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LEVEL II STUDY

TOWN OF GREYBULL
WATER SUPPLY PROJECT

EXECUTIVE SUMMARY

PREPARED FOR:

WYOMING WATER DEVELOPMENT COMMISSION
HERSCHLER BUILDING
CHEYENNE, WYOMING 82002

APRIL 1998



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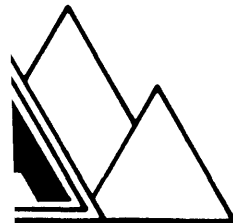
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GREYBULL WATER SUPPLY LEVEL II STUDY

EXECUTIVE SUMMARY

PREPARED FOR THE WYOMING WATER DEVELOPMENT COMMISSION

APRIL 1998

PURPOSE

Engineering Associates was retained by the Wyoming Water Development Commission to conduct a Level II Study of the potable water supply system for the Town of Greybull and surrounding areas toward Shell and southwest of Town. Included in the scope of work were the following items:

- Create a plan for upgrades to the Greybull transmission, distribution, and storage systems to meet the demands of the 2025 population, including preliminary design information.
- Examine the potential and feasibility of providing water service to rural areas southwest of Greybull, including the area currently owned by the Town.
- Determine the feasibility of installing a new tank west of the Big Horn River, including a transmission line from the existing Greybull Water Transmission Pipeline (GWTP).
- Prepare preliminary cost estimates and funding scenarios for recommended improvements.

A Cybernet computer modeling program was used to analyze the existing system and provide conceptual designs for future upgrades and expansions to the system.

POPULATION PROJECTIONS AND WATER DEMAND

Population projections were determined to project water demand for the year 2025. The following information was utilized:

- The development of land in and around the Town will occur in proportion to the projected population growth (0.6% per year).
- The development of land in rural areas will occur in proportion to the projected population growth for those areas (1.0% per year).
- The majority of growth within Greybull will occur in areas southwest of Greybull, including lands owned by the Town. This growth was distributed in proportion to current land use patterns within the Town.

Estimated Water Demands for the current system and the system in 2025 are outlined below.

1997 AND 2025 WATER DEMANDS

Area	1997 Demands (Gallons per Day)			2025 Demands (Gallons per Day)		
	Average Day (ADD)	Maximum Day (MDD)	Peak Hour (PHD)	Average Day (ADD)	Maximum Day (MDD)	Peak Hour (PHD)
In Town	435,309	1,305,927	1,871,829	520,207	1,560,621	2,236,890
Town Facilities	65,000	195,000	279,500	90,239	270,717	388,028
Out of Town	122,988	368,964	528,848	193,309	579,927	831,229
Total	623,297	1,869,891	2,680,177	803,755	2,411,265	3,456,147

EXISTING SYSTEM DEFICIENCIES AND/OR OBSERVATIONS

Town System

- Approximately 70% of the Town system does not have the ability to provide the required fire flows, based on established flow and duration criterions. Several areas within the incorporated Town limits have 4-inch diameter pipes that are over 40 years old. These pipes are “choking” the system, and are in critical need of replacement due to age and condition.
- Transmission mains, distribution lines, and a tank are needed to improve fire flows and service to the west side of Greybull.
- Storage facilities are inadequate to meet existing and projected 2025 storage needs.
- Fire hydrant spacing may be inadequate at this time.
- The majority of the system in Town has high pressures, typically 80-90 psi.
- The Town currently does not have dedicated transmission mains in the north-south or east-west direction. This has the potential to impact growth, especially on the north end of Town.

Greybull Water Transmission Pipeline (GWTP)

- As indicated by Nelson Engineering, Inc.’s (NEI) Level II Study, the GWTP does not have the flow capacity to provide fire flows to rural residents without pumping.
- During low usage times, pressures in the transmission line become excessive in some areas and additional Pressure Reducing Valves (PRVs) are needed to control the pressure and protect the system. This issue is currently being addressed by the Town and Crank Companies, Inc. (CCI).
- Many of the existing air/vacuum valves are in poor condition and need replaced. This issue is currently being addressed by the Town and CCI.

- Low pressures exist in areas along the GWTP during periods of high demand.
- NEI indicated that most services connected to the GWTP do not have a backflow prevention valve, cistern, pump, or pressure tank and are relying on the pipeline to provide pressure and storage. To remedy this problem, the taps may need to be moved to provide adequate pressures for filling cisterns, in some cases. This is a particular problem in the Shell area, where the elevations of some homes are too close to the high water elevation in the storage tank.
- The existing 0.35 MG tank above Shell is only being cycled through 0.7 feet of its total depth and only 5% of the tank's capacity is being used.

SOURCES OF SUPPLY

- Existing Sources:
 - Shell Valley Number 1 Well. Estimated Production - 960 GPM (1.382 MGD).
 - Shell Valley Number 2 Well. Estimated Production - 225 GPM (0.324 MGD).
 - Infiltration Gallery. Violating the EPA Surface Water Treatment Rule and must be abandoned.
- New Source:
 - White Creek Well to replace Infiltration Gallery. Estimated Production - 350 GPM (0.504 MGD). The Town recently voted to accept this well from WWDC and add it to their system.
- Additional Source (to meet 2025 demands):
 - Basin Area Water Supply Project (BAWS) Connection. Estimated Flow Available - 100 to 150 GPM (0.144 to 0.216 MGD). See Phase C Improvements.

STORAGE

- Existing Storage:
 - 1 million gallon steel tank. Storage for Town. Located approximately one mile east of the Big Horn River on the south side of Highway 14. Installed in 1964. Has a history of overflowing and is currently controlled by manually adjusting upstream valves on the GWTP. Scheduled for exterior painting this summer. Interior and exterior maintenance of steel tanks in a timely manner is imperative to their longevity.
 - 350,000 gallon tank. Storage for Shell. Located below Shell Valley Wells. Installed in 1987. Overall good condition. Interior and exterior of tank should be maintained to keep in good condition. Operational problems exist with the tank. According to NEI's study, only about five percent of the Shell Tank's capacity is currently being used because of customer complaints about low pressures when operated over its entire range. In order to obtain the maximum life out of the Shell Valley Wells and protect their artesian properties, the altitude valves filling the Shell Tank should not be opened and closed excessively. The valves are currently being used excessively because the full tank capacity is not being used. This should be addressed.

- Proposed Storage:
 - New 250,000 gallon tank. Locate approximately 1 ½ miles southwest of Town above Greybull River Road. See Phase A Improvements.

RECOMMENDED IMPROVEMENTS AND ESTIMATED COSTS

Several improvements are recommended by this report which will provide additional storage, install additional transmission lines and a second river crossing, connect to a supplemental source of supply, improve fire flows, and replace old, small diameter pipe throughout Town. Obviously, all of these improvements cannot be completed concurrently for economic reasons, as well as the major disruption such a construction plan would cause to the public.

Therefore, we have grouped the improvements into several projects, and have prioritized them, with an estimated year of installation. Following this information is a discussion of each project, with specific cost information. All debt service calculations are based on 1,178 existing taps.

PRIORITY AND COSTS OF RECOMMENDED IMPROVEMENTS

Priority	Project Name	Estimated Costs *	Year Constructed
1	Phase A - Transmission & Storage Upgrades	\$1,353,387.00	1999
2	Phase B - River Crossing and Transmission Line Through Town	\$401,864.00	2001
3	Phase 1 - Fire Flow Upgrades (without Phase VII) **	\$212,316.00	2003
	Phase 1 - Fire Flow Upgrades (with Phase VII) **	\$793,818.00	2003
4	Phase 2 - Fire Flow Upgrades	\$364,680.00	2005
5	Phase 3 - Fire Flow Upgrades	\$334,835.00	2007
6	Phase 4 - Four-Inch Pipe Replacements	\$1,573,539.00	2010 - 2025
7	Phase C - Basin Area Water Supply Connection	\$331,960.00	***

* Estimated costs are shown in 1998 dollar values.

** Phase 1 improvements include all proposed Phase VII Improvements, which have been submitted to the Farm Loan Board (FLB) for 1998 funding by CCI. The appropriate figure can be used depending upon if 1998 FLB funding is obtained or denied.

*** The priority of this phase of improvements may change depending on input from area residents, progression of development along Highway 16 -20 and water supply requirements.

The available funding sources for the proposed projects are listed below. No RUS funding was considered at the request of the Town. More information on RUS funding is included in the report.

Wyoming Water Development Commission (WWDC)	60% grant	40% loan
Farm Loan Board (FLB)	50% grant	50% loan
Rural Utilities Services (RUS)	45% grant	55% loan

**PHASE A
Transmission and Storage Upgrades**

General Description

Currently, the 1 million gallon storage tank that serves the Town is located east of the Big Horn River, and the Town is served from that tank through one water line crossing under the river. Loss of either facility could mean the loss of water service until repairs can be accomplished, as well as an increased risk of inadequate fire protection.

Phase A includes the installation of a storage tank on the west side of the Big Horn River, with a transmission main from the southwest side of Town to the tank. This additional storage will allow the Town to continue to provide service to its customers in the event of a failure in the GWTP. The Town would be able to truck water to the new tank or fill the tank utilizing water from the proposed BAWS (Phase C). This duplicity will allow for easier maintenance of the existing 1 million gallon storage tank and associated components because they could be taken off-line with minimal short-term effects on the system and its customers. Major benefits include:

- Duplicity of storage facilities.
- Protection against loss of the existing river crossing.
- Additional storage for fire fighting and emergency needs.

The area southwest of Greybull offers the most likely direction for Town growth. The objective of locating the tank in this area is to provide a transmission main to private land along the Greybull River where that growth is likely to occur as well as to the 80 acres owned by the Town. Two potential tank sites located on BLM land were selected for evaluation for the new tank west of the river. Final site selection will also likely be based on the preference of the public and adjacent land owners.

Recommended Improvements

This phase of work will include the installation of approximately 14,000 feet of 12-inch pipe, a new concrete tank and access road, altitude valve, telemetry, pressure reducing valves station, and miscellaneous fittings. Construction will be moderately difficult because of one crossing of U.S. Highway 16 & 20 and a railroad crossing.

Estimated Project Costs

Total Project Cost	\$1,353,387.00
Proposed Funding:	
WWDC Grant	\$801,000.00
WWDC Loan (20 years @ 7.25%)	\$534,000.00
Town of Greybull	\$18,387.00
Annual Debt Service Per Tap	\$43.62

PHASE B
River Crossing and Transmission Line Through Town

General Description

As discussed in Phase A, the Town currently is served by the 1 million gallon storage tank east of the Big Horn River through a water line under this river. This is the main transmission line to Town and any problems with this line could cause a disruption in service.

Phase B recommends an additional river crossing, as well as a transmission line through Town to connect to the line serving the Airport Bench Water District and Big Horn County Airport. This transmission line will improve fire flows throughout the downtown area, as well as assist in filling the new storage tank installed in Phase A.

Recommended Improvements

This phase consists of installing a new 14-inch transmission line along Highway 14 from the GWTP east of Town, crossing under the Big Horn River to South Second Street. A 12-inch line would then run south along South Second Street to First Avenue South and west to Railroad Avenue, then north on Railroad Avenue to Second Avenue North. Approximately 2,300 feet of 14-inch pipe and 3,200 feet of 12-inch pipe and associated fittings are included in Phase B.

Normal difficulties associated with urban waterline construction and river crossings are anticipated. Crossing the river has several alternatives, which can be further analyzed during final design. Some of these options include suspending the water line on the existing bridge, direct burying a PVC pipe under the river, boring under the river, pipe bursting or using the old river crossing as a casing. Our cost analysis is based on direct burying a pipe under the river, so potential cost savings could be realized depending upon the final river crossing design.

Estimated Project Costs

Total Project Cost		\$401,864.00
Proposed Funding:		
	WWDC Grant	\$238,200.00
	WWDC Loan (20 years @ 7.25%)	\$158,800.00
	Town of Greybull	\$4,864.00
Annual Debt Service Per Tap		\$12.97

PHASE C
Basin Area Water Supply Connection

General Description

With the acceptance of the White Creek Well and abandonment of the Infiltration Gallery, the Town will meet the EPA regulations and current water demands. However, the projected 2025 demands will push the GWTP to its capacity. A connection to the Basin Area Water Supply (BAWS) system can provide the additional source of supply needed to meet those demands.

The BAWS potentially has approximately 100 to 150 GPM (0.144 to 0.216 MGD) of water that could be used to supplement existing Town supplies. Even though this phase is not scheduled for construction for many years, the Town should consider working with the BAWS Joint Powers Board as soon as possible to make sure this surplus supply is dedicated to the Town of Greybull for future use.

The transmission line connecting to the BAWS will allow commercial/industrial development to occur along Highway 16 & 20, south of Greybull, as the need arises. This will help support the Town's economy and allow for continued business opportunities. This connection could also be beneficial for the BAWS. If there was a break in BAWS pipeline north of Basin, Greybull could supply them water from the Town's system in an emergency situation.

Recommended Improvements

This phase of work will include the installation of 5,840 feet of 8-inch diameter pipe, a flow control valve, a 2-inch meter, telemetry controls, and a structure to house control and monitoring equipment. Construction of Phase C will be moderately easy. The only difficulties anticipated will be crossing the Greybull River to connect to the BAWS system.

Estimated Project Costs

Total Project Cost		\$331,960.00
Proposed Funding:		
	WWDC Grant	\$196,800.00
	WWDC Loan (20 years @ 7.25%)	\$131,200.00
	Town of Greybull	\$3,960.00
Annual Debt Service Per Tap		\$10.72

PHASE 1 UPGRADES
Fire Flow Improvements and Phase VII Improvements

General Description

The primary objective of this phase of upgrades is to increase the available fire flows along the highway business district and near the schools. A significant portion of the work in this phase was included based on CCI's recommendations for Phase VII Improvements, which have been submitted for proposed Farm Loan Board funding.

Recommended Improvements

Replacement of existing 4-inch lines and installation of new lines will have the greatest impact on fire flows in these areas. All replacement pipes are recommended to be 8-inch PVC as requested by WWDC.

Estimated Project Costs

Costs presented below are assuming the Phase VII Improvements will be funded by FLB this year. Total Phase 1 costs, including Phase VII improvements are outlined in the report.

Total Project Cost (without Phase VII Improvements)	\$212,316.00
Proposed Funding:	
FLB Grant	\$105,000.00
FLB Loan (30 years @ 7.25%)	\$105,000.00
Town of Greybull	\$2,316.00
Annual Debt Service Per Tap	\$7.36

PHASE 2 UPGRADES
Fire Flow Improvements

General Description

The primary objective of this phase of upgrades is to increase the available fire flows in the southeast end of Town, near the high school and to provide fire flows within 1,000 feet of all structures. This upgrade also improves flows in areas targeted previously in Phase 1.

Recommended Improvements

Replacement of existing 4-inch lines and installation of new lines will further increase the fire flows in areas previously targeted and areas on the south end of Town. All replacement pipes are recommended to be 8-inch PVC.

PHASE 2 UPGRADES (Continued)

Estimated Project Costs

Total Project Cost		\$364,680.00
Proposed Funding:		
	FLB Grant	\$180,500.00
	FLB Loan (30 years @ 7.25%)	\$180,500.00
	Town of Greybull	\$3,680.00
Annual Debt Service Per Tap		\$12.16

PHASE 3 UPGRADES Fire Flow Improvements

General Description

The primary objective of this phase of upgrades is to improve fire flows on the north end of town and loop dead-end lines back into the system. These improvements will additionally improve fire flows in the adjacent areas, specifically the local schools and industrial/commercial areas in the north end of Town.

Recommended Improvements

Replacement of existing 4-inch lines and installation of new lines in the subject area will provide looping and insure that fire flows are available within 1,000 feet of all structures on the north end of Town. Pipe replacements using 8-inch PVC is recommended.

Estimated Project Costs

Total Project Cost		\$334,835.00
Proposed Funding:		
	FLB Grant	\$165,500.00
	FLB Loan (30 years @ 7.25%)	\$165,500.00
	Town of Greybull	\$3,835.00
Annual Debt Service Per Tap		\$11.61

**PHASE 4 UPGRADES
Four-Inch Pipe Replacements**

General Description

According to Town personnel, the existing 4-inch pipes are all over 40 years old. The smaller diameter pipes such as 2-inch and 4-inch have a tendency to deteriorate more rapidly than large diameter pipes. Build-up inside these pipes significantly reduces their carrying capacity. The existing 4-inch pipes in Town are suspected to be cast iron or steel and are likely in need of replacement. These pipes also have a very limited capacity for delivering fire flow.

Some existing 4-inch water lines are dead-end lines, and we have recommended looping those lines with 8-inch lines under Phases 1 through 3. Since the majority of these water lines are the same age, the water line replacements have been prioritized by areas where increased pipe size will improve fire flows, decrease head losses, or provide additional looping for maintenance and servicing benefits.

Recommended Improvements

The prioritization of the line replacements was based on the initial replacement of 4-inch lines that will improve fire flows in the surrounding areas. The remaining pipes were then prioritized from south to north. All replacement pipes are recommended to be 8-inch PVC. Since there are so many lines in this final phase, it has been scheduled over a period of 15 years. Installation of these lines are prioritized in five year increments in the report since it is highly probable that the entire phase cannot be completed at one time due to economic constraints.

Estimated Project Costs

Total Project Cost	\$1,573,539.00
Proposed Funding:	
FLB Grant	\$778,000.00
FLB Loan (30 years @ 7.25%)	\$778,000.00
Town of Greybull	\$17,539.00
Annual Debt Service Per Tap	\$54.57