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DAYTON MASTER PLAN

LEVEL I STUDY

EXECUTIVE SUMMARY

Prepared for:

Wyoming Water Development Commission

Submitted by:

EnTech, Inc. Consulting Engineers
Sheridan, Wyoming
in association with

Environmental Design Engineering

November, 2000
Executive Summary

for:

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EXECUTIVE SUMMARY

1. INTRODUCTION & PROJECT DESCRIPTION

The Town of Dayton, Wyoming (Dayton) requested assistance from the Wyoming Water Development Commission (WWDC) to develop a Level 1 water system master plan that would meet the needs of the community for the next 20 years. The study objectives included: evaluation of the existing water system (treatment & distribution), and identification of alternatives to meet future system demands.

Specific areas of concern identified by Dayton in its request to the WWDC to perform the master plan study were as follows:

- 10” Asbestos Cement (Transite) Transmission Main Connecting Dayton’s Water Treatment Plant to Dayton’s distribution system
  - Aging transite pipe could lead to dangerous fibers being dispersed into the water system.
  - Existing routing of transite transmission main is beneath an agricultural reservoir along a portion of its length.
  - Current size may not meet future needs.

- Water Treatment Plant (WTP)
  - Improve plant operational flexibility and capability during periods of high turbidity during the spring months of the year.
  - Meeting future system demands.
  - Meeting future U.S. Environmental Protection Agency (EPA) Safe Drinking Water Act requirements.

- Distribution System
  - Identify and address pressure and flow problems, including specifically the low-pressure problems in the southeast portion of Dayton.

A reconnaissance evaluation of the feasibility of a regional water system that would connect the Dayton water system with the Town of Ranchester’s (Ranchester) system was also included in this study. Ranchester is located approximately five miles east and downstream of Dayton, thus making a regional water system conceivable. A regional system would not only serve the two towns, but the lands located within the Tongue River Valley between the two municipalities.

The findings, alternatives, and recommendations of the Level 1 Master Plan are summarized in this Executive Summary.

2. POPULATION PROJECTIONS AND LAND USE

Dayton and the surrounding areas are located at the base of the Big Horn Mountains in northern Wyoming approximately 15 miles from the Montana border (See Figure 2-1). The community is surrounded by agricultural properties that serve as cattle ranches and/or dry land farms. Commercial activity in Dayton includes restaurants, stores, and a few specialty shops. No industry currently resides within Dayton. Tongue River High School (TRHS) serves the community and surrounding areas, including students from Ranchester. Many of the residents that make their home in Dayton are retired or work in Sheridan or the coal mines to the north and east.

The current populations of Dayton and Ranchester are reported to be 651 and 735 people, respectively. An annual growth rate of 1.5% was assumed for growth of the area, resulting in a total projected population of 880 in Dayton and 990 people in Ranchester in 2020.
Growth of the unincorporated rural area between Dayton and Ranchester is predicted to be 170 in 2020. The land bounded by U.S. Highway 14 on the north and County Road 120 on the south was used as the rural service area. This rural population was developed using criteria from Sheridan County zoning regulations and recent population density estimates.

The regional service area population prediction totals 2040 people by the year 2020.

3. **SERVICE AREAS AND WATER DEMANDS**

3.1 **Town of Dayton**

Typical maximum production near 0.59 million gallons per day (MGD) over the last five years was reported by Dayton water treatment plant (WTP) records. These maximum day records were used to estimate average day and peak hour demands for the community and projected to 2020.

Pressure zone boundaries are very near the Dayton corporate limits in the area of the existing storage tank. To maintain pressures above 35 pounds per square inch (psi) in this area, additional energy is required for the system.

3.2 **Town of Ranchester**

Ranchester WTP records were also used to estimate system demand for that community. Consistency was maintained in the study by using common peaking factors for Ranchester and Dayton.

3.3 **Tongue River Valley**

The water demand for the rural areas between Dayton and Ranchester is assumed to be 190 gallons /day/capita. This value is identical to the estimated usage identified for the rural water system ultimately constructed as part of the Sheridan Area Water Project, recently completed in Sheridan County. Peaking factors have been reduced for the rural area when compared with those for Dayton and Ranchester, with thought that other sources of water will be used for irrigation.

Although there are no large commercial water users in the either town at this time, an additional 0.10 MGD was included to meet the needs of any possible future commercial/industrial use in the regional system estimates.

Table 3.1 summarizes projected water demands as estimated for the Master Plan.

<table>
<thead>
<tr>
<th>Projected Design Year 2020 Demands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average Day</strong></td>
</tr>
<tr>
<td>Dayton</td>
</tr>
<tr>
<td>Ranchester</td>
</tr>
<tr>
<td>Tongue River Valley</td>
</tr>
</tbody>
</table>

Dayton Average Daily Usage: 250 Gal/Day/Capita
Ranchester Average Daily Usage: 270 Gal/Day/Capita

<table>
<thead>
<tr>
<th>Dayton &amp; Ranchester Peaking Factors</th>
</tr>
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<tbody>
<tr>
<td>Maximum Day/Average Day</td>
</tr>
<tr>
<td>Peak Hour/Average Day</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tongue River Valley</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Daily per Capita Usage</td>
</tr>
<tr>
<td>Maximum Day/Average Day</td>
</tr>
</tbody>
</table>
4. DESCRIPTION OF EXISTING SYSTEMS

4.1 Town of Dayton

Dayton holds two (2) surface water permits from the Tongue River. These adjudications provide the source for the WTP and a sprinkler system at Scott Bicentennial Park. The senior of these permits is 4.00 cubic feet per second (cfs), equating to 2.58 MGD, and is diverted to the Dayton WTP. This amount of 2.58 MGD is considerably greater than both the WTP’s current capacity of approximately 1.0 MGD and Dayton’s maximum day use of 0.59 MGD. The Dayton WTP is capable of operating at a rate up to 1.4 MGD for short durations. The senior water right has a stated point of diversion (i.e., headgate location) at the site of the original intake for Dayton, located upstream from the current intake location.

Dayton also holds two (2) groundwater permits for small amounts of water (55 gpm) that are used by the community at the cemetery and a supplement to the Scott Bicentennial Park irrigation system.

Raw water is delivered into the WTP by gravity from an infiltration gallery buried into the bed/bank of the Tongue River. The water flows to a wet well in the treatment building which is equipped with two pumps, sized at 600 gpm and 400 gpm, totaling 1,000 gpm. The pumps deliver water to a bank of four integrated multi-media gravity filters and ultimately to a clearwell with a capacity of 128,000 gallons.

The WTP is typically operated manually, although the plant is equipped to run in an automatic mode. Manual operation is required due to constraints in the distribution system within Dayton. High raw water turbidity levels that require frequent backwashing of the filters also require that the plant be operated manually. High turbidity is typically only a problem in the late spring and early summer months. During these periods, employees have spent as much as 22 hours per day operating the WTP.

Finished water is delivered to Dayton through a 32-year old 10” Asbestos Cement “Transite” transmission main. The transmission main travels approximately 1.5 miles through hay fields to its connection with the distribution system. The transite transmission main connects to the distribution system near TRHS and also north of the Mountain Inn along the west side of U.S. Highway 14. The transmission main has not experienced noticeable leaks or breaks, but a large reservoir, on the IXL Ranch, exists over approximately 1300’ of its length. If a leak occurred under or near the reservoir, the result could lead to a long period of no water service to the Dayton and/or contamination of the entire water system.

Dayton’s water distribution system consists of approximately 56,000 lineal feet of 4” through 10” pipe. Pipe materials include polyvinyl chloride (PVC) and cast iron (CIP). There are many locations where dead-end or undersized waterlines exist within the Dayton system. Analyses of the system pressures under peak-demand periods indicate that improvements in these areas are required to maintain adequate residual pressures during fire events.

The WTP clearwell overflow elevation of 4050’ provides static pressures within the distribution system between 35-65 psi. The lowest of these pressures is minimally acceptable during low demand periods; however, when demand increases (e.g., during the summertime irrigation months), many areas of Dayton can fall as low as 25 psi. This is below the current minimum allowable system pressure of 35 psi set by the Wyoming Department of Environmental Quality (WDEQ).

Dayton installed a below-ground booster pump station and an above-ground 240,000-gallon welded steel storage tank near the southeast portion of the Town in 1992 for the purposes of increasing system pressures and to add distribution storage for fire protection. The overflow elevation of the tank is approximately 40’ higher than the WTP clearwell elevation, or 4090’. During those times that the tank is full and the booster pump station is off, static pressures within the service area range from 54 to 82 psi, and are thus more than adequate.

Due to the high ground elevations of the homes adjacent to the booster pump station, coupled with the system head loss developed when the pumps are operating and the tank is filling, pressures drop to unacceptable levels,
sometimes as low as 25 psi, within portions of the system. During peak summertime periods, the low pressures have occurred for up to 14 hours per day. In order to minimize the inconvenience caused by such low pressures, Dayton water personnel attempt to manually operate the booster pumps during low demand periods. This is not always possible, creating additional inconvenience to customers.

A hydraulic analysis of Dayton’s existing water distribution system was completed as part of this study. Figure 4-1 depicts the current maximum day residual pressures in Dayton’s existing distribution system as predicted by the hydraulic analysis. These predicted pressures indicate that when the storage tank is filling, (i.e., WTP control, unacceptably low pressures are developed in the southeast part of the system.

Dayton has recently received a rating of 5 from the ISO; however, Dayton has not established minimum fire flow requirements for new developments. Analysis of the fire flow capability of the system was completed with acceptable results predicted when the system is under storage tank control.

The existing storage volume in Dayton is approximately 368,000 gallons when considering the WTP clearwell and the storage tank in Town. Per WDEQ regulations, this volume is adequate to meet an average day demand of the Dayton system to year 2020.

4.2 Town of Ranchester

Ranchester operates a 1.0 MGD WTP that utilizes a standard coagulation/flocculation/sedimentation/filtration treatment process prior to gas chlorination. The WTP diverts water from the Tongue River within the Ranchester limits. Raw water quality is sometimes poor which requires additional pretreatment before water is produced for the system. Finished water is pumped from the WTP to a 500,000-gallon storage tank located north of the community. Analysis of the distribution system was beyond the scope of this project, although the system was modeled in April 2000 and no problems were identified. Additionally, the system is reported to be in good condition and pressures are seen to be acceptable.

4.3 Tongue River Valley

The ranches and homes in the rural, unincorporated areas between Dayton and Ranchester are served by individual wells. These wells were not analyzed for water quantity or quality in this Level 1 study.

5. PROPOSED ADDITIONAL WATER SUPPLIES

The Dayton WTP has an adjudicated water right of 4.00 cfs (= 2.6 MGD), a current rated capacity of 0.86 MGD, a current maximum day usage of 0.60 MGD, and a projected maximum day usage of 0.82 MGD in 2020. As such, it is recommended that Dayton not pursue additional water rights at this time. However, in order to validate the 4.00 cfs amount, Dayton should seek to utilize up to 4.00 cfs at any one time in order to assure this right’s future continued availability. The permitted point of diversion for the 4.00 cfs right is upstream from the actual point where water is diverted to the WTP. It is recommended that Dayton change this point of diversion to comply with the current diversion point.

Based upon the lack of high-yield groundwater wells in the vicinity of Dayton, and due to Dayton’s familiarity with and long reliance upon a WTP, it is reasoned that Dayton should pursue additional WTP capacity to meet future demands vs. exploring groundwater options.

Ranchester has an 1891 water right that is senior on the Tongue River. This right is for an amount of 12.9 cfs (= 8.3 MGD), which is considerably greater than Ranchester’s historical maximum day usage of 0.6 MGD and Year 2020 anticipated maximum day usage of 0.92 MGD. Due to these facts, it is not anticipated that Ranchester will be actively seeking additional water rights to meet its future water demands. As with Dayton, however, it is recommended that Ranchester attempt to validate the 12.9 cfs amount by seeking to utilize at any one time as much of the 12.9 cfs as possible in order to assure this right’s continued future availability.
Dayton Master Plan
WWDC Level I Study
Existing Maximum Day Water System Pressures

Executive Summary
Fig. 4-1
6. PROPOSED IMPROVEMENTS AND COST ANALYSES

6.1 Dayton Only Alternatives

6.1.1 Water Treatment Facilities Proposed Improvements

One of the principal objectives of this study identified improvements needed for the Dayton WTP. Proposed improvement were approached from several aspects, including the need for additional capacity, operational and maintenance enhancements, performance improvements, and possible regionalization.

As depicted in Table 3.1, the maximum day demand in the design year 2020 for Dayton is anticipated to be 0.82 MGD. Based upon the existing rated capacity of the Dayton WTP, the existing WTP should be capable of providing for the design year 2020 without the need for additional capacity.

It should be noted, however, that the useful life of many of the components within the WTP will not last another 20 years without significant maintenance or replacement.

At the present time, though the infiltration gallery perforated piping is stated to be in poor condition, the WTP operates adequately. Even under conditions when low water in the Tongue River requires that water be introduced into the WTP directly through the unscreened headgate, the WTP operates adequately. The findings of this study indicate that the replacement of the infiltration gallery was not essential to the successful operation of the WTP. However, in order to simplify the operation of the WTP and correspondingly reducing the need for almost constant attention during the spring runoff period, alterations recommended for further study include the following:

- WTP ALTERNATIVE A: Replace/reconstruct the infiltration gallery, and install variable frequency drives on the existing influent raw water pumps; and
- WTP ALTERNATIVE B: Relocate the infiltration gallery and construct a presedimentation basin upstream of the existing raw water pump station.

Alternative A provides the most basic modifications to the WTP to achieve benefits to the raw water and plant operations. The estimated cost of Alternative A is $90,448.

The concept of using a presedimentation basin for pretreatment during spring runoff to reduce the solids loading to the filters is identified as Alternative B. To completely understand the raw water quality of the WTP, sampling of the WTP influent is required in the months of April-June. The results of limited data collected for this study show that there is the possibility for turbidity reduction should there be a mechanism for presedimentation of raw water prior to entry into the influent pumping system. As such, a presedimentation basin is proposed with this alternative. A preliminary cost estimate for Alternative B is $129,030.

It is now fairly common practice to utilize remote telemetry or SCADA systems to assist water system operators in the operation of both water treatment and water distribution systems. Such systems have resulting continued to decrease in price. For these reasons, it is recommended that Dayton include in a future study the acquisition of a SCADA system. A preliminary cost of $324,473 has been estimated for a SCADA system in this study.

It should be understood that the alternatives discussed require considerable additional investigation and analysis prior to actual implementation.

6.1.2 Transmission and Distribution (T & D) System Proposed Improvements

Three alternatives were identified in this study that provide solutions to existing transmission and distribution system inadequacies, and meet the future needs of the Dayton community to the year 2020. The transmission
main from the WTP to the TRHS was sized at 12” for all alternatives considered. Alternate routes of the transmission main were investigated, but the recommended route follows the existing pipeline in all areas except in the vicinity of the IXL Ranch headquarters and the reservoir. The recommended pipeline route has been identified to the north and west of the existing alignment in both of these areas. The existing alignment, recommended route (Proposed Alignment #1), and one alternative route is shown on Figure 6-1.

Common to each of the three alternatives presented to alleviate low pressure problems within the distribution system is the installation of various miscellaneous piping identified to eliminate dead-end lines, upgrade undersized mains, and improve looping within the system.

A hydraulic analysis was completed for all alternatives complete with a prediction of available fire flows. Fire flows predictions were above 800 gpm at all locations within the system in all alternatives considered.

6.1.2.1 T&D Alternative A

A new above-ground booster pumping station located near the TRHS was identified in T&D Alternative A. This new pumping station would eliminate the need for the existing pumping station located in the southeast part of Dayton. This alternative requires all water to be pumped to the distribution system. The existing storage tank would provide the control for the new pumps; i.e., pumps would operate based upon the level of the tank, as is the case now.

Resulting pressures in the system under Alternative A would be slightly higher (2-5 psi) than those now experienced when the existing pump station is not operating and Dayton is served by the storage tank. A concern with this alternative is that additional water pressure, while needed in the southeast part of Dayton, is not needed in the majority of the town.

The capital cost of Alternative A, including the replacement of the transmission main, is estimated to be $817,962. Although the capital cost is less than all other alternatives considered, it is not the recommended alternative due to the cost of pumping all water to the distribution system.

6.1.2.2 T&D Alternative B

T&D Alternative B establishes two pressure zones to serve the Dayton area. The area north of South Fork Avenue and west of Broadway Avenue is established as Zone1, Zone 2 serves all other areas. The existing storage tank is relocated to an elevation below its current location to provide an overflow elevation that matches the WTP clearwell elevation of 4050’ to serve Zone 1. A new 90,000-gallon storage tank is sited south of Dayton at an overflow elevation of 4162’ to serve Zone 2. A new pump station located near the existing pump station provides the supply for the Zone 2 tank. A parallel pipe in South Fork Avenue and a pressure reducing valve (PRV) are required to provide transmission to Zone 2 and separation between the two zones.

The Alternative B estimated capital cost is $1,231,414. This cost is greater than any other alternative considered, but this alternative increases the service area of the Dayton water system to allow growth in the system at much higher ground elevations near the current corporate boundary. This alternative was evaluated by Dayton and ultimately was not selected as the best alternative considered.

6.1.2.3 T & D Alternative C

T & D Alternative C is the recommended alternative for Dayton. This alternative, shown on Figure 6-2, is similar to Alternative B in that it separates the distribution system into two pressure zones. Zone 1 serves the part of Dayton north of South Fork Avenue and west of Broadway Avenue. Zone 2 is served via a new pumping station located near TRHS. The existing storage tank would be filled by water pumped from this location through a new 8” waterline that is routed south across and then parallel to Highway 14. Separation of the zones is similar to Alternative B, in that a new PRV is sited at the intersection of Broadway Avenue and East 6th Avenue. Separation of the zones in other locations is accomplished by closing existing system valves.
Dayton Master Plan WWDC Level I Study
T & D Alternative C

FIG. 6-2
The size of the transmission main replacement for the existing 10” transite main is reduced from the TRHS to the connection at the Mountain Inn along Hwy 14 with this alternative. Zone 2 demands are delivered to the south part of Dayton through the new facilities. Thereby reducing the capacity requirements of the replacement main in this area. The size of the transmission main in this area is downsized to 10” rather than 12”, as is the case with Alternatives A and B.

The cost of $853,780 was estimated for the improvements described in T & D Alternative C in the draft report. This cost included $48,350 for a meter replacement program for Dayton. This cost was included in each alternative presented. Following a review of the draft report, Dayton made a request to remove this cost from consideration. Therefore, the cost was removed and other minor revisions were made that are reflected in the section 10 of this summary.

The total estimated cost of T & D Alternative C is not the lowest cost when considering the capital cost of the other alternatives. Other factors that were considered when making this the recommended alternative include the following:

- Alternative C provides a second, redundant connection near the existing storage tank.
- Alternative C creates two pressure zones that require pumping only for the higher parts of Dayton. In this way, much of Dayton can then be served with gravity service from the WTP. This benefit could prove to be particularly important if energy costs rise, or if growth requiring water service occurs east of Dayton.
- Alternative C requires installation of a new 8” main on the south side of Dayton. It is reasoned that this part of Dayton is a logical area for future growth of the Town.

### 6.2 Regional System Alternatives

#### 6.2.1 Water Treatment Facilities

In order to implement a regional system for even the existing customers in the Dayton and Ranchester service areas, it will be necessary to expand the WTP at the Dayton site. An expanded WTP must necessarily be sized to approximately 2 MGD, based upon the sum of the two existing Dayton and Ranchester WTP capacities. Should this alternative be considered, it is important to determine if sufficient space exists on the south side of the Tongue River in this area. Otherwise, it may be necessary to locate an entirely new WTP of this size to the northwest side of the river and abandon the existing facility.

A detailed cost estimate of a new 2 MGD WTP to serve Dayton, Ranchester and the Tongue River Valley has not been performed, given the lack of information on land availability, raw water quality and treatment processes involved. However, a preliminary cost estimate has been prepared, and it is estimated that it would cost $1½ to $3 million to provide for a new or expanded WTP to serve the regional area.

#### 6.2.2 Transmission Main

A regional pipeline was considered that extends east from Dayton through the Tongue River Valley, terminating on the southwesterly side of Ranchester. The regional pipeline was sized to connect to each of the three T & D alternatives developed for the “Dayton Only” concept. The regional transmission main extension from Dayton to Ranchester is essentially the same for each alternative and is depicted in Figure 6-3. There are, however, small variations due to certain pipeline and pump sizes necessary for each alternative considered.

Table 6.1 provides a summary of transmission and distribution total costs for each alternative, assuming both the Dayton Only and regional (i.e., transmission main from Dayton to Ranchester) components are constructed.
Table 6.1
Regional Transmission and Distribution System Alternatives

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>T &amp; D Alternative A – Dayton Only</td>
<td>$817,962</td>
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<tr>
<td>Additional Transmission System to Implement Regional System</td>
<td>$1,252,445</td>
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<tr>
<td>Total Cost for Alternative A - Regional System</td>
<td>$2,070,407</td>
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<tr>
<td>T &amp; D Alternative B – Dayton Only</td>
<td>$1,231,414</td>
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<tr>
<td>Additional Transmission System to Implement Regional System</td>
<td>$1,048,780</td>
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<tr>
<td>Total Cost for Alternative B - Regional System</td>
<td>$2,280,194</td>
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<tr>
<td>T &amp; D Alternative C - Dayton Only</td>
<td>$853,780</td>
</tr>
<tr>
<td>Additional Transmission System to Implement Regional System</td>
<td>$1,225,247</td>
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<tr>
<td>Total Cost for Alternative C - Regional System</td>
<td>$2,079,027</td>
</tr>
</tbody>
</table>

7. EXISTING WATER REVENUE STRUCTURE

Water rate structures of both Dayton and Ranchester were investigated and compared to other communities in northern Wyoming. (See Table 7.1). When comparing rates, it is important to understand the method of operations of the water system. A community that has a well as a water source typically does not have the costs associated with treating a surface water source. Loan repayment is also typically included in water rates for recent upgrades of a water system. This study did not investigate detailed information as to what is included in the rates of the surrounding communities; therefore, comparing these rates with Dayton or Ranchester must be done with these considerations discussed above in mind.

Dayton’s water rates were increased in fiscal year 2000. The new water rates have increased anticipated revenues by approximately 20% above previous years. In addition to this increased revenue, Dayton has reserves of $155,000 that it has earmarked for the improvements identified in this report.

Table 7.1

Typical Monthly Water Bill
Comparison between Communities

<table>
<thead>
<tr>
<th>COMMUNITY</th>
<th>TOTAL BILL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dayton</td>
<td>$19.90</td>
</tr>
<tr>
<td>Ranchester</td>
<td>$17.70</td>
</tr>
<tr>
<td>Buffalo</td>
<td>$17.80</td>
</tr>
<tr>
<td>Greybull</td>
<td>$24.70</td>
</tr>
<tr>
<td>Basin</td>
<td>$29.80</td>
</tr>
</tbody>
</table>

Based upon a monthly water use of 12,500 gallons

8. REGIONAL SYSTEM OWNERSHIP

Assuming that Dayton and Ranchester decide that it is in their best interests to jointly receive treated water via a regional system, it would then be necessary to establish the entity that would be responsible for owning and operating the treatment and transmission facilities. It is assumed for purposes of this report that a governmental entity would be established that would be comprised of representatives of both Dayton and Ranchester. Two of the possible governmental mechanisms that could be created and used to implement a regional system are as follows:

- Joint Powers Boards
- Utility Districts (if appropriate modifications are made to state statutes)
9. **FUNDING ASSISTANCE AVAILABLE**

There are many state and federal agencies that administer programs that fund water system improvements. The agencies from which grants and loans are typically requested by Wyoming cities and towns were identified and they include the following:

- Wyoming Water Development Commission (WWDC)
- United States Department of Agriculture Rural Utilities Service (RUS)
- Wyoming Business Council (Community Development Block Grant)
- State Land and Investment Board (SLIB)
- WYDEQ State Revolving Loan Fund

10. **RECOMMENDATIONS AND SUMMARY**

10.1 **Regional System Recommendation**

As was discussed in Section 6, a regional system would require that a 2 MGD WTP be constructed at the site of the existing Dayton WTP. It is currently unknown as to if there is sufficient land available at the site of the existing Dayton WTP to expand the current plant to the required 2 MGD necessary to serve the regional area. Section 6 also provided information on the transmission main system that would be necessary to convey water for a regional system that would serve Dayton, Ranchester, and the Tongue River Valley. The cost for the additional transmission system (i.e., the transmission system from Dayton to Ranchester and associated appurtenances) necessary to serve the entire regional area ranged from $1,048,070 to $1,252,445, depending upon the alternative selected.

In addition to the high cost necessary to acquire a 2 MGD WTP facility and construct the additional transmission system to serve the regional area, political questions would have to be successfully addressed to include the following:

- Ownership of the WTP and transmission main
- Operations
- Water Rights
- Costs

In light of:

1. the fact that both Dayton’s and Ranchester’s WTP’s are currently working satisfactorily,
2. the high cost to construct additional WTP capacity at the Dayton WTP site to serve both communities (= approximately $1½ to $3 million),
3. the high additional cost to construct a new transmission main connecting Dayton to Ranchester (an additional $1,048,780 to $1,252,445 over and above the improvements necessary to solve Dayton’s current problems), and
4. the difficult political questions itemized above that would need to be addressed,

it is recommended that a regional system not be considered further at this time.

10.2 **Dayton Only Recommendations**

10.2.1 **Water Treatment Plant**

Two alternatives were proposed to alleviate the Dayton WTP’s problems associated with raw water turbidity discussed previously. It is important to note that very limited data exists on the raw water turbidity and the ultimate effectiveness of either of the alternatives identified. It is thus recommended that, in lieu of progressing forward with either of these alternatives to secure design and construction funding, Dayton should pursue a Level II study to more accurately determine the efficacy of these alternatives.


10.2.2 Transmission and Distribution Systems

It is recommended that T & D Alternative C be pursued by Dayton. The following recommendations are made regarding funding of this alternative.

- A grant request of approximately $440,000 should be made to the WWDC to fund one-half of the eligible improvements.
- A grant/loan request for $403,000 should be made to RUS.
- Dayton should use earmarked reserves of $155,000 to match RUS funding

10.2.3 Phasing Construction of Recommended T & D Improvements

In response to requests by the WWDC and Dayton to perhaps phase the implementation of the recommended alternative, a modified T & D Alternative C was evaluated. This modified alternative spreads the costs of the improvements over a period of two years. These requests by the WWDC and Dayton were made with the understanding that the transmission and pressure system improvements were not dependent upon each other in the early years of the project. Dayton identifies the most critical area of need to be resolution of the low-pressure problem in the southeast part of the community.

Construction of Phase 1 was identified to begin in 2001, with the Phase 2 beginning in 2002. A description of each phase follows:

- Phase 1 (to resolve low pressure problem in southeast part of Dayton)
  - New pumping system located near TRHS to pump to existing tank
  - New 8” waterline from the pump station to the base of the existing tank, connecting to the existing system at Beckton Road and the southern end of Steamboat Drive
  - New PRV installed south of East 6th Avenue along Broadway
  - New 6” valve cut into existing waterline between East 6th Avenue and Steamboat Drive

- Phase 2 (to replace existing 10” transite transmission main)
  - New 12” transmission main from the WTP to the TRHS, 10” to the Mountain Inn
  - Minor improvements within Dayton to loop critical areas of the distribution system

Constructing all improvements or phasing the construction is considered an acceptable method of implementing the recommended alternative. It is recommended that the design of Phase 2 be completed during Phase 1. This will provide the detailed information to meet many of the RUS funding requirements. A cost estimate for the phased alternative is given in Table 10.1.
### Table 10.1  
**Phased Construction Cost - T & D Alternative Worksheet**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
<th>UNIT COST</th>
<th>ESTIMATE COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of Final Designs &amp; Specifications</td>
<td>LS</td>
<td>1</td>
<td>$54,500</td>
<td>$54,500</td>
</tr>
<tr>
<td>Permitting, Mitigation &amp; Environmental Report</td>
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<td>1</td>
<td>$15,000</td>
<td>$5,000</td>
</tr>
<tr>
<td>Legal Fees</td>
<td>LS</td>
<td>1</td>
<td>$5,000</td>
<td>$5,000</td>
</tr>
<tr>
<td>Acquisition of Access &amp; Rights-of-Way</td>
<td>LS</td>
<td>1</td>
<td>$1/ LF of Pipe</td>
<td>$12,500</td>
</tr>
</tbody>
</table>

**Total Estimated Engineering, Permitting, Access & Legal Fees**  
$77,000

**TRANSMISSION IMPROVEMENTS**

| 12" PVC Transmission Main | LF | 11,000 | $28 | $308,000 |
| 12" PVC Transmission Main Appurtenances | EA | 11 | $500/1000 LF of Pipe | $5,000 |
| 10" PVC Transmission Main | LF | 1,250 | $20 | $25,000 |
| 10" PVC Transmission Main Appurtenances | EA | 1,250 | $500/1000 LF of Pipe | $2,500 |
| 12" PVC Transmission Main Connection (WTP & Distribution System) | EA | 2 | $5,000 | $10,000 |
| 12" Tongue River Crossing | EA | 2 | $12,000 | $24,000 |

**Total Estimated Transmission Improvements**  
$388,625

**ALTERNATIVE C WATER SYSTEM PRESSURE IMPROVEMENTS**

| 8" PVC Zone 2 Water Main from Transmission Main | LF | 3800 | $18 | $68,400 |
| 8" PVC Appurtenances | EA | 3.8 | $800/1000 LF of Pipe | $3,040 |
| Booster Station | EA | 1 | $80,000 | $80,000 |
| PRV and Vault (Broadway & 6th) | EA | 1 | $15,000 | $15,000 |
| Hwy 336 Bore | LF | 100 | $150 | $15,000 |
| 6" Valve @ Int. of East 6th Ave & Steamboat Dr. | EA | 1 | $600 | $600 |

**Total Alternative C (Phased) Water System Pressure Improvements**  
$182,040

**COMMON DISTRIBUTION SYSTEM IMPROVEMENTS TO ALL ALTERNATIVES**

| New 8" PVC from Main St. to Swimming Pool | LF | 150 | $18 | $2,700 |
| New 8" Looping-Beckton Road to S. Steamboat Drive | LF | 600 | $18 | $10,800 |
| Extend 6" Waterline to East 4th Avenue East | LF | 150 | $15 | $2,250 |
| Replace 4" to 8" on East 6th Avenue | LF | 150 | $18 | $2,700 |
| Increase size to 8" in East 4th Avenue | EA | 400 | $18 | $7,200 |
| Appurtenances | EA | 1.45 | $800/1000 LF of Pipe | $1,160 |

**Total Distribution System Improvements Common to All Alternatives**  
$26,810

**Contingency @ 15%**  
$109,968

**Projected Total Cost - T & D Alternative C - Dayton Only**  
$843,091

**Note:** Dayton intends to use town reserves ($155,000) and other funding sources to fund Phase 1 in lieu of obtaining a WWDC Loan

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**Construction Cost Subtotal**  
$666,475

**Engineering costs @ 10% of Construction Cost Subtotal**  
$66,648

**Subtotal**  
$733,123

**Contingency @ 15%**  
$109,968

**Projected Total Cost - T & D Alternative C - Dayton Only**  
$843,091

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**Capital Facilities Tax (Set aside for Transmission Main repair)**  
$75,000

**Clearwell Expansion Reserve**  
$20,000

**Interest on Capital Facilities Tax Monies**  
$155,000