cost per household is multiplied by the number of households to give an estimated cost for three components:

A. Water Source: includes well, pump, and chlorination.
B. Water Storage Tank
C. Water Distribution System

The graph on page 1-5 provides a ***cost per household***, based on the number of households, for the water source, water storage, and distribution system.

Part 2. Groundwater Systems – More than 300 Households

For groundwater systems serving more than 1,000 people (or more than approximately 300 households), the costs must be based on a more complicated method using feet of pipe needed and depth of well to be drilled.

Part 3. Surface Water Systems

The surface water cost estimate is presented two ways: based on flow rate of the system (number of gallons) or based on the number of households.

Drinking Water System Cost Estimate Worksheet
PART 1: Groundwater System For 300 Households or Less (Households, not population)

Source: New Mexico Environment Department

Complete the appropriate Section(s), by determining the number of households to be served, then determine the cost per household, using the graph on page 1-3. Enter the subtotal from each section into the Total System Cost Worksheet on page 1-5.

- 9 Water Source: Well, Pump, Chlorination: ***Complete Section A***
- 9 Water Storage Tank: ***Complete Section B***
- 9 Water Distribution System: Piping to customers: ***Complete Section C***

Section A - Water Source Cost

Determine the total number of households to be served, then using the graph on page 1-5, estimate the cost per household using the *Water Source Cost Line*. (For example, for 200 households, the cost per household is $2,108). Multiply the number of households by the cost per household.

Number of Households		Cost Per Household		Water Source Cost
	X		=	

Section B - Water Storage Cost

Determine the total number of households to be served, then using the graph on page 1-5, estimate the cost per household using the *Water Storage Cost Line*. (For example, for 200 households, the cost per household is $703). Multiply the number of households by the cost per household.

Number of Households		Cost Per Household		Water Storage Cost
	X		=	

Section C - Water Distribution Cost

Determine the total number of households to be served, then using the graph on page 1-5, estimate the cost per household using the *Distribution System Cost Line*. (For example, for 200 households, the cost per household is $3,162). Multiply the number of households by the cost per household.

Number of Households		Cost Per Household		Water Distribution Cost
	X		=	

Total Project Estimated Cost

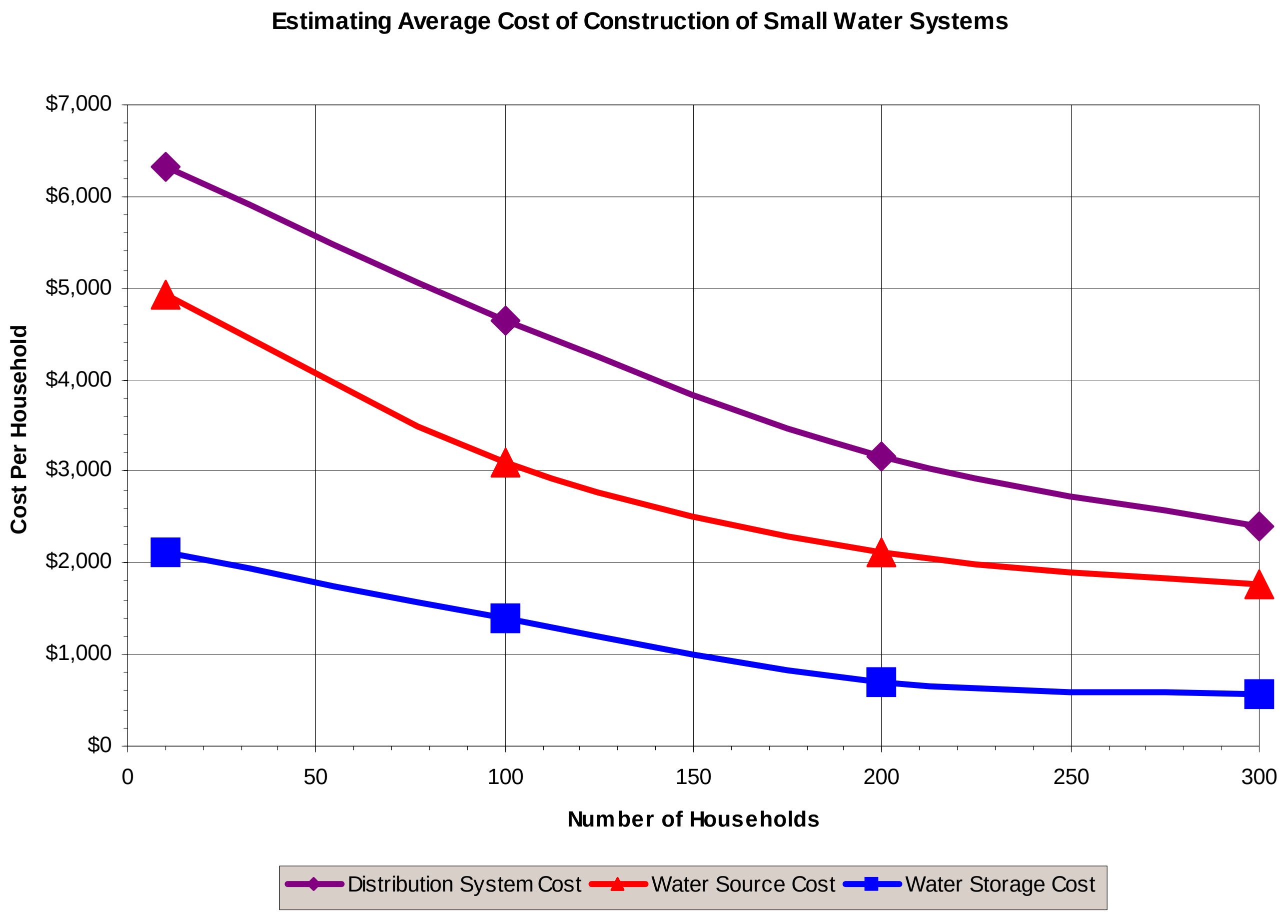
The total estimated project cost is: cost of the source (Section A), plus the cost of storage (Section B), plus the cost of distribution (Section C), as calculated from the sections on the previous page. If only one or two components are needed out of the three, just place a zero in the box for the component that is not needed. For example, if your community needed only a well and a storage tank and not a whole new distribution system, then you would fill in numbers for Section A and B, but place a zero in the box for Section C.

Water Source Cost	+	Water Storage Cost	+	Water Distribution Cost	=	Total Project Costs

Notes on Cost Estimates:

1. Costs include engineering, engineering inspection, and contracted construction
2. Distribution line costs include the use of PVC pipe and the installation of meters
3. Source costs include well drilling, pump and controls, well house, and chlorination equipment.
4. Costs <u>do not include</u> the cost of land, additional treatment (beyond chlorination), legal costs, or costs to extend electricity to the well and well house.

For example calculations, see Appendix A.


Estimating Average Cost of Construction of Small Water Systems
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
Cost Per Household
0
50
100
150
200
250
300
Number of Households
Distribution System Cost
Water Source Cost
Water Storage Cost

PART 2: Drinking Water System Cost Estimate Worksheet
Groundwater System for 300 Households or More (Households, not Population)
Source: Various, See Below

Components Needed *(Check All that Apply):*

9 Water Source: Well, Pump, Chlorinator: ***Complete Section A***
9 Water Storage Tank: ***Complete Section B***
9 Water Distribution System: Piping to customers: ***Complete Section C***

Section A
Water Source Cost

Source of cost data: Information from well installers and equipment suppliers, 2000 updated to 2006

Well Cost

Well Cost is dependent on many items such as soil conditions, depth, site accessibility, construction specifications, expected flow rates, etc. Therefore, as stated above, this cost estimate makes many assumptions to allow a community to determine the magnitude of the cost for a water source. It should not be used to instruct a well driller as to the size or depth of a well.

In order to estimate the cost of the water source, begin by estimating the depth that a well would have to be to serve the customers in the area. This depth could be based on the depth of other wells in the system, the depth of wells from neighboring systems, information from the United States Geologic Survey (USGS), information from the State Engineer's Office, or an educated guess. This guide assumes either a 6-inch or 8-inch diameter well. Below 500 feet assume 6-inch, greater than 500 feet, assume 8-inch. Use the table below to obtain a per foot cost for the well construction.

Size of Well	Well less than 500 feet (cost/foot)	500 foot well (cost/foot)	Well greater than 500 feet deep (cost/foot)
6-inch	$140	$126	Does Not Apply
8-inch	Does Not Apply	$155	$140

These costs include drilling, casing, screen, pump test, and well development.

Multiply the number of feet of well depth by the appropriate cost per foot:

Depth of Well (ft)	X	Cost Per Foot	=	Well Cost (include on page 1-8)

Pump Cost

The source will also require a pump. Pump prices can vary significantly based on depth of well, capacity of pump, and other factors. A range of pump prices of $3,500 to $35,000 is fairly reasonable. Use the table below to estimate a cost for the pump and include on Page 1-8

Size of Well (Diameter)	Well depth less than 500 feet	Well depth of 500 feet	Well depth greater than 500 feet
6-inch	$3,500	$7,000	Does Not Apply
8-inch	Does Not Apply	$7,000	$14,000 - $35,000

Chlorinator Cost

In addition to the pump and well, in most cases, a chlorinator is also needed for treatment of the raw water. The cost of the chlorinator will vary with the volume of water pumped, but not with the depth of the well. Given the estimating technique here, only one chlorinator cost is provided. This will give a "ball-park" estimate of the costs. If you know for sure that your well will not need a chlorinator, a zero may be placed in the equation for subtotal costs on Page 1-8.

Chlorinator	Cost
Small well (300-500 homes or 110-180gpm)	$420 - $700
Medium well (500-700 homes or 180-255gpm)	$700 - $1,100
Large well (700-900 homes or 255-330gpm)	$1,100 - $1,700

Need for Multiple Pumps and Wells

It is a good idea to have redundant wells and pumps within a water system in case the pump breaks or there is a problem with the well. Also, in some cases multiple wells are needed for geographic reasons or because one well cannot supply the required quantity of water. If multiple wells are required or desired, simply follow the procedure above for each well needed and include on Page 1-8.

Subtotal for Source of Water

Fill in one line for each well, pump, and chlorinator needed:

Well 1 Costs		Pump 1 Cost		Chlorinator 1 Cost		Source 1 Total
	+		+		=	

Well 2 Costs		Pump 2 Cost		Chlorinator 2 Cost		Source 2 Total
	+		+		=	

Well 3 Costs		Pump 3 Cost		Chlorinator 3 Cost		Source 3 Total
	+		+		=	

Source 1 Total		Source 2 Total		Source 3 Total		Subtotal Cost for Source
	+		+		=	

(Include on Summary Page 1-11)

Section B
Water Storage Cost

Source of cost data: Information from Equipment Suppliers, 2000 updated for 2006

The cost of storage tanks varies tremendously based on the size, type of tank, construction conditions, and other factors. It also requires knowing a size estimate of the tank to complete the cost estimate. If the tank is replacing a previous tank, either use the same size as the previous tank or a larger size if the tank is being replaced due to lack of sufficient size. The table below shows a recommended storage capacity, (2 day use plus fire flow storage) based on the number of homes served, assuming an average 3.5 persons per household. The volumes listed are total storage, therefore, if the community is adding additional storage, not replacing an existing tank, the size of the existing storage should be subtracted from this number to determine the recommended size for the new storage tank. For example, a community of 400 households has a recommend storage of 330,000 gallons. The community currently has a 200,000 gallon tank that they plan to keep in use. Therefore, when looking at the tank costs, the recommended size the community should use is 330,000-200,000 or 130,000 gallons.

Number of Households	**Minimum Recommended Storage Volume**
300	260,000 gallons
400	330,000 gallons
500	400,000 gallons
600	470,000 gallons

The table below provides a cost range per gallon, base on the size of tank.

Size of Tank	**Cost Range ($/gallon)**
less than 50,000	$1.41 - $1.05
50,000 - 75,000	$1.05 - $0.56
75,000 - 300,000	$0.56 - $0.50
300,000 - 500,000	$0.50- $0.42
500,000 - 1,000,000	$0.42 - $0.35

Multiply the number of gallons needed by the cost per gallon:

Number of Gallons Needed		Cost Per Gallon		Total Tank Cost (include on page 1-11)
	X		=	

Section C
Water Distribution Cost

Source of cost data: Information from City of Albuquerque Planning Dept. 1998

As a general guide, water line prices can be estimated using a cost of approximately $1.50 per inch of pipe diameter per linear foot. This cost includes the cost of construction, pipe materials and labor. It assumes standard construction conditions. If the ground that will contain the piping is very rocky, such that it would require measures such as blasting to install the pipe, the costs would be significantly higher. This general guide is for the cost to install pipe only and should be used accordingly. When constructing a new water distribution system, the costs should include the installation of items such as valves, fittings, meters, service lines and fire hydrants. Therefore, for new construction, the following estimation values should be used.

To use this estimation technique, the user must make an estimate of the length (quantity in feet) of piping needed. There are several simple methods to at least obtain a good guess of the distances needed. One way would be to use a GPS unit and drive along the streets that would be served. The GPS unit will calculate the total distance needed. Many counties and cities now have GPS units for other uses, such as E911 or road maintenance, that may be borrowed for this purpose. Another method would be to drive along the roads that will be served and use the car's odometer to measure the distance. This measurement will of course be in miles, but can be easily converted to feet by multiplying the number of miles by 5280 to obtain the number of feet. A third method is to use mapping that is available and measure the distance along the map. Whatever units the map uses will need to be converted to feet.

In terms of pipe diameter, the minimum pipe size needed for fire flow is 6 inches. Therefore a good estimate may be 6 or 8 inch pipe. If you have better information, such as knowledge of the size of pipe needed or you know the rest of the system is a certain size pipe, use the best information available.

Size of Pipe	Cost per Linear Foot	Comments
4-inch	$38.51	Maximum flow of 225gpm
6-inch	$41.52	Minimum needed for fire flow
8-inch	$46.32	Maximum flow of 1000 gpm
10-inch	$52.72	Maximum flow of 1500 gpm

Multiply the number of feet of pipe by the appropriate cost per foot from the table above:

Feet of Pipe Needed		Cost Per Foot		Subtotal Cost (Include on Summary Page 1-11)
	X		=	

Summary Page for Estimated Total System Cost
For Part 2: Groundwater Systems Serving 300 or More Households

The total system cost would be the cost of the source plus the cost of distribution plus the cost of storage as calculated from each section above. If only one or two components are needed out of the three, just place a zero in the box for the component that is not needed. For example, if your community needed only a well and a storage tank and not a whole new distribution system, then you would fill in numbers for Section A and B, but place a zero in the box for Section C.

Cost of Source Section A	+	Cost of Storage Section B	+	Cost of Distribution Section C	=	**Total System Cost**

For example calculations, see Appendix A.

Part 3: Drinking Water System Cost Estimate Worksheet

Surface Water Treatment System
For Any Number of Households

Source: Rural Utilities Services, 2000 updated for 2007

The previous cost estimating techniques were for ***groundwater treatment systems***. The information provided here is for ***surface water treatment facilities.*** Costs for distribution systems and storage tanks can be determined using the methods presented previously; the first method from Part 1 should be used if there are less than 300 households and the second method from Part 2 should be used if there are greater than 300 households in the system

This cost table is a surface water treatment facility, and is a one-time cost estimate for construction of a new facility. The estimate does not include expenses for operation and maintenance.

Rural residential households are estimated to include 3.5 people per household. The average daily water use is approximately 125 gallons per person per day. This cost table is based on those estimates.

Approximate Number of Households to be Served	Size of Surface Water Treatment Facility	Cost per 1 Gallon of Water
Greater than 3,000	1,000,000 gallons or more per day	$1.75
2,000 – 3,000	750,000 gallons or more per day	$2.19
1,500 – 2,000	500,000 gallons per day	$2.81
Less than 1,500	Less than 500,000 gallons per day	$3.63 - $4.22

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Section 2

Wastewater Infrastructure

Cost Estimating

Wastewater Infrastructure Cost Estimating

Introduction

The information included in this section will assist communities in developing estimates for wastewater infrastructure projects. The basic components of a wastewater collection and treatment system/facility consist of:

- Collection System;
- Treatment System/Facility; and
- Effluent Disposal.

Collection System

A collection system is used to convey the wastewater generated at the households to the wastewater treatment facility. See Section A below for cost estimating worksheets. (For descriptions of Wastewater Collection System Alternatives, see Appendix B.)

Treatment System

There are many options available for the treatment of wastewater generated in the community. Treatment plants may range anywhere from complex mechanical systems constructed of concrete and steel to simple natural type systems, such as lagoons, wetlands, and land treatment systems. The choice of the type of system to use involves many considerations, such as:

Quality/Quantity of flow
Characteristics of the raw wastewater
Quality/Quantity of effluent desired
Type of discharge (surface water, groundwater, irrigation, etc.)
Permit conditions
Acceptable degree of operation and maintenance
Quality/Quantity of land available for the system
Physical characteristics of the area (soil, groundwater, bedrock, topography, etc.)

For cost estimation worksheets regarding Treatment Systems, see section B below. (For descriptions of Wastewater Treatment System Alternatives, see Appendix C.)

Effluent Disposal

Following wastewater treatment, the treated effluent must be discharged. There are various options available for the discharge of effluent. If a surface water source is nearby, surface water discharge may be an option. This type of disposal requires an NPDES (National Pollutant Discharge Elimination System) permit from the Environmental Protection Agency (EPA), which, depending on the surface water source, may have quite stringent discharge standards as well as monitoring and reporting requirements. Alternatively, the wastewater effluent may be discharged to groundwater, which requires a permit from the New Mexico Environment Department. These permits have stringent nitrogen limits but less involved monitoring and reporting requirements. Groundwater discharges include infiltration (similar to a household leach field system), injection, irrigation of farmland, and irrigation of public or other lands (irrigation systems require winter storage facilities and varying levels of treatment depending on use per the NMED.). The wastewater effluent may also be disposed of through evaporation, although this method is very land intensive.

Basis of Cost Estimation

Cost estimates in this guide are provided only for collection and treatment, not for effluent disposal. Those costs are too variable and site specific to be included in a general cost estimation guide. A cost should be added for this component of the project. The New Mexico Environment Department can be contacted for assistance on determining effluent quality and the options available to the community for disposing of effluent. The cost estimates for collection and treatment do not include the costs for right of way, for land acquisition, or the costs of operation and maintenance. In addition, the cost estimates are for new construction only, and are not intended to be used for the upgrade or expansion of existing facilities. Construction costs were increased 25% to cover engineering fees and contingencies.

A flow rate of 350 gallons per household per day and 3.5 persons per household was assumed. This estimate is based on general engineering estimates and is most likely conservative for New Mexico. Rural communities tend to generate less wastewater per capita than the national average. The costs presented are for average conditions. For example, these costs do not consider the costs of dewatering if groundwater is shallow, or the costs of blasting if the bedrock is close to the surface. If extreme conditions, such as these, prevail, the cost estimates should be increased.

The trenching costs included are for traditional trenching methods used in the installation of conventional gravity sewers. It is often possible to save a considerable amount of money on trenching by using simpler trenching techniques with the alternative sewer systems. These techniques are possible because smaller diameter pipe is used and the pipe is buried at a shallower depth.

One advantage of alternative sewers verses gravity sewers is that the pipe diameters used are smaller and that the burial depth is much shallower. It is possible to place alternative sewers along street rights-of-way, whereas it may not be possible to place gravity sewers there, due to diameter of the pipes and depths of the sewers. Therefore, it was assumed that gravity sewers would be placed underneath streets and alternative sewers were assumed to be placed along the sides of streets. A cost for pavement removal and replacement was included with the gravity sewers but not the alternative sewers.

For each housing density condition, the distance between houses was calculated based on the average acreage condition. Square lots were assumed for determining distances between houses.

Section A
Wastewater Collection System

Traditionally, wastewater collection systems have consisted mainly of conventional *gravity sewers* and, where topography did not allow for a complete gravity system, a pump station(s) was added to the system. Gravity sewers require little, and relatively simple, operation and maintenance. However, these sewers are expensive on a linear foot basis. Costs can be prohibitively expensive if extreme conditions prevail, such as high groundwater table, low depth to bedrock, unfavorable topography, or very long distances between houses.

Available alternative systems include: *vacuum collection sewers; small diameter gravity collection systems, grinder pump systems, and septic tank effluent pumping systems*. For a successful system: 1) the selected alternative must fit the physical characteristics of the community, 2) the design must be well conceived, 3) the community must be accepting of the alternative, and 4) the community must be capable of handling the operation and maintenance requirements of the systems.

It is not valid to use the values presented on the cost estimation tables to compare alternatives for collection systems. This type of evaluation must be made by comparing lifecycle costs between alternatives. A lifecycle cost considers the capital cost of construction and the operation and maintenance costs for the life of the project (generally 20 years is used, but a longer time period may be used). Alternatives that have lower capital costs may have higher operation and maintenance costs. Alternatives to gravity sewers are generally used when special conditions make the construction of gravity sewers difficult and expensive, e.g. high groundwater table, unfavorable topography, and low depth to bedrock.

Estimated costs were for each type of sewer collection system, on a per household cost basis, for four different categories of housing density. Multiplying the per household costs of the desired collection system type by the number of houses in each density category will provide a rough estimate of the cost of the collection system. A worksheet is provided to aid in this calculation. A combination system may also be priced out. For example, a small diameter gravity sewer is desired to serve 125 customers but topographic conditions indicate that 10 customers are on a lower elevation street. The cost estimate for 125 households using a small diameter gravity sewer can be determined using Part 1, Section A-3 below and the estimate for a septic tank effluent pump system for 10 customers using the per household costs can be determined using Part 1, Section A-5 below. The two estimates should then be added together to determine the total collection system cost from Part 1, Section A.

Part 1, Section B should be used to estimate the cost of a pump station (or lift station). To determine if a pump station is necessary, the community must have an idea of ground elevations throughout the area of the collection system. If there is a point in the collection system that is lower than all areas surrounding it (excluding the treatment area), and the collection system is a gravity system, a pump station is required at that area. There are other uses for pump stations with vacuum and grinder pump collection systems. If the community determines a pump station will be used for any type of collection system, Part 1, Section B should be used.

Part 1: Wastewater Collection System

Section A - Collection System Construction Estimated Costs

Determine the specific type of collection system to be constructed and go to the appropriate section(s). (See Appendix B for descriptions of each type of system.)

1. Gravity Collection System
2. Vacuum Collection System
3. Small Diameter Gravity Collection System
4. Grinder Pump
5. Septic Tank Effluent Pump.

For the specific type of collection system, identify the assumed density (acres per house). Enter the number of estimated houses and multiply by the cost per house. Copy the subtotal to the Project Summary Worksheet on Page 2-11.

1. Gravity Collection System

Rural: 3 to 5 acres per house

Number of Houses		Cost Per House		Subtotal for Gravity Collection System
	X	$28,950	=	

Semi -Rural: 1 to 3 acres per house

Number of Houses		Cost Per House		Subtotal for Gravity Collection System
	X	$20,805	=	

Semi- Urban: 0.5 - 1.0 acre per house

Number of Houses		Cost Per House		Subtotal for Gravity Collection System
	X	$13,815	=	

Urban: Less than 0.5 acre per house

Number of Houses		Cost Per House		Subtotal for Gravity Collection System
	X	$7,360	=	

2. *Vacuum Collection System*

Copy the subtotal to the Project Summary Worksheet on Page 2-11.

Rural: 3 to 5 acres per house

Number of Houses		Cost Per House		Subtotal for Vacuum Collection System
	X	$17,292	=	

Semi -Rural: 1 to 3 acres per house

Number of Houses		Cost Per House		Subtotal for Vacuum Collection System
	X	$13,470	=	

Semi- Urban: 0.5 - 1.0 acre per house

Number of Houses		Cost Per House		Subtotal for Vacuum Collection System
	X	$9,893	=	

Urban: Less than 0.5 acres per house

Number of Houses		Cost Per House		Subtotal for Vacuum Collection System
	X	$7,160	=	

3. Small Diameter Gravity

Copy the subtotals to the Project Summary Worksheet on Page 2-11.

Rural: 3 to 5 acres per house

Number of Houses		Cost Per House		Subtotal for Small Diameter Gravity System
	X	$20,805	=	

Semi -Rural: 1 to 3 acres per house

Number of Houses		Cost Per House		Subtotal for Small Diameter Gravity System
	X	$16,671	=	

Semi- Urban: 0.5 - 1.0 acre per house

Number of Houses		Cost Per House		Subtotal for Small Diameter Gravity System
	X	$13,816	=	

Urban: Less than 0.5 acres per house

Number of Houses		Cost Per House		Subtotal for Small Diameter Gravity System
	X	$7,360	=	

4. Grinder Pump

Copy the subtotals to the Project Summary Worksheet on Page 2-11.

Rural: 3 to 5 acres per house

Number of Houses		Cost Per House		Subtotal for Grinder Pump Systems
	X	$20,647	=	

Semi -Rural:1 to 3 acres per house

Number of Houses		Cost Per House		Subtotal for Grinder Pump Systems
	X	$17,084	=	

Semi- Urban: 0.5 - 1.0 acre per house

Number of Houses		Cost Per House		Subtotal for Grinder Pump Systems
	X	$13,751	=	

Urban: Less than 0.5 acres per house

Number of Houses		Cost Per House		Subtotal for Grinder Pump Systems
	X	$11,204	=	

5. Septic Tank Effluent Pump

Copy the subtotals to the Project Summary Worksheet on Page 2-11.

Rural: 3 to 5 acres per house

Number of Houses		Cost Per House		Subtotal for Septic Tank Pumping Systems
	X	$21,937	=	

Semi -Rural: 1 to 3 acres per house

Number of Houses		Cost Per House		Subtotal for Septic Tank Pumping Systems
	X	$18,376	=	

Semi- Urban: 0.5 - 1.0 acre per house

Number of Houses		Cost Per House		Subtotal for Septic Tank Pumping Systems
	X	$15,041	=	

Urban: Less than 0.5 acres per house

Number of Houses		Cost Per House		Subtotal for Septic Tank Pumping Systems
	X	$12,495	=	

Part 1: Wastewater Collection System
Section B - Pump Station

If a pump station is necessary, determine the number of houses to be connected to the pump station. Multiply by the given amount. Enter the total on the Project Summary Worksheet, on Page 2-11.

1. *Fewer than 100 Houses*

Number of Houses		Cost Per House		Subtotal for Pumping Station
	X	$1,986	=	

2. *100 to 500 Houses*

Number of Houses		Cost Per House		Subtotal for Pumping Station
	X	$913	=	

3. *More than 500 Houses*

Number of Houses		Cost Per House		Subtotal for Pumping Station
	X	$357	=	

Part 2: Wastewater Treatment Facility Cost Table

New Construction

Determine the number of households that the wastewater treatment facility will serve. Rural, residential households are estimated to include 3.5 persons per household. The average wastewater to be treated is approximately 100 gallons per person per day.

Enter the number of households in the equation below. Use the following table to estimate the cost per gallon of wastewater to be treated, and calculate the estimated cost of the treatment facility. Enter the subtotal on the Project Summary Worksheet on Page 2-11.

Approximate Number of Households	Size of Wastewater Treatment Facility	Range of Cost per 1 Gallon of Wastewater to be Treated
Less than 3,000	1,000,000 gallons or less per day	$7.03 - $11.24
More than 3,000	1,000,000 gallons or more per day	$11.24 - $14.05

Number of Households		Gallons of Wastewater per Day per Household		Cost Per Gallon		Subtotal for Treatment Facilities
	X	350 gallons/household/day	X	$	=	$

Wastewater Project Summary Worksheet

Part 1: Section A - Collection System Cost		Part 1: Section B - Pump Station Cost		Part 2 - Treatment Facility Cost		Total
$	+	$	+	$	=	$

Section 3

Roads and Streets

Cost Estimating

Roads and Streets Cost Estimating

Introduction

The information included in this section will assist communities in developing estimates for road and street projects. The estimates are for typical projects without unusual design features or complications. If your project departs significantly from the typical one, contact a state highway district engineer for additional assistance, or engage a consultant to conduct a detailed planning analysis. Structural components, such as culverts and bridges are estimated separately.

In this guide there are two types of road functions addressed, arterials and collectors. These types are based on origin of the traffic:

- ***Arterial -*** An arterial moves traffic originating outside an area through the area. This is considered through-traffic, these cars do not have a destination in the area.
- ***Collector -*** A collector moves traffic that originates in the area and has destinations in the area. It moves traffic from a neighborhood to an arterial.

For more specific information on these definitions please refer to the New Mexico Department of Transportation's (NMDOT) publication entitled, "State Access Management Manual" specifically chapter 2. This publication can be found at the following website (accessed 6/06): http://www.nmshtd.state.nm.us/main.asp?secid=11703

The Mid Region Council of Governments has published a map showing these classifications in Albuquerque entitled, "Roadway Functional Classification." It can be used as an example and can be found at the following website (accessed 6/06):
http://www.mrcog-nm.gov/images/Maps/funcclass.pdf

For each type of road two types of traffic loads are addressed, Principal or Major and Minor. They are distinguishable based on traffic loads per day.

- ***Principal or Major*** – A principal arterial or major collector would have nearly twice as many cars per day i.e. 12,000 cars per day.
- ***Minor*** – A minor arterial or minor collector would have nearly half as many cars per day i.e. 7,000 cars per day.

The three main types of projects addressed in this guide are:

- ***Rehabilitation*** which improves a road to acceptable standards,
- ***Reconstruction***, which includes upgrading an unsurfaced road, and
- ***New construction***, which is a new roadway through natural terrain, where there is no existing road.

Source of Data

These cost estimates were developed from information provided by the New Mexico State Highway and Transportation Department. We also had discussions with Albuquerque Public Works and the City of Santa Fe Planning Departments.

Basis of Cost Estimation

Design of specific projects will depend on local conditions, but these estimates can be used for preliminary planning purposes. Local conditions such as drainage characteristics, soil composition, grade, etc. will greatly influence final costs. For existing roads, utility relocation may be an additional cost that should be considered. The cost estimates are given for center -line miles, regardless of the number of lanes. Cost estimates for structural components, such as culverts and bridges are given separately at the end of this section.

Instructions for Roads and Streets Cost Estimate Worksheets

Select the type of project area (rural or urban), then select the specific type of project (rehabilitation, reconstruction, or new construction). Complete the appropriate Section. Copy the total amount from each Section to the Project Summary Worksheet on Page 3-4.

Rural Area

9 Rehabilitation: ***Complete Section A***
9 Reconstruction: ***Complete Section B***
9 New Construction: ***Complete Section C***

Urban Area

9 Rehabilitation: ***Complete Section D***
9 Reconstruction: ***Complete Section E***
9 New Construction: ***Complete Sect. F***

For structural components, determine if the components are to be rehabilitated or replaced. Complete the appropriate Section. Copy the total amount from each Section to the Project Summary Worksheet on Page 3-4.

Structural Components

9 Rehabilitation: ***Complete Section G***
9 Replacement: ***Complete Section H***

Roads and Streets Cost Estimate PROJECT SUMMARY WORKSHEET

After each appropriate Section is completed, copy the total amount from each Section to this Project Summary Worksheet for the total estimated project cost.

1. *Rural Area*

Cost for Rehabilitation From Section A		Cost for Reconstruction From Section B		Cost for New Construction From Section C		Subtotal Rural Cost
	+		+		=	

2. *Urban Area*

Cost for Rehabilitation From Section D		Cost for Reconstruction From Section E		Cost for New Construction From Section F		Subtotal Urban Cost
	+		+		=	

3. *Structural Components*

Cost for Rehabilitation From Section G		Cost for Replacement From Section H		Subtotal Structural
	+		=	

Total Cost for Project

1. Rural Area Subtotal		2. Urban Area Subtotal		3. Structural Component Subtotal		Total Cost for Project
	+		+		=	

Section A
Rural Area - Rehabilitation

Determine the specific road function, then enter the number of estimated centerline miles. Multiply by the cost per centerline mile. Copy the total cost to the Project Summary Worksheet on Page 3-4.

1. *Principal Arterial*

Number of Centerline Miles in Rural Area		Cost per Centerline Mile for Principal Arterial in Rural Area		Subtotal Cost
	X	$618,300	=	

2. *Minor Arterial*

Number of Centerline Miles in Rural Area		Cost per Centerline Mile for Minor Arterial in Rural Area		Subtotal Cost
	X	$449,700	=	

3. *Major Collector*

Number of Centerline Miles in Rural Area		Cost per Centerline Mile for Major Collector in Rural Area		Subtotal Cost
	X	$604,200	=	

4. *Minor Collector*

Number of Centerline Miles in Rural Area		Cost per Centerline Mile for Minor Collector in Rural Area		Subtotal Cost
	X	$365,400	=	

Total for Rural Rehabilitation Projects

Section A.1. Principal Arterial Subtotal		Section A.2. Minor Arterial Subtotal		Section A.3 Major Collector Subtotal		Section A.4 Minor Collector Subtotal		Section A Total Cost – Rural Rehabilitation
	+		+		+		=	

Section B
Rural Area - Reconstruction

Determine the specific road function, then enter the estimated number of centerline miles. Multiply by the cost per centerline mile. Copy the total cost to the Project Summary Worksheet on Page 3-4.

1. *Principal Arterial*

Number of Centerline Miles in Rural Area		Cost per Centerline Mile for Principal Arterial in Rural Area		Subtotal Cost
	X	$2,459,100	=	

2. *Minor Arterial*

Number of Centerline Miles in Rural Area		Cost per Centerline Mile for Minor Arterial in Rural Area		Subtotal Cost
	X	$1,686,200	=	

3. *Major Collector*

Number of Centerline Miles in Rural Area		Cost per Centerline Mile for Major Collector in Rural Area		Subtotal Cost
	X	$2,107,800	=	

4. *Minor Collector*

Number of Centerline Miles in Rural Area		Cost per Centerline Mile for Minor Collector in Rural Area		Subtotal Cost
	X	$815,000	=	

Total for Rural Reconstruction Project

Section B.1. Principal Arterial Subtotal		Section B.2. Minor Arterial Subtotal		Section B.3 Major Collector Subtotal		Section B.4 Minor Collector Subtotal		Section B Total Cost – Rural Rehabilitation
	+		+		+		=	

Section C
Rural Area - New Construction

Determine the specific road function, then enter the number of estimated centerline miles. Multiply by the cost per centerline mile. Enter the total on the Project Summary Worksheet on Page 3-4.

1. *Principal Arterial*

Number of Centerline Miles in Rural Area		Cost per Centerline Mile for Principal Arterial in Rural Area		Subtotal Cost
	X	$3,021,200	=	

2. *Minor Arterial*

Number of Centerline Miles in Rural Area		Cost per Centerline Mile for Minor Arterial in Rural Area		Subtotal Cost
	X	$1,264,700	=	

3. *Major Collector*

Number of Centerline Miles in Rural Area		Cost per Centerline Mile for Major Collector in Rural Area		Subtotal Cost
	X	$2,740,100	=	

4. *Minor Collector*

Number of Centerline Miles in Rural Area		Cost per Centerline Mile for Minor Collector in Rural Area		Subtotal Cost
	X	$1,018,800	=	

Total for Rural Area New Construction

Section C.1. Principal Arterial Subtotal		Section C.2. Minor Arterial Subtotal		Section C.3 Major Collector Subtotal		Section C.4 Minor Collector Subtotal		Section C Total Cost – Rural Rehabilitation
	+		+		+		=	

Section D
Urban Area - Rehabilitation

Determine the specific road function, then enter the estimated number of centerline miles. Multiply by the cost per centerline miles. Copy the total cost to the Project Summary Worksheet on Page 3-4

1. *Principal Arterial*

Number of Centerline Miles in Urban Area		Cost per Centerline Mile for Principal Arterial in Urban Area		Subtotal Cost
	X	$1,686,200	=	

2. *Minor Arterial*

Number of Centerline Miles in Urban Area		Cost per Centerline Mile for Minor Arterial in Urban Area		Subtotal Cost
	X	$1,545,700	=	

3. *Major Collector*

Number of Centerline Miles in Urban Area		Cost per Centerline Mile for Major Collector in Urban Area		Subtotal Cost
	X	$1,897,000	=	

4. *Minor Collector*

Number of Centerline Miles in Urban Area		Cost per Centerline Mile for Minor Collector in Urban Area		Subtotal Cost
	X	$1,545,700	=	

Total for Urban Rehabilitation Project

Section D.1. Principal Arterial Subtotal		Section D.2. Minor Arterial Subtotal		Section D.3 Major Collector Subtotal		Section D.4 Minor Collector Subtotal		Section D Total Cost – Rural Rehabilitation
	+		+		+		=	

Section E
Urban Area - Reconstruction

Determine the specific road function, then enter the number of estimated centerline miles. Multiply by the cost per centerline mile. Copy the total cost to the Project Summary Worksheet on Page 3-4.

1. *Principal Arterial*

Number of Centerline Miles in Urban Area		Cost per Centerline Mile for Principal Arterial in Urban Area		Subtotal Cost
	X	$7,166,500	=	

2. *Minor Arterial*

Number of Centerline Miles in Urban Area		Cost per Centerline Mile for Minor Arterial in Urban Area		Subtotal Cost
	X	$5,339,800	=	

3. *Major Collector*

Number of Centerline Miles in Urban Area		Cost per Centerline Mile for Major Collector in Urban Area		Subtotal Cost
	X	$4,496,600	=	

4. *Minor Collector*

Number of Centerline Miles in Urban Area		Cost per Centerline Mile for Minor Collector in Urban Area		Subtotal Cost
	X	$3,653,500	=	

Total for Urban Reconstruction Projects

Section E.1. Principal Arterial Subtotal		Section E.2. Minor Arterial Subtotal		Section E.3 Major Collector Subtotal		Section E.4 Minor Collector Subtotal		Section E Total Cost – Rural Rehabilitation
	+		+		+		=	

Section F
Urban Area - New Construction

Determine the specific road function, then enter the number estimated of centerline miles. Multiply by the cost per centerline mile. Copy the total cost to the Project Summary Worksheet on Page 3-4.

1. *Principal Arterial*

Number of Centerline Miles in Urban Area		Cost per Centerline Mile for Principal Arterial in Urban Area		Subtotal Cost
	X	$3,372,500	=	

2. *Minor Arterial*

Number of Centerline Miles in Urban Area		Cost per Centerline Mile for Minor Arterial in Urban Area		Subtotal Cost
	X	$2,950,900	=	

3. *Major Collector*

Number of Centerline Miles in Urban Area		Cost per Centerline Mile for Minor Arterial in Urban Area		Subtotal Cost
	X	$2,529,400	=	

4. *Minor Collector*

Number of Centerline Miles in Urban Area		Cost per Centerline Mile for Minor Arterial in Urban Area		Subtotal Cost
	X	$2,048,800	=	

Total for Urban New Construction Projects

Section F.1. Principal Arterial Subtotal		Section F.2. Minor Arterial Subtotal		Section F.3 Major Collector Subtotal		Section F.4 Minor Collector Subtotal		Section F Total Cost – Rural Rehabilitation
	+		+		+		=	

Section G
Structure Rehabilitation Costs

From Table 3-1 on Page 3-12, use the descriptions of the type of rehabilitation project for the structure to determine whether your project is typical, intermediate or extreme. Fill in the appropriate table below. Determine the number of square feet in the project and multiply by the cost per square foot. Copy the total cost to the Project Summary Worksheet on Page 3-4.

1. *Typical Rehabilitation*

Number of Square Feet		Cost per Square Foot		Subtotal Cost
	X	$42.16	=	

2. *Intermediate Rehabilitation*

Number of Square Feet		Cost per Square Foot		Subtotal Cost
	X	$56.21	=	

3. *Extreme Rehabilitation*

Number of Square Feet		Cost per Square Foot		Subtotal Cost
	X	$70.26	=	

Total for Structure Rehabilitation

Section G.1		Section G.2		Section G.3		Total Structure Cost
	+		+		=	

Table 3-1
Structure Rehabilitation Cost Estimate

Estimating Structure Rehabilitation Cost		
Classification	***Description***	***Cost Estimate***
Typical Rehabilitation	Deck Join Replacement, Deck Repair and Resurfacing, Barrier Railing Replacement, Approach Slab Replacement	$42.16/sq. ft.
Intermediate Rehabilitation	Typical Rehabilitation including Partial or Total Deck Replacement	$56.21/sq. ft.
Extreme Rehabilitation	Typical Rehabilitation including Partial or Total Beam Replacement and/or Partial or Total Deck Replacemenet	$70.26/sq. ft.

Section H
Structure Replacement Costs

From Table 3-2 on page 3-14, use the descriptions of the type of structure for replacement to determine whether your project is a minor structure, intermediate structure, or major structure. Fill in the appropriate table below. Determine the number of square feet in the project and multiply by the cost per square foot. Copy the total to the Project Summary Worksheet on Page 3-4

1. Minor Structure

Number of Square Feet		Cost per Square Foot		Subtotal Cost
	X	$70.26	=	

2. Intermediate Structure

Number of Square Feet		Cost per Square Foot		Subtotal Cost
	X	$105.39	=	

3. Major Structure

Number of Square Feet		Cost per Square Foot		Subtotal Cost
	X	$140.52	=	

Total for Structure Replacement

Section H.1		Section H.2		Section H.3		Total Cost
	+		+		=	

Table 3-2
Structure Replacement Cost Estimate

Estimating Structure Replacement Costs		
Classification	***Description***	***Cost Estimate***
Minor Structures	Small Concrete Box Culvert Widening	$56.21/sq. ft.
	Large Concrete Box Culvert Replacement	$84.31/sq. ft.
	Average	$70.26/sq. ft.
Intermediate Structures	Single Span Replacement – No Surprises	$84.31/sq. ft.
	Multi-Span Bridge Replacement – Soil Problems	$126.47/sq. ft.
	Average	$105.39/sq.ft.
Major Structures	Normal River Crossing	$112.42/sq. ft.
	Gorge Bridge, High Elevation, Environmentally Sensitive	$168.62/sq. ft.
	Average	$140.52

Section 4

Buildings

Cost Estimating

Buildings Cost Estimating

Introduction

This section of the cost estimating guide gives information to assist communities in determining the preliminary size of a new facility and provides cost estimates for new buildings. When projecting future needs in a small community, thinking about multiple uses and future expansion is important. Flexibility and adaptability in use will be most cost effective in the long run.

General Information

The figures given are for typical buildings in a small community. These figures are conservative estimates and the highest figure of a model building was used. Land acquisition can be a major element in estimating the cost of a capital improvements project. Another contributing factor to the total cost of a project is the operating costs, future expansion needs, changing programs, and local building code requirements. The cost estimates given in this section are for the building construction only and do not include land acquisition, landscaping, general equipment, special features, or furnishings. When considering a new building project, local building code requirements, zoning ordinances, and other land use restrictions must be investigated.

The information presented here is only a beginning reference point. Further analysis, evaluation, and review of a specific building project will generate a more accurate cost estimate.

Sources of Data

Information was developed from the following references and updated for inflation to 2007 prices.

Architectural Graphic Standards. 1981.
DeChiara, J. H. And Callendy, J. H., Ed., *Time Saver Standards for Building Types*. McGraw Hill, 3rd Edition, 1990.
De Chiara, J. And Koppelman, L. *Urban Planning and Design Criteria*. Van Nostrant Reinhold Co., NY. 3rd Edition. 1982
Means Square Foot Costs. R.S. Means Company, Inc. 1999

Basis of Cost Estimation

The building costs are given per square foot of floor area and are based on a model building type, using basic specifications. The costs have been modified by using a location factor for New Mexico. Cost estimates are based on floor area at grade level and above, and are for buildings without a basement or special features. Building costs include exterior wall construction, interior construction, foundation, roof, mechanical (plumbing, heating, and cooling), and electrical systems. Costs do not include site work, site improvements, utility extensions, or roads and parking.

City Hall/Administration or County Administration

A City Hall/Administration or County Administration building generally contains office space for city or county departments. It also includes offices for the chief administrator, elected officials, council chambers, conference room, employee lounge, reception area, and file and storage space. Typically, 100 to 225 square feet per employee is allocated for office space. Some city departments require extensive contact with the general public and thus will need additional space. Sometimes these offices are combined with a police station, jail, or civic center. A new building should be planned in relationship to other facilities such as county offices, health department, etc.

For the following model: Costs given are for a one-story building with a 12 foot story height. Floor coverings are 70% carpet, 15% terrazzo, and 15% vinyl tile. Exterior wall is stone with concrete block back-up. Costs include architects fee of 15% and general condition fees (overhead and profit) of 15%.

Population To Be Served	**Range of Typical Building Size for Administration**	**Typical Cost Per Square Foot**
Under 5,000	2,000 sq. ft. to 5,000 sq. ft.	$160
5,000 to 10,000	5,000 sq. ft. to 6,500 sq. ft.	$146
Over 10,000	6,500 sq. ft. to 8,000 sq. ft	$136

Size of Building (sq. ft.)		Cost Per Sq. Ft.		Total Building Cost
	X		=	

Community Center

Community centers often function as multi-purpose buildings, especially in rural areas. The center often serves as a local or regional health clinic, a recreational facility, and community meeting centers. The center could be located close to a local park or school and share the use of outdoor recreational facilities. While specific plans and designs will vary from community to community, generally 1 to 2 square feet per person should be allocated, based on desired capacity or number of residents to be served.

For the following community center model: Cost given is for a one story building with 12 foot story height; floor finishing is 50% carpet and 50% vinyl tile. Exterior wall is concrete block. Cost includes architect fees of 9% and fees for general conditions (overhead and profit) of 15%.

Population To Be Served	Range of Typical Building Size for Community Center	Typical Cost Per Square Foot
Under 8,000	10,000 sq. ft. - 20,000 sq. ft.	$124
Over 8,000	20,000 sq. ft. - 30,000 sq. ft.	$110

Size of Building (sq. ft.)		Cost Per Sq. Ft.		Total Building Cost
	X		=	

Fire Station

In small towns, all the functions of a fire station are usually housed in one facility. These functions include: administrative offices, space for equipment, training facilities, maintenance and supply area, fire alarm and communications center, and locker space. The equipment is the same whether the fire department personnel are paid or volunteers. However, volunteer fire departments generally do not need a kitchen and dormitory area.

For the model fire station: Cost given is for a one story building with 14 foot story height; floor coverings are 50% vinyl and 50% painted concrete floor. Exterior wall is concrete block. Cost includes architect fees of 8% and fees for general conditions (overhead and profit) of 15%.

Population to be Served	Typical Building Size for Fire Station	Typical Cost Per Square Foot
Under 2,000	2,000 sq. ft.	$179
2,000 - 5,000	4,000 sq. ft.	$153
5,000 - 10,000	6,000 sq. ft.	$134
Over 10,000	8,000 sq. ft.	$124

Size of Building (sq. ft.)		Cost Per Sq. Ft.		Total Building Cost
	X		=	

Library

In designing a library, space must be allocated for linear feet of shelving for books, extra floor space for circulation, reading space, and space for staff offices and customer desk. For the model library: Cost given is for a one story building with 14 foot story height. Floor coverings are 50% carpet and 50% vinyl tile. Exterior wall is concrete block. Cost includes architect fees of 8% and fees for general conditions (overhead and profit) of 15%.

Population to be Served	Range of Typical Building Size for Library	Typical Cost per Square Foot
Under 2,000	2,000 sq. ft. to 2,500 sq. ft.	$205
2,000 - 5,000	2,500 sq. ft. to 3,500 sq. ft	$205
5,000 - 10,000	3,500 sq. ft. to 7,000 sq. ft.	$205
Over 10,000	7,000 sq. ft. to 10,000 sq. ft	$187

Size of Building (sq. ft.)		Cost Per Sq. Ft.		Total Building Cost
	X		=	

Warehouse

Warehouses are used for receiving goods and equipment, and storage of goods and equipment. Public works departments also use warehouse type space for storing equipment and vehicle maintenance.

For the following model: Costs given are for a one story building with 24 foot story height. Floor is 90% hardener and 10% vinyl composite tile. Exterior wall is brick with concrete block back up. Cost includes architect fees of 7% and fees for general conditions (overhead and profit) of 15%.

Population to be Served	Typical Building Size for Warehouse	Typical Costs Per Square Foot
Under 5,000	10,000 sq. ft.	$111
5,000 - 10,000	20,000 sq. ft	$91
Over 10,000	30,000 sq. ft.	$83

Size of Building (sq. ft.)		Cost Per Sq. Ft.		Total Building Cost
	X		=	

Parking

In designing parking lots, consideration must be given to access for handicapped, pedestrian walkways, and landscaping. Using 45 degree angle parking, with 3 inches of bituminous paving, and 10 inch gravel base, the cost is approximately $730 per car. Cost includes materials and installation.

To determine the number of spaces required consult your local zoning ordinances for the zone parking requirements where the building will be built or you can use the following general rule:

Total Number of Square Feet in Building *divided by 300* = number of total parking spaces.
To meet statutory and the federal ADA handicapped space requirements, the following table should be used.

Total Parking Spaces Required	Handicapped Spaces Required
15 - 25	1
26 - 35	2
36 - 50	3
51 - 100	4
101 - 300	8
301 - 500	12
501 - 800	16
801 - 1,000	20
More than 1,000	20 + 3 for each additional 1,000

Appendix A

Example

Calculations

EXAMPLE CALCULATION - PART 1
Drinking Water System Cost Estimate Worksheet
For 300 Households or Less (Households, not population)
Source: New Mexico Environment Department

Example Setting: A community of 175 households wishes to develop a community water system. Currently all residents are on individual wells. The community will need to develop a source, build a storage tank, and put in distribution lines.

Components Needed *(Check All that Apply):*

- ☑ Water Source: Well, Pump, Chlorination: ***Complete Section A***
- ☑ Water Storage: ***Complete Section B***
- ☑ Water Distribution: ***Complete Section C***

Section A - Water Source Cost

Multiply the number of households by the cost per household.

Number of Households		Cost Per Household		Water Source Cost
175	X	$2,200	=	$385,000

Section B - Water Storage Cost

Multiply the number of households by the cost per household.

Number of Households		Cost Per Household		Water Storage Cost
175	X	$850	=	$148,750

Section C - Water Distribution Cost

Multiply the number of households by the cost per household.

Number of Households		Cost Per Household		Water Distribution Cost
175	X	$3,400	=	$595,000

Total System Cost

The total system cost would be the cost of the source, plus the cost of storage, plus the cost of distribution as calculated from each section above.

Water Source Cost		Water Storage Cost		Water Distribution Cost		Total Project Costs
$385,000	+	$148,750	+	$595,000	=	$1,128,750

EXAMPLE CALCULATION – PART 2

Drinking Water System Cost Estimate Worksheet

For 300 Households or More (Households, not population)

Example Setting: A community of 500 households wishes to upgrade and expand their drinking water system. The community needs 2 wells, which they estimate to be 350 feet and 500 feet deep and one storage tank of 50,000 gallons. The community will also need approximately 2500 linear feet of pipe.

Components Needed *(Check All that Apply):*

- ☑ Water Source: Well, Pump, Chlorinator: ***Complete Section A***
- ☑ Water Storage Tank: ***Complete Section B***
- ☑ Water Distribution System: Piping to customers: ***Complete Section C***

Section A -Water Source Cost

Well Cost

Size of Well	Well less than 500 feet (cost/foot)	500 foot well (cost/foot)	Well greater than 500 feet deep (cost/foot)
6-inch	$140	$126	
8-inch		$155	$140

These costs include drilling, casing, screen, pump test, and well development.

Multiply the number of feet of well depth by the appropriate cost per foot for Well #1 and #2:

Depth of Well (ft)		Cost Per Foot		Well Cost (include on page 1-8)
350	X	$140	=	$49,000

Depth of Well (ft)		Cost Per Foot		Well Cost (include on page 1-8)
500	X	$126	=	$63,000

Pump Cost

Size of Well (Diameter)	Well depth less than 500 feet	Well depth of 500 feet	Well depth greater than 500 feet
6-inch	$3,500	$7,000	
8-inch		$7,000	$14,000 - $35,000

In this example use $3,500 for one well pump and $7,000 for the other well pump and include on Page A-4.

Chlorinator Cost

Chlorinator	Cost
Small well (in terms of flow)	$420 - $700
Medium well (in terms of flow)	$700- $1,100
Large well (in terms of flow)	$1,100 - $1,700

Use the figure of $700 for one well and $1,100 for the second well. Include these figures on Page A-4.

Need for Multiple Pumps and Wells

The summary page A-4 needs to contain 2 wells.

Subtotal for Source of Water

Fill in one line for each well, pump, and chlorinator needed:

Well 1 Costs		Pump 1 Cost		Chlorinator 1 Cost		Source 1 Total
49,000	+	$3,500	+	$700	=	$53,200

Well 2 Costs		Pump 2 Cost		Chlorinator 2 Cost		Source 2 Total
$63,000	+	$7,000	+	$1,100	=	$71,100

Well 3 Costs		Pump 3 Cost		Chlorinator 3 Cost		Source 3 Total
$0	+	$0	+	$0	=	$0

Source 1 Total		Source 2 Total		Source 3 Total		Subtotal Cost for Source
$53,200	+	$71,100	+	$0	=	$124,300

Section B - Water Storage Cost
Source of cost data: Information from Equipment Suppliers, 2000

Size of Tank	Cost Range ($/gallon)
500,000 - 1,000,000	$0.35 - $0.42
300,000 - 500,000	$0.42 - $0.50
75,000 - 300,000	$0.50 - $0.56
50,000 - 75,000	$0.56 - $1.05
less than 50,000	$1.05 - $1.41

Multiply the number of gallons needed by the cost per gallon:

Number of Gallons Needed		Cost Per Gallon		Total Tank Cost
50,000	X	$1.05	=	$52,500

Section C - Water Distribution Cost
Source of cost data: Information from City of Albuquerque, 1998

This community intends to use 8 inch pipe.

Size of Pipe	Cost per Linear Foot	Comments
4-inch	$38.51	Maximum flow of 225gpm
6-inch	$41.52	Minimum needed for fire flow
8-inch	$46.32	Maximum flow of 1000 gpm
10-inch	$52.72	Maximum flow of 1500 gpm

Multiply the number of feet of pipe by the appropriate cost per foot from the table on the previous page.

Feet of Pipe Needed		Cost Per Foot		Subtotal Cost
2,500	X	$46.32	=	$115,800

Total System Cost

The total system cost would be the cost of the source plus the cost of distribution plus the cost of storage as calculated from each section above. If only one or two components are needed out of the three, just place a zero in the box for the component that is not needed. For example, if your community needed only a well and a storage tank and not a whole new distribution system, then you would fill in numbers for Section A and B, but place a zero in the box for Section C.

Cost of Source Section A		Cost of Storage Section B		Cost of Distribution Section C		**Total System Cost**
$124,300	+	$52,500	+	$115,800	=	$292,600

Appendix B

Wastewater Collection

System Alternatives

Wastewater Collection System Alternatives

To address the needs of small communities that could not always afford conventional gravity sewers, several initiatives were undertaken to develop and promote the use of alternative sewer systems. Available alternatives include: pressure sewers, both grinder pump systems and septic tank effluent pumping (STEP) systems; vacuum sewers; and small diameter gravity sewers. Each of these sewers has been used successfully and unsuccessfully. To ensure a successful installation, 1) the selected alternative must fit the physical characteristics of the community, 2) the design must be well conceived, 3) the community must be accepting of the alternative, and 4) the community must be capable of handling the operation and maintenance requirements of the systems. A brief description of the types of sewers is provided below.

Gravity Sewer System

Gravity sewer systems involve placing sewer pipes at a slope sufficient to convey sewage within the pipe by natural gravity. The slope must be sufficient to maintain a minimum velocity, referred to as the scour velocity, to prevent solids from settling within the pipe. The sewers generally must be laid in straight-line segments with manholes every 500 feet and at every change in pipe size, direction, or connection of laterals. The New Mexico Environment Department (NMED) recommends a minimum pipe diameter of 8 inches for all gravity sewers.

The design of gravity sewers is a time-honored practice that is well documented and understood by engineers and the simple operation of the sewers is desirable to operation and maintenance personnel. Areas of high density and favorable topography are conducive to gravity sewers. Gravity sewers tend to be costly on a linear foot basis, so in areas that are sparsely populated, gravity sewers may be prohibitively expensive. If the slope of the land does not fall in the direction of sewer flow, very deep sewers will be required, which may be a particular problem when groundwater is high, rock is near the surface, or construction corridors are narrow. However, if pump stations are not needed the operation and maintenance costs are low. If the costs of construction of gravity sewers are slightly higher than the cost of alternative sewers, gravity sewers are still probably preferred because of the ease of operation and maintenance and the overall acceptance of gravity sewers.

Gravity sewers without pump stations require little operation and maintenance. Periodically, the sewers must be flushed to clean out any accumulated solids. Over time, corrosion, cracking, or general deterioration of the sewers and the manholes may occur. The extent of these problems depends on the generation of hydrogen sulfide with the sewers, the pipe material, age of sewers, presence of trees (potential to cause root intrusion), and other factors. Corroded or cracked manholes may allow water to infiltrate into the sewer, greatly increasing the quantity of water that must be treated at the treatment plant. Manholes may be repaired by coating the interior of the manhole or by filling cracks with grout or other compound.

Vacuum Sewer System

A vacuum system is a mechanized system of wastewater transport that uses differential air pressure to move the wastewater in the pipes. A central vacuum station evacuates air from the collection lines, creating a differential air pressure between ambient air pressure and the pressure in the collection line. A normally closed vacuum/gravity interface valve separates individual users from the vacuum mains to completely seal the lines and maintain the vacuum on the system. The valves are located in a pit that collects wastewater from the users. When a specified amount of wastewater is collected in the pit, pressure sensors open the valve and the pressure differential between the vacuum lines and the atmosphere propels the wastewater toward the vacuum station.

A skilled operator is required to properly operate and maintain the system. The operator should receive training in the design and operation of the system and ideally would be involved in the construction portion of the job to learn the system components.

Vacuum systems require a central vacuum station to operate the system, which must contain vacuum pumps, wastewater discharge pumps, electrical controls, a wastewater collection tank, and associated equipment. These stations can be more costly to construct than a gravity lift station. The cost effectiveness of this system may not be realized unless several lift stations would be necessary with gravity sewers or unless the installation of the gravity sewers themselves is prohibitively expensive.

It is possible to locate the vacuum pits, required at each connection point within the road right-of-way to prevent the need to construct system components on private property.

Small Diameter Gravity Sewers

Small Diameter Gravity Sewers (SDGS) are made up of interceptor tanks (septic tanks) and small diameter collection mains. Interceptor tanks are located upstream of each connection, usually on the property being served, and remove grease and settleable solids from the raw wastewater. The wastewater flows from each interceptor tank by gravity (or in the case of the septic tank effluent pumping systems described later, by pump) to the collector mains. The collector mains are located within public street rights-of-way and transport the collected wastewater to a treatment facility or a conventional gravity collection system connection point.

Because solids are not transported with the wastewater in SDGS, the collector mains do not need to be designed to carry solids. The modification is design produces several benefits over conventional gravity sewers: 1) less slope is required on the sewers, 2) sewer depths are reduced, 3) manholes are not required at all junctions, changes in grade and direction, and regular intervals, 4) sewer alignments need not be straight, and 5) within certain hydraulic restrictions, sections of the mains may have an inflective gradient. The sewer diameters can also be reduced because the interceptor tanks act to reduce the ratio of peak flow to average flow.

SDGS systems require periodic pumping of the interceptor tanks to remove the accumulated solids, but otherwise the sewers operate similarly to conventional gravity sewers. SDGS can be combined with septic tank effluent pumping systems (described later) to eliminate the need for mainline pumping stations, which can reduce construction and operation and maintenance costs. The combination of SDGS with septic tank pumps also allows the system to be installed at an acceptable elevation that accommodates most users, while eliminating the need to install the sewers at a very low depth to accommodate a few low-elevation users. These users can be supplied with pumps to gain access to the system.

The sewer utility should be responsible for the entire system, including septic tanks and any septic tank effluent pumping units. Operation and maintenance requirements of SDGS systems are generally simple in nature, requiring no special qualifications for maintenance staff other than a familiarity with the system. The operator=s responsibilities will be largely limited to service calls, new service connection inspections, and administrative duties. Interceptor tank pumping is usually performed by an outside contractor under the direction of the utility district.

One disadvantage of SDGS involves the interceptor tanks. The need for interceptor tanks creates the need for periodic pumping of the tanks, which creates the need for handling and disposing of septage. Because the time between pumping is long (between 5 to 10 years for residential users), this drawback to the SDGS system should not be too great of a concern. Also, because of the use of septic tanks, odors can be created in the system, and odors have been the most frequently reported problem with SDGS systems. Odors can occur at lift stations or from house plumbing stack vents, particularly at homes located at higher elevations or ends of lines. Odors are more pronounced where turbulence occurs. By minimizing turbulence in the mains and the lift stations and providing proper venting, odor problems have been easily overcome. Proper design can prevent much of the odor potential of the system.

SDGS systems require that interceptor tanks be installed on private property. This type of construction can be troublesome for construction contractors who generally do not like to work on private property. Homeowners may also be very demanding in the restoration of landscaping after the installation of the septic tanks. In addition, homeowners must be willing to grant easements to the governmental entity constructing the system to allow construction, installation, and operation and maintenance of the interceptor tank.

Pressure Sewer System - Grinder Pump

A pressure sewer uses a small diameter pipeline, shallowly buried following the profile of the ground. Typically main diameters are 2 to 6 inches and burial depths may be 30 inches or below the frost line, whichever is greater. Each home uses a small pump to discharge to the main. With a grinder pump system, the pump grinds the solids in the wastewater to slurry, similar to a kitchen garbage disposal.

The wastewater with the ground-up solids is transported through the collection main to a connection point with a gravity sewer or to a wastewater treatment facility. Pressure system mains do not have to have a straight alignment, or a particular slope, and can be routed around major obstacles. Pressure systems are not inherently maintenance intensive. Past performance has shown that well designed systems that are attended to by skilled, qualified maintenance personnel are relatively easy to operate and maintain. However, the systems do require regular routine maintenance to perform properly and incorrect operation and maintenance may be worse than none at all. Normal maintenance consists mostly of answering service calls by system users. The amount and type of service required varies widely between projects but past experience has shown that many calls are electrically related or related to stringy material jamming the grinder pump mechanisms. There may be one service call every two to four years for every pump, so staffing must be adequate to handle service calls on roughly a half to a fourth of the system in a given year.

The major advantage of a pressure system is that small collector mains may be used that can be installed at a relatively constant (the system can follow the ground contours) shallow depth. A pressure system can be used cost-effectively where adverse topography exists or where obstacles are encountered. Pressure sewers may permit service to low-lying areas that otherwise could not connect to the gravity sewer.

A major disadvantage of this system, similar to the SDGS and STEP systems, is that construction must take place on customer=s property. Another drawback of the system is that electrical service must be provided to each grinder pump unit. As long as there is presently household service that meets the standards of the area, the expense of connecting the pump units is not that great. Another consideration is that the electrical connection can be made before the household junction box, so that the utility district installing the systems do not have to access the household electric service.

Pressure Sewer System - Septic Tank Effluent Pump

Septic tank effluent pump (STEP) systems operate based on the same principals described above for the grinder pump systems. The main difference between the two systems is the use of a septic tank prior to pumping. STEP systems are in essence a combination of the SDGS and the grinder pump pressure sewers. In STEP systems, wastewater flows by gravity from the service to a septic tank, where floatable and settleable solids are removed. The settled wastewater is then pumped to a pressure sewer or an SDGS collector main (if the STEP system is being used in conjunction with a SDGS system) with a septic tank effluent pump. The sewer is free of solids, similar to the SDGS.

As described with the grinder systems, the pressure sewer is a small diameter pipeline, shallowly buried following the profile of the ground. Typical main diameters are 2 to 6 inches and burial depths may be 30 inches or below the frost line, whichever is greater.

The septic tank effluent is transported through the pressure sewer to a connection point with a gravity sewer, SDGS collector main, or to a wastewater treatment facility. Pressure system mains do not have to have a straight alignment, or a particular slope, and can be routed around major obstacles.

With the exception of the maintenance of the septic tank that was described in the SDGS system, the operation and maintenance requirements are similar to those described above for the grinder pump system. However, because the STEP systems do not contain solids, the sewers do not have solids deposition problems and the STEP pumps are less likely to become clogged with stringy material.

In general, the advantages and disadvantages of the STEP system are very similar to those of the grinder pump system. One additional advantage of the STEP system is that the septic tank removes much of the solids from the raw wastewater which reduces the strength of the wastewater, in terms of BOD and suspended solids. Depending on the type of treatment selected this may be a considerable advantage. An additional disadvantage with the STEP system is the potential for odors in the system. To help prevent odors, basin covers are gasketed or made such that escaping gases are vented to the soil or ventilation is provided by the roof vent of the home. In most cases where odors have been reported, improper house venting was to blame.

Appendix C

Wastewater Treatment

System Alternatives

Wastewater Treatment System Alternatives

There are many different types of treatment systems available. Most of these systems are some variation of natural biological treatment, in which the growth of specific microorganisms is promoted to consume the organic matter in the wastewater. Some processes are considered "suspended growth" because the microorganisms are suspended throughout the wastewater and others are referred to as "attached growth" because the microorganisms are attached to surfaces, such as rocks, plant roots, or plastic media.

The systems can also be classified in terms of mechanical verses natural systems. Mechanical systems rely upon pumps, blowers, compressors, and other mechanical devices to achieve aeration, mixing, and settling. Natural systems rely upon natural processes, such as the transfer of air to water at the water surface, soil filtration, or plant activity, to achieve treatment without any or very few mechanical devices.

It is not possible to describe all the treatment processes available, but some of the more common processes used by small communities within New Mexico are described below.

Conventional Activated Sludge Plant (Conventional Concrete and Steel)

In the context of this report, conventional activated sludge treatment systems are considered to be concrete and steel type facilities, although there are many other types of processes that can also be employed in concrete and steel type facilities. A typical plant has some headwork facilities (e.g., screen, grit removal) followed by primary settling, activated sludge treatment, secondary settling, and disinfection. These systems have been employed for a very long time in the US and the world and are well accepted in the design community.

Conventional systems depend on mechanical components for the aeration of the activated sludge, the recycling of the sludge, and in primary and secondary settling. The systems are very reliable and are tolerant of influent variations and a wide variety of climatic conditions. Compared to the natural systems, conventional systems can achieve similar or greater treatment efficiency in a much smaller space. Detention times for the activated sludge portion of the treatment process are on the order of 6 to 8 hours.

The disadvantages of activated sludge include: construction costs, operation and maintenance costs, and sludge generation. The conventional treatment systems are extremely costly to construct. These systems require a lot of concrete and steel and mechanical components. The systems use a lot of energy and require a lot of attention from a well-trained operator, which causes the operation and maintenance costs to be very high. Activated sludge plants generate a significant amount of sludge that must be disposed of. Sludge handling is difficult and expensive and is often the most costly part of the treatment system.

Because of the high construction and operation and maintenance costs, the life-cycle costs of a conventional system are not very favorable in comparison to the natural system options for smaller flow rates. (Life-cycle costs consider the capital construction costs and the yearly operation and maintenance costs for each year of the project for its entire life (typically 20 years or more.)) However, at higher flow rates, there is an economy of scale which tends to reduce the per gallon costs of the system. Also, the large amount of land required might not be available or it may be prohibitively expensive.

Lagoons

Lagoons have been used for the treatment of wastewater for over 3000 years and have been used in the US since 1901. Numerous pond systems are in operation in the US today in all kinds of applications and all types of climatic conditions. Lagoons can be used as stand alone treatment systems or can be combined with other types or treatment processes. Lagoons are essentially ponds and are simply excavated earthen holes that retain the wastewater for a considerable period of time.

The most basic classification of lagoon systems is based on the dominant biological reactions occurring within the pond. The four principal types of lagoons are listed below.

Aerobic
Facultative
Aerated
Anaerobic

All four types can be considered natural treatment systems. Anaerobic lagoons are used or the treatment of strong industrial wastewater or agricultural wastes and do not have significant application for the treatment of municipal wastewater. These ponds will not be described any further here, nor are they included in the cost estimating guide. The other three systems are described briefly below.

Lagoons are very simple systems to construct requiring mainly earth moving equipment and some type of impermeable barrier to prevent untreated wastewater from seeping into the groundwater. System operation is very simple and does not require a well-trained operator. Because there are little or no mechanical parts associated with the lagoons, operation and maintenance costs are minimal. The sludge generated within the lagoon collects on the bottom and may only have to be removed every 10 to 15 years.

The disadvantages of lagoons include the land requirement, public health concerns, and treatment efficiency. A lagoon system is able to operate naturally and generate very little sludge because of the very long detention times. However, this type of operation requires a large amount of land, and if land is expensive or unavailable, these options are not appropriate. Lagoons may attract animals and serve as a breeding ground for mosquitoes and represent an open surface of untreated wastewater.

Treatment efficiency in well-designed, well-operated lagoons may be quite good, but poorly designed and operated systems may not prove to be efficient and reliable.

Overall, if land is available and inexpensive and a remote or secured location can be found for the lagoon, lagoons may represent the lowest life-cycle cost of all the alternatives.

Aerobic Lagoon

Aerobic lagoons are shallow, 1 to 4 feet deep, and detention times are short, 3 to 5 days. Oxygen and light are maintained throughout the entire depth of the lagoon. Mixing may be provided to expose all the algae living within the lagoon to sunlight and to prevent the deposition of solids. Oxygen is provided by algae photosynthesis and reaeration at the water surface and aerobic bacteria stabilize the waste. Aerobic lagoons are used only in warm, sunny climates, so their use would probably be limited to southern New Mexico.

Facultative Lagoons

The most common type of lagoons is facultative. Facultative lagoons are typically 4 to 8 feet deep with a detention time of 5 to 30 days. The pond has an aerobic zone at the top part of the lagoon where oxygen is added through surface reaeration and algae photosynthesis and an anaerobic zone at the bottom of the pond where settled solids are further decomposed. The zone in between the two layers ranges from a lot of oxygen to very little.

Aerated Lagoons

In an aerated lagoon, oxygen is supplied through mechanical aeration or diffused aeration (also a mechanical process). Aerated ponds are typically 6 to 20 feet deep and have detention times of 3 to 10 days. The main advantage of an aerated pond is that it requires less area than other types.

Constructed Wetlands

There are approximately 500 operating constructed wetlands treatment systems in the United States today. There are two types of wetlands in use B free water surface and subsurface. Both types of wetlands require some type of primary treatment, such as septic tanks or lagoons, and both types employ a liner underneath the system to prevent groundwater contamination. In a free water surface wetland, the water is exposed to the atmosphere and the bed contains emergent aquatic vegetation, which is rooted in soil at the bottom of the bed. The water depth is about a foot and detention times range from 3 to 15 days or more. The subsurface flow wetlands contain a gravel media that supports the plant roots and the wastewater flows below the gravel surface in the plant root zone.

A subsurface flow wetland has many advantages over a free water surface wetland. The systems are smaller than free water surface systems, the water surface is not exposed so there are no public access problems or mosquito problems and the system may be better suited to colder climates. However, the requirement of gravel greatly increases the construction costs and the systems are probably not cost competitive at higher flow rates.

Wetland systems require little operation and maintenance, so on a life-cycle cost basis, the systems may be very favorable. These systems typically require less land than a lagoon system, but construction costs for subsurface flow wetlands will be higher due to the gravel.

The major disadvantages with a wetland system are the lack of knowledge in design and operation and the poor nutrient removal efficiency. Wetland systems are fairly new systems, having only been used for the past 20 years or so, verses the other systems that have been around for 100 years or more. Design standards are being constantly revised as more information is gathered. In New Mexico, many of the treatment plants discharge to groundwater. This type of system requires the removal of nitrogen. The typical wetland system has not proven to provide much nitrogen removal. However, with various modifications in design or operation, the system can be made to remove nitrogen. The cost estimation guide includes one of these design modifications.

Appendix D

Cost

Estimating

Resources

ICIP Project Information: Category

Category	Source for Cost Estimating
Adm/Service Facilities (local only, not state)	Cost Estimating Guide by NM EFC – Buildings Section
Airports	Terry Simcoe, Aviation Planner, Aviation Division, Department of Transportation, 476-0930, Terry.Simcoe@state.nm.us
Arts	Community should be large enough to have engineer on staff and/or have resources available to hire engineer
Clean Energy	
Convention Facilities	Cost Estimating Guide by NM EFC – Buildings Section
Cultural Facilities	Cost Estimating Guide by NM EFC – Buildings Section
Daycare Facilities	Cost Estimating Guide by NM EFC – Buildings Section
Domestic Violence Facilities	Cost Estimating Guide by NM EFC – Buildings Section
Economic Development	
Fair Facilities	
Health-Related Infrastructure	Cost Estimating Guide by NM EFC – Buildings Section
Housing-Related Infrastructure	Cost Estimating Guide by NM EFC – Buildings Section
Landfills	NMED Solid Waste Dept., Community should be large enough to have engineer on staff and/or have resources available to hire engineer
Libraries	Cost Estimating Guide by NM EFC – Buildings Section
Lighting	Cost Estimating Guide by NM EFC – Roads Section
Median	Cost Estimating Guide by NM EFC – Roads Section
Museum	Cost Estimating Guide by NM EFC – Buildings Section
Overpass	Cost Estimating Guide by NM EFC – Roads Section
Public Education (state only, not local)	New Mexico Public Education Department "How New Mexico Schools are Funded", 08/2006
Rest Areas	New Mexico Department of Transportation District Offices - http://www.nmshtd.state.nm.us/main.asp?secid=11148
Roads/Streets/Bridges	Cost Estimating Guide by NM EFC – Roads Section
Senior Facilities	Cost Estimating Guide by NM EFC – Buildings Section
Solid Waste	NMED Solid Waste Dept.
State Government Facilities (not local)	Cost Estimating Guide by NM EFC – Buildings Section
State Parks	NM Energy, Minerals and Natural Sources Dept.
Storm/Surface Water control	Community should be large enough to have engineer on staff and/or have resources available to hire engineer
Transit	Community should be large enough to have engineer on staff and/or have resources available to hire engineer
University (state)	
Wastewater	Cost Estimating Guide by NM EFC – Wastewater Section

Other Sources for Cost Estimating Information

- RS Means Books, various categories - $150 - $450 each
- RS Means website
  - Quick Cost Estimator for Buildings by Type http://www.rsmeans.com/calculator/index.asp
- New Mexico Environment Department – Construction Programs Bureau
  - Engineering Fees - http://www.nmenv.state.nm.us/cpb/PTAB_Manual%20Rev%2005-24-06.pdf
- New Mexico Department of Transportation
  - Road Construction Bid Item Cost Information by Year http://nmshtd.state.nm.us/main.asp?secid=15244
- City of Albuquerque Public Works
  - Construction Unit Prices as Bid – to be updated fall 2007
  - 1998 prices here - http://www.cabq.gov/planning/publications/unitpr98.pdf
  - check here for updates - http://www.cabq.gov/planning/publications/
- Consumer Price Index
  - Used to Determine Inflation Rates - http://www.bls.gov/cpi/
- Inflation Data.Com
  - A source for determining generic inflation rates for any month and year period, includes a calculator
  - http://inflationdata.com/Inflation/Inflation_Rate/InflationCalculator.asp#results
- US Army Corps of Engineers
  - Inflation indexes updated every 2 years
  - March 30, 2007 - http://www.usace.army.mil/publications/eng-manuals/em1110-2-1304/entire.pdf
- Engineering News Record – Subscription Based
  - "ENR publishes both a Construction Cost Index and Building Cost index that are widely used in the construction industry."
  - http://enr.construction.com/features/conEco/default.asp
- Turner Construction Cost Index – updated quarterly
  - "Used widely by the construction industry and Federal and State governments, the building costs and price trends tracked by The Turner Building Cost Index may or may not reflect regional conditions in any given quarter. The Cost Index is determined by several factors considered on a nationwide basis—labor rates and productivity, material prices and the competitive condition of the marketplace. This index does not necessarily conform to other published indices because others do not generally take all of these factors into account. Turner has issued this quarterly forecast for more than 75 years."
  - http://www.turnerconstruction.com/corporate/content.asp?d=20