ELEMENT ENGINEERING LLC

CITY OF MONTE VISTA

UTILITY MASTER PLAN

ROADWAY MASTER PLAN
WATER SYSTEM MASTER PLAN
WASTEWATER SYSTEM MASTER PLAN

JANUARY 2021

UTILITY MASTER PLAN
FOR
CITY OF MONTE VISTA

JANUARY 2021

EE JOB NO.: 0052.0005

ELEMENT ENGINEERING LLC
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TABLE OF CONTENTS

1 EXECUTIVE SUMMARY – UTILITY MASTER PLAN

The City of Monte Vista engaged the services of Element Engineering in 2020 to complete a utility master plan to assist the city with decisions related to various infrastructure and roadway upgrades. The utility master plan was compiled as three volumes:

Volume I – Roadway Master Plan
Volume II – Water System Master Plan
Volume III – Wastewater System Master Plan

Each volume of the Utility Master Plan has been compiled as a stand-alone document for ease of use. However, for a comprehensive understanding of the city's utilities, all volumes of the Utility Master Plan should be reviewed.

Executive summaries of each volume of the Utility Master Plan have been compiled. These summaries provide a brief outline of the complete master plans including cost estimates for proposed improvements. For detailed cost estimates and exhibits of the proposed improvements, please refer to the complete volumes of the master plans.

2 EXECUTIVE SUMMARY – ROADWAY MASTER PLAN

The roadway master plan for the City of Monte Vista compiles conditions of the existing roadways and provides recommendations for improvement projects. The master plan can be used as a tool to assist the city in current and future planning and budgeting. The master plan is meant to be a growing document, and provides information about the city's roadway needs, associated costs, and alternative service levels to inform the public and policymakers as future service and funding options are considered.

The City of Monte Vista maintains 28 miles of roads within the city limits. As part of the roadway master plan, evaluations were conducted to determine functional and structural conditions of each roadway section for purposes of routine monitoring and maintenance or necessary corrective action. The results of the evaluation are presented as:

- Roadway Evaluation Spreadsheet
- Roadway Existing Conditions Exhibit

The master plan includes an analysis of roadways and sidewalks combined with strategies to combine roadway improvements with water system replacement projects including the following:

- Roadway Inspection & Evaluation
- Recommendations for Roadway Maintenance
- Roadway Maintenance Cost Estimates
- Recommendation for Roadway Replacements
- Roadway Replacement Cost Estimates
- Roadway and Water System Replacement Recommendations

2.1 COMPONENTS OF ROADWAY INSPECTIONS

Visual condition surveys document aspects of both functional and structural pavement conditions and serve as a qualitative indicator of overall condition. The following are the general components of roadway inspections:

- Roadway Historical Records
- Surface Defects
- Appearance of Subsurface Failures
- Drainage
- Curb and Gutter
- Sidewalks
- Condition of Utilities Under the Roadway

2.2 PAVEMENT MAINTENANCE AND REPLACEMENT TECHNIQUES

The following are pavement maintenance and replacement techniques described and considered in the Roadway Master Plan:

- Crack Sealing
- Slurry Seal

- Chip Seal
- Asphalt Overlay
- Total Roadway Asphalt Replacement

2.3 ROADWAY – EXISTING CONDITIONS EVALUATION

In July 2020, an evaluation was completed of all the City of Monte Vista Roadways. The evaluation and improvement recommendations take into account all pavement conditions along with the other component's such as drainage, curb and gutter, and sidewalks, as mentioned previously.

The City of Monte Vista has approximately 28 miles of roadways, with 80% of the roads paved, and the remaining 20% gravel/roadbase. Of the existing paved roads, 15% are in good to fair shape and are in need of annual maintenance, and 85% are in need of total replacement.

Overtime, asphalt loses its oil and binder content and becomes very brittle and begins to crack, leading to potholes and then to severe alligator cracking. Many of the city's roads meet this description, as expected as they are approximately 50 years old.

Various maintenance techniques over the years have been used to help prolong the life of the city's streets, however the majority due to age have reached a point where typical maintenance techniques are not feasible and if applied would likely not last more than 1 to 2 years.

Many of the city streets have curb and gutter, and much of the curb and gutter is in need of replacement. There are also areas where no curb and gutter exist and should be added to protect the edges of asphalt, as well as improve drainage. It is estimated that 60% of the city's roadways need curb and gutter either replaced or added.

Though the majority of the city's streets have curb and gutter, many do not have sidewalks. Just like the curb and gutter, many of the existing sidewalks are also in need of replacement. The city's sidewalk system is in need of many improvements. Overtime, some residents have completely removed the sidewalks in front of their homes likely due to deterioration. Many of the city streets don't have sidewalks, thus making streets the only option for walking. Like a lot of communities where sidewalks were installed in the 1970's, most do not meet the American with Disabilities Act (ADA), which requires handicap ramps at every intersection.

Good drainage is very important for the longevity of asphalt. Over time if roadways have improper drainage, the storm water will sit on the edges of the asphalt and begin penetrating the subgrade under the asphalt. This causes the asphalt to prematurely fail. Many cities contend with drainage problems during a major storm, and it generally takes a few hours for the water to recede. Many times, cities were originally designed with minimal elevation changes thus making it difficult to properly address drainage. With the exception of a few areas, the City of Monte Vista has decent drainage. Many of the city's storm inlets are in need of replacement as they are under sized and are not properly connected to the main storm lines.

2.4 ROADWAY – RECOMMENDED IMPROVEMENTS

Recommended improvements to the City of Monte Vista's roadways are presented in the Roadway Master Plan as the following:

- Roadway Improvements Table
    - Block by block recommendations including cost estimates for all recommended improvements including roadway, sidewalk, curb, and gutter
- Roadway Improvements Recommendation Exhibit
- Sidewalk, Curb, and Gutter Recommendations Exhibit

Table 1 summarizes the overall condition percentages and category cost estimates.

Table 1: Roadway Condition Summary

Condition	Percent	Miles	Recommendation	Approx. Cost
Good to Fair	15%	4.2	Annual Maintenance	$ 2,000,000
Poor	85%	23.8	Total Replacement	$ 30,000,000

The city has approximately 28 miles of the roadways. Approximately 15% (4.2 miles) of the city's roadways are in good to fair shape and are not recommended for total replacement. It is important to maintain these streets through crack sealing, patching, chip sealing or overlays. This maintenance should begin as soon as possible. The 2020 estimated cost for maintaining these streets is $2,000,000 (this dollar amount does not factor in the average 2% construction cost increase per year).

Currently, the city budgets $140,000 annually for street improvements. If the city dedicated the full $140,000 strictly to maintenance, it would take approximately 14 years to maintain these streets. With most of the maintenance techniques only having a life span of approximately 5-6 years before they need to be reapplied, many of these streets will likely be placed in the total replacement category within 10 years.

The remaining 80% (23.8 miles) of the city's roadways are in poor condition and in need of total replacement. The 2020 estimated cost for complete replacement of these streets is $30,000,000.

Even without considering the 80% of the city's streets in need of total replacement, the city's current budget is financially unable to meet the needs of the necessary general roadway maintenance.

The Roadway Master Plan offers three alternatives for project types for cost comparisons:

1. Roadway Only Improvements
2. Complete Roadway Improvements with Waterlines
3. Waterline Improvements and Asphalt Patch

2.5 ROADWAY – PROJECT FUNDING

The roadway improvement budget cannot properly fund a complete one block reconstruction project. This budget is underfunded by approximately $20,000 - $80,000. The discrepancy between the estimated cost for improvements and annual budgeted amount increases over time as the estimated construction costs increase by 2% each year.

Knowing the required projects cannot be funded with the current funds, the city will need to look at options for funding larger projects. As discussed, most infrastructure improvements such as water line

replacement, can be funded through the State Health Department or USDA Rural Development and paid back through rate increases to the water fund. However, these funding options are not available for roadway improvements and they must be funded through other options.

Another possible funding option is to create special districts throughout the city, possibly four or five areas. This would allow each designated district/individual property owner to vote on assessments or some other pay back mechanism to cover the cost for needed roadway improvements within their district. Pay back could be 10 to 15 years so as not to exceed the estimated 20-to-25-year life span of the roadways. There are several firms who specialize in creating special districts and can take polls to determine if residents would be interested in this option for project financing.

3 EXECUTIVE SUMMARY – WATER SYSTEM MASTER PLAN

The water system master plan for the City of Monte Vista strives to compile and organize information on the existing and future conditions of the water treatment and distribution system to maintain compliance with regulations and continue providing adequate service to its users. The report provides recommendations for infrastructure improvement projects and provides guidance for prioritization of improvement projects. The master plan can be used as a tool to assist the city in current and future planning and budgeting. The master plan is meant to be a growing document, and any changes to the potable water systems should be documented accordingly.

The master plan includes analysis of infrastructure and recommendations for improvement including the following:

- Review of existing service area and population and population projections
- Review of existing water treatment facilities
- Review of existing distribution system
- Review of existing water demands and the ability to provide necessary water volumes to the city
- Recommendations for water system improvements including cost estimates, including:
    - Water pipe
    - Water meters
    - Fire hydrants
    - Potable water storage tank(s)

3.1 WATER SYSTEM - DESCRIPTION AND EVALUATION

The City of Monte Vista water system operates under Public Water System Identification (PWSID) No. CO-0153600. The city obtains water from five municipal/domestic groundwater wells located throughout the city. All five pumps discharge directly into the distribution system after chlorine injection.

The City's distribution system consists of approximately 30 miles of finished water pipe including isolation valves, fire hydrants, and service water meters. Pipe sizes range from 4-inch to 12-inch diameters and are constructed of asbestos cement, thin-walled steel, and PVC. The majority of the system consists of asbestos cement and steel pipe. No storage tanks or booster pumps exist in the system.

The pipe in the distribution system is of inadequate size in some areas, and inappropriate pipe material in most areas. All pipe in a distribution system that provides fire flow should be a minimum of 6-inches, with a commonly accepted minimum water main size of 8-inches. Existing 4-inch and 6-inch pipes in the distribution system are considered undersized and should be considered for replacement.

Asbestos cement (AC) piping weakens over time and is costly to maintain and repair. Once this pipe is disturbed, faults in the pipe expand rapidly and point repairs often do not hold for any significant amount of time. AC pipe is also costly to properly rehabilitate as a specialized team should be brought in to manage rehabilitation and disposal of the pipe. Existing AC pipe in the distribution system should be considered for replacement.

Steel pipe was the best option available at the time of installation of much of the distribution system, but this material is now outdated and is no longer recommended. This material is highly susceptible to

corrosion. Additionally, the type of steel pipe in the city's distribution system is a thin walled irrigation rated pipe. The pipe is expensive to maintain as specialized fittings are required, which can be difficult to obtain. Existing steel pipe in the distribution system should be considered for replacement.

Polyvinyl chloride (PVC) piping is recommended for this system. HDPE and ductile iron pipe are also acceptable pipe materials for modern distribution systems; however, these pipe types are not recommended for the city as they are unnecessarily expensive compared with PVC.

Finally, water loss in the distribution system is apparent. For all these reasons, replacement of all pipe in the distribution system, except for the recently replaced pipe, should be considered and planned for.

Most services in the distribution are metered using Invensys SR and SR II Touch Read Meters. Most meters exist in meter pits outside of homes and buildings, though some meters are located inside. Meters are read monthly using a Sensus AutoGun Model 4090 and a Sensus AutoRead HandHeld Device Model AR 5501. The city utilizes meter readings for water billing purposes.

There are a small number of city owned areas that are provided unmetered water. These include the softball fields and Montez Park.

The city has recently revised its policy so that any meter replacements of meters inside homes must me moved to thermal-coil type meter pits outside of the home, one foot from the curb box. This is a good practice to allow better access to meters and should be maintained for all future replacements.

Most meters in the system are old and have exceeded the typical lifespan of 15-years. Additionally, it takes four city staff one-week to complete meter readings of the system with the existing touch read system. This could be reduced to two workers and one day if the system were a radio read system.

For these reasons, the master plan recommends that all meters in the system be replaced, including drive by radio read capabilities. Meters should also be added to the areas that are currently unmetered to allow better calculations of actual water loss in the system.

All hydrants in the service area were installed as part of the original construction of the city's distribution system. All hydrants are aging and are nearing the end of their useful life. Hydrants should be considered for replacement in conjunction with adjacent water line replacement.

No potable water storage tank exists in the current distribution system. All service demand, including fire flow, must be provided by the raw water wells. The construction of a water storage tank is included as a recommended improvement to the water system.

No booster stations exist within the distribution system. The distribution system is relatively flat and pressures throughout the system are quite consistent. This is discussed further in the water model analysis included in this report. No booster stations are recommended for the distribution system. Additionally, if a water storage tank is constructed, the tank should be an elevated storage tank that is hydraulically connected to the distribution system. The tank would provide pressure to the system based on the water level in the tank. A storage tank that requires a pumping station is not recommended.

3.2 WATER SYSTEM – RECOMMENDED IMPROVEMENTS

Recommended water main improvements include the replacement of all non-PVC pipe and all pipe less than 8-inches. This pipe is aging, is costly to repair, and results in the system not being able to adequately meet system demands. These recommendations were analyzed using a water model.

Cost estimates are presented for each block in the distribution system as part of the master plan. The costs include water pipe, service lines, adjacent fire hydrants, meters with thermal coil meter pits, engineering, and mobilization. Additionally, the costs for asphalt patching and sidewalk, curb, and gutter patching are also included. All costs are presented in 2020 dollars, and cost estimates assume only one block will be completed at a time. Options for completing improvements as a larger project and the resulting change to total project costs is discussed in the report.

The recommended meter replacements are included in block-by-block cost estimates based on the number of services on each block. If the city instead elects to replace the meters as one large and separate project, the estimated cost is $900,000 - $950,000 for furnishing and installation of meters and meter pits.

The construction a water storage tanks in the distribution system is recommended. Water storage tanks allow maximum water demands to be met more easily without straining the production capacity of the raw water wells, especially in summer. Currently, summer demand requires up to four wells to pump at the same time to keep up with demand. If two raw water wells were not operational at the same time, the city may not be able to meet demand. A water storage tank would alleviate this problem as system demand can be met using the stored water and the tank can be refilled during hours of lower usage, typically overnight.

A storage tank is also recommended to provide fire flow. Fires can occur during hot summer months; therefore, fire demand often intersects with peak system demand. If this situation occurs, the city's system will likely not be able to keep up with demand. A storage tank is needed to ensure demand never exceeds supply.

The preliminary proposed tank location is near the corner of Country Club Drive and E Prospect Ave in the Northwest corner of the service area near the existing Prospect Well, as discussed with city staff.

This report recommends the construction of a one million gallon potable water elevated storage tank. This volume is approximately equal to average day demand plus fire flow. One million gallons balances the demand of the service area, water age, and financial considerations.

Table 2 presents the cost estimate for the proposed storage tank. If the city elects to construct a potable water storage tank, the city will need to budget for ongoing tank coatings. This is estimated to be approximately $150,000 every 20 years.

Table 2: Water Storage Tank Cost

Monte Vista - Water Storage Tank					
CONSTRUCTION ITEMS					
Item	**Description**	**Qty**	**Unit**	**Unit Price**	**Subtotal**
1	Elevated Storage Tank and Foundation - 1 MG	1	LS	$ 2,600,000	$ 2,600,000
2	Tank Mixer	1	LS	$ 50,000	$ 50,000
3	Plasti-Fab Building	1	LS	$ 22,400	$ 22,400
4	Building Foundation	1	LS	$ 6,000	$ 6,000
5	6-ft Chain Link Fence with Gate	600	LF	$ 40	$ 24,000
6	Site Grading	1	LS	$ 15,000	$ 15,000
7	Ancillary Piping and Valves	1	LS	$ 65,000	$ 65,000
				Subtotal Construction Items	**$ 2,782,400**
Instrumentation and Controls					$ 25,000
Seeding/Erosion Control/Site Restoration					$ 20,000
Mobilization (5% Construction Items)					$ 139,120
				Subtotal Construction Cost	**$ 2,966,520**
Contractor OH&P and General Conditions					$ 445,000
Total Construction Cost					**$ 3,411,520**
NON-CONSTRUCTION ITEMS					
Contingency (10%)					$ 341,152
Engineering, Permitting, and Survey					$ 175,000
Construction Management and Observation					$ 175,000
Total Non-Construction Project Cost					**$ 691,152**
Total Project Cost					**$ 4,102,672**

3.3 PROJECT SCOPE & FUNDING

The master plan report offers several alternatives for completion of the proposed water improvements. These include the scope of water project to be completed (one block per year, entire water system at once, or something in between), and consideration of concurrent roadway improvements. The interaction of water system improvements and roadway improvements is also discussed in the City of Monte Vista's Roadway Master Plan.

Scenarios for the scope of water line replacement per project discussed are summarized as follows:

Scenario 1 – Complete One Block of Proposed Improvements Each Year
Scenario 2 – Complete One or Multiple Larger Projects

Construction of individual projects block by block is very expensive over the long term. Each year, construction costs increase by an estimated 2%. By completing a larger project, the city is not paying for the annual project increase, and benefits from lower unit prices. Lower prices include reduction in unit costs (pipe per foot, temporary water line per foot, etc.), reduction in engineering costs, and reduction in mobilization costs. The estimated savings across the entire city results in a potential difference of ten to fifteen million dollars. Additionally, construction of a larger project opens the feasibility of obtaining grant funding for the project. If the city elects to complete one block of improvements each year, the city will likely need to entirely self-fund the projects.

The city currently commits $100,000 annually to water main improvement projects. The existing annual budgeted water distribution system improvements fund is not adequate to support the estimated cost of

block-by-block improvements. Additionally, as discussed in the Roadway Master Plan, the roadway budget is not sufficient to fund the associated surface improvements.

Consideration should also be given to the number of years it would take to complete the scope of improvements recommended in this report if they are only completed by one block per year. Using this method, the improvements would take approximately 360 years. With this time frame most of the system will require 3 or 4 replacements before all improvements are complete.

Most the city's water lines need to be replaced. As discussed in the Roadway Master Plan, the majority of the city's roadways also need to be replaced. Much of the water system was installed in the 1950's and many of the city's roads were paved in the 1970's. Most of the water main lines are old steel thin walled pipe and are continually failing. Many of the streets are also in poor condition. In general, paved roadways will last 25 years if properly maintained. Most of the City of Monte Vista's paved roads are nearing 50 years old.

The recommended water line and roadway projects should be completed concurrently. It is very important to replace all aging infrastructure prior to the placement of new roadway asphalt, concrete curb, gutter, and sidewalks. During the planning for all future improvements, the local electrical, gas, and communication companies should be notified to discuss any of their plans for updating their systems.

3.4 PROJECT FUNDING

The proposed water improvement projects can be funded through a combination of grants, loans, and water system revenue. New tap fees will not be considered as a viable cash flow for funding to be conservative. Although an SRF loan is a viable option for funding to the city, this report will assume the project is only funded through USDA. For a project of this proposed magnitude, the inclusion of SRF funding will not significantly improve the funding package and could result in a less desirable package. A DOLA grant could also be paired, though the amount of this grant may not be significant compared to the overall cost of the project and will likely result in an equivalent reduction in USDA's grant offer. The rate study only assumes USDA grant and loan for project funding.

The rate study assumes that the water distribution system improvements will be completed through larger projects. The rate study offers five project sizes for comparison:

1. Completion of 1/8 of the Total Proposed Water Distribution System Improvements
2. Completion of 1/4 of the Total Proposed Water Distribution System Improvements
3. Completion of 1/3 of the Total Proposed Water Distribution System Improvements
4. Completion of 1/2 of the Total Proposed Water Distribution System Improvements
5. Completion of All of the Total Proposed Water Distribution System Improvements

Additionally, a project that only includes the construction of the proposed tank with no water line project is included in the rate study.

The amount of grant that the city would be awarded through USDA is unknown and can only be assumed at this stage. The tables below present the rate study assuming no grant is awarded, and with an assumed amount of grant.

Table 3 presents a rate study to calculate the estimated necessary increase to user rates to support the loan payment as a result of the project, both with and without an assumed grant amount. The project costs also include bridge and interim financing costs associated with obtaining a loan through USDA. These rates assume that the rate increase will be applied evenly to all user categories and that a rate increase will only be applied to the base user fee. In summary, the assumed funding scenario with grants is as follows:

- 40% (of remaining project cost) USDA Grant
    - This grant amount is only an estimated assumption. The grant funding amount cannot be known until a funding application is submitted and a Letter of Conditions is issued
- Remaining Project Cost – USDA Loan
    - 40-year loan term
    - 2.5% Interest Rate
- Rates are estimated assuming the existing $100,000 in annual budgeted funds is applied towards the loan payment as well as without these funds.
- A 25% reduction in cost as compared with the block-by-block costs has been applied to these larger project scenarios to account for the reduction in unit costs (pipe per foot, temporary water line per foot, etc.), reduction in engineering costs, and reduction in mobilization costs.

Table 3: Water System Improvements - Rate Study

Project Alternatives	Project Costs					No Grant			With Estimated USDA Grant (40%)				
	Waterline Cost	Asphalt Patch & Curb, Gutter, and Walk Patch	Tank	Bridge & Interim Financing	Total Project Cost	Annual USDA Loan Payment	Monthly User Rate Increase	Monthly User Rate Increase w/ Existing $100,000 Applied	USDA Grant (40%)	USDA Loan	Annual USDA Loan Payment	Monthly User Rate Increase	Monthly User Rate Increase w/ Existing $100,000 Applied
Tank Only	$ -	$ -	$ 4,102,672.00	$ 300,000	**$ 4,402,672**	$ 175,386	**$ 7.70**	**$ 3.31**	$ 1,761,069	$ 2,641,603	$ 105,232	**$ 4.62**	**$ 0.23**
1/8 Total Waterline	$ 3,366,221	$ -	$ -	$ 489,000	**$ 3,855,221**	$ 153,578	**$ 6.75**	**$ 2.35**	$ 1,542,089	$ 2,313,133	$ 92,147	**$ 4.05**	**$ (0.34)**
	$ 3,366,221	$ 991,351	$ -	$ 489,000	**$ 4,846,572**	$ 193,069	**$ 8.48**	**$ 4.09**	$ 1,938,629	$ 2,907,943	$ 115,842	**$ 5.09**	**$ 0.70**
	$ 3,366,221	$ 991,351	$ 4,102,672	$ 489,000	**$ 8,949,244**	$ 356,504	**$ 15.66**	**$ 11.27**	$ 3,579,698	$ 5,369,547	$ 213,903	**$ 9.40**	**$ 5.00**
	$ 3,366,221	$ -	$ 4,102,672	$ 489,000	**$ 7,957,893**	$ 317,012	**$ 13.93**	**$ 9.53**	$ 3,183,157	$ 4,774,736	$ 190,207	**$ 8.36**	**$ 3.96**
1/4 Total Waterline	$ 6,732,443	$ -	$ -	$ 764,000	**$ 7,496,443**	$ 298,630	**$ 13.12**	**$ 8.73**	$ 2,998,577	$ 4,497,866	$ 179,178	**$ 7.87**	**$ 3.48**
	$ 6,732,443	$ 1,982,701	$ -	$ 764,000	**$ 9,479,144**	$ 377,613	**$ 16.59**	**$ 12.20**	$ 3,791,658	$ 5,687,487	$ 226,568	**$ 9.95**	**$ 5.56**
	$ 6,732,443	$ 1,982,701	$ 4,102,672	$ 764,000	**$ 13,581,816**	$ 541,048	**$ 23.77**	**$ 19.37**	$ 5,432,727	$ 8,149,090	$ 324,629	**$ 14.26**	**$ 9.87**
	$ 6,732,443	$ -	$ 4,102,672	$ 764,000	**$ 11,599,115**	$ 462,065	**$ 20.30**	**$ 15.91**	$ 4,639,646	$ 6,959,469	$ 277,239	**$ 12.18**	**$ 7.79**
1/3 Total Waterline	$ 8,976,591	$ -	$ -	$ 1,094,000	**$ 10,070,591**	$ 401,174	**$ 17.62**	**$ 13.23**	$ 4,028,236	$ 6,042,354	$ 240,705	**$ 10.57**	**$ 6.18**
	$ 8,976,591	$ 2,643,602	$ -	$ 1,094,000	**$ 12,714,192**	$ 506,486	**$ 22.25**	**$ 17.86**	$ 5,085,677	$ 7,628,515	$ 303,891	**$ 13.35**	**$ 8.96**
	$ 8,976,591	$ 2,643,602	$ 4,102,672	$ 1,094,000	**$ 16,816,864**	$ 669,921	**$ 29.43**	**$ 25.04**	$ 6,726,746	$ 10,090,119	$ 401,952	**$ 17.66**	**$ 13.26**
	$ 8,976,591	$ -	$ 4,102,672	$ 1,094,000	**$ 14,173,263**	$ 564,609	**$ 24.80**	**$ 20.41**	$ 5,669,305	$ 8,503,958	$ 338,766	**$ 14.88**	**$ 10.49**
1/2 Total Waterline	$ 13,464,886	$ -	$ -	$ 1,605,000	**$ 15,069,886**	$ 600,327	**$ 26.37**	**$ 21.98**	$ 6,027,954	$ 9,041,931	$ 360,196	**$ 15.82**	**$ 11.43**
	$ 13,464,886	$ 3,965,403	$ -	$ 1,605,000	**$ 19,035,289**	$ 758,294	**$ 33.31**	**$ 28.92**	$ 7,614,115	$ 11,421,173	$ 454,977	**$ 19.99**	**$ 15.59**
	$ 13,464,886	$ 3,965,403	$ 4,102,672	$ 1,605,000	**$ 23,137,961**	$ 921,729	**$ 40.49**	**$ 36.10**	$ 9,255,184	$ 13,882,776	$ 553,038	**$ 24.29**	**$ 19.90**
	$ 13,464,886	$ -	$ 4,102,672	$ 1,605,000	**$ 19,172,558**	$ 763,762	**$ 33.55**	**$ 29.16**	$ 7,669,023	$ 11,503,535	$ 458,257	**$ 20.13**	**$ 15.74**
Total Waterline	$ 26,929,772	$ -	$ -	$ 2,717,000	**$ 29,646,772**	$ 1,181,016	**$ 51.88**	**$ 47.49**	$ 11,858,709	$ 17,788,063	$ 708,609	**$ 31.13**	**$ 26.74**
	$ 26,929,772	$ 7,930,806	$ -	$ 2,717,000	**$ 37,577,577**	$ 1,496,949	**$ 65.76**	**$ 61.37**	$ 15,031,031	$ 22,546,546	$ 898,169	**$ 39.46**	**$ 35.06**
	$ 26,929,772	$ 7,930,806	$ 4,102,672	$ 2,717,000	**$ 41,680,249**	$ 1,660,384	**$ 72.94**	**$ 68.55**	$ 16,672,100	$ 25,008,150	$ 996,230	**$ 43.76**	**$ 39.37**
	$ 26,929,772	$ -	$ 4,102,672	$ 2,717,000	**$ 33,749,444**	$ 1,344,451	**$ 59.06**	**$ 54.67**	$ 13,499,777	$ 20,249,666	$ 806,670	**$ 35.44**	**$ 31.04**

Notes:
1. All presented projects assume a 25% reduction in cost from block-by-block cost estimates, as appropriate based on estimated reduction in mobilization, engineering, and unit prices.
2. USDA Loan Payment calculted assuming 40 year loan term and 2.5% annual interest rate.
3. USDA Grant calculated assuming 40% of Total Project Cost.
4. Increase to User Rates calculated assuming equal increase to total of 1897 total in-city and out-of-city services.

4 EXECUTIVE SUMMARY – WASTEWATER SYSTEM MASTER PLAN

The wastewater system master plan for the City of Monte Vista strives to compile and organize information on the existing and future conditions of the wastewater collection system and wastewater treatment facilities to maintain compliance with regulations and continue providing adequate service to its users. The report provides recommendations for infrastructure improvement projects and provides guidance for prioritization of improvement projects. The master plan can be used as a tool to assist the city in current and future planning and budgeting. The master plan is meant to be a growing document, and any changes to the wastewater systems should be documented accordingly.

The wastewater system master plan includes an analysis of the existing treatment system and outlines recommended improvements. The city currently operates two lagoon wastewater treatment plants that may require improvements to meet upcoming effluent limits. A full analysis of the system is necessary to determine if the city should continue operating two facilities or combine the treatment to one facility. Factors that will help determine this decision include the ability of the existing facilities to meet existing and upcoming regulations, condition of the existing facilities, costs to direct all collections system wastewater flows to one location, and the life-cycle cost analysis of feasible improvement alternatives.

The master plan includes analysis of infrastructure and recommendations for improvement including the following:

- Review of existing service area and population and population projections
- Review of existing collection system
- Review of existing lift stations
- Review of existing wastewater treatment facilities
- Review of existing WWTPs and their ability to meet proposed effluent limits based upon recently issued CDPHE preliminary effluent limits (PELs)
- Recommendations for WWTP improvement to meet effluent limits including cost estimates
- Recommendations for further collection system improvements to continue to improve I&I reduction

4.1 WASTEWATER SYSTEM - DESCRIPTION AND EVALUATION

The city owns and operates two wastewater treatment plants: the Henderson WWTP, and the Veterans WWTP. Domestic and commercial wastewater is collected from the city's service area in approximately 120,000 linear feet of sewer pipe. Additionally, the city owns and operates two lift stations in the wastewater collection system.

The Henderson WWTP consists of a four-cell partial mix aerated lagoon system rated at 3.09 million gallons per day (MGD) and treats wastewater from the majority of the city's service area including the incorporated areas of Monte Vista. The Veterans WWTP consists of a one-cell aerated lagoon followed by a clarifier and is rated at 0.95 MGD.

The collection system encompassed by the Sickles Street Basin, the 2nd Avenue Basin, and the 6th Avenue Basin, as well as a small portion of the Sherman Avenue Basin, consists of approximately 120,385 linear feet of 6-inch through 30-inch diameter vitrified clay pipe (VCP), concrete pipe, and polyvinylchloride pipe (PVC). According to city staff, many of the manholes in this area are concrete manholes without bases, or

corrugated metal pipe (CMP) culverts that are rapidly deteriorating. According to a 1998 City of Monte Vista Inflow and Infiltration Study, the core of the collection system, which includes the 2nd Avenue Interceptor, was installed prior to 1908. The system is comprised of components ranging in age from approximately 1908 to 2018.

As part of the 2015 Wastewater Capital Improvements Project & Preliminary Engineering Report, a camera and inspection of the interceptors within the Henderson WWTP service area was completed. Review of the videos and manhole inspection revealed numerous areas of infiltration along Sickles Street as well as many manholes in need of repair or replacement throughout the study area.

Significant improvements have been completed within the collections system with projects totaling approximately $2.4M in construction costs over the three projects completed between 2016 and 2018. However, further improvements are needed to complete the improvements identified in the 2015 Wastewater Capital Improvements Project & Preliminary Engineering Report.

Two lift stations exist within the City of Monte Vista's collection system: Lariat Loop Lift Station and Tierra Del Sol Estates Lift Station. The Lariat Loop lift station is in good working order. The station was completely replaced in 2016 and has been operating very well since construction completion. No improvements are necessary for the Lariat Loop lift station beyond normal maintenance procedures. The Tierra Del Sol Estates lift station is also in good condition. The subdivision that the lift station serves is not a full buildout. No near-term improvements to the lift station are required, even if further development in the subdivision occurs.

The Henderson Wastewater Treament Plant is generally in adequate condition. There are no unit processes or equipment that are in need of immediate repair with some routine maintenance required such as blower repair. However, improvements to the facility are necessary due to discharge compliance violations.

The Henderson facility is in significant non-compliance. On August 25, 2020, Notice of Violation/Cease and Desist Order No. DO-200825-1 was issued to the city. The NOV was issued for Failure to Comply with Permit Effluent Limitations, as well as a small number of reporting violations. The listed permit violations in the NOV include effluent BOD, total suspended solids (TSS), TSS percent removal, total mercury, potentially dissolved copper, potentially dissolved cadmium, potentially dissolved zinc, and whole effluent toxicity.

Treatment to achieve effluent metals limits to the low concentrations in the Henderson facility's discharge permit would include tertiary filtration with a chemical and polymer addition. A lagoon facility, post settling, will not produce effluent quality high enough to meet the influent tertiary filtration requirements for treatment to the metals concentrations in the discharge permit. Therefore, a lagoon treatment plant cannot achieve effluent metals concentrations to the low levels in the discharge permit, even with additional treatment units.

The Veterans Wastewater Treatment Plant (VWWTP) needs significant upgrades and equipment replacement for continued reliable operation. The existing facility is currently out of compliance due to effluent metals limitations that came into effect in February 2020. Without improvements to the facility, the treatment plant will continue to violate discharge permit limits, likely leading to enforcement actions. However, improvements to the Veterans facility should only be enacted if it is the goal of the city to maintain ownership and long-term operation of the Veterans WWTP. The Wastewater System Master Plan suggests that the city move to terminate operation of the VWWTP for municipal use.

4.2 COLLECTION SYSTEM IMPROVEMENTS

The master plan suggests that the city complete the repairs identified in the 2015 Wastewater Capital Improvements Project & Preliminary Engineering Report that have not been completed to date. A summary of the proposed collections system improvements is listed below:

- Add 29 Manholes (replace cleanouts, install at dead ends, or install along extended gravity pipe)
- Uncover 6 Manholes
- Excavate and Complete Point Repair at 19 Locations (offset joints, sags, or broken pipe)
- 7,340 Linear Feet of Cured-In-Place Pipe
- Trim 5 Protruding Taps

No improvements are recommended for either the Lariat Loop Lift Station or the Tierra Del Sol Lift Station.

4.3 VETERANS WASTEWATER TREATMENT PLANT IMPROVEMENTS

The Wastewater System Master Plan considered the following alternatives for improvements to the VWWTP.

1. Alternative 1 – Divert Flows from Henderson and Maximize Veterans Capacity
2. Alternative 2 – Maximize the Capacity for the Current Municipal and Industrial Flows
3. Alternative 3 – Convert Veterans WWTP to Industrial Flows Only

The master plan concludes that Alternative 3 – Convert Veterans WWTP to Industrial Flows Only is the recommended alternative. This alternative would involve the consolidation of all City of Monte Vista service area flows to the Henderson facility. The Veterans facility would then only be operated for treatment of industrial flows.

Once municipal flows are removed, the city could consider selling the Veteran's facility to either a private entity or other governmental agency, such as Rio Grande County or other newly formed districts. This would ensure the long-term viability of the facility and allow it to treat flows from future industrial development in the area. Most importantly, it would eliminate the burden of operation of one of the two wastewater treatment facilities in the city, including the responsibility of compliance with two discharge permits.

This alternative includes two components: (1) divert municipal flows to Henderson, and (2) improvements to Veterans WWTP. These components and associated costs estimates will be discussed separately, as they do not need to occur as one project. If the city elects to divert the municipal flows from Veterans to Henderson, costly improvements to the Veterans facility should not be completed by the city if the intent is to sell the plant.

This alternative would include the construction of a lift station and force main to pump all municipal flows from the Veterans facility to the Henderson site. The lift station would be located on land owned or acquired by the city.

4.4 HENDERSON WASTEWATER TREATMENT PLANT IMPROVEMENTS

The existing Henderson Wastewater Treatment Plant is currently in significant non-compliance, which has

resulted in the issuance of a Notice of Violation. Improvements to the facility are necessary to bring the facility into compliance with existing regulations as well as likely future limits.

This report considered the following alternatives for improvements to the Henderson WWTP.

1. Alternative 1 – Divert Flows from Henderson to Veterans and Eliminate Henderson WWTP
2. Alternative 2 – Convert to Groundwater Discharge
3. Alternative 3 – Rehabilitate Lagoon Facility and Add Unit Processes
4. Alternative 4 – Construct New Activated Sludge Wastewater Treatment Plant

The master plan concludes that Alternative 4 – Construct New Activated Sludge Wastewater Treatment Plant Only is the recommended alternative.

This alternative would include the complete decommissioning of the existing Henderson lagoon facility and the construction of a new activated sludge wastewater treatment plant. The facility would be designed to meet all existing limits and all estimated future limits.

4.5 WASTEWATER SYSTEM - RECOMMENDED IMPROVEMENTS

The recommended improvements to the City of Monte Vista's Wastewater System are as follows:

1. Improvements to the Gravity Collection System
2. Divert Municipal Flows from Veterans to Henderson
3. Construct New Activated Sludge Wastewater Treatment Plant at Henderson location

The three recommended improvements project could be completed as one large Wastewater System Improvements Project. This would simplify grant and loan funding and would minimize administrative costs associated with project completion. Table 4 presents a construction cost estimate summary for the consolidation of the three projects.

Table 4: Recommended Wastewater System Improvements - Total Project Cost

Total Construction Cost	**$**	**23,315,177**
Collection System Improvements	*$*	*807,052*
Veterans Municipal Flows Consolidation to Henderson	*$*	*1,813,075*
New Activated Sludge WWTP at Henderson Location	*$*	*20,695,050*
Total Contingency	**$**	**2,593,530**
Total Non-Construction Cost	**$**	**4,298,050**
Total Project Cost	**$**	**30,206,757**

4.6 PROJECT FUNDING

The proposed wastewater improvement projects can be funded through a combination of grants, loans, and sewer system revenue. New tap fees will not be considered as a viable cash flow for funding to be conservative. Although an SRF loan is a viable option for funding to the city, this report will assume the project is only funded through DOLA and USDA. For a project of this magnitude, the inclusion of SRF funding will not significantly improve the funding package and could result in a less desirable package.

The amount of grant that the city would be awarded through DOLA and USDA is unknown and can only be assumed at this stage. The tables below present the rate study assuming no grant is awarded, and with an assumed amount of grant. Note that completing the project with no grant funding is not feasible or reasonable and is only presented for reference.

Table 5 summarizes the estimated user rate for each user category. These rates assume that the rate increase will be applied evenly to all user categories, that a rate increase will only be applied to the base user fee, and that grants will be awarded in the amount as follows:

- $1,000,000 DOLA Grant
- 40% (of remaining project cost) USDA Grant
    - This grant amount is only an estimated assumption. The grant funding amount cannot be known until a funding application is submitted and a Letter of Conditions is issued
- Remaining Project Cost – USDA Loan
    - 40-year loan term
    - 2.5% Interest Rate

Table 5: Proposed Monthly Sewer Rates

	Services	Existing Monthly Base Fee	Increase to Monthly Base Fee	Proposed Monthly Base Fee	Additional Annual Revenue
Residential - In-City	1,783	$ 18.39	$ 48.73	**$ 67.12**	$ 1,042,613
Residential - Out-of-City	119	$ 20.40	$ 48.73	**$ 69.13**	$ 69,586
Commercial - In-City	32	$ 18.39	$ 48.73	**$ 67.12**	$ 18,712
Commercial - Out-of-City	2	$ 20.40	$ 48.73	**$ 69.13**	$ 1,170
Total Sanitary Sewer Services	**1,936**				**$ 1,132,080**