

LEEDS TOWN
WASTEWATER STUDY





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WASTEWATER STUDY

OCTOBER 1996

JONES & DEMILLE ENGINEERING

45 EAST 500 NORTH
RICHFIELD, UTAH 84701
801-896-8266
FAX: 801-896-8268

158 WEST 1600 SOUTH, SUITE 101
ST. GEORGE, UTAH 84770
801-656-0257
FAX: 801-656-3849

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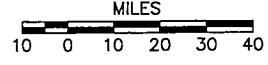
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SECTION 1
INTRODUCTION

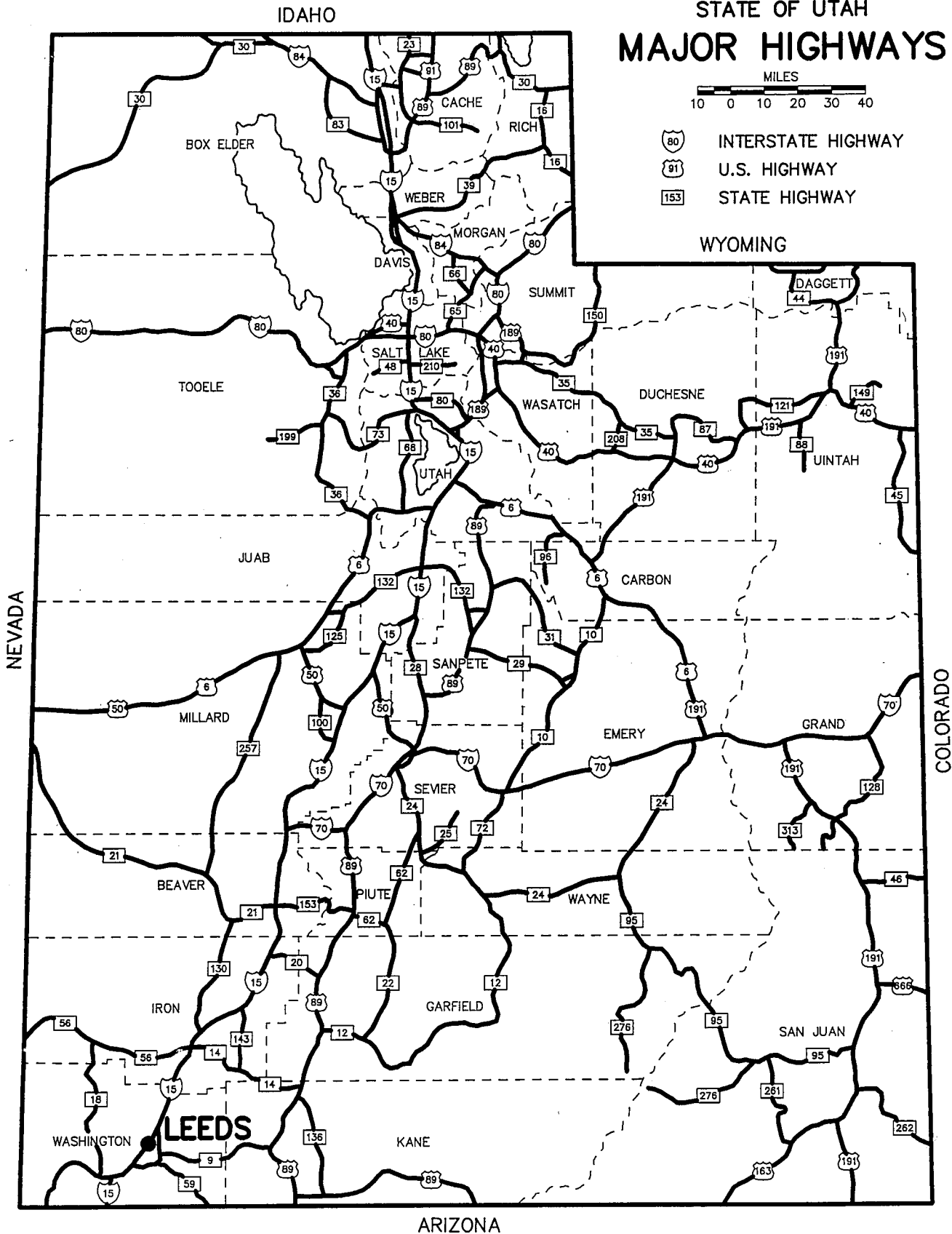
Leeds Town, just off Interstate 15, is approximately 20 miles northeast of St. George and southeast of the Pine Valley mountains. The community began as an outgrowth of nearby Harrisburg when immigrants from Leeds, Yorkshire, England moved to the site in 1867 when silver mining was big in the area. Mining is no longer found in this area, but the town is growing continually as more people are moving to the Dixie Region. Leeds is a residential community consisting of retirees and residents that commute to work in other areas of Washington County.

Leeds Town does not have a community wastewater system. The system of waste disposal is through individual systems, which consists of septic tanks and drain fields. Many of the individual systems are experiencing problems with ground water and drainfield failures due to poor soil conditions. The Town is concerned that these problems combined with growth may compromise the ground water quality. Therefore, the Town Council commissioned this study to determine the feasibility of funding and constructing a community wide system. This study was funded by the State of Utah Water Quality Board.

STATE OF UTAH MAJOR HIGHWAYS



- INTERSTATE HIGHWAY
- U.S. HIGHWAY
- STATE HIGHWAY



Jones & DeMille Engineering
 45 East 500 North - P.O. Box 757
 Richfield, Utah 84701
 (801) 896-8266

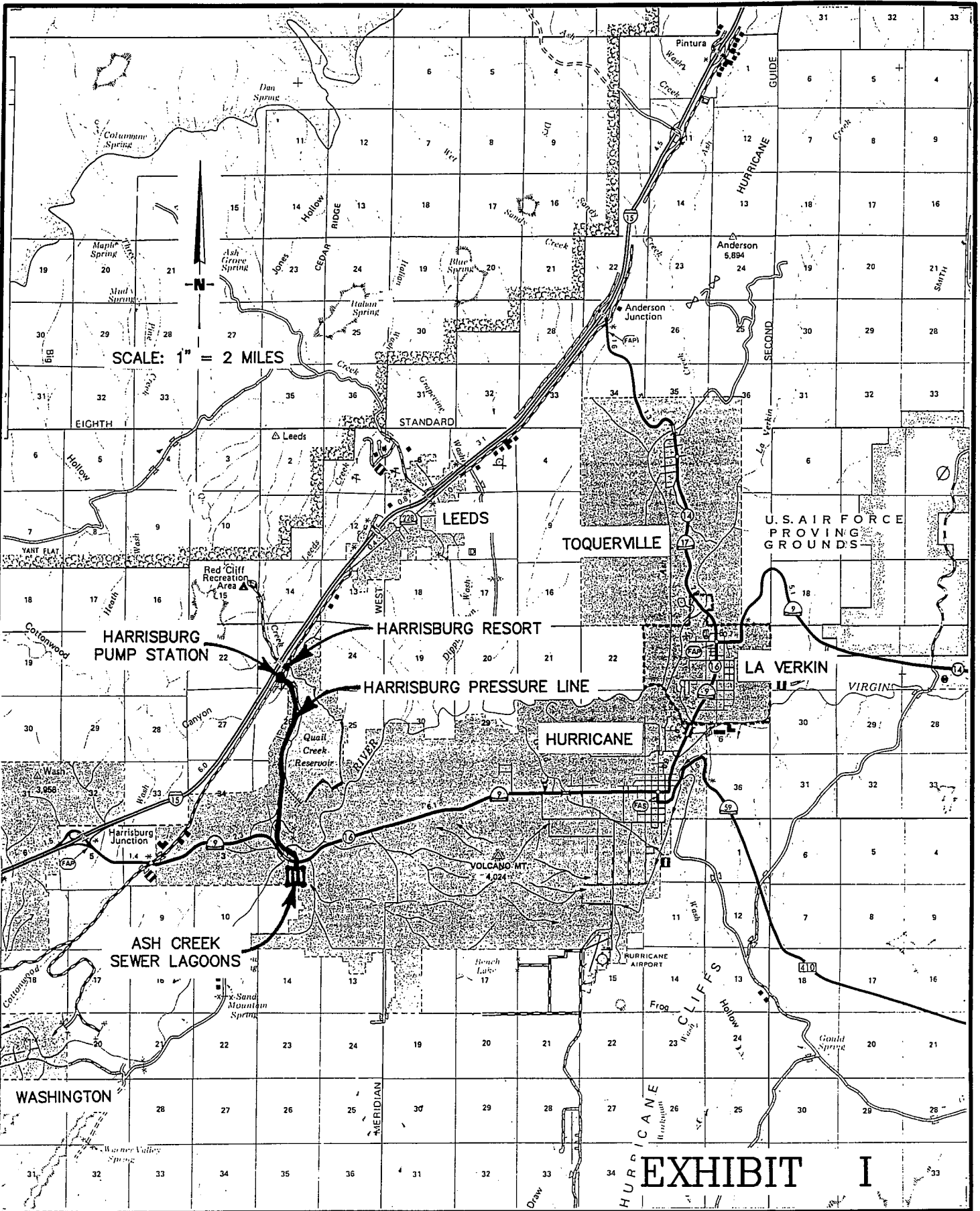
**LEEDS TOWN
 LOCATION MAP**

SECTION 2
STUDY OVERVIEW

The wastewater needs of the central part of Washington County including Toquerville, LaVerkin, and Hurricane are being provided for by the Ash Creek Special Service District. Leeds Town is geographically in a position to be able to participate with these other communities in the Ash Creek Special Service District. Leeds is a small community with limited resources and it is not practical for them to fund, construct, and operate a wastewater treatment facility. Total containment lagoons and land applications were considered as possible treatment systems that Leeds could afford to operate. However, there was not an affordable suitable site available near the Town.

There are currently two ways to access the existing Ash Creek Lagoon system. One is through the Harrisburg trunk line and the other is through the collection line that has been built to the WalMart complex and industrial park.

The Harrisburg line was installed by the developer of the Harrisburg resort. The Harrisburg resort community was born when Quail Creek was constructed. The housing in Harrisburg primarily is for retirement and second homes. The housing is dense and thus requires a community wastewater system. Harrisburg has a collection system, pump station, and long pressure outfall line that goes to the Ash Creek wastewater lagoons. Exhibit 1 shows the location of the outfall line and the Ash Creek lagoons. The Harrisburg pressure line also services Quail Creek State Park and the St. George Water Treatment Plant. This line consists of approximately 22,000 feet of eight inch PVC and approximately 2,000 feet of 6 inch PVC, with the six inch line being at the end of the outfall line.



Jones & DeMille Engineering
 45 East 500 North — P.O. Box 757
 Richfield, Utah 84701
 (801) 896-8266

**LEEDS TOWN,
 HARRISBURG RESORT
 & ASH CREEK LAGOONS**

The pump and line are currently owned, operated, and maintained by the Ash Creek Special Service District. Ash Creek has indicated that Leeds town can connect to this pressure line.

WalMart and the industrial park are in Hurricane City and these improvements were installed by a special improvement district. The engineer for Hurricane indicated that the line was built by and for the adjacent property owners and does not have capacity to handle any additional wastewater. Ash Creek discouraged pursuing a connection to this line.

The Town of Leeds and their Engineer have met with the Ash Creek Special Service District at two regularly scheduled meetings. In addition to meeting with the Board, there has been regular discussion and coordination with the Service District Manager, Darwin Hall. The purpose for the meetings and coordination was to get some firm commitments from Ash Creek. The information available at this point is as follows:

1. Ash Creek has agreed to treat and dispose of the wastewater delivered by Leeds to the Ash Creek wastewater lagoons.
2. Ash Creek has agreed to allow Leeds to connect to the existing eight inch pressure sewer at Harrisburg. Leeds will upgrade the pumping station at Harrisburg as needed.
3. Ash Creek will maintain and operate the Leeds collection system and transmission system.

4. Ash Creek will charge Leeds Town an impact fee of \$1,500 per residential connection. The impact fees for commercial connections are attached in the Appendix.

5. Ash Creek will charge Leeds Town \$15.00 per month per residential connection for operation and maintenance. Commercial, industrial, schools, and churches will be charged \$19.00 for the first 12,000 gallons of culinary water used plus \$1.77 per 1,000 gallons over the 12,000 gallons.

The user rates and impact fees that Leeds will be paying to Ash Creek will be the same fees Ash Creek is currently charging existing users. In addition to the monthly operation and maintenance fees, Leeds users will also have to pay to retire any debt service that may be incurred to construct the wastewater collection system.

This study will attempt to give Leeds Town the information they need to determine the feasibility and affordability of a community system. If there is public support, Leeds can use the study to seek the most favorable funding for the system.

SECTION 3
EVALUATION CRITERIA

This section will briefly state some of the criteria used to perform a preliminary evaluation of the wastewater system needs for Leeds Town. Health Department criteria combined with current and future population will be used to determine the sizes of pipe, their location, pump sizes, and wastewater flows.

3.1 Design Criteria.

Wastewater Flows are based on the Administrative Rules for Design Requirements for Wastewater Collection for Treatment and Disposal Systems, June 5, 1992.

Average daily residential flows are based on 100 gallons per capita per day.

Commercial flows are based on the following:

| | |
|------------------|--------------------------------|
| Motels | 62 gallons per capita per day |
| RV Parks | 125 gallons per unit per day |
| Service Stations | 250 gallons per pump per day |
| Modern Camps | 35 gallons per camper per day |
| Restaurants | 35 gallons per seat per day |
| Launderette | 580 gallons per washer per day |
| Schools | 20 gallons per person per day |

Outfall sewer lines should be designed at 2.5 times the average daily rate.

Collector sewers should be designed at 4 times the average daily rate.

3.2 Population Projections.

The Town of Leeds has been experiencing a lot of growth over the past six years. There are several approaches for estimating the future growth rates and population of Leeds and the surrounding areas. One method is to use the 1990 census and the current population to determine growth rate and project it over the next ten, twenty, and fifty years. Another method is to use the Five County AOG population projections. In addition to these considerations the total land area available for development can also be used to determine the maximum build out of the area.

The population of Leeds in 1990, according to the census, was 254 persons. The estimated resident population by count by the Town is currently 420 persons. Based on this information the growth in Leeds has exceeded the Five County projections by about 43%. Both sets of information and projections are in the following Table.

| TABLE 3.2 LEEDS POPULATION PROJECTIONS | | | | | | |
|--|----------------|------|-----------------------|------|------|------|
| Source | 1990 Census | 1996 | Percent Increase | 2000 | 2010 | 2020 |
| 5 County AOG | 254 | 310 | 1990-1996 22% | 362 | 471 | 559 |
| | | | Annual 3.38% | | | |
| Based on Growth from 1990-1996 | 254 | 420 | 1990-1996 65.4% | 587 | 1357 | 2500 |
| | | | Annual 8.74% | | | |
| Based on the average rate of the 5 County projections and the 1990-1996 growth rate | --- | 420 | Annual increase 6% | 530 | 950 | 1700 |

The average annual growth rate of 6% will be used for wastewater flow calculations in this study. It is believed this rate is most representative for a long term projection to the year 2020.

SECTION 4
WASTEWATER FLOWS

4.1 Design Year.

The design year to be used for this study will be the year 2020.

4.2 Average Daily and Peak Daily Flows.

The average daily and peak daily flows are represented in Table 4.2 below.

| TABLE 4.2 LEEDS WASTEWATER FLOWS | | | | |
|-------------------------------------|---------------|---------------|----------------|----------------|
| SOURCE | 1996 | 2000 | 2010 | 2020 |
| | Quantity | Quantity | Quantity | Quantity |
| | Gallons | Gallons | Gallons | Gallons |
| Residential, Persons | 420 | 530 | 950 | 1,700 |
| 100 Gallons per Capita/Day | 42,000 | 53,000 | 95,000 | 170,000 |
| Motels 2.5 Persons/Room | 0 | 33 | 66 | 100 |
| 62 Gallons / Capita/ Day | 0 | 5,115 | 10,230 | 15,500 |
| Laundromat | 0 | 5 | 10 | 20 |
| 580 Gallons/ Day/ Washers | 0 | 2,900 | 5,800 | 11,600 |
| Restaurant, Seats | 40 | 64 | 124 | 184 |
| 35 Gallons/ Seat/ Day | 1,400 | 2,240 | 4,340 | 6,440 |
| Small Businesses | 4 | 10 | 20 | 40 |
| 200 Gallons/ Business/ Day | 800 | 2,000 | 4,000 | 8,000 |
| RV Sites (Full Service) | 94 | 118 | 178 | 238 |
| 125 Gallons/ Site | 11,750 | 14,750 | 22,250 | 29,750 |
| Total Gallons Per Day | 56,850 | 82,195 | 147,045 | 250,000 |
| Daily Flow, gpm | 40 | 57 | 102 | 174 |
| Peak Daily Flow, gpm @ 2.5 x Daily | 100 | 143 | 255 | 435 |

4.3 Harrisburg Resort, Peak Daily Flow for the Year 2020.

The peak daily design flow for the Harrisburg pressure sewer was taken from the design data prepared by Creamer and Noble, Engineering Consultants for the Harrisburg development in December 1987. A copy of those figures is included in the Appendix. The peak daily design flow from those figures is 420 gallons per minute. This rate is for 1,800 RV sites. There are currently 205 RV sites at the Harrisburg Resort. This flow was based on RV sites, not home sites. Many of the lots in the Harrisburg Development are being used for a second home retirement residents. As the resort develops, these flow rates should be re-evaluated.

4.4 Harrisburg Pressure Line Capacity.

The combined peak daily flow of Harrisburg and Leeds for the year 2010 is approximately 675 gallons per minute, assuming the Harrisburg Resort completes its proposed development. This flow can be adequately transmitted by the Harrisburg line if the last 2,000 feet of six inch pipe is upgraded with a parallel eight inch pressure line.

SECTION 5

WASTEWATER COLLECTION, TRANSMISSION, AND TREATMENT

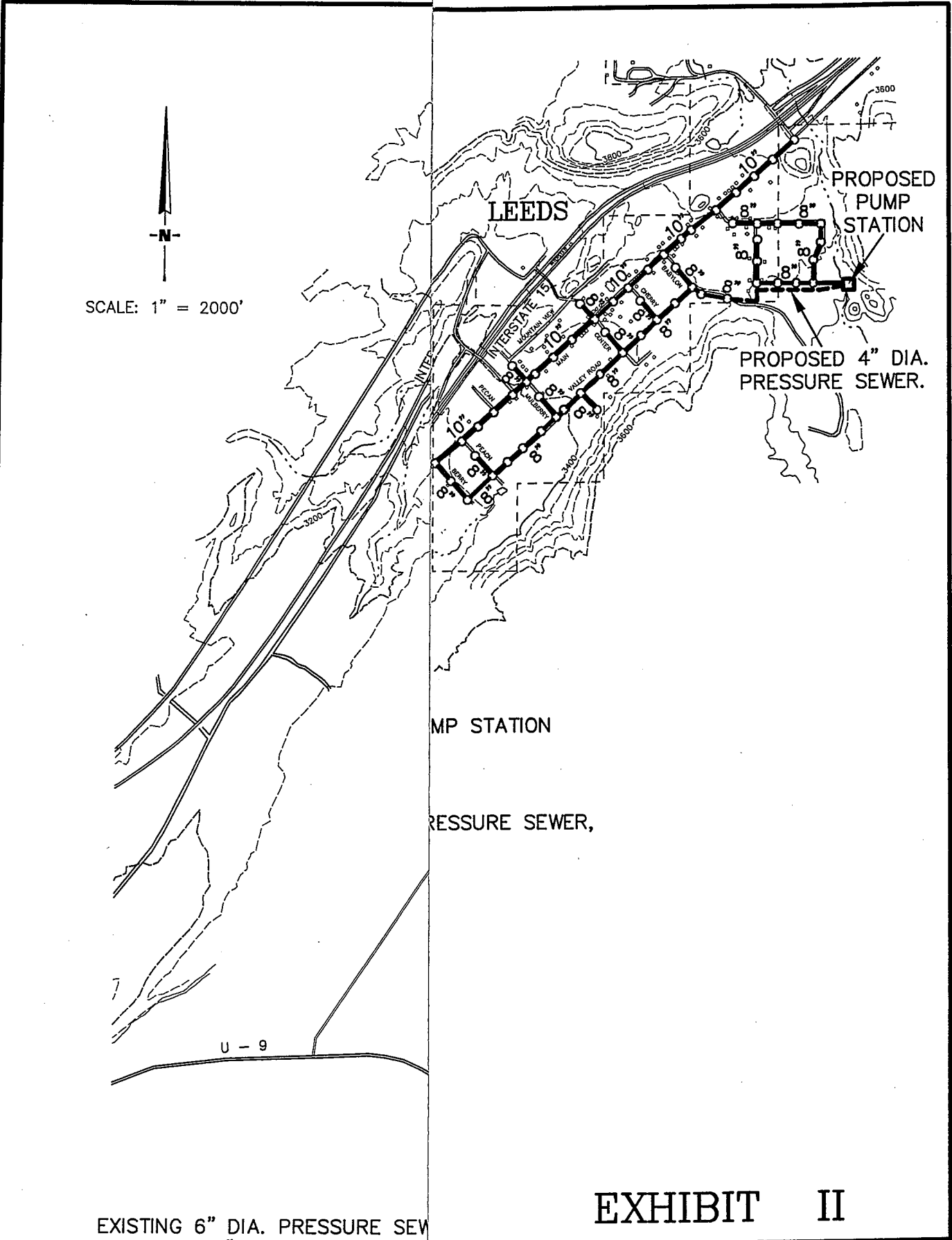
5.1 Collection and Transmission.

As part of the study a possible collection system was evaluated. Collection and transmission line locations, manhole locations, and pump station locations will be determined when the project is designed. Exhibit II shows a preliminary system layout of collection and transmission lines for a wastewater system. The trunk through Leeds Town should be sized large enough to handle wastewater flow from Leeds and the Anderson Junction Area. The information on this exhibit will be used for estimating a project cost.

At completion of the project, the system will be turned over to the Ash Creek Service District to operate and maintain. Leeds Town will pay Ash Creek to perform this service.

5.2 Wastewater Treatment.

All of the wastewater collected by this proposed system will be delivered to the present Ash Creek wastewater lagoons. Leeds will be paying Ash Creek for this treatment. Ash Creek has indicated they will change an impact fee of \$1,500 per residence. This fee is designated for future upgrading of the wastewater treatment facility. The commercial, institutional, and industrial users would pay on a different rate structure. The Ash Creek impact fee schedule is in the Appendix. In order to transmit the wastewater from Leeds to the Ash Creek lagoons, about 2,000 feet of six inch transmission line will need to be upgraded to eight inch diameter line by the year 2015.



SCALE: 1" = 2000'

LEEDS

PROPOSED PUMP STATION

PROPOSED 4" DIA. PRESSURE SEWER.

MP STATION

RESSURE SEWER,

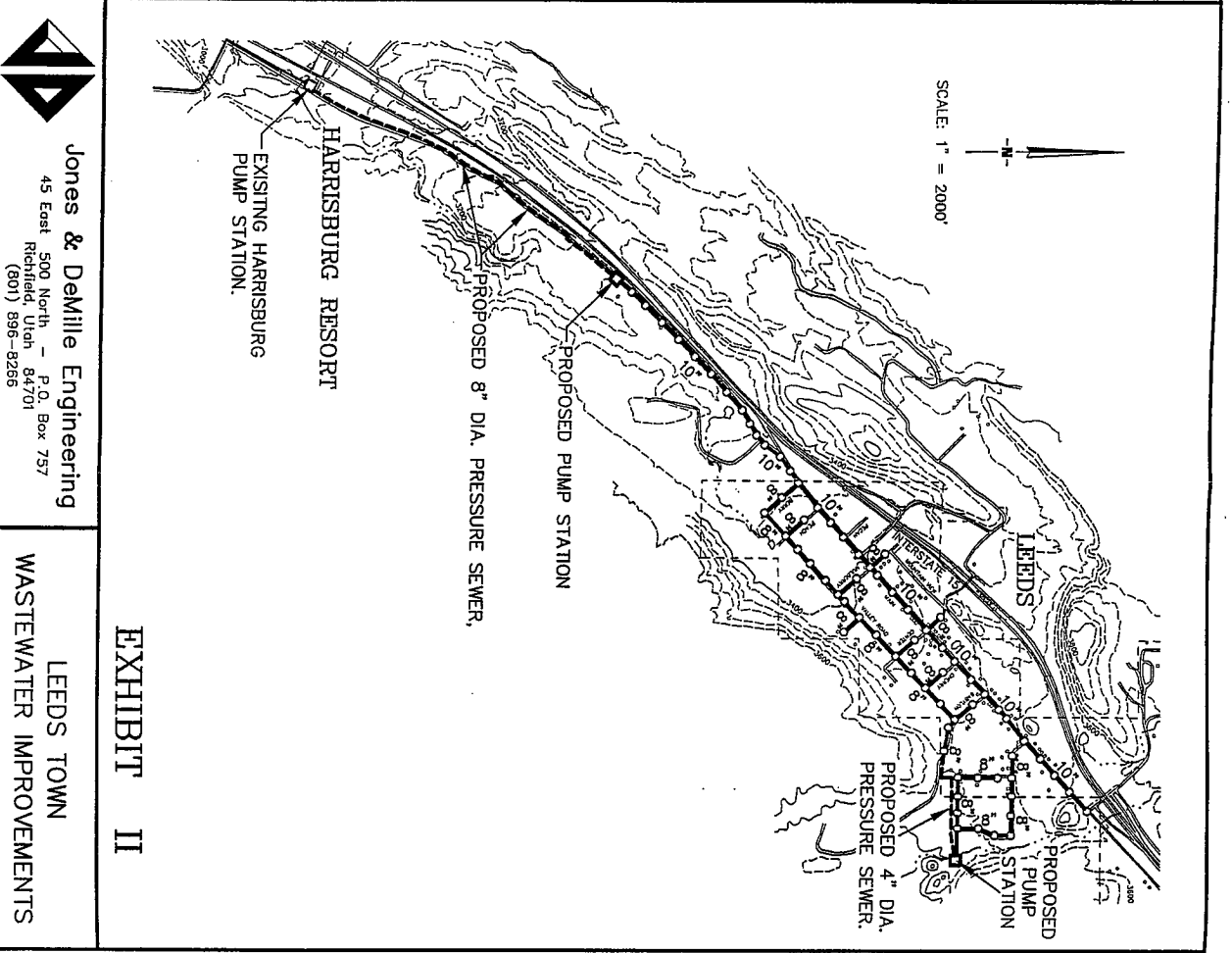
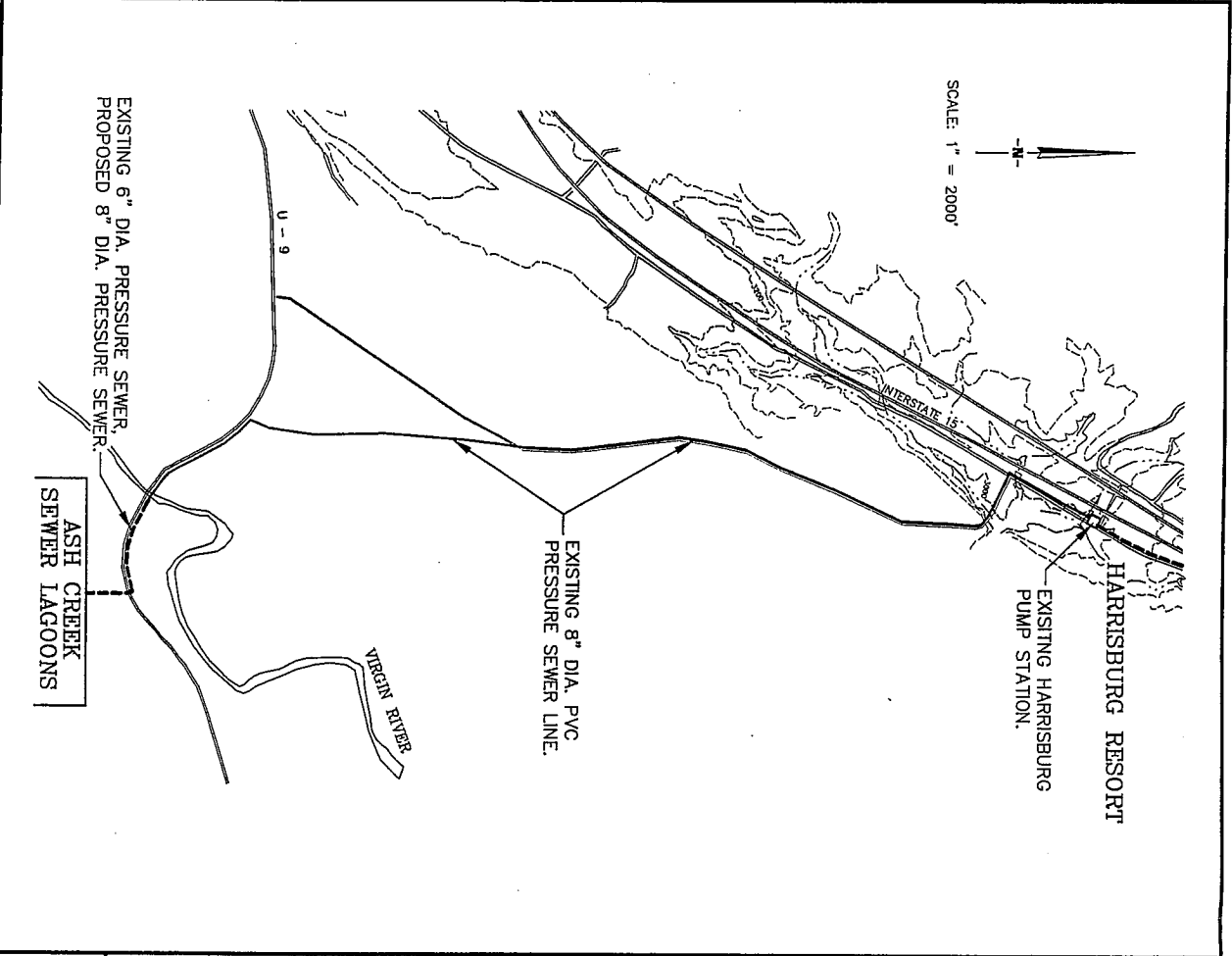
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EXISTING 6" DIA. PRESSURE SEW
 PROPOSED 8" DIA. PRESSURE S

EXHIBIT II

LEEDS TOWN WASTEWATER IMPROVEMENTS

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Jones & Demille Engineering
 45 East 500 North - P.O. Box 757
 Richfield, Utah 84701
 (801) 896-8286

LEEDS TOWN
WASTEWATER IMPROVEMENTS

EXHIBIT II

SECTION 6

PROJECT COST ESTIMATE

The cost estimate for the wastewater improvements includes a collection system in the Town of Leeds, two lift stations, and a transmission line to Harrisburg Resort, and the upgrading of 2,000 feet of existing Harrisburg pressure sewer. An effort was made to incorporate into the estimate the additional construction costs associated with the large boulders that lie beneath the surface throughout Leeds.

The Cost Estimate is on the following page.

**COST ESTIMATE
LEEDS WASTEWATER IMPROVEMENTS**

| Item # | Item | Quantity | Units | Unit Price | Cost |
|--------|-------------------------------------|----------|-------|--------------|----------------|
| 1 | Mobilization | 1 | L. S. | \$40,000.00 | \$40,000.00 |
| 2 | 10" Sewer Line | 12000 | L. F. | \$20.00 | \$240,000.00 |
| 3 | 8" Sewer Line | 15000 | L. F. | \$17.00 | \$255,000.00 |
| 4 | 8" Pressure Line | 11000 | L. F. | \$9.00 | \$99,000.00 |
| 5 | 4" Pressure Line | 1850 | L. F. | \$5.00 | \$9,250.00 |
| 6 | 4' Dia. Manholes | 85 | Each | \$1,600.00 | \$136,000.00 |
| 7 | Lift Station | 2 | Each | \$20,000.00 | \$40,000.00 |
| 8 | Asphalt Street Repair including UBC | 3350 | S. Y. | \$30.00 | \$100,500.00 |
| 9 | Gravel Street Repair | 3000 | S. Y. | \$8.00 | \$24,000.00 |
| 10 | 4" Cleanout | 120 | Each | \$200.00 | \$24,000.00 |
| 11 | 4" Service Line | 6000 | L. F. | \$8.00 | \$48,000.00 |
| 12 | 4" Sewer Connection | 120 | Each | \$200.00 | \$24,000.00 |
| 13 | Highway Crossing at Lagoons | 1 | L. S. | \$26,750.00 | \$26,750.00 |
| | SUBTOTAL | | | | \$1,066,500.00 |
| 14 | Contingency | | | | \$93,500.00 |
| | TOTAL CONSTRUCTION | | | | \$1,160,000.00 |
| 15 | Right-of-ways, Easements, Etc. | 1 | L. S. | \$25,000.00 | \$25,000.00 |
| 16 | Design Engineering | 1 | L. S. | \$60,000.00 | \$60,000.00 |
| 17 | Construction Management | 1 | L. S. | \$60,000.00 | \$60,000.00 |
| 18 | Legal Fees & Bond Counsel | 1 | L. S. | \$15,000.00 | \$15,000.00 |
| 19 | Archaeology | 1 | L. S. | \$30,000.00 | \$30,000.00 |
| 20 | Ash Creek Connection Fee | 1 | L. S. | \$210,000.00 | \$210,000.00 |
| | SUBTOTAL | | | | \$400,000.00 |
| | TOTAL PROJECT COST | | | | \$1,560,000.00 |

SECTION 7
PROJECT FINANCE

7.1 User Fee Affordability.

Leeds Town is a small town with very little tax base. Many of the residents are retired and are living on fixed incomes. The 1990 census lists Leeds median household income at \$22,143.00. This is below the poverty income level of \$24,559.00 set by USDA-RD (formerly Farmers Home Administration). The 1992 MAGI from State of Utah income tax returns is \$22,445.00. These income levels qualify Leeds Town for up to 75 percent grant from RECD (Rural and Economic Community Development).

Other funding agencies, such as the Community Impact Board and Water Quality Board, would expect Leeds to have an annual user fee of about 1.25 to 1.4 percent of the median adjusted gross income. This would equate to approximately \$23.00 to \$26.00 per month. This user fee is to include operation and maintenance fees, and debt service.

The Town Council and citizens in attendance at council meetings, expect to pay a fee of somewhere in the range of \$25.00 to \$28.00 per month. Fees in excess of this amount would be considered a hardship on residents, especially those living on fixed incomes. Some of the more recently funded community wastewater systems (Panguitch and Enoch) have had user rates in the range of \$25.00 to \$26.00 per month.

7.2 Proposed Project Budget.

In order to determine the financing of this project, a proposed budget of income and expenses needs to be formulated. For the purpose of this budget, a user fee of \$30.00 per month for residential and \$40.00 per month for commercial is used. These rates exceed the affordability guidelines and

are higher than the citizens would like, but based on preliminary cost estimates and probable financing, the rates may have to be this high. The following is a proposed budget.

| BUDGET | | | | |
|---|-------------|-----|------------|--------------|
| REVENUE | | | | |
| User Fees | | | | |
| | Residential | 135 | \$30.00 | \$48,600.00 |
| | Commercial | 5 | \$40.00 | \$2,400.00 |
| | Subtotal | | | \$51,000.00 |
| Connection Fee | | | | |
| | Residential | 135 | \$1,500.00 | \$202,500.00 |
| | Commercial | 5 | \$1,500.00 | \$7,500.00 |
| | Subtotal | | | \$210,000.00 |
| TOTAL REVENUE | | | | \$261,000.00 |
| EXPENSES | | | | |
| Operation and Maintenance (By Ash Creek Special Service District) | | | | |
| | Residential | 135 | \$15.00 | \$24,300.00 |
| | Commercial | 5 | \$19.00 | \$1,140.00 |
| | Subtotal | | | \$25,440.00 |
| Ash Creek Connection Fee | | | | |
| | Residential | 135 | \$1,500.00 | \$202,500.00 |
| | Commercial | 5 | \$1,500.00 | \$7,500.00 |
| | Subtotal | | | \$210,000.00 |
| Administrative | | | | \$1,700.00 |
| Debt Service Reserve Account Payment | | | | \$2,000.00 |
| TOTAL EXPENSES | | | | \$239,140.00 |
| BALANCE AVAILABLE FOR DEBT SERVICE | | | | \$21,860.00 |

7.3 Proposed Project Financing.

Based on the proposed budget and an assumed maximum user rate, the following is a possible financing scenario.

| POSSIBLE FINANCING SCENARIO | | |
|---|--|-----------------------|
| PROJECT FINANCE | | |
| | Loan (Based on \$21,860 in annual debt service) | \$360,000.00 |
| | Grant | \$990,000.00 |
| | Owner Contribution | \$210,000.00 |
| TOTAL PROJECT COST | | \$1,560,000.00 |
| POSSIBLE FUNDING INSTITUTION PARTICIPATION | | |
| | RECD Grant | \$495,000.00 |
| | RECD Loan for 40 years @ 4.6% (\$8,820 per year) | \$160,000.00 |
| | Water Quality Board Loan for 20 years @ 3% (13,044 per year) | \$200,000.00 |
| | Water Quality Board Grant | \$495,000.00 |
| TOTAL FINANCING | | \$1,350,000.00 |

This scenario equates to approximately ⁷63.5% grant and 23% loan.

User rates would need to be \$30.00 per month per connection for this scenario.

SECTION 8
RECOMMENDATIONS

It is recommended that Leeds Town pursue funding by making preliminary applications to USDA-RD and the State Water Quality based on the proposed financing. The preapplications will act as a catalyst for a discussion between the agencies and Leeds Town. This will give Leeds an idea of what the agencies can or cannot do and when funding may be obtained. The result of this process may be the involvement of additional funding agencies in order to provide the grant that Leeds needs to make the project feasible.

APPENDIX

Ash Creek Special Service District
Rate & Impact Fee Schedule

SCHEDULE I

Surcharge Rate Structure
for Above Normal Strength Wastes

The Ash Creek Special Service District, by and through its Engineer, has determined the average total suspended solids (TSS) and biochemical oxygen demand (BOD) daily loadings for the average residential user to be 120 mg/1 BOD and 150 mg/1 TSS. The District, by and through its Engineer, has assessed a surcharge rate for all non-residential users discharging wastes with BOD and TSS strengths greater than the average residential user. The surcharge will be sufficient to cover the costs of treating such users above normal strength wastes. Such users will pay an additional service charge of \$0.011 per 1,000 gallons for each 25 mg/1 above 120 mg/1 BOD and \$0.007 per 1,000 gallons for each 25 mg/1 above 150 mg/1 TSS.

SCHEDULE II

Monthly Rate Schedule

| <u>User Class</u> | <u>Monthly Rate</u> |
|--|---------------------|
| I. Permanent Residential -- all residential dwelling units intended or used primarily for permanent, continuous or nonseasonal occupancy, per unit (including single family homes, mobile homes, permanent trailers, permanent RVs, condominiums, townhomes, apartments, etc.) | \$15.00 |
| II. Transitory Residential -- all residential dwelling units intended or used primarily for transitory, overnight or seasonal occupancy, per unit (including RV parks, overnight R.V. rentals and camp units, etc.) | \$ 7.50 |
| III. Commercial, Schools, Churches, Motels | |
| For up to first 12,000 gallons of water used * | \$19.06 |
| For each additional 1000 gallons of water used above 12,000 gallons | \$ 1.77 |

* For commercial, schools and churches, monthly water usage shall be based on the average monthly water use during months of December, January and February of each year. For motels, monthly water usage shall be based on the average monthly water use during the months of May, June and July of each year.

IMPACT FEE SCHEDULE

| TYPE OF ESTABLISHMENT | METHOD OF DETERMINATION | GALLONS ¹ | REU ² | IMPACT FEE |
|-----------------------|--|----------------------|------------------|------------|
| Permanent Residence | Per residence | 400 | 1 | \$1,500.00 |
| Hotels & Motels | Per room | 150 | 0.375 | \$562.50 |
| RV Parks | Per space | 100 | 0.25 | \$375.00 |
| Airports | Per passenger | 3 | 0.0075 | \$11.25 |
| | Per employee | 15 | 0.0375 | \$56.25 |
| Boarding Houses | For each resident boarder and employee | 50 | 0.125 | \$187.50 |
| | Additional for each nonresident boarder | 10 | 0.025 | \$37.50 |
| Bowling Alleys | With snack bar (per alley) | 100 | 0.25 | \$375.00 |
| | With no snack bar (per alley) | 85 | 0.2125 | \$318.75 |
| Churches | Per person | 5 | 0.0125 | \$18.75 |
| Country Clubs | Per resident member | 100 | 0.25 | \$375.00 |
| | Per nonresident member present | 25 | 0.0625 | \$93.75 |
| | Per employee | 15 | 0.0375 | \$56.25 |
| Dentist's Office | Per chair | 200 | 0.5 | \$750.00 |
| | Per staff member | 35 | 0.0875 | \$131.25 |
| Doctor's Office | Per patient | 10 | 0.025 | \$37.50 |
| | Per staff member | 35 | 0.0875 | \$131.25 |
| Fairgrounds | Per person | 1 | 0.0025 | \$3.75 |
| Fire Stations | With full-time employees and food preparation (per person) | 70 | 0.175 | \$262.50 |
| | With no full-time employees and no food preparation (per person) | 5 | 0.0125 | \$18.75 |

IMPACT FEE SCHEDULE

| TYPE OF ESTABLISHMENT | METHOD OF DETERMINATION | GALLONS ¹ | REU ² | IMPACT FEE |
|--|--|----------------------|------------------|------------|
| Gyms | Per participant | 25 | 0.0625 | \$93.75 |
| | Per spectator | 4 | 0.01 | \$15.00 |
| Hairdresser | Per chair | 50 | 0.125 | \$187.50 |
| | Per operator | 35 | 0.0875 | \$131.25 |
| Hospitals | Per bed space | 250 | 0.625 | \$937.50 |
| | With showers per 8 hour shift (per person) | 35 | 0.0875 | \$131.25 |
| Industrial Buildings (exclusive of industrial waste) | With no showers per 8 hour shift (per person) | 15 | 0.0375 | \$56.25 |
| | Per washer | 580 | 1.45 | \$2,175.00 |
| Movie Theaters | Auditorium (per seat) | 5 | 0.0125 | \$18.75 |
| | Drive-in (per car) | 10 | 0.025 | \$37.50 |
| Nursing Homes | Per bed space | 280 | 0.7 | \$1,050.00 |
| | With cafeteria (per employee) | 25 | 0.0625 | \$93.75 |
| Office Buildings and Business Establishments (sanitary wastes only, per shift) | With no cafeteria (per employee) | 15 | 0.0375 | \$56.25 |
| | Per person | 5 | 0.0125 | \$18.75 |
| Picnic Parks (toilet wastes only) | Restaurants without 24 hour service (per seat) | 35 | 0.0875 | \$131.25 |
| | Restaurants with 24 hour service (per seat) | 50 | 0.125 | \$187.50 |
| Rooming House | Single service customer utensils only (per customer) | 2 | 0.005 | \$7.50 |
| | Or, per customer served (includes toilet and kitchen wastes) | 10 | 0.025 | \$37.50 |
| | Per person | 40 | 0.1 | \$150.00 |

IMPACT FEE SCHEDULE

| TYPE OF ESTABLISHMENT | METHOD OF DETERMINATION | GALLONS ¹ | REU ² | IMPACT FEE |
|---------------------------------|---|----------------------|------------------|------------|
| Schools | Boarding (per person) | 75 | 0.1875 | \$281.25 |
| | Day, without cafeteria, gym or showers (per person) | 15 | 0.0375 | \$56.25 |
| | Day, with cafeteria, but no gym or showers (per person) | 20 | 0.05 | \$75.00 |
| | Day, with cafeteria, gym and showers (per person) | 25 | 0.0625 | \$93.75 |
| Service Stations | Per vehicle served | 10 | 0.025 | \$37.50 |
| Skating Rink, Dance Halls, etc | No kitchen wastes (per person) | 10 | 0.025 | \$37.50 |
| | Additional for kitchen wastes (per person) | 3 | 0.0075 | \$11.25 |
| Ski Areas (no kitchen wastes) | Per person | 10 | 0.025 | \$37.50 |
| Stores | Per public toilet room | 500 | 1.25 | \$1,875.00 |
| | Per employee | 11 | 0.0275 | \$41.25 |
| Swimming Pools and Bathhouses | Per person | 10 | 0.025 | \$37.50 |
| Taverns, Bars, Cocktail Lounges | Per seat | 20 | 0.05 | \$75.00 |
| Visitor Centers | Per visitor | 5 | 0.0125 | \$18.75 |

¹Gallon per day usage based on *State of Utah Rules for Public Drinking Water Systems*, Part II, Section R309-105

²REU = Residential Equivalent Unit

Harrisburg Resort
Wastewater Calculations



CREAMER & NOBLE ENGINEERS
P.O. BOX 1094, ST. GEORGE, UTAH 84770
PHONE (801) 673-4677

December 14, 1987

Mr. Fred Wright
660 North Twin Lakes Drive
St. George, UT 84770

Re: Harrisburg Estates
Sewer Design

Dear Mr. Wright:

The following is the additional information you requested as part of the original design of the pressurized sewer outfall line for Harrisburg Estates. The letter dated December 11, 1987 includes a total design flow of .93 cfs. It was also indicated in that letter that a 6-inch sewer line was installed from the Virgin River Bridge to the Ash Creek Sewer Lagoons. If this line were increased to an 8-inch line, the peak capacity could be increased from .93 cfs to approximately 1.5 cfs or an increase of approximately 50 percent design flow.

This design flow is based on a recommended design criteria of velocity of flow for PVC pipe of 5 feet per second. At present the peak design flow is .93 cfs.

If you have any questions or need further information, please feel free to call.

Sincerely,

CREAMER & NOBLE, INC.

Brent E. Gardner

Brent E. Gardner, P.E.

BEG:sb

Z28/1

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Mr. Fred Wright
Harrisburg Estates Sewer Design
December 11, 1987

I have enclosed a copy of the plans that were used for the construction of the sewer line. It should be noted from the Virgin River Bridge to the Ash Creek Sewer Lagoons a 6-inch sewer line was installed. If you have any further questions regarding the above, please feel free to call.

Sincerely,

CREAMER & NOBLE, INC.

Brent E. Gardner

Brent E. Gardner, P.E.

Enclosures

BEG:sb



CREAMER & NOBLE ENGINEERS
 P.O. BOX 1094, ST. GEORGE, UTAH 84770
 PHONE (801) 673-4677

December 11, 1987

Mr. Fred Wright
 660 North Twin Lakes Drive
 St. George, UT 84770

Re: Harrisburg Estates
 Sewer Design

Dear Mr. Wright:

The following is the design criteria used in the original design of the pressurized sewer outfall line for Harrisburg Estates. The design flows were based on the Utah Department of Health Regulations.

Design Flows

| | <u>GPD</u> |
|--|-------------------|
| Harrisburg Estates | |
| 1800 R.V. Units @ 125 gpd | 225,000 |
| Convenience Store @ 250 gal/pump | 1,500 |
| Assume 6 pumps | |
| Restaurant @ 35 gal/seat | 2,625 |
| Assume 75 seats | |
| Fast Food @ 35 gal/seat | <u>1,400</u> |
| Assume 40 seats | |
| | 230,525 gpd |
| Quail Creek Recreational Facilities | |
| 3 Restrooms @ 30 gal/person | |
| Assume 120 boats w/ 3 people | <u>10,800 gpd</u> |
| | |
| TOTAL | 241,325 gpd |
| Peaking Factor X 2.5 | <u>2.5</u> |
| | 603,312 gpd |
| | = 419 gpm |
| | = 0.93 cfs |

