Executive Summary
DOWNER NEIGHBORHOOD WATER SUPPLY LEVEL II

NOVEMBER 1, 1998

Prepared for:
Wyoming Water Development Commission
Herschler Building, Fourth Floor-West
122 W. 25 Street
Cheyenne, Wyoming 82002

and

Downer Neighborhood Improvement
and Service District
240 Taylor Avenue
Sheridan, Wyoming 82801

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In cooperation with: Lord Consulting, LLC
CER Professional Consultants
Prestfeldt Surveying
Nies Mapping Group
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<td>6</td>
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1.0 Introduction

1.01 PROJECT AUTHORIZATION


1.02 PROJECT LOCATION

The Downer Neighborhood Improvement and Service District (DNISD) located adjacent to the north boundary of the City of Sheridan, Wyoming. The DNISD is in the Soldier Creek Valley bounded by Goose Creek on the east, Mydland Road on the west and State Highway 337 (Fort McKenzie) Road on the north. A commercial area north of Fort Road is also included in the DNISD.

1.03 DESCRIPTION OF EXISTING SYSTEMS

The Soldier Creek Water Company System currently serves the Downer area with fifty year old transmission and distribution piping. The system connects to the City of Sheridan through a master water meter located on Bowman Avenue slightly north of 11th Street in the city's 3,950’ pressure zone. One-half block west of 11th Street a pressure reducing valve named "Dana Addition-PRV" reduces pressure from the 4,038' zone to the 3,950' zone and delivers water to the Soldier Creek Water Company. The entire Soldier Creek Water Company Water System operates within the 3,950’ pressure zone.

Soldier Creek Water Company delivers water through cast iron, ductile iron and polyvinyl chloride (PVC) pipelines to 132 residents and commercial users. Water services are-metered at each user service line and billing is bi-monthly (every two months). It was concluded in this Level II Study the Soldier Creek Water Company system is corroded and expensive to maintain, is undersized, and should be abandoned.

The Soldier Creek Water Company purchases treated water from the City of Sheridan under a contract dated August 16, 1948 and extended for two years from July 7, 1997 to July 7, 1999.

The City of Sheridan receives water from Big Goose Creek via three pipelines delivering raw water to the Big Goose Water Treatment Plant (BGWTP) located on Big Goose Creek and the Sheridan Water Treatment Plant (SWTP) located just west of Sheridan. The BGWTP is not a focus of this study other than to note it is interconnected to the City of Sheridan's water system. The SWTP includes a four (4) million gallon (MG) clearwell which is the primary treated water storage for the North Sheridan area including the Downer area. The Sheridan water distribution system delivers water to two (2) pressure zones within the city identified as the 4,038-foot and the 3,950-foot zones.

The DNISD was formed in January, 1998 with the intent to develop a project to replace the Soldier Creek Water Company's 50-year old system. An agreement for water service between DNISD and the City of Sheridan for the future will need to be negotiated.

1.04 SUMMARY AND CONCLUSIONS

The proposed DNISD-ONLY project alternative is feasible from an engineering and economic position. Ownership and operational issues need to be determined.
DNISD is ready to move forward with a Level III project. The recommendations in this report are to proceed with the DNISD-ONLY alternative with a project budget of $2,995,900 and a WWDC grant of $1,085,100 phased over a two year construction period. This recommendation includes a request for Rural Development-Rural Utility Service (RD-RUS) funding of a grant of $1,611,200 and loan of $299,600 at a 5% interest rate over a 25-year period also phased over a two year construction period (see Table 4). It is also recommended the City of Sheridan provide funds to upsize 4,083-feet of DNISD 10-inch transmission line to a 12-inch transmission line for a cost of approximately $21,000.00 to accommodate future regional considerations.

From an engineering perspective, an ownership and operational alternative providing for the City of Sheridan to operate, maintain, and administer the DNISD distribution system would be the most economical. Eliminating master meters, allowing cross connections between the city and DNISD systems and administration economies of scale would be a benefit. Considerations of the affects on funding availability must be considered. DNISD ownership with a contract for services from the city (Option #2) appears to be feasible and the most acceptable to the District.

Under this Option #2, DNISD would construct and own the water distribution system beyond the city’s master meter and contract with the city for operation and maintenance (O&M) and administration of the system. This option is similar to the current arrangement between the SAWSJPB and the city for O&M of the Sheridan Area Water System in the rural areas where the system is owned by SAWSJPB.

### 2.0 Water Demand in Service Area

#### 2.01 WATER DEMAND IN SERVICE AREA

Current land use in the DNISD study area is either residential, commercial, or agricultural. The DNISD is a partially developed platted tract of land within the regional area of this study. DNISD includes 277 acres of which 106 acres are currently developed and 171 acres are undeveloped. The undeveloped area contains 104 acres of steep slopes, flood plain, and roads and streets. The remaining 67 acres of undeveloped land in the DNISD will ultimately experience growth similar to the current densities. Most of the area is residential with scattered small commercial businesses. The northern portion of DNISD along State Highway 337 (Fort McKenzie Road) is an established commercial area including a concrete batch plant with gravel stockpiles, irrigation equipment supply company, lumber yard, contractor storage area, coal supply yard (currently unoccupied), a commercial building with several small businesses and a sawmill/lumber treating facility (currently unoccupied). This commercial area contains 45 acres. The DNISD currently includes 157 property owners and there are 132 users on the Soldier Creek Water Company existing water system. Several homes use wells as a water source and some taps are split to serve several homes. Deducting the northern commercial area, the residential area currently contains 157 homes. Assuming 2.5 people per home, this represents a current population of approximately 393 people. There are 1,194 platted lots in the Downer Addition. Most residential lots are 40 feet by 125 feet with 43 larger tracts along the northern edge of the residential area. Most properties include multiple lots which will be referred to as ownership tracts. Many lots are undeveloped and will remain as backyards or pasture land. It is assumed the existing 157 residential tracts can be further developed to add 41 households, and 109 other tracts can be developed on currently undeveloped land. This study assumes a "build-out" of the area would include 308 households with a population of 768 people.

Some homes in the DNISD are served by municipal sanitary sewer, but most homes are on private septic tanks and leach fields. As evidenced in the geotechnical investigation, the area
is predominantly deep clay material with low permeability. Septic system failure in the DNISD area is common. New septic system permits issued by Sheridan County will not be allowed by the State Department of Environmental Quality (DEQ) if the home is within 400 feet of the existing city's Northwest Trunk Sewer and can be connected to the existing municipal sewer collection system. (A city variance for a hardship release from this requirement has been used in the past.) High density within DNISD is unlikely to occur in part because of sanitary sewer problems.

In summary, this analysis shows DNISD currently supports a population of about 393 people in 157 homes and has growth potential for an additional 150 homes containing 375 people. Therefore, the total population projection estimate is 308 homes containing 768 people.

Water demand within the City of Sheridan was identified in the "Sheridan Area Water Supply Study Level II-Stage II." HKM Associates, 1990. The study used a value of 260 gpcd within the City for new water service. The 1990 study recommended using a design demand for the new rural water system of 190 gpcd, rationalizing water consumption in the rural areas would be less than in the city because secondary irrigation water is available in most rural areas. Several years of use of the rural water system have shown the current average day demand to be 90 gpcd. In 1997, the City of Sheridan used about 220 gpcd. Most rural water users have secondary water sources for lawn watering and irrigation. This assumption is valid for some of the Downer area residents, although some future Downer area development will have to rely on the municipal water system for lawn watering.

This study recommends the design demand for the Downer project be established at the 140 gpcd upper end of the Soldier Creek Water Company's current use. This estimated usage is near the average use between city and rural use in the Sheridan area wide water system. Design criteria are shown in Table 1.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>DESIGN CRITERIA*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water System</td>
<td>1998</td>
</tr>
<tr>
<td>Average Day</td>
<td>4.5 mgd</td>
</tr>
<tr>
<td>Peak Day</td>
<td>11.3 mgd</td>
</tr>
<tr>
<td>Peak Hour</td>
<td>17.8 mgd</td>
</tr>
<tr>
<td>Peaking Factors (City Residential Usage)</td>
<td></td>
</tr>
<tr>
<td>Peak Day/Ave. Day</td>
<td>2.65</td>
</tr>
<tr>
<td>Peak Hour/Ave. Day</td>
<td>4.20</td>
</tr>
<tr>
<td>Per Capita Flow Rates</td>
<td></td>
</tr>
<tr>
<td>Ave. Day - City</td>
<td>260 gpcd</td>
</tr>
<tr>
<td>Ave. Day - Rural</td>
<td>140 gpcd**</td>
</tr>
<tr>
<td>Peak Day - City</td>
<td>690 gpcd</td>
</tr>
<tr>
<td>Average Household Size</td>
<td>2.5</td>
</tr>
<tr>
<td>Fire Flows (see discussion)</td>
<td></td>
</tr>
<tr>
<td>Residential Areas</td>
<td>1,500 gpm</td>
</tr>
<tr>
<td>Commercial Areas</td>
<td>2,500 gpm</td>
</tr>
<tr>
<td>Industrial Areas</td>
<td>3,000 gpm</td>
</tr>
</tbody>
</table>

** Average Day Flow Rate revised for DNISD area.
3.0 Water Supply

3.01 WATER SUPPLY

The water supply for the DNISD project is from the City of Sheridan or the SAWSJPB areawide water system. Ground water of sufficient quantity and quality does not exist in the area and surface water in the drainages is heavily appropriated. Purchasing agricultural water or existing high mountain storage was evaluated, however not recommended. The logical source of water for the DNISD and Regional expansion is from the City of Sheridan water system. The city has served the DNISD area through the existing Soldier Creek Water Company since 1948 and the service should continue.

The City of Sheridan and SAWSJPB jointly own water supplies from Big Goose Creek and stored water in Twin Lakes Reservoir, Park Reservoir, Sawmill Reservoir and Dome Reservoir located in the Big Horn Mountains west of Sheridan. The VAMC also receives its water supply from these same sources through a water supply agreement with the City of Sheridan.

The water supply from Big Goose Creek is used from direct flow appropriations throughout the year. Typically, Big Goose Creek flow is regulated in early to mid-July. At that time stored water is released from high mountain reservoirs to supplement or replace direct stream flow.

Capital improvements are not proposed in this Level II Study for the water supply, raw water delivery, nor water treatment facilities. Water rights proposed for the DNISD and Regional alternatives are portions of the City of Sheridan and SAWSJPB water rights.

4.0 Proposed Water Distribution System

Two distribution system options to serve the Downer area were considered in this study. One option would serve the DNISD-ONLY, with no consideration of expanded services beyond the DNISD boundary. The second option was to incorporate regional planning to serve DNISD and surrounding areas. This section will discuss the DNISD-ONLY option and present a detailed opinion of cost for the system. For discussion and cost of the regional system refer to the Final Report.

4.01 RECOMMENDED WATER SYSTEM-DNISD ONLY

Pipeline routes were selected to provide a looped water system to all existing DNISD households. Looping will maintain water quality, pressure and fewer service disruptions during repairs and maintenance and is required by DEQ regulations. Figure 1 provides location of transmission lines and distribution mains within the DNISD boundaries.

Routes were selected to provide two locations for supply into the DNISD and pressure reduction, from the 4,038-foot pressure zone to the 3,950-foot pressure zone. This redundancy is desirable to allow continued water service when service and maintenance is being performed on one or the other pressure reducing valve (PRV) stations. More importantly, the existing SCWC service is off an existing 8-inch city water main which serves another city residential area. Commercial fire flows in the DNISD area cannot be accomplished through the existing 8-inch city main and the 6-inch SCWC main. Under the proposed option the primary water service will takeoff of a 12-inch city main on Highland Avenue and 8th Street and extend north to State Highway #337 (Fort McKenzie Road) and into the DNISD commercial area. Other transmission lines will loop the east and west end of DNISD. Various interconnecting distribution mains will provide water distribution to users in DNISD.
A new pressure reducing/meter vault is proposed on Highland Avenue and 12th Street. The DOW-PRV 1 station location is shown on Figure 1. The station will become the primary source of water for the DNISD system with the existing Dana Addition-PRV and SCWC-Meter being a secondary source with the isolation valve normally closed.

4.02 FEASIBILITY COST ESTIMATE-DNISD-ONLY

The total project costs for the DNISD-ONLY alternative are presented in Table 2.

The opinion of probable construction cost for the DNISD-ONLY alternative incorporates the following assumptions:

- Costs obtained from previous bid tabulations of similar present projects in the Sheridan area
- Costs inflated to Year 2000
- Road reconstruction of County Road #80 will be completed by Sheridan County in a separate project
- Road repairs to State Highway #337 (Fort McKenzie Road) will be patched only (road to be reconstructed by WYDOT in Year 2002)
- DNISD streets will be reconstructed equal to the existing streets
- Reclamation in open areas will be compacted and reseeded
- Water lines will not be dead-ended
- Fire hydrants will be provided to comply with city proposed standards
- Existing fire hydrants will be replaced
- Cross connections to city water lines will occur only at pressure reducing stations

**TABLE 2**
FEASIBILITY COST ESTIMATE
WATER SYSTEM-DNISD ONLY

<table>
<thead>
<tr>
<th>COST ELEMENT</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Design (Construction Cost Subtotal #1 x 10%)</td>
<td>$203,000</td>
</tr>
<tr>
<td>Permitting</td>
<td>$10,000</td>
</tr>
<tr>
<td>Legal Fees</td>
<td>$20,000</td>
</tr>
<tr>
<td>DNISD Administration</td>
<td>$135,500</td>
</tr>
<tr>
<td>Easement Acquisition</td>
<td>$60,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONSTRUCTION ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>AMOUNT</th>
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<tbody>
<tr>
<td>Construction Total</td>
<td>LS</td>
<td>1</td>
<td>$2,029,500</td>
<td>$2,029,500</td>
</tr>
<tr>
<td>Construction Cost Subtotal #1 (CCS #1)</td>
<td></td>
<td></td>
<td></td>
<td>$2,029,500</td>
</tr>
<tr>
<td>Construction Engineering (CCS #1 x 10%)</td>
<td></td>
<td></td>
<td></td>
<td>$203,000</td>
</tr>
<tr>
<td>Construction Cost Subtotal #2 (CCS #2)</td>
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<td></td>
<td></td>
<td>$2,232,500</td>
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<tr>
<td>Contingency (CCS #2 x 15%)</td>
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<td></td>
<td></td>
<td>$334,900</td>
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<tr>
<td>Construction Cost Total</td>
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<td></td>
<td></td>
<td>$2,567,400</td>
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</table>

PROJECT COST TOTAL $2,995,900
5.0 Project Schedule

The Downer Neighborhood Project consists of several infrastructure improvements including the DNISD-ONLY water system component. Other components include sanitary sewer, street and drainage improvements, County Road #80 reconstruction and State Highway #337 (Fort McKenzie Road) reconstruction. Various funding sources, each with policies and deadlines and construction schedules result in a complex scheduling plan.

Utility construction schedules are partially driven by the road reconstruction schedules, because utilities must be completed prior to or in conjunction with the road construction. County Road #80 is scheduled for reconstruction during the 1999 construction season and State Highway #337 (Fort McKenzie Road) is schedule for the 2002 construction season.

The Proposed Schedule anticipates all utility improvements will be constructed concurrently. Due to funding limitations, construction of utility improvements will occur in two phases, with each phase incorporating a specific area within the DNISD. The proposed schedule as provided in Section 5.02 assumes the following:

- The design for construction of Phase I and Phase II utility improvements will occur at the same time.
- Phase I construction contract will be bid as one construction project and include water, sewer and County Road improvements.
- Phase II construction will be bid as a separate construction project and include water, sewer and DNISD streets and drainage improvements.
- Construction of State Highway #337 will be a separate construction contract administered through the Wyoming Department of Transportation.

1.1 Water System
- WWDC and RD-RUS will jointly finance the water project
- WWDC funds available for design and construction of Phase I and II
- RD-RUS funds available for construction of Phase I
- Second contract will be required by RD-RUS and WWDC for Phase III

1.2 Sewer System
- Rd-RUS and SLIB will jointly finance the sewer project
- SLIB funds available for design and construction of Phase I
- Second contract will be required by RD-RUS and SLIB for Phase II

1.3 DNISD Streets
- SLIB finance design and Phase II

1.4 County Road #80
- Design funded by SCRF and SLIB
- SCRF and SLIB funds available for Phase I
- Water, sewer, and County Road #80 constructed during Phase I

1.5 State Highway #337 (Fort McKenzie Road)
- Design and construction funded by WYDOT
5.01 Project Schedule
Downer Neighborhood Improvement Project

Task Name
1 Downer Neighborhood Project
  1.1 Water System
    1.1.1 Level II Study
    1.1.2 Level III Design and Construction
      1.1.2.1 WWDC - Grant Application
      1.1.2.2 RD/RUS - Phase I - Grant Application
      1.1.2.3 Phase I - Design
      1.1.2.4 Phase I - Construction
      1.1.2.5 RD/RUS - Phase II - Grant Application
      1.1.2.6 Phase II - Construction
  1.2 Sewer System
    1.2.1 Feasibility Study
    1.2.2 Design and Construction
      1.2.2.1 RD-RUS Phase I - Grant Application
      1.2.2.2 SLIB - Phase I - Grant Application
      1.2.2.3 Phase I - Design
      1.2.2.4 Phase I - Construction
      1.2.2.5 Phase I - Construction
      1.2.2.6 RD-RUS - Phase II - Grant Application
      1.2.2.7 SLIB - Phase II - Grant Application
      1.2.2.8 Phase II - Construction
  1.3 DNISD Streets
    1.3.1 Design and Construction
      1.3.1.1 SLIB - Grant Application
      1.3.1.2 Design
      1.3.1.3 Phase II - Construction
  1.4 County Road # 80
    1.4.1 Design
    1.4.2 Construction
  1.5 State HWY # 337-Fort Road
    1.5.1 Design
    1.5.2 Construction

Start: Wed 10/14/98
Finish: Fri 10/26/01

MSE-HKM, INC.
6.0 Economic Analysis and Project Financing

In Table 2 the construction cost and total cost was presented for the DNISD-ONLY alternative. The DNISD-ONLY alternative addresses the project costs for the DNISD water system needed to serve the district area with no regard for a larger regional area. The REGIONAL ALTERNATIVE B addresses the project costs for a regional transmission system which would also serve areas outside the DNISD area. Refer to the Final Report for more detail on the regional alternative. Only those system items which affect sizing inside DNISD are addressed in this section. This economic analysis does not consider the regional system components which are the responsibility of others (i.e., City of Sheridan, VAMC, or private developers).

6.01 ECONOMIC ANALYSIS

Annual DNISD Water Cost

DNISD rate per EDU = $11.75 per month (typical)

Operations and Maintenance Costs (O&M)

O&M cost per EDU = $18.30 per month

Capital Improvements

Assumptions
- Assume 57% of the construction cost and contingency are grant eligible at a 50/50 grant/loan ratio.
- Assume 100% of the design and construction engineering, permitting, legal, DNISD administration and ROW acquisition are grant eligible at a 50/50 grant/loan ratio.
- Assume total costs as shown in Table 2.
- Table 3 assumes WWDC would grant funds for 50% of the eligible items. Total WWDC grant is $1,085,100. Assuming a 60% grant would result in a WWDC grant of $1,187,500. The difference of $1,187,500 - $1,085,100 = $102,500 was absorbed in the RD-RUS grant column in Table 3. If this difference of $102,500 was applied to the RD-RUS loan and repaid by DNISD, the monthly debt service would be increased by $3.43 per month per EDU.

| TABLE 3 |

| WWDC AND RD-RUS GRANT/LOAN FUNDING (ASSUMED) |

<table>
<thead>
<tr>
<th>Cost Element</th>
<th>WWDC Grant (50%)</th>
<th>RD-RUS Grant</th>
<th>RD-RUS Loan</th>
<th>Total Cost</th>
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<tr>
<td>Final Design</td>
<td>$101,500</td>
<td>$91,500</td>
<td>$10,000</td>
<td>$203,000</td>
</tr>
<tr>
<td>Permitting</td>
<td>$5,000</td>
<td>$1,000</td>
<td>$4,000</td>
<td>$10,000</td>
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<tr>
<td>Legal Fees</td>
<td>$10,000</td>
<td>$2,000</td>
<td>$8,000</td>
<td>$20,000</td>
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<tr>
<td>DNISD Admin.</td>
<td>$67,800</td>
<td>0</td>
<td>$67,700</td>
<td>$135,500</td>
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<tr>
<td>Easement Acquisition</td>
<td>$30,000</td>
<td>$6,000</td>
<td>$24,000</td>
<td>$60,000</td>
</tr>
<tr>
<td>Construction Cost(57%)</td>
<td>$578,400</td>
<td>$1,290,200</td>
<td>$160,900</td>
<td>$2,029,500</td>
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<tr>
<td>Construction Engineering</td>
<td>$101,500</td>
<td>$91,500</td>
<td>$10,000</td>
<td>$203,000</td>
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<tr>
<td>Contingency (57%)</td>
<td>$190,900</td>
<td>$129,000</td>
<td>$15,000</td>
<td>$334,900</td>
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<tr>
<td>TOTAL</td>
<td>$1,085,100</td>
<td>$1,611,200</td>
<td>$299,600</td>
<td>$2,995,900</td>
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</tbody>
</table>

36% 54% 10% 100%
**Debt Repayment**

Annual Payment = $299,600 (0.0710) = $21,272

Monthly Debt Service per EDU = $10.01/month

**Reserve Account**

DNISD is required by funding agencies to establish a reserve account for debt repayment. Assume 10% of the annual debt payment (per RD-RUS requirements). An additional reserve account is recommended to fund a depreciation account.

Reserve Account per EDU = $2.00 per EDU per month

Estimated monthly rates to recover water rates, operation and maintenance, debt and reserve funds are summarized in Table 4.

<table>
<thead>
<tr>
<th>Costs Monthly</th>
<th>Color</th>
<th>DNISD</th>
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<tbody>
<tr>
<td>Water Rates</td>
<td></td>
<td>$18.30</td>
</tr>
<tr>
<td>O&amp;M</td>
<td></td>
<td>$15.28</td>
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<tr>
<td>Debt-Repayment</td>
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<td>$10.01</td>
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<tr>
<td>Reserve Account</td>
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<td>$2.00</td>
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<tr>
<td><strong>Total Monthly Rate Per EDU</strong></td>
<td></td>
<td><strong>$42.06</strong></td>
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* Funded by WWDC and RD-RUS