# 2022 DEPRECIATION STUDY

CALCULATED ANNUAL DEPRECIATION ACCRUAL RATES
APPLICABLE TO COMMON PLANT IN SERVICE
as of December 31, 2021

Prepared for Montana-Dakota Utilities Co.
April 2023

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SECTION 1

# 1  STUDY HIGHLIGHTS

Pursuant to Montana-Dakota Utilities Co.'s ("MDU" or the "Company") request, Concentric Advisors, ULC ("Concentric") conducted a depreciation study related to the common general plant accounts, as of December 31, 2021. The purpose of the study is to determine the annual depreciation accrual rates and amounts applicable to the original cost of common utility plant, as of December 31, 2021.

The depreciation rates are based on the broad group Straight-Line method using the Average Life Group ("ALG") procedure and were applied on a Remaining Life basis. The calculations were based on attained ages and estimated average service life and forecasted net salvage characteristics for each depreciable group of assets. Variances between the calculated accrued depreciation and the book accumulated depreciation, as at December 31, 2021, are amortized over the composite remaining life of assets.

MDU's accounting policy has not changed since the last depreciation study.

Concentric recommends the calculated annual depreciation accrual rates set forth herein apply specifically to common plant in service, as of December 31, 2021. The annual depreciation accrual rates are summarized by tables related to:

- the total required annual accrual amounts;

- the annual accrual requirements related to the recovery of the original cost of the investment; and

- the annual accrual amount related to the recovery of the expected net salvage requirements at the time of retirement.

Finally, this study results in an annual depreciation expense accrual related to the recovery of original cost and net salvage requirement of $4.3 million, when applied to depreciable plant study balances, as of December 31, 2021, of $81.5 million. The study results are summarized at an aggregate functional group level as follows:

SUMMARY OF ORIGINAL COST, ACCRUAL PERCENTAGES AND AMOUNTS

| Plant Group / Accounts | Original Cost | Previous Study Annual Accrual | | Recommended Annual Accrual | |
|---|---|---|---|---|---|
| General Plant | $81,481,558 | 4.30% | $2,924,572 | 5.31% | $4,327,970 |
| **TOTAL** | **$81,481,558** | **4.30%** | **$2,924,572** | **5.31%** | **$4,327,970** |

**Total Depreciable Plant**

**81.48M**

**Previous Study Annual Accrual**

2.92M

**Proposed 2022 Depreciation Expense Accrual**

4.33M

**Change in Annual Accrual**

1.40M

**Change in Depreciation Rate**

1.01%

**Previous Study Depreciation Rate**

4.30%

**Proposed 2022 Depreciation Rate**

5.31%

**Annual Accrual Amount - Top Five Accounts**

| Account | Annual Accrual |
|---|---|
| STRUCT. & IMPR. 390.00 | 1.5M |
| COMP. EQUIPMENT - PC 391.30 | 0.9M |
| TRANSP. EQUIP. 392.20 | 0.8M |
| COMP. EQUIPMENT - OTHER 391.50 | 0.5M |
| COMM. EQUIP. - FIXED RADIOS 397.10 | 0.2M |

SECTION 2

# 2  BASIS OF THE STUDY

## 2.1  Scope

This study sets forth the results of the depreciation study for the common general plant assets of MDU, to determine the annual depreciation accrual rates and amounts for book purposes applicable to the original cost of investment as of December 31, 2021.  The rates and amounts are based on the Straight-Line Method, incorporating the ALG Procedure applied on a Remaining Life Basis.  This study also describes the concepts, methods and judgments which underlie the recommended annual depreciation accrual rates related to the MDU assets in service, as of December 31, 2021.

The service life estimates resulting from the study were based on:

- informed professional judgment which incorporated analyses of historical plant retirement data recorded through December 31, 2021;

- a review of MDU company practice and outlook, as they relate to plant operation and retirement; and

- consideration of current practice in the electric and gas system industries, including knowledge of service life estimates used for other electric and gas system companies.

The depreciation accrual rates presented herein are based on generally-accepted methods and procedures for calculating depreciation.  The estimated survivor curves used in this study are based on studies incorporating actual data through 2021 for most accounts.

## 2.2  Plan of Study

This study is presented in the following order:

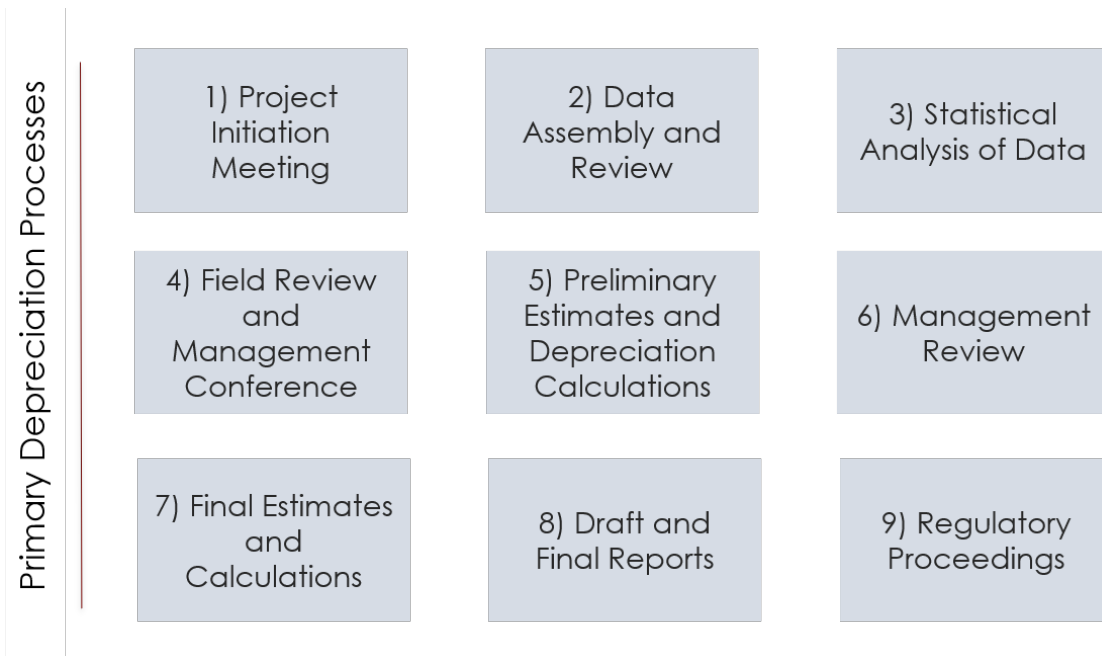| | |
|---|---|
| Section 1: | Study Highlights, presents a brief summary of the depreciation study and results |
| Section 2: | Contains statements with respect to the plan and the basis of the study |
| Section 3: | Development of the Required Depreciation Rates, presents descriptions of the methods used and factors considered in the service life study |
| Section 4: | Calculation of Annual and Accrued Depreciation, presents the methods and procedures used in the calculation of depreciation |
| Section 5: | Results of Study, presents summaries by depreciable group of annual and accrued depreciation in Tables 1, 1A, and 1B. |
| Section 6: | Presents the results of the Retirement Rate Analysis |
| Section 7: | Presents the results of the Net Salvage Study |
| Section 8: | Presents the results of the Detailed Depreciation Calculations |
| Section 9: | Estimation of Survivor Curves, is an overview of Iowa curves and the Retirement Rate Analysis |
| Section 10: | Estimation of Net Salvage discusses the methodology used in calculating net salvages |

## 2.3 Depreciation

A full and comprehensive depreciation study includes the following components:

1.  supported recommendations regarding Average Service Life estimates for each account;

2.  supported recommendations regarding estimated Net Salvage requirements for each account;

3.  selection of an appropriate grouping procedure;

4.  detailed calculation of the depreciation rate utilizing the estimated Average Service Life and Net Salvage requirements; and

5.  a document explaining the procedures followed and justifying the results in a format suitable for submission to senior management and regulatory authorities.

A diagram of the nine primary processes followed by Concentric in the development of the depreciation study is provided below. Each of the steps is undertaken by Concentric using proprietary software.

For most accounts, the annual and accrued depreciation were calculated by the Straight-Line Method using the ALG Procedure. For certain general plant accounts, the annual and accrued depreciation are based on amortization accounting. Both types of calculations were based on original cost, attained ages and an estimate of service lives.

Consistent with the current MDU practice, amortization accounting continues to be recommended for certain general plant accounts because of the disproportionate plant accounting effort required in these accounts. Many regulated utilities in North America have received approval to adopt amortization accounting for these accounts.

**Primary Depreciation Processes**

| | | |
|---|---|---|
| 1) Project Initiation Meeting | 2) Data Assembly and Review | 3) Statistical Analysis of Data |
| 4) Field Review and Management Conference | 5) Preliminary Estimates and Depreciation Calculations | 6) Management Review |
| 7) Final Estimates and Calculations | 8) Draft and Final Reports | 9) Regulatory Proceedings |

## 2.4  Information Provided by MDU

MDU has provided Concentric with the required information, as of December 31, 2021 for all accounts being studied in this study. This information includes the following:

- Current balances by vintage year for each account (aged balances) through December 31, 2021. The balances provide the amount of investment sorted by installation year. This file is only inclusive of plant in service and does not include any retirement information;

- retirement transactions for all accounts through December 31, 2021. The transactions include information regarding the transaction year of the retirement, the installation year of the asset being retired, and the original cost of the asset being retired; and

- cost of removal and gross salvage transactions for all accounts requiring the recovery of net salvage through December 31, 2021. The transactions include information regarding the transaction year of the retirement, the costs associated with the retirement, and any gross salvage proceeds from the sale or reuse of the property.

## 2.5  Data Reconciliation

The above data was reviewed and reconciled to Company control schedules to ensure accuracy and reasonableness in use of the calculations developed in this study. These checks include:

- that the surviving investment by account equals (or can be reconciled to) the Company's gross plant in service and accumulated depreciation ledger balances;

- that the surviving investment in each vintage is not negative. In other words, this check confirms that the sum of retirements from any given vintage have not exceeded the amount of plant additions to the vintage; and

- that any adjusting transactions are properly accounted for within the databases.

SECTION 3

# 3 DEVELOPMENT OF THE REQUIRED DEPRECIATION RATES

## 3.1 Depreciation

The development of the depreciation calculations requires the input of an average service life, a retirement dispersion curve (i.e. Iowa curve) and net salvage recommendations (i.e. the depreciation parameters). Additionally, to complete the depreciation calculations, the calculation methods must be established. Specifically, the selection of the depreciation method must establish three types of additional input:

1. the choice of a depreciation method;

2. a basis upon which to apply the method, and

3. in the case of group assets, a procedure to use in grouping the assets.

In this study, the depreciation rates for MDU have been calculated in accordance with the Straight-Line method, the ALG procedure and applied using the Remaining Life technique where any accumulated depreciation variances are trued-up within the depreciation rate calculations over the composite remaining life of each account.

Depreciation, as applied to depreciable plant, means the loss in service value not restored by current maintenance, incurred in connection with the consumption or prospective retirement of common plant in the course of service from causes which are known to be in current operation and against which the utility is not protected by insurance. Among the causes to be given consideration are wear and tear, decay, action of the elements, inadequacy, obsolescence, changes in the art and changes in demand and requirements of public authorities.[1]

When considering the action of the elements, the average service life and net salvage calculations have considered large catastrophic events that have occurred and impacted the life estimates of utilities across North America. The average service life of utilities has been influenced by events including:

- forest fires;
- earthquakes;
- tornadoes;
- ice storms;
- wind-storms;
- large scale flooding;
- fires;
- lightning;
- intentional actions of third parties;
- hoar frost; and
- other natural forces of nature.

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[1] The National Association of Railroad and Utilities Commissioners, Uniform System of Accounts for Gas Utilities.

Depreciation, as used in accounting, is a method of distributing fixed capital costs, less net salvage, over a period of time by allocating annual amounts to expense. Each annual amount of such depreciation expense is part of that year's total cost of providing utility service. Normally, the period of time over which the fixed capital cost is allocated to the cost of service is equal to the period of time over which an item renders service - that is, the item's service life. The most prevalent method of allocation is to distribute an equal amount of cost to each year of service life. This method is known as the Straight-Line method of depreciation.

The calculation of annual and accrued depreciation based on the Straight-Line method requires the estimation of survivor curves and is described in the following sections of this report. The development of the proposed depreciation rates also requires the selection of group depreciation procedures, as discussed below.

### 3.1.1   Study Depreciation Methods and Procedures

When more than a single item of property is under consideration, a group procedure for depreciation is appropriate because normally all of the items within a group do not have identical service lives but have lives that are dispersed over a range of time. There are two primary group procedures, namely, the Average Life Group (ALG) and Equal Life Group (ELG) procedures.

In the ALG Procedure, the rate of annual depreciation is based on the average service life of the group. This rate is applied to the surviving balances of the group's cost. A characteristic of this procedure is that the cost of plant retired prior to average life is not fully recouped at the time of retirement, whereas the cost of plant retired subsequent to the average life is more than fully recouped. Over the entire life cycle, the portion of cost not recouped prior to average life is balanced by the cost recouped subsequent to average life.

In the Equal Life Group Procedure, also known as the Unit Summation Procedure, the property group is subdivided according to service life. That is, each equal life group includes that portion of the property which experiences the life of that specific group. The relative size of each equal life group is determined from the property's life dispersion curve. The calculated depreciation for the property group is the summation of the calculated depreciation based on the service life of each equal life unit.

For most accounts, the annual and accrued depreciation were calculated by the Straight-Line Method using the ALG Procedure. For certain general plant accounts, the annual and accrued depreciation are based on amortization accounting. Both types of calculations were based on original cost, attained ages and an estimate of service lives.

While the Equal Life Group Procedure provides an enhanced matching of depreciation expense to the consumption of service value, the Straight-Line Method, Average Life Group Procedure is a commonly used depreciation calculation that has been widely accepted in jurisdictions throughout North America including MDU in prior studies. Concentric recommends its continued use.

Amortization accounting is used for certain general plant accounts because of the disproportionate plant accounting effort required in these accounts. Many regulated utilities in North America have received approval to adopt amortization accounting for these accounts. This study calculates the annual and accrued depreciation using the Straight-Line Method and ALG Procedure for most

accounts. For certain general plant accounts, the annual and accrued depreciation are based on amortization accounting. Both types of calculations were based on original cost, attained ages and estimates of service lives. Variances between the calculated accrued depreciation and the book accumulated depreciation are amortized over the composite remaining life of each account within the remaining life calculations.

Continued monitoring and maintenance of the accumulated depreciation reserve at the account level is recommended. Concentric has determined an amortization amount to correct the present variance with the calculated accrued depreciation (theoretical reserve) over the composite remaining life of each account.

### 3.1.2  Changes Since Last MDU Full Depreciation Study

The depreciation rates calculated in this study were calculated on the same manner as used in the prior full depreciation study – i.e. using the straight-line method, the ALG Procedure applied on a remaining life basis. However, Concentric notes that in the application of the remaining life basis, the prior study calculated the remaining life on a broad average basis, whereas Concentric incorporates a refinement into the remaining life calculations based on a weighted investment by vintage approach. The vintaged remaining life approach weighs the calculations of remaining life on an allocation of the actual book accumulated depreciation account by the Calculated Accumulated Depreciation (CAD) factor determined for each vintage of plant in service. This method is described as a CAD weighted calculation in the textbook Depreciation Systems by Frank K. Wolf and W. Chester Fitch, published by the Iowa State University in 1994 under the title "Adjustments" within the Broad Group Model.

In contrast, the remaining life calculations in prior studies was based on a broad averaging of the composite remaining life. The method is also discussed as the Amortization Method (AM) in Depreciation Systems under the title "Adjustments" within the Broad Group Model.

When depreciation rates are calculated utilizing a remaining life technique, the depreciation rate is established by dividing the undepreciated value of each group of assets (after consideration to the net salvage requirements) by the composite remaining life of the group of assets. This calculation is made for each vintage surviving investment as of the date of the study (December 31, 2021), and then composited into a calculation for the account or group as a whole. This calculation requires two estimates:

1.  The actual booked accumulated depreciation for each vintage within each account.

    MDU does not track the booked accumulated depreciation reserve by vintage within each account. Rather the depreciation expense is calculated at an account level and booked to accumulated depreciation at the same account level. Concentric notes that this is the practice employed by virtually all regulated utilities. As such, the accumulated depreciation by account is allocated within the account to each vintage, on the basis of the calculated accumulated depreciation by vintage. The calculated accumulated depreciation is a function of the estimated survivor curve, the average service life estimate, the net salvage estimates and the achieved age of each vintage.

2. The estimated remaining life of each vintage with each account. The estimated remaining life of each vintage is a direct function of the achieved age of each vintage, the estimated survivor curve and the average service life estimate.

Once the above two estimates are determined (the allocated booked reserve by vintage and the average remaining life of each vintage), an annual accrual requirement for each vintage is determined by dividing the net book value for each vintage (considering the estimated future salvage requirements) by the average remaining life of the vintage. The annual requirement for each vintage is summed at the account level and divided into the sum of the accounts original cost surviving as of December 31, 2021.

This process results in each vintage's calculated net book value to be depreciated over an appropriate remaining life. This vintage weighting on CAD approach to the remaining life calculations is widely considered to be the most accurate. Concentric agrees and views this methodology as the correct and most appropriate calculation.

### 3.1.3  Survivor Curves

The use of an average service life or a property group implies that the various units in the group have different lives. Thus, the average life may be obtained by determining the separate lives of each of the units, or by constructing a survivor curve plotting the number of units which survive at successive ages using the retirement rate method of analysis.

The range of survivor characteristics usually experienced by utility and industrial properties is encompassed by a system of generalized survivor curves known as the Iowa type curves. The Iowa curves *"...were sorted into three groups according to whether the mode was to the left, approximately coincident with, or to the right of the average-life ordinate. The curves in each of these three groups were then sub-classified in accordance with the height of the mode, taking also into consideration the distance of the mode to the left or right of the average life."* [2] The Iowa curves are described as L-type (i.e. left-moded), R-type (i.e. right-moded), and S-type (i.e. symmetrical). Further development resulted in the introduction of O-type (i.e. origin-moded curves) where the greatest frequency of retirement occurs at the origin, or immediately after age zero. Individual type curves are further depicted with numerical subscripts which represent the relative heights of the modes of the frequency curves within each family.

The program that is used by Concentric for statistical smooth curve fitting utilizes an internal "goodness-of-fit" criterion known as the Residual Measure. This Residual Measure is based on a least squares solution of the differences between the stub curve (or original data points) and smooth survivor curve which also requires a balancing of the differences above and below the stub curve.

The criterion of goodness-of-fit is the mean square of the differences between the points on the stub and fitted smooth survivor curves. The residual measure, or standard error of estimate, shown in the output format is the square root of this mean square. As such, the lower the Residual Measure the better the statistical fit between the analyzed Iowa curve and the observed data points. Concentric

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[2]  Robley Winfrey, Statistical Analyses of Industrial Property Retirements, Bulletin 125 revised (Engineering Research Institute, Iowa State University, 1935) 65

follows the widely used practice of fitting Iowa curves up to one percent of the maximum exposures. This standard practice is utilized to minimize the influence of typically small retirements applied to similarly small exposures which may unduly affect the Iowa curve fitting process. However, Concentric will recognize the observed data points beyond the one percent of maximum exposures if it is determined that the additional data is a valid consideration for life recommendation.

A discussion of the general concept of survivor curves and retirement rate method is presented in Section 9.

### 3.1.4  Survivor Curve and Net Salvage Judgments

The service life and net salvage estimates used in the depreciation and amortization calculations were based on informed professional judgment which incorporated a review of management's plans, policies and outlook, a general knowledge of the electric and gas utility industries, and comparisons of the service life and net salvage estimates from Concentric's studies of other utilities. The use of survivor curves, to reflect the expected dispersion of retirement, provides a consistent method of estimating depreciation for plant. Iowa type survivor curves were used to depict the estimated survivor curves for the plant accounts not subject to amortization accounting.

The procedure for estimating service lives consisted of compiling historical data for the plant accounts or depreciable groups, analyzing this history through the use of widely accepted techniques, and forecasting the survivor characteristics for each depreciable group on the basis of interpretations of the historical data and the probable future. The forecasting of a probable future included management and operational staff interviews. The combination of the historical experience and the probable future yielded estimated survivor curves from which the average service lives were derived.

The resultant depreciation rates are summarized in the applicable tables of this study (Section 5). The depreciation rates should be reviewed periodically to reflect the changes that result from plant and reserve account activity. A depreciation reserve deficiency or surplus will develop if future capital expenditures vary significantly from those anticipated in this study.

The estimates of net salvage for the mass property accounts were based mostly in part on historical data related to actual retirement activity for the years 1968 through 2021, for most accounts. Gross salvage and cost of removal as recorded to the depreciation reserve account and related to experienced retirements were used. Concentric notes the data from the previous depreciation consultant was used and considered in the historic net salvage analysis, but more relevancy was placed on the more recent data from 2009 through 2021 provided directly to Concentric by MDU. Percentages of the cost of plant retired were calculated for each component of net salvage on an annual, three-year, five-year, and on a cumulative moving average basis.

The following discussion, dealing with a number of accounts which comprise the majority of the investment analyzed, presents an overview of the factors considered by Concentric in the determination of the average service life and net salvage estimates.  The survivor curve estimates for the remainder of the accounts not discussed in the following sections were based on similar considerations.

ACCOUNT 390 – STRUCTURES AND IMPROVEMENTS

| Investment $ | Investment % | Previously Approved Curves | Concentric Recommended Curve | Previously Approved Salvage | Concentric Recommended Salvage |
|---|---|---|---|---|---|
| $57,959,115 | 71.13% | 38-R3 | 40-R2 | 0% | -5% |

The investment in Structures and Improvements is approximately $57.9 million, representing 71 percent of the total depreciable plant studied. The retirements, additions and other plant transactions, for the period 1952 through 2021, were analyzed by the retirement rate method. Retirements, for the period 2009 through 2021, of $7,806,923.44 were recorded for this period. The currently approved life parameter is an Iowa 38-R3 that produced a fit with a related residual measure of 3.0467. An Iowa 40-R2 produced a better fit with a residual measure of 2.5362, as depicted on page 6-2. Discussions with MDU operational and management staff indicated that the Iowa 40-R2 is a good representation of the historical life and future expectations. Based on the above discussion and considerations, and on Concentric's experience, an Iowa 40-R2 is a reasonable expectation for the investment in this account. As such, Concentric recommends an Iowa 40-R2 to represent the future expectations for the investment in this account.

This account currently has a previously approved net salvage of zero percent. This account has shown a wide range in historical net salvage activity since 1968. The range has been from negative 31 percent to positive 43 percent. A three-year band produces results that range from over negative 1,000 percent to over positive 100 percent. The five-year band ranges from over negative 500 to over positive 1,000 percent. The full depth band averages positive 21 percent. At this time, Concentric recommends that a slight step down to a negative five percent net salvage estimate be used in the depreciation calculations within this study.

ACCOUNT 392.1- TRANSPORTATION EQUIPMENT – TRAILERS

| Investment $ | Investment % | Previously Approved Curves | Concentric Recommended Curve | Previously Approved Salvage | Concentric Recommended Salvage |
|---|---|---|---|---|---|
| $18,482 | 0.02% | 25-L1 | 25-R1 | 20% | 15% |

The investment in this account relates to Transportation Equipment - Trailers. The investment in this account is approximately $18 thousand, representing 0.02 percent of the total depreciable plant studied. The retirements, additions and other plant transactions, for the period 1937 through 2021, were analyzed by the retirement rate method. Retirements, for the period 2009 through 2021, of $55,565.59 were recorded for this period. The currently approved life parameter is an Iowa 25-L1 which produced a fit with a related residual measure of 1.748. An Iowa 25-R1 produced a fit with a related residual measure of 1.7738, as depicted on page 6-6. Discussions with MDU operational and management staff indicated that the Iowa 25-R1 is a good representation of the historical life and future expectations. Based on the above and considerations, and on Concentric's experience, an Iowa 25-R1 is a reasonable expectation for the investment in this account. As such, Concentric recommends an Iowa 25-R1 to represent the future expectations for the investment in this account.

This account currently has an approved net salvage of positive 20 percent. This account has shown a limited range in the historical net salvage activity with low retirements since 2013. At this time,

Concentric recommends that a positive 15 percent net salvage estimate be used in the depreciation calculations within this study.

ACCOUNT 392.2 – TRANSPORTATION EQUIPMENT – VEHICLES

| Investment $ | Investment % | Previously Approved Curves | Concentric Recommended Curve | Previously Approved Salvage | Concentric Recommended Salvage |
|---|---|---|---|---|---|
| $8,552,949 | 10.5% | 9-R3 | 10-L2.5 | 20% | 20% |

The investment in this account relates to Transportation Equipment – Vehicles. This includes everything from ¼ ton trucks to ¾ ton trucks, service trucks, and trucks with cranes.

The investment in Transportation Equipment - Vehicles is approximately $8.5 million, representing 10.5 percent of the total depreciable plant studied. The retirements, additions and other plant transactions, for the period 1979 through 2021, were analyzed by the retirement rate method. Retirements, for the period 2009 through 2021, of $7,601,423.76 were recorded for this period. The currently approved life parameter for the MDU account is an Iowa 9-R3 that produced a fit with a related residual measure of 0.2624. Data analysis and discussion with MDU personnel indicated that a slight adjustment to a 10-L2.5, with a residual measure of 0.1571, produced a better visual and mathematical fit, and is a reasonable expectation for the investment in this account. As such, Concentric recommends an Iowa 10-L2.5 going forward to represent the future expectations for the investment in this account.

This account currently has an approved net salvage of positive 20 percent. This account has shown a close range in historical net salvage activity since 2009. The range has been from positive 31 percent to positive 82 percent. A three-year band produces results that range from positive 15 percent to positive 49 percent. The five-year band ranges from positive 18 percent to positive 68 percent. The full depth band averages positive 31 percent. At this time, Concentric recommends that a positive 20 percent net salvage estimate continue to be used in the depreciation calculations within this study.

SECTION 4

# 4 CALCULATION OF ANNUAL AND ACCRUED DEPRECIATION

## 4.1 Calculation of Annual and Accrued Amortization

Amortization is the gradual extinguishment of an amount in an account by distributing such amount over a fixed period, over the life of the asset or liability to which it applies, or over the period during which it is anticipated the benefit will be realized. Normally, the distribution of the amount is in equal amounts to each year of the amortization period.

The calculation of annual and accrued amortization requires the selection of an amortization period. The amortization periods used in this report were based on judgment which incorporated a consideration of the period during which the assets will render most of their service, the amortization period and service lives used by other utilities, and the service life estimates previously used for the asset under depreciation accounting.

Amortization accounting is proposed for a number of accounts that represent numerous units of property, but a very small portion of depreciable plant in service. The accounts and their amortization periods are as follows:

| Account | Title | Investment | Recommended Amortization Period in Years |
|---------|-------|-----------|------------------------------------------|
| 391.1 | Office Furniture & Equipment | $2,130,096 | 15 |
| 391.3 | Computer Equipment – PC | $3,638,802 | 5 |
| 391.5 | Computer Equipment – Other | $2,045,305 | 5 |
| 393.0 | Stores Equipment | $174,519 | 30 |
| 394.1 | Tools, Shop, & Garage Equipment | $759,520 | 20 |
| 394.3 | Vehicle Maintenance Equipment | $46,590 | 20 |
| 394.4 | Vehicle Refueling Equipment | $3,815 | 20 |
| 397.1 | Communication Equipment – Fixed Radios | $2,454,294 | 15 |
| 397.2 | Communication Equipment – Mobile Radios | $1,069,272 | 15 |
| 397.3 | General Telephone Communication Equipment | $681,544 | 10 |
| 397.5 | Supervisory & Telemetering Equipment | $15,704 | 10 |
| 397.8 | Network Equipment | $387,937 | 5 |
| 398.0 | Miscellaneous Equipment | $1,543,614 | 25 |

For the purpose of calculating annual amortization amounts, as of December 31, 2021, the book depreciation reserve for each plant account (or sub-account) is assigned or allocated to vintages. The book reserve assigned to vintages with an age greater than the amortization period is equal to the vintage's original cost. The remaining book reserve is allocated among vintages with an age less than

the amortization period in proportion to the calculated accrued amortization. The calculated accrued amortization is equal to the original cost multiplied by the ratio of the vintage's age to its amortization period. The annual amortization amount is determined by dividing the future amortizations (original cost less allocated book reserve) by the remaining period of amortization for the vintage.

## 4.2 Monitoring of Book Accumulated Depreciation

The calculated accrued depreciation or amortization represents that portion of the depreciable cost which will not be allocated to expense through future depreciation accruals, if current forecasts of service life characteristics materialize and are used as a basis for depreciation accounting. Thus, the calculated accrued depreciation provides a measure of the book accumulated depreciation. The use of this measure is recommended in the amortization of book accumulated depreciation variances to insure complete recovery of capital over the life of the property.

The recommended amortization of the variance between the book accumulated depreciation and the calculated accrued depreciation is based on an amortization period equal to the composite remaining life for each property group where the variance exceeds five percent of the calculated accrued depreciation.

The composite remaining life for use in the calculation of accumulated depreciation variances is derived by developing the composite sum of the individual vintage remaining lives.

SECTION 5

# 5 RESULTS OF THE STUDY

## 5.1 Qualification of Results

The calculated annual and accrued depreciation are the principal results of the study and are shown in Tables 1, 1A, and 1B, related to investment as of December 31, 2021. Continued surveillance and periodic revisions are normally required to maintain continued use of appropriate annual depreciation accrual rates. An assumption that accrual rates can remain unchanged over a long period of time implies a disregard for the inherent variability in service lives and salvage and for the change of the composition of property in service. The annual accrual rates and the accrued depreciation were calculated in accordance with the Straight-Line method, using the ALG procedure, based on estimates which reflect considerations of current historical evidence and expected future conditions.

## 5.2 Description of Detailed Tabulations

The following tables provide summaries by account of the original cost of investment, calculated and booked accumulated depreciation amounts, the required amount of annual depreciation expense, the required depreciation rate to be applied against the original cost of the account and the estimated composite remaining life of the surviving plant in service.

The detailed calculations of annual depreciation applicable to depreciable assets, as of December 31, 2021, are presented in account sequence starting in Section 5 – Page 5-2. The tables indicate the estimated average survivor curves used in the calculations. The tables set forth (for each installation year) the original cost, calculated accrued depreciation and the calculated annual accrual.

# MONTANA-DAKOTA UTILITIES CO. - COMMON PLANT

**TABLE 1. REVISED SUMMARY OF SERVICE LIFE AND NET SALVAGE ESTIMATES AND CALCULATED ANNUAL AND
ACCRUED DEPRECIATION RELATED TO THE RECOVERY OF AVERAGE ORIGINAL COST IN COMMON PLANT AS OF DECEMBER 31, 2021**

**- TOTAL -**

| ACCOUNT | DESCRIPTION | ESTIMATED SURVIVOR CURVE | NET SALVAGE PERCENT | SURVIVING ORIGINAL COST AS OF 12/31/2021 | CALCULATED ACCRUED DEPRECIATION | BOOK RESERVE | ACCRUAL AMOUNT | RATE | REMAINING LIFE |
|---|---|---|---|---|---|---|---|---|---|
| **GENERAL PLANT** | | | | | | | | | |
| 390.0 | STRUCTURES & IMPROVEMENTS | 40-R2 | -5 | 57,959,115 | 16,797,415 | 17,279,728 | 1,490,513 | 2.57% | 29.0 |
| 391.1 | OFFICE FURNITURE & EQUIPMENT | 15-SQ | 0 | 2,130,096 | 1,006,971 | 980,352 | 144,983 | 6.81% | 7.9 |
| 391.3 | COMPUTER EQUIPMENT - PC | 5-SQ | 0 | 3,638,802 | 1,803,390 | 1,465,895 | 886,780 | 24.37% | 2.5 |
| 391.5 | COMPUTER EQUIPMENT - OTHER | 5-SQ | 0 | 2,045,305 | 990,748 | 806,878 | 484,639 | 23.70% | 2.6 |
| 392.1 | TRANSPORTATION EQUIPMENT - TRAILERS | 25-R1 | 15 | 18,482 | 4,321 | 4,252 | 633 | 3.42% | 18.1 |
| 392.2 | TRANSPORTATION EQUIPMENT | 10-L2.5 | 20 | 8,552,949 | 2,647,624 | 1,941,593 | 825,496 | 9.65% | 6.1 |
| 393.0 | STORES EQUIPMENT | 30-SQ | 0 | 174,519 | 44,725 | 50,428 | 5,123 | 2.94% | 22.3 |
| 394.1 | TOOLS, SHOP, & GARAGE EQUIPMENT | 20-SQ | 0 | 759,520 | 329,182 | 602,422 | 9,640 | 1.27% | 11.3 |
| 394.3 | VEHICLE MAINTENANCE EQUIPMENT | 20-SQ | 0 | 46,590 | 36,560 | 36,561 | 2,328 | 5.00% | 4.3 |
| 394.4 | VEHICLE REFUELING EQUIPMENT | 20-SQ | 0 | 3,815 | 3,147 | 3,815 | - | 0.00% | 3.5 |
| 397.1 | COMMUNICATION EQUIPMENT - FIXED RADIOS | 15-SQ | 0 | 2,454,294 | 1,108,474 | 1,075,983 | 172,894 | 7.04% | 8.2 |
| 397.2 | COMMUNICATION EQUIPMENT - MOBILE RADIOS | 15-SQ | 0 | 1,069,272 | 658,235 | 644,848 | 75,385 | 7.05% | 5.8 |
| 397.3 | GENERAL TELEPHONE COMMUNICATION EQUIPMENT | 10-SQ | 0 | 681,544 | 508,725 | 483,979 | 80,619 | 11.83% | 2.5 |
| 397.5 | SUPERVISORY & TELEMETERING EQUIPMENT | 10-SQ | 0 | 15,704 | 11,645 | 7,698 | 4,356 | 27.74% | 2.6 |
| 397.8 | NETWORK EQUIPMENT | 5-SQ | 0 | 387,937 | 187,973 | 139,218 | 97,514 | 25.14% | 2.6 |
| 398.0 | MISCELLANEOUS EQUIPMENT | 25-SQ | 0 | 1,543,614 | 529,827 | 695,508 | 47,067 | 3.05% | 16.4 |
| **TOTAL GENERAL PLANT** | | | | **81,481,558** | **26,668,962** | **26,219,158** | **4,327,970** | **5.31%** | |
| | | | | | | | | | |
| **TOTAL COMMON PLANT STUDIED** | | | | **81,481,558** | **26,668,962** | **26,219,158** | **4,327,970** | **5.31%** | |
| | | | | | | | | | |
| **PLANT NOT STUDIED** | | | | | | | | | |
| 303.0 | MISCELLANEOUS INTANGIBLE PLANT | | | 68,089,437 | | | | | |
| 389.0 | LAND & LAND RIGHTS GENERAL | | | 3,285,775 | | | | | |
| 392.3 | AIRCRAFT EQUIPMENT | | | 5,104,289 | | | | | |
| **TOTAL PLANT** | | | | 157,961,059 | | | | | |

# MONTANA-DAKOTA UTILITIES CO. - COMMON PLANT

### TABLE 1A. REVISED SUMMARY OF SERVICE LIFE AND NET SALVAGE ESTIMATES AND CALCULATED ANNUAL AND
### ACCRUED DEPRECIATION RELATED TO THE RECOVERY OF AVERAGE ORIGINAL COST IN COMMON PLANT AS OF DECEMBER 31, 2021
### - LIFE -

| ACCOUNT | DESCRIPTION | ESTIMATED SURVIVOR CURVE | NET SALVAGE PERCENT | SURVIVING ORIGINAL COST AS OF 12/31/2021 | CALCULATED ACCRUED DEPRECIATION | BOOK RESERVE | ACCRUAL AMOUNT | RATE | REMAINING LIFE |
|---|---|---|---|---|---|---|---|---|---|
| **GENERAL PLANT** | | | | | | | | | |
| 390.0 | STRUCTURES & IMPROVEMENTS | 40-R2 | 0 | 57,959,115 | 15,997,538 | 18,045,786 | 1,318,028 | 2.27% | 29.0 |
| 391.1 | OFFICE FURNITURE & EQUIPMENT | 15-SQ | 0 | 2,130,096 | 1,006,971 | 980,352 | 144,983 | 6.81% | 7.9 |
| 391.3 | COMPUTER EQUIPMENT - PC | 5-SQ | 0 | 3,638,802 | 1,803,390 | 1,465,895 | 886,780 | 24.37% | 2.5 |
| 391.5 | COMPUTER EQUIPMENT - OTHER | 5-SQ | 0 | 2,045,305 | 990,748 | 806,878 | 484,639 | 23.70% | 2.6 |
| 392.1 | TRANSPORTATION EQUIPMENT - TRAILERS | 25-R1 | 15 | 18,482 | 4,321 | 4,252 | 633 | 3.42% | 18.1 |
| 392.2 | TRANSPORTATION EQUIPMENT | 10-L2.5 | 20 | 8,552,949 | 2,647,624 | 1,941,593 | 825,496 | 9.65% | 6.1 |
| 393.0 | STORES EQUIPMENT | 30-SQ | 0 | 174,519 | 44,725 | 50,428 | 5,123 | 2.94% | 22.3 |
| 394.1 | TOOLS, SHOP, & GARAGE EQUIPMENT | 20-SQ | 0 | 759,520 | 329,182 | 602,422 | 9,640 | 1.27% | 11.3 |
| 394.3 | VEHICLE MAINTENANCE EQUIPMENT | 20-SQ | 0 | 46,590 | 36,560 | 36,561 | 2,328 | 5.00% | 4.3 |
| 394.4 | VEHICLE REFUELING EQUIPMENT | 20-SQ | 0 | 3,815 | 3,147 | 3,815 | - | 0.00% | 3.5 |
| 397.1 | COMMUNICATION EQUIPMENT - FIXED RADIOS | 15-SQ | 0 | 2,454,294 | 1,108,474 | 1,075,983 | 172,894 | 7.04% | 8.2 |
| 397.2 | COMMUNICATION EQUIPMENT - MOBILE RADIOS | 15-SQ | 0 | 1,069,272 | 658,235 | 644,848 | 75,385 | 7.05% | 5.8 |
| 397.3 | GENERAL TELEPHONE COMMUNICATION EQUIPMENT | 10-SQ | 0 | 681,544 | 508,725 | 483,979 | 80,619 | 11.83% | 2.5 |
| 397.5 | SUPERVISORY & TELEMETERING EQUIPMENT | 10-SQ | 0 | 15,704 | 11,645 | 7,698 | 4,356 | 27.74% | 2.6 |
| 397.8 | NETWORK EQUIPMENT | 5-SQ | 0 | 387,937 | 187,973 | 139,218 | 97,514 | 25.14% | 2.6 |
| 398.0 | MISCELLANEOUS EQUIPMENT | 25-SQ | 0 | 1,543,614 | 529,827 | 695,508 | 47,067 | 3.05% | 16.4 |
| **TOTAL GENERAL PLANT** | | | | **81,481,558** | **25,869,085** | **26,985,216** | **4,155,485** | **5.10%** | |
| | | | | | | | | | |
| **TOTAL COMMON PLANT STUDIED** | | | | **81,481,558** | **25,869,085** | **26,985,216** | **4,155,485** | **5.10%** | |
| | | | | | | | | | |
| **PLANT NOT STUDIED** | | | | | | | | | |
| 303.0 | MISCELLANEOUS INTANGIBLE PLANT | | | 68,089,437 | | | | | |
| 389.0 | LAND & LAND RIGHTS GENERAL | | | 3,285,775 | | | | | |
| 392.3 | AIRCRAFT EQUIPMENT | | | 5,104,289 | | | | | |
| **TOTAL PLANT** | | | | 157,961,059 | | | | | |

# MONTANA-DAKOTA UTILITIES CO. - COMMON PLANT

**TABLE 1B. REVISED SUMMARY OF SERVICE LIFE AND NET SALVAGE ESTIMATES AND CALCULATED ANNUAL AND**
**ACCRUED DEPRECIATION RELATED TO THE RECOVERY OF NET SALVAGE IN COMMON PLANT AS OF DECEMBER 31, 2021**
**- NET SALVAGE -**

| ACCOUNT | DESCRIPTION | ESTIMATED SURVIVOR CURVE | NET SALVAGE PERCENT | SURVIVING ORIGINAL COST AS OF 12/31/2021 | CALCULATED ACCRUED DEPRECIATION | BOOK RESERVE | ACCRUAL AMOUNT | RATE |
|---|---|---|---|---|---|---|---|---|
| **GENERAL PLANT** | | | | | | | | |
| 390.0 | STRUCTURES & IMPROVEMENTS | 40-R2 | -5 | 57,959,115 | 799,877 | (766,058) | 172,485 | 0.30% |
| 391.1 | OFFICE FURNITURE & EQUIPMENT | 15-SQ | 0 | 2,130,096 | - | - | - | 0.00% |
| 391.3 | COMPUTER EQUIPMENT - PC | 5-SQ | 0 | 3,638,802 | - | - | - | 0.00% |
| 391.5 | COMPUTER EQUIPMENT - OTHER | 5-SQ | 0 | 2,045,305 | - | - | - | 0.00% |
| 392.1 | TRANSPORTATION EQUIPMENT - TRAILERS | 25-R1 | 0 | 18,482 | - | - | - | 0.00% |
| 392.2 | TRANSPORTATION EQUIPMENT | 10-L2.5 | 0 | 8,552,949 | - | - | - | 0.00% |
| 393.0 | STORES EQUIPMENT | 30-SQ | 0 | 174,519 | - | - | - | 0.00% |
| 394.1 | TOOLS, SHOP, & GARAGE EQUIPMENT | 20-SQ | 0 | 759,520 | - | - | - | 0.00% |
| 394.3 | VEHICLE MAINTENANCE EQUIPMENT | 20-SQ | 0 | 46,590 | - | - | - | 0.00% |
| 394.4 | VEHICLE REFUELING EQUIPMENT | 20-SQ | 0 | 3,815 | - | - | - | 0.00% |
| 397.1 | COMMUNICATION EQUIPMENT - FIXED RADIOS | 15-SQ | 0 | 2,454,294 | - | - | - | 0.00% |
| 397.2 | COMMUNICATION EQUIPMENT - MOBILE RADIOS | 15-SQ | 0 | 1,069,272 | - | - | - | 0.00% |
| 397.3 | GENERAL TELEPHONE COMMUNICATION EQUIPMENT | 10-SQ | 0 | 681,544 | - | - | - | 0.00% |
| 397.5 | SUPERVISORY & TELEMETERING EQUIPMENT | 10-SQ | 0 | 15,704 | - | - | - | 0.00% |
| 397.8 | NETWORK EQUIPMENT | 5-SQ | 0 | 387,937 | - | - | - | 0.00% |
| 398.0 | MISCELLANEOUS EQUIPMENT | 25-SQ | 0 | 1,543,614 | - | - | - | 0.00% |
| **TOTAL GENERAL PLANT** | | | | **81,481,558** | **799,877** | **(766,058)** | **172,485** | **0.21%** |
| | | | | | | | | |
| **TOTAL COMMON PLANT STUDIED** | | | | **81,481,558** | **799,877** | **(766,058)** | **172,485** | **0.21%** |
| | | | | | | | | |
| **PLANT NOT STUDIED** | | | | | | | | |
| 303.0 | MISCELLANEOUS INTANGIBLE PLANT | | | 68,089,437 | | | | |
| 389.0 | LAND & LAND RIGHTS GENERAL | | | 3,285,775 | | | | |
| 392.3 | AIRCRAFT EQUIPMENT | | | 5,104,289 | | | | |
| **TOTAL PLANT** | | | | 157,961,059 | | | | |

SECTION 6

# 6   RETIREMENT RATE ANALYSIS

# MDU Common

## Account 390.00 - Structures & Improvements

Placement Band - 1952 - 2021   Experience Band - 2009 - 2021

## Actual and Smooth Survivor Curves
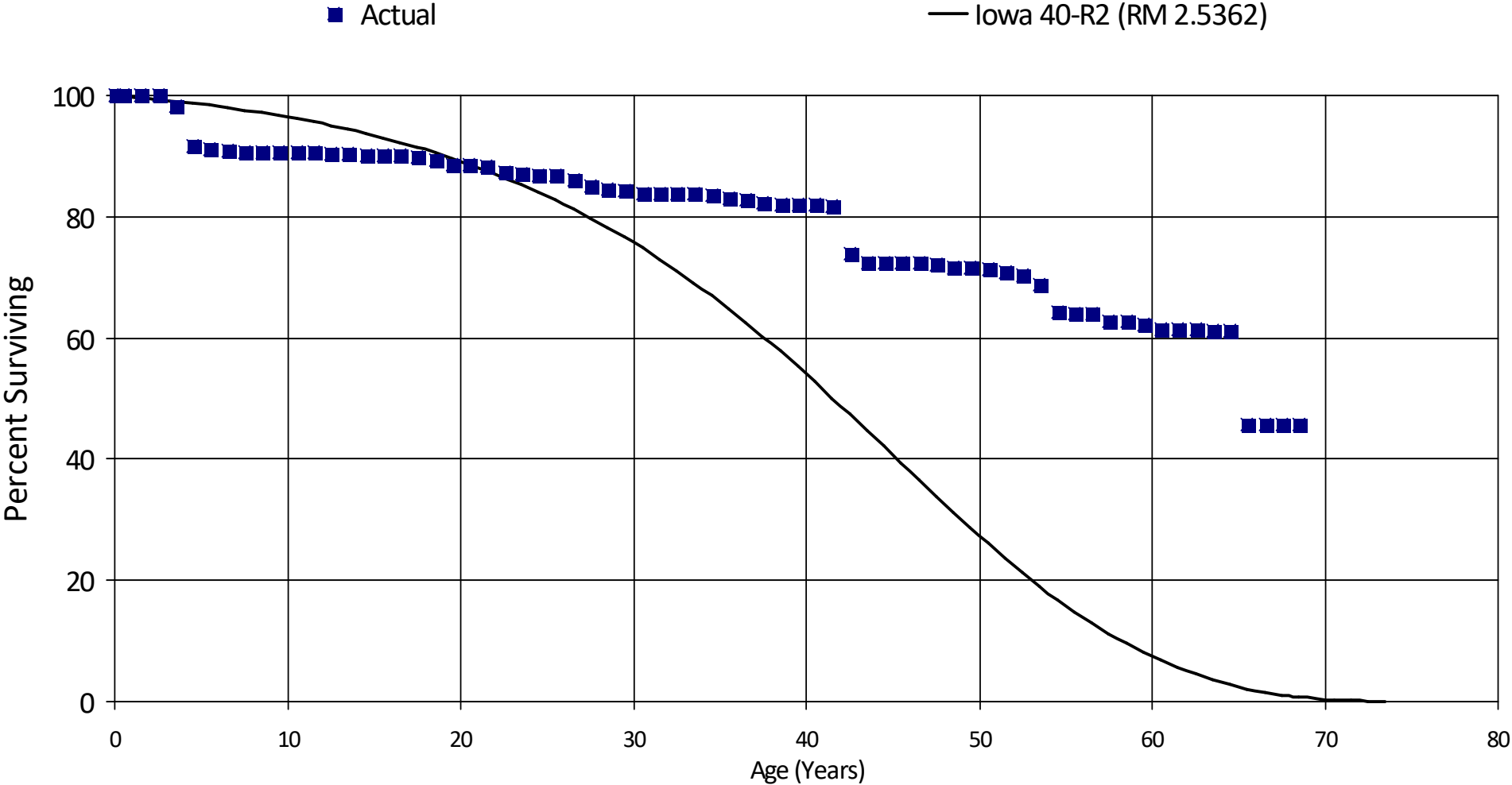
# MDU Common

## Account 390.00 - Structures & Improvements

Placement Band - 1952 - 2021    Experience Band - 2009 - 2021

## RETIREMENT RATE ANALYSIS

| Age at Begin of Interval | Exposures at Beginning of Age Interval | Retirements During Age Interval | Retmt Ratio | Survivor Ratio | % Surviving |
|---|---|---|---|---|---|
| 0 | 65,766,039 | 13,475 | 0.00020 | 0.99980 | 100.00 |
| 0.5 | 65,679,966 | 39,092 | 0.00060 | 0.99940 | 99.98 |
| 1.5 | 57,830,913 | 20,887 | 0.00036 | 0.99964 | 99.92 |
| 2.5 | 56,318,909 | 1,003,331 | 0.01782 | 0.98218 | 99.88 |
| 3.5 | 52,804,475 | 3,429,736 | 0.06495 | 0.93505 | 98.10 |
| 4.5 | 45,614,835 | 263,478 | 0.00578 | 0.99422 | 91.73 |
| 5.5 | 43,986,084 | 142,215 | 0.00323 | 0.99677 | 91.20 |
| 6.5 | 43,276,893 | 110,672 | 0.00256 | 0.99744 | 90.91 |
| 7.5 | 27,321,253 | 24,730 | 0.00091 | 0.99909 | 90.68 |
| 8.5 | 26,974,929 | 4,989 | 0.00018 | 0.99982 | 90.60 |
| 9.5 | 25,865,503 | 13,890 | 0.00054 | 0.99946 | 90.58 |
| 10.5 | 25,422,780 | 0 | 0.00000 | 1.00000 | 90.53 |
| 11.5 | 23,139,844 | 16,504 | 0.00071 | 0.99929 | 90.53 |
| 12.5 | 23,123,340 | 40,006 | 0.00173 | 0.99827 | 90.47 |
| 13.5 | 22,285,383 | 48,884 | 0.00219 | 0.99781 | 90.31 |
| 14.5 | 22,065,083 | 4,793 | 0.00022 | 0.99978 | 90.11 |
| 15.5 | 22,040,286 | 15,872 | 0.00072 | 0.99928 | 90.09 |
| 16.5 | 18,129,628 | 33,129 | 0.00183 | 0.99817 | 90.03 |
| 17.5 | 16,870,206 | 112,893 | 0.00669 | 0.99331 | 89.87 |
| 18.5 | 16,566,860 | 130,387 | 0.00787 | 0.99213 | 89.27 |
| 19.5 | 16,029,336 | 0 | 0.00000 | 1.00000 | 88.57 |
| 20.5 | 15,862,316 | 59,046 | 0.00372 | 0.99628 | 88.57 |
| 21.5 | 15,171,557 | 144,610 | 0.00953 | 0.99047 | 88.24 |
| 22.5 | 14,844,554 | 51,782 | 0.00349 | 0.99651 | 87.40 |
| 23.5 | 14,607,148 | 40,651 | 0.00278 | 0.99722 | 87.09 |
| 24.5 | 13,922,697 | 9,569 | 0.00069 | 0.99931 | 86.85 |
| 25.5 | 13,624,592 | 136,345 | 0.01001 | 0.98999 | 86.79 |
| 26.5 | 23,910,259 | 227,418 | 0.00951 | 0.99049 | 85.92 |

# MDU Common

## Account 390.00 - Structures & Improvements

Placement Band - 1952 - 2021    Experience Band - 2009 - 2021

| | | | | | |
|---|---|---|---|---|---|
| 27.5 | 21,009,324 | 148,104 | 0.00705 | 0.99295 | 85.10 |
| 28.5 | 20,522,861 | 27,625 | 0.00135 | 0.99865 | 84.50 |
| 29.5 | 20,166,019 | 139,561 | 0.00692 | 0.99308 | 84.39 |
| 30.5 | 19,921,820 | 24 | 0.00000 | 1.00000 | 83.81 |
| 31.5 | 19,820,262 | 21,480 | 0.00108 | 0.99892 | 83.81 |
| 32.5 | 19,764,835 | 8,757 | 0.00044 | 0.99956 | 83.72 |
| 33.5 | 19,746,416 | 35,112 | 0.00178 | 0.99822 | 83.68 |
| 34.5 | 19,705,848 | 130,913 | 0.00664 | 0.99336 | 83.53 |
| 35.5 | 19,190,872 | 38,262 | 0.00199 | 0.99801 | 82.98 |
| 36.5 | 18,083,098 | 101,848 | 0.00563 | 0.99437 | 82.81 |
| 37.5 | 11,575,849 | 63,298 | 0.00547 | 0.99453 | 82.34 |
| 38.5 | 10,681,923 | 0 | 0.00000 | 1.00000 | 81.89 |
| 39.5 | 7,282,278 | 0 | 0.00000 | 1.00000 | 81.89 |
| 40.5 | 6,991,807 | 10,837 | 0.00155 | 0.99845 | 81.89 |
| 41.5 | 6,462,831 | 629,902 | 0.09747 | 0.90253 | 81.76 |
| 42.5 | 4,657,096 | 97,810 | 0.02100 | 0.97900 | 73.79 |
| 43.5 | 4,532,160 | -13,846 | -0.00306 | 1.00306 | 72.24 |
| 44.5 | 4,021,935 | 6,046 | 0.00150 | 0.99850 | 72.46 |
| 45.5 | 3,972,989 | 0 | 0.00000 | 1.00000 | 72.35 |
| 46.5 | 3,972,989 | 9,424 | 0.00237 | 0.99763 | 72.35 |
| 47.5 | 3,937,914 | 27,540 | 0.00699 | 0.99301 | 72.18 |
| 48.5 | 3,812,362 | 0 | 0.00000 | 1.00000 | 71.68 |
| 49.5 | 3,363,329 | 11,960 | 0.00356 | 0.99644 | 71.68 |
| 50.5 | 3,293,627 | 29,387 | 0.00892 | 0.99108 | 71.42 |
| 51.5 | 3,261,294 | 18,061 | 0.00554 | 0.99446 | 70.78 |
| 52.5 | 3,074,356 | 67,113 | 0.02183 | 0.97817 | 70.39 |
| 53.5 | 738,579 | 49,944 | 0.06762 | 0.93238 | 68.85 |
| 54.5 | 523,232 | 2,459 | 0.00470 | 0.99530 | 64.19 |
| 55.5 | 150,655 | 0 | 0.00000 | 1.00000 | 63.89 |
| 56.5 | 143,620 | 2,816 | 0.01961 | 0.98039 | 63.89 |
| 57.5 | 80,158 | 0 | 0.00000 | 1.00000 | 62.64 |

# MDU Common

## Account 390.00 - Structures & Improvements

Placement Band - 1952 - 2021    Experience Band - 2009 - 2021

| | | | | | |
|---|---|---|---|---|---|
| 58.5 | 82,900 | 630 | 0.00760 | 0.99240 | 62.64 |
| 59.5 | 67,751 | 891 | 0.01315 | 0.98685 | 62.16 |
| 60.5 | 65,325 | 0 | 0.00000 | 1.00000 | 61.34 |
| 61.5 | 63,239 | 0 | 0.00000 | 1.00000 | 61.34 |
| 62.5 | 62,367 | 185 | 0.00297 | 0.99703 | 61.34 |
| 63.5 | 61,320 | 0 | 0.00000 | 1.00000 | 61.16 |
| 64.5 | 9,503 | 2,393 | 0.25182 | 0.74818 | 61.16 |
| 65.5 | 4,602 | 0 | 0.00000 | 1.00000 | 45.76 |
| 66.5 | 4,585 | 0 | 0.00000 | 1.00000 | 45.76 |
| 67.5 | 1,102 | 0 | 0.00000 | 1.00000 | 45.76 |
| 68.5 | -2,393 | 0 | 0.00000 | 1.00000 | 45.76 |
| Totals: | 7,806,920 | | | | |

# MDU Common

## Account 392.10 - Transportation Equipment - Trailers

Placement Band - 1937 - 2021    Experience Band - 2009 - 2021

## Actual and Smooth Survivor Curves



■ Actual          —— Iowa 25-R1 (RM 1.7738)
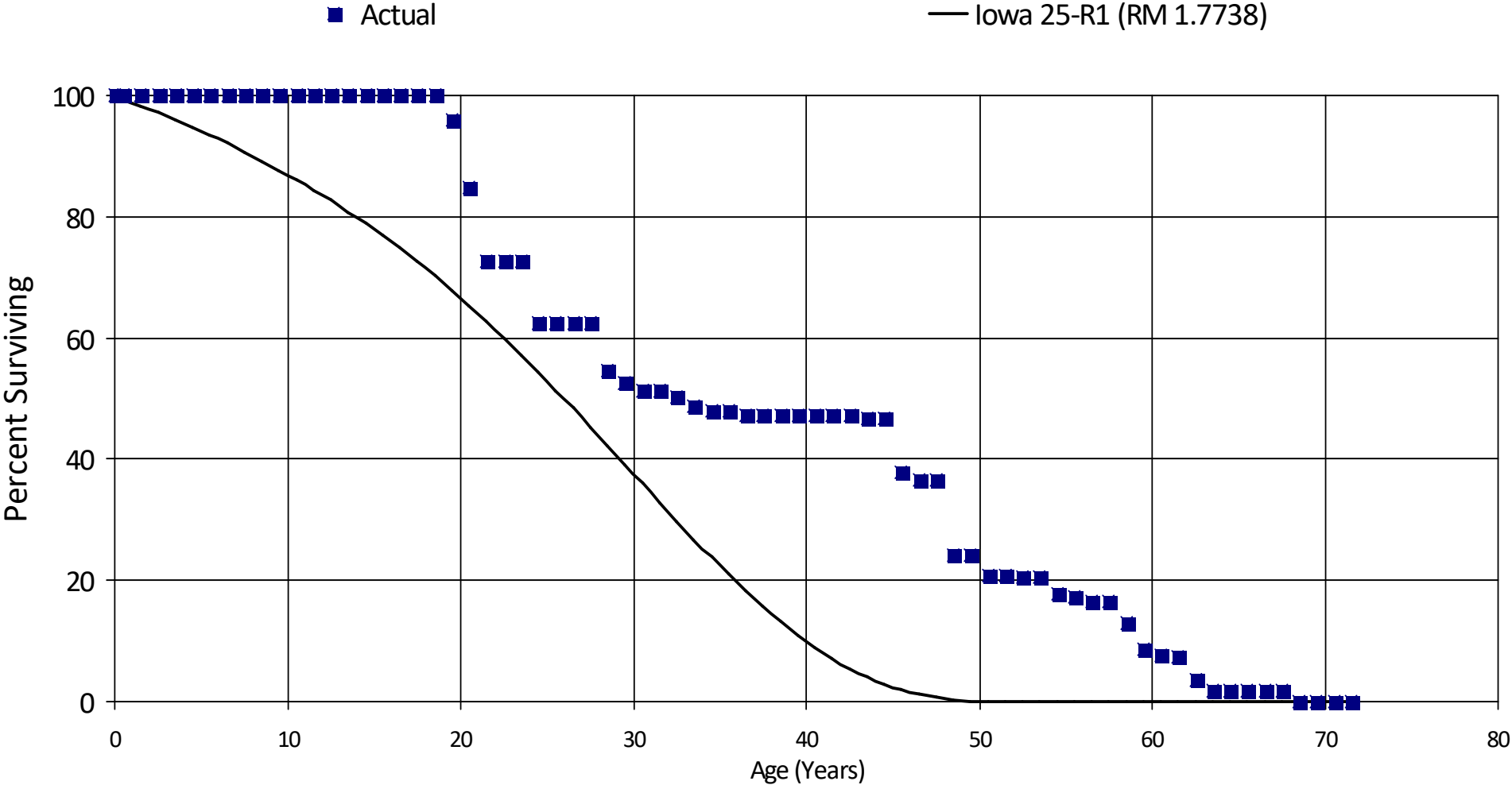
# MDU Common

## Account 392.10 - Transportation Equipment - Trailers

Placement Band - 1937 - 2021   Experience Band - 2009 - 2021

## RETIREMENT RATE ANALYSIS

| Age at Begin of Interval | Exposures at Beginning of Age Interval | Retirements During Age Interval | Retmt Ratio | Survivor Ratio | % Surviving |
|---|---|---|---|---|---|
| 0 | 74,048 | 0 | 0.00000 | 1.00000 | 100.00 |
| 0.5 | 74,048 | 0 | 0.00000 | 1.00000 | 100.00 |
| 1.5 | 74,048 | 0 | 0.00000 | 1.00000 | 100.00 |
| 2.5 | 74,048 | 0 | 0.00000 | 1.00000 | 100.00 |
| 3.5 | 74,048 | 0 | 0.00000 | 1.00000 | 100.00 |
| 4.5 | 74,048 | 0 | 0.00000 | 1.00000 | 100.00 |
| 5.5 | 74,048 | 0 | 0.00000 | 1.00000 | 100.00 |
| 6.5 | 74,048 | 0 | 0.00000 | 1.00000 | 100.00 |
| 7.5 | 74,048 | 0 | 0.00000 | 1.00000 | 100.00 |
| 8.5 | 71,565 | 0 | 0.00000 | 1.00000 | 100.00 |
| 9.5 | 62,980 | 0 | 0.00000 | 1.00000 | 100.00 |
| 10.5 | 55,566 | 0 | 0.00000 | 1.00000 | 100.00 |
| 11.5 | 55,566 | 0 | 0.00000 | 1.00000 | 100.00 |
| 12.5 | 55,566 | 0 | 0.00000 | 1.00000 | 100.00 |
| 13.5 | 55,566 | 0 | 0.00000 | 1.00000 | 100.00 |
| 14.5 | 55,566 | 0 | 0.00000 | 1.00000 | 100.00 |
| 15.5 | 55,566 | 0 | 0.00000 | 1.00000 | 100.00 |
| 16.5 | 55,566 | 0 | 0.00000 | 1.00000 | 100.00 |
| 17.5 | 55,566 | 0 | 0.00000 | 1.00000 | 100.00 |
| 18.5 | 55,566 | 2,295 | 0.04130 | 0.95870 | 100.00 |
| 19.5 | 53,271 | 6,178 | 0.11597 | 0.88403 | 95.87 |
| 20.5 | 47,093 | 6,781 | 0.14399 | 0.85601 | 84.75 |
| 21.5 | 40,312 | 0 | 0.00000 | 1.00000 | 72.55 |
| 22.5 | 40,312 | 0 | 0.00000 | 1.00000 | 72.55 |
| 23.5 | 40,312 | 5,664 | 0.14050 | 0.85950 | 72.55 |
| 24.5 | 34,648 | 0 | 0.00000 | 1.00000 | 62.36 |
| 25.5 | 34,648 | 0 | 0.00000 | 1.00000 | 62.36 |
| 26.5 | 34,648 | 0 | 0.00000 | 1.00000 | 62.36 |

# MDU Common

## Account 392.10 - Transportation Equipment - Trailers

Placement Band - 1937 - 2021   Experience Band - 2009 - 2021

| | | | | | |
|---|---|---|---|---|---|
| 27.5 | 34,648 | 4,278 | 0.12347 | 0.87653 | 62.36 |
| 28.5 | 30,371 | 1,112 | 0.03661 | 0.96339 | 54.66 |
| 29.5 | 29,258 | 748 | 0.02557 | 0.97443 | 52.66 |
| 30.5 | 28,511 | 0 | 0.00000 | 1.00000 | 51.31 |
| 31.5 | 28,511 | 611 | 0.02143 | 0.97857 | 51.31 |
| 32.5 | 27,900 | 776 | 0.02781 | 0.97219 | 50.21 |
| 33.5 | 27,123 | 448 | 0.01652 | 0.98348 | 48.81 |
| 34.5 | 26,675 | 0 | 0.00000 | 1.00000 | 48.00 |
| 35.5 | 26,675 | 402 | 0.01507 | 0.98493 | 48.00 |
| 36.5 | 26,272 | 0 | 0.00000 | 1.00000 | 47.28 |
| 37.5 | 26,272 | 0 | 0.00000 | 1.00000 | 47.28 |
| 38.5 | 26,272 | 0 | 0.00000 | 1.00000 | 47.28 |
| 39.5 | 26,272 | 0 | 0.00000 | 1.00000 | 47.28 |
| 40.5 | 26,272 | 0 | 0.00000 | 1.00000 | 47.28 |
| 41.5 | 26,272 | 0 | 0.00000 | 1.00000 | 47.28 |
| 42.5 | 26,272 | 365 | 0.01389 | 0.98611 | 47.28 |
| 43.5 | 25,907 | 0 | 0.00000 | 1.00000 | 46.62 |
| 44.5 | 25,907 | 4,902 | 0.18921 | 0.81079 | 46.62 |
| 45.5 | 21,005 | 671 | 0.03194 | 0.96806 | 37.80 |
| 46.5 | 20,334 | 0 | 0.00000 | 1.00000 | 36.59 |
| 47.5 | 20,334 | 6,950 | 0.34179 | 0.65821 | 36.59 |
| 48.5 | 13,384 | 0 | 0.00000 | 1.00000 | 24.08 |
| 49.5 | 13,384 | 1,758 | 0.13135 | 0.86865 | 24.08 |
| 50.5 | 11,627 | 0 | 0.00000 | 1.00000 | 20.92 |
| 51.5 | 11,627 | 254 | 0.02185 | 0.97815 | 20.92 |
| 52.5 | 11,373 | 0 | 0.00000 | 1.00000 | 20.46 |
| 53.5 | 11,373 | 1,439 | 0.12652 | 0.87348 | 20.46 |
| 54.5 | 9,934 | 333 | 0.03352 | 0.96648 | 17.87 |
| 55.5 | 9,601 | 417 | 0.04343 | 0.95657 | 17.27 |
| 56.5 | 9,184 | 0 | 0.00000 | 1.00000 | 16.52 |
| 57.5 | 9,184 | 2,021 | 0.22005 | 0.77995 | 16.52 |

# MDU Common

## Account 392.10 - Transportation Equipment - Trailers

Placement Band - 1937 - 2021    Experience Band - 2009 - 2021

| | | | | | |
|---|---|---|---|---|---|
| 58.5 | 7,163 | 2,418 | 0.33755 | 0.66245 | 12.88 |
| 59.5 | 4,745 | 551 | 0.11611 | 0.88389 | 8.53 |
| 60.5 | 4,195 | 56 | 0.01335 | 0.98665 | 7.54 |
| 61.5 | 4,139 | 2,155 | 0.52066 | 0.47934 | 7.44 |
| 62.5 | 1,984 | 1,012 | 0.51008 | 0.48992 | 3.57 |
| 63.5 | 972 | 0 | 0.00000 | 1.00000 | 1.75 |
| 64.5 | 972 | 0 | 0.00000 | 1.00000 | 1.75 |
| 65.5 | 972 | 0 | 0.00000 | 1.00000 | 1.75 |
| 66.5 | 972 | 0 | 0.00000 | 1.00000 | 1.75 |
| 67.5 | 972 | 947 | 0.97447 | 0.02553 | 1.75 |
| 68.5 | 25 | 0 | 0.00000 | 1.00000 | 0.04 |
| 69.5 | 25 | 0 | 0.00000 | 1.00000 | 0.04 |
| 70.5 | 25 | 0 | 0.00000 | 1.00000 | 0.04 |
| 71.5 | 25 | 25 | 1.00000 | | 0.04 |
| Totals: | 55,567 | | | | |

# MDU Common

## Account 392.20 - Transportation Equipment

Placement Band - 1979 - 2021   Experience Band - 2009 - 2021

## Actual and Smooth Survivor Curves

■ Actual          —— Iowa 10-L2.5 (RM 0.1571)
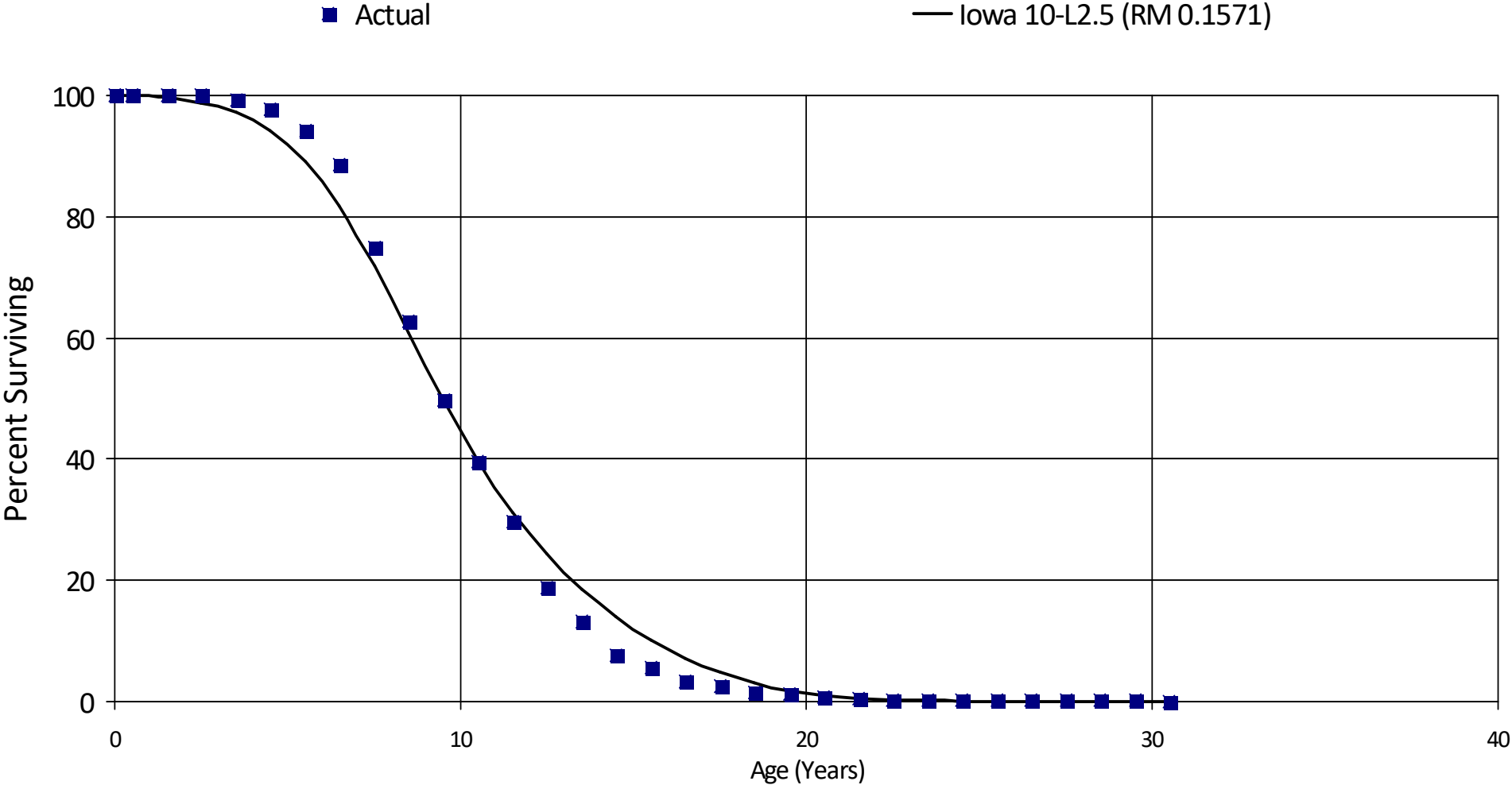
# MDU Common

## Account 392.20 - Transportation Equipment

Placement Band - 1979 - 2021   Experience Band - 2009 - 2021

## RETIREMENT RATE ANALYSIS

| Age at Begin of Interval | Exposures at Beginning of Age Interval | Retirements During Age Interval | Retmt Ratio | Survivor Ratio | % Surviving |
|---|---|---|---|---|---|
| 0 | 16,154,373 | 0 | 0.00000 | 1.00000 | 100.00 |
| 0.5 | 15,921,146 | 0 | 0.00000 | 1.00000 | 100.00 |
| 1.5 | 14,926,282 | 13,683 | 0.00092 | 0.99908 | 100.00 |
| 2.5 | 13,066,738 | 85,792 | 0.00657 | 0.99343 | 99.91 |
| 3.5 | 12,019,875 | 196,860 | 0.01638 | 0.98362 | 99.25 |
| 4.5 | 10,971,841 | 387,493 | 0.03532 | 0.96468 | 97.62 |
| 5.5 | 9,209,486 | 538,637 | 0.05849 | 0.94151 | 94.17 |
| 6.5 | 7,744,781 | 1,209,555 | 0.15618 | 0.84382 | 88.66 |
| 7.5 | 5,936,758 | 968,739 | 0.16318 | 0.83682 | 74.81 |
| 8.5 | 4,799,794 | 989,697 | 0.20620 | 0.79380 | 62.60 |
| 9.5 | 3,476,252 | 705,665 | 0.20300 | 0.79700 | 49.69 |
| 10.5 | 2,583,629 | 648,788 | 0.25111 | 0.74889 | 39.60 |
| 11.5 | 1,896,318 | 697,431 | 0.36778 | 0.63222 | 29.66 |
| 12.5 | 1,198,887 | 358,698 | 0.29919 | 0.70081 | 18.75 |
| 13.5 | 840,189 | 345,824 | 0.41160 | 0.58840 | 13.14 |
| 14.5 | 467,451 | 127,299 | 0.27233 | 0.72767 | 7.73 |
| 15.5 | 340,151 | 141,041 | 0.41464 | 0.58536 | 5.62 |
| 16.5 | 199,110 | 48,943 | 0.24581 | 0.75419 | 3.29 |
| 17.5 | 150,167 | 54,251 | 0.36127 | 0.63873 | 2.48 |
| 18.5 | 95,916 | 24,033 | 0.25056 | 0.74944 | 1.58 |
| 19.5 | 58,994 | 22,124 | 0.37502 | 0.62498 | 1.18 |
| 20.5 | 36,870 | 12,603 | 0.34182 | 0.65818 | 0.74 |
| 21.5 | 24,268 | 15,588 | 0.64233 | 0.35767 | 0.49 |
| 22.5 | 8,680 | 0 | 0.00000 | 1.00000 | 0.18 |
| 23.5 | 8,680 | 0 | 0.00000 | 1.00000 | 0.18 |
| 24.5 | 8,680 | 0 | 0.00000 | 1.00000 | 0.18 |
| 25.5 | 8,680 | 0 | 0.00000 | 1.00000 | 0.18 |
| 26.5 | 8,680 | 0 | 0.00000 | 1.00000 | 0.18 |

# MDU Common

## Account 392.20 - Transportation Equipment

Placement Band - 1979 - 2021    Experience Band - 2009 - 2021

| | | | | | |
|---|---|---|---|---|---|
| 27.5 | 8,680 | 0 | 0.00000 | 1.00000 | 0.18 |
| 28.5 | 8,680 | 0 | 0.00000 | 1.00000 | 0.18 |
| 29.5 | 8,680 | 8,680 | 1.00005 | -0.00005 | 0.18 |
| 30.5 | 0 | 0 | 0.00000 | 0.00000 | 0.00 |
| Totals: | | 7,601,424 | | | |

SECTION 7
# 7  NET SALVAGE

# Montana-Dakota Utilities Co. - Common Plant
**ACCOUNT 390 - GENERAL PLANT - STRUCTURES & IMPROVEMENTS**
**SUMMARY OF BOOK SALVAGE**

| Year | Regular Retirements | Cost of Removal Amount | Cost of Removal Percent | Gross Salvage Amount | Gross Salvage Percent | Net Salvage Amount | Net Salvage Percent | 3-Year Amount | 3-Year Percent | 5-Year Amount | 5-Year Percent | Historical Amount | Historical Percent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1968 | 4,756 | 40 | 1 | (662) | (14) | 622 | 13 | | | | | 622 | 13 |
| 1969 | 23,146 | 979 | 4 | (350) | (2) | (629) | -3 | | | | | -3 | 0 |
| 1970 | 9,536 | 1,402 | 15 | (5,551) | (58) | 4,149 | 44 | 1,381 | 11 | | | 1,381 | 11 |
| 1971 | 56 | 1,458 | 2,626 | (816) | (1,470) | (642) | -1,156 | 960 | 9 | | | 875 | 9 |
| 1972 | 89,020 | 100 | 0 | (20,851) | (23) | 20,751 | 23 | 8,086 | 25 | 4,850 | 19 | 4,850 | 19 |
| 1973 | 823 | - | 0 | (556) | (68) | 556 | 68 | 6,888 | 23 | 4,837 | 20 | 4,135 | 19 |
| 1974 | 6,649 | 2,381 | 36 | 0 | 0 | (2,381) | -36 | 6,309 | 20 | 4,487 | 21 | 3,204 | 17 |
| 1975 | 0 | - | | 0 | | 0 | | -608 | -24 | 3,657 | 19 | 3,204 | 17 |
| 1976 | 699 | 18 | 3 | 0 | 0 | (18) | -3 | -800 | -33 | 3,782 | 19 | 2,801 | 17 |
| 1977 | 33,563 | 7,368 | 22 | (10) | (0) | (7,358) | -22 | -2,459 | -22 | -1,840 | -22 | 1,672 | 9 |
| 1978 | 5,945 | 471 | 8 | (167) | (3) | (304) | -5 | -2,560 | -19 | -2,012 | -21 | 1,475 | 8 |
| 1979 | 362 | 29 | 8 | 2 | 1 | (31) | -9 | -2,564 | -19 | -1,542 | -19 | 1,338 | 8 |
| 1980 | 36,429 | - | 0 | (46,043) | (126) | 46,043 | 126 | 15,236 | 107 | 7,666 | 50 | 5,063 | 29 |
| 1981 | 386 | - | 0 | 0 | 0 | 0 | 0 | 15,337 | 124 | 7,670 | 50 | 5,063 | 29 |
| 1982 | 2,390 | - | 0 | 35,198 | 1,473 | (35,198) | -1,473 | 3,615 | 28 | 2,102 | 23 | 1,966 | 12 |
| 1983 | 151,268 | 17,106 | 11 | (52,055) | (34) | 34,949 | 23 | -83 | 0 | 9,152 | 24 | 4,322 | 17 |
| 1984 | 0 | - | | (240) | | 240 | | -3 | 0 | 9,207 | 24 | 4,050 | 17 |
| 1985 | 29,321 | - | 0 | 0 | 0 | 0 | 0 | 11,730 | 19 | -2 | 0 | 4,050 | 15 |
| 1986 | 353,206 | 23,017 | 7 | (463) | (0) | (22,554) | -6 | -7,438 | -6 | -4,513 | -4 | 2,387 | 5 |
| 1987 | 114,669 | 178,551 | 156 | (7) | (0) | (178,544) | -156 | -67,033 | -40 | -33,182 | -26 | -8,256 | -16 |
| 1988 | 1,066 | 44,428 | 4,168 | (20) | (2) | (44,408) | -4,167 | -81,835 | -52 | -49,053 | -49 | -10,264 | -21 |
| 1989 | 2,908 | 1,362 | 47 | 0 | 0 | (1,362) | -47 | -74,771 | -189 | -49,374 | -49 | -9,796 | -21 |
| 1990 | 1,179 | 4,184 | 355 | 0 | 0 | (4,184) | -355 | -16,651 | -969 | -50,210 | -53 | -9,515 | -22 |
| 1991 | 11,318 | 21,000 | 186 | 0 | 0 | (21,000) | -186 | -8,848 | -172 | -49,899 | -190 | -10,062 | -24 |
| 1992 | 6,400 | 59,486 | 929 | 0 | 0 | (59,486) | -929 | -28,223 | -448 | -26,088 | -570 | -12,309 | -31 |
| 1993 | 66,938 | 11,015 | 16 | (5,500) | (8) | (5,515) | -8 | -28,667 | -102 | -18,309 | -103 | -12,013 | -29 |
| 1994 | 76,340 | 3,348 | 4 | (53) | (0) | (3,296) | -4 | -22,765 | -46 | -18,696 | -58 | -11,650 | -27 |
| 1995 | 249,269 | 48,516 | 19 | (188,096) | (75) | 139,580 | 56 | 43,590 | 33 | 10,057 | 12 | -5,601 | -11 |
| 1996 | 174,572 | 22,546 | 13 | (26,753) | (15) | 4,207 | 2 | 46,830 | 28 | 15,098 | 13 | -5,224 | -9 |
| 1997 | 97788.56 | 4,265 | 4 | (45,364) | (46) | 41,099 | 42 | 61,629 | 35 | 35,215 | 26 | -3,508 | -6 |
| 1998 | 255,812 | 40,399 | 16 | | 0 | (40,399) | -16 | 1,636 | 1 | 28,238 | 17 | -4,825 | -7 |
| 1999 | 303792.23 | 12,226 | 4 | (30,685) | (10) | 18,459 | 6 | 6,386 | 3 | 32,589 | 15 | -4,023 | -6 |
| 2000 | 172,070 | 30,935 | 18 | (10,284) | (6) | (20,651) | -12 | -14,197 | -6 | 543 | 0 | -4,577 | -6 |
| 2001 | 109,760 | 14,719 | 13 | | 0 | (14,719) | -13 | -5,637 | -3 | -3,242 | -2 | -4,904 | -6 |
| 2002 | 110,036 | 29,202 | 27 | | 0 | (29,202) | -27 | -21,524 | -16 | -17,302 | -9 | -5,663 | -7 |
| 2003 | 16416 | - | 0 | | 0 | 0 | 0 | -14,640 | -19 | -9,223 | -6 | -5,663 | -7 |
| 2004 | 0 | 26,474 | | (639,099) | | 612,625 | | 194,474 | 461 | 109,611 | 134 | 13,073 | 17 |
| 2005 | (32,273) | 225 | (1) | | 0 | (225) | 1 | 204,133 | -3,862 | 113,696 | 279 | 12,682 | 17 |
| 2006 | 13,529 | 9,973 | 74 | (330,000) | (2,439) | 320,028 | 2,365 | 310,809 | -4,975 | 180,645 | 839 | 21,463 | 30 |
| 2007 | 45,025 | 14,205 | 32 | (111,000) | (247) | 96,795 | 215 | 138,866 | 1,585 | 205,845 | 2,410 | 23,555 | 33 |
| 2008 | 26,949 | 2,070 | 8 | | 0 | (2,070) | -8 | 138,251 | 485 | 205,430 | 1,930 | 22,863 | 33 |

# Montana-Dakota Utilities Co. - Common Plant
## ACCOUNT 390 - GENERAL PLANT - STRUCTURES & IMPROVEMENTS
## SUMMARY OF BOOK SALVAGE

| Year | Regular Retirements | Cost of Removal Amount | Cost of Removal Percent | Gross Salvage Amount | Gross Salvage Percent | Net Salvage Amount | Net Salvage Percent | 3-Year Amount | 3-Year Percent | 5-Year Amount | 5-Year Percent | Historical Amount | Historical Percent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2009 | 542,058 | 41,867 | 8 | (526,444) | (97) | 484,577 | 89 | 193,101 | 94 | 179,821 | 151 | 35,013 | 43 |
| 2010 | 59,049 | 3,138 | | (244) | | (2,894) | | 159,871 | 76 | 179,287 | 131 | 34,041 | 42 |
| 2011 | 88,464 | 19,861 | 22 | (453) | (1) | (19,408) | -22 | 154,091 | 67 | 111,400 | 73 | 32,705 | 40 |
| 2012 | 192,754 | 3,872 | 2 | (250) | (0) | (3,622) | -2 | -8,641 | -8 | 91,316 | 50 | 31,819 | 38 |
| 2013 | 11,998 | | | | | 0 | | -7,677 | -8 | 91,730 | 51 | 31,819 | 38 |
| 2014 | 762,013 | 1,212 | 0 | | 0 | (1,212) | 0 | -1,611 | 0 | -5,427 | -2 | 31,033 | 31 |
| 2015 | 28,556 | 93,108 | 326 | | 0 | (93,108) | -326 | -31,440 | -12 | -23,470 | -11 | 28,146 | 28 |
| 2016 | 4,973,129 | 120,759 | 2 | (1,250,383) | (25) | 1,129,624 | 23 | 345,101 | 18 | 206,337 | 17 | 53,179 | 25 |
| 2017 | 177,483 | 191,183 | 108 | (91,149) | (51) | (100,034) | -56 | 312,161 | 18 | 187,054 | 16 | 49,774 | 24 |
| 2018 | 165,707 | 28,937 | 17 | (1,000) | (1) | (27,937) | -17 | 333,884 | 19 | 181,467 | 15 | 48,085 | 23 |
| 2019 | 282,192 | 60,776 | 22 | (9,760) | (3) | (51,016) | -18 | -59,662 | -29 | 171,506 | 15 | 45,977 | 22 |
| 2020 | 301,002 | 77,992 | 26 | | 0 | (77,992) | -26 | -52,315 | -21 | 174,529 | 15 | 43,394 | 21 |
| 2021 | 222,519.29 | 124,870 | 56 | (179,182) | (81) | 54,312 | 24 | -24,899 | -9 | -40,533 | -18 | 43,617 | 21 |
| | | | | | | | | | | | | | |
| TOTAL | 10,378,043 | 1,401,070 | 13.50 | -3,538,286 | (34.09) | 2,137,217 | 20.59 | | | | | | |

# Montana-Dakota Utilities Co. - Common Plant
## ACCOUNT 392.1 - GENERAL PLANT - TRANSPORTATION EQUIPMENT - TRAILERS
## SUMMARY OF BOOK SALVAGE

| Year | Regular Retirements | Cost of Removal Amount | Cost of Removal Percent | Gross Salvage Amount | Gross Salvage Percent | Net Salvage Amount | Net Salvage Percent | 3-Year Amount | 3-Year Percent | 5-Year Amount | 5-Year Percent | Historical Amount | Historical Percent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2005 | 0 | | | (3,500) | | 3,500 | | | | | | 3,500 | 0 |
| 2006 | 0 | | | | | 0 | | | | | | 3,500 | 0 |
| 2007 | 0 | | | (950) | | 950 | | 1,483 | 0 | | | 2,225 | 0 |
| 2008 | 0 | | | (4,850) | | 4,850 | | 1,933 | 0 | | | 3,100 | 0 |
| 2009 | 26,134 | 0 | | (385) | (1) | 385 | 1 | 3,228 | 37 | 1,937 | 37 | 2,421 | 37 |
| 2010 | 6,896 | 0 | | (476) | (7) | 476 | 7 | 3,387 | 31 | 1,332 | 20 | 2,032 | 31 |
| 2011 | 10,083 | 0 | | (680) | (7) | 680 | 7 | 3,614 | 25 | 1,468 | 17 | 1,807 | 25 |
| 2012 | 12,453 | 0 | | (2,853) | (23) | 2,853 | 23 | 1,336 | 14 | 1,849 | 17 | 1,956 | 25 |
| 2013 | | | | | | 0 | | 1,178 | 16 | 879 | 8 | 1,956 | 25 |
| 2014 | | | | | | 0 | | 951 | 23 | 802 | 14 | 1,956 | 25 |
| 2015 | | | | | | 0 | | 0 | 0 | 707 | 16 | 1,956 | 25 |
| 2016 | | | | | | 0 | | 0 | 0 | 571 | 23 | 1,956 | 25 |
| 2017 | | | | (4,155) | | 4,155 | | 1,385 | 0 | 831 | 0 | 2,231 | 32 |
| 2018 | | | | (3,720) | | 3,720 | | 2,625 | 0 | 1,575 | 0 | 2,397 | 39 |
| 2019 | | | | (19,050) | | 19,050 | | 8,975 | 0 | 5,385 | 0 | 4,062 | 73 |
| 2020 | | | | | | 0 | | 7,590 | 0 | 5,385 | 0 | 4,062 | 73 |
| 2021 | | | | | | 0 | | 6,350 | 0 | 5,385 | 0 | 4,062 | 73 |
| | | | | | | | | | | | | | |
| **TOTAL** | **55,566** | **0** | **0.00** | **-40,619** | **(73.10)** | **40,619** | **73.10** | | | | | | |

# Montana-Dakota Utilities Co. - Common Plant

**ACCOUNT 392.2 - GENERAL PLANT - TRANSPORTATION EQUIPMENT - VEHICLES**
**SUMMARY  OF  BOOK  SALVAGE**

| Year | Regular Retirements | Cost of Removal Amount | Cost of Removal Percent | Gross Salvage Amount | Gross Salvage Percent | Net Salvage Amount | Net Salvage Percent | 3-Year Amount | 3-Year Percent | 5-Year Amount | 5-Year Percent | Historical Amount | Historical Percent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2004 | 0 | | | (124,143) | | 124,143 | | | | | | 124,143 | 0 |
| 2005 | 0 | | | (74,531) | | 74,531 | | | | | | 99,337 | 0 |
| 2006 | 0 | | | (112,620) | | 112,620 | | 103,765 | 0 | | | 103,765 | 0 |
| 2007 | 0 | | | (143,063) | | 143,063 | | 110,071 | 0 | | | 113,589 | 0 |
| 2008 | 0 | | | (123,203) | | 123,203 | | 126,295 | 0 | 115,512 | 0 | 115,512 | 0 |
| 2009 | 943,733 | | 0 | (192,584) | (20) | 192,584 | 20 | 152,950 | 49 | 129,200 | 68 | 128,357 | 82 |
| 2010 | 465,031 | | 0 | (126,147) | (27) | 126,147 | 27 | 147,311 | 31 | 139,523 | 50 | 128,042 | 64 |
| 2011 | 137,474 | | 0 | (33,401) | (24) | 33,401 | 24 | 117,377 | 23 | 123,680 | 40 | 116,211 | 60 |
| 2012 | 228,230 | | 0 | (85,168) | (37) | 85,168 | 37 | 81,572 | 29 | 112,100 | 32 | 112,762 | 57 |
| 2013 | 65,494 | | 0 | (49,347) | (75) | 49,347 | | 55,972 | 39 | 97,329 | 26 | 106,421 | 58 |
| 2014 | 507,650 | | 0 | (128,676) | (25) | 128,676 | 25 | 87,730 | 33 | 84,548 | 30 | 108,444 | 51 |
| 2015 | 565,400 | | 0 | (135,436) | (24) | 135,436 | 24 | 104,486 | 28 | 86,405 | 29 | 110,693 | 46 |
| 2016 | 1,307,335 | | 0 | (135,238) | (10) | 135,238 | 10 | 133,117 | 17 | 106,773 | 20 | 112,581 | 35 |
| 2017 | 832,091 | (2) | (0) | (127,071) | (15) | 127,073 | 15 | 132,582 | 15 | 115,154 | 18 | 113,616 | 31 |
| 2018 | 487,481 | (15) | (0) | (170,917) | (35) | 170,932 | 35 | 144,414 | 16 | 139,471 | 19 | 117,437 | 32 |
| 2019 | 873,014 | | 0 | (198,937) | (23) | 198,937 | 23 | 165,647 | 23 | 153,523 | 19 | 122,531 | 31 |
| 2020 | 734,877 | | 0 | (250,036) | (34) | 250,036 | 34 | 206,635 | 30 | 176,443 | 21 | 130,031 | 31 |
| 2021 | 453,616 | | 0 | (146,366) | (32) | 146,366 | | 198,446 | 29 | 178,669 | 26 | 130,939 | 31 |
| | | | | | | | | | | | | | |
| **TOTAL** | **7,601,424** | **(17)** | **(0.00)** | **-2,356,882** | **(31.01)** | **2,356,899** | **31.01** | | | | | | |

SECTION 8

# 8  DETAILED DEPRECIATION CALCULATIONS

# MDU Common

Account #: 390.00 - Structures & Improvements

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF December 31, 2021

| Year | Original Cost | Calculated Accumulated Depreciation | Allocated Actual Booked Amount | Accumulated Depreciation Factor | Net Book Value | ALG Remaining Life | Annual Accrual | Average Age |
|------|---------------|-------------------------------------|--------------------------------|----------------------------------|----------------|--------------------|----------------|-------------|
| 1953 | 1,101.98 | 1,112 | 1,144 | 0.9888 | 13 | 1.55 | 8 | 68.5 |
| 1954 | 863.89 | 866 | 891 | 0.9819 | 16 | 1.82 | 9 | 67.5 |
| 1956 | 2,508.43 | 2,478 | 2,549 | 0.9677 | 85 | 2.37 | 36 | 65.5 |
| 1957 | 8,477.14 | 8,310 | 8,548 | 0.9604 | 353 | 2.66 | 133 | 64.5 |
| 1958 | 708.02 | 689 | 709 | 0.9531 | 35 | 2.94 | 12 | 63.5 |
| 1959 | 413.04 | 399 | 410 | 0.9462 | 23 | 3.23 | 7 | 62.5 |
| 1960 | 2,078.30 | 1,990 | 2,048 | 0.9383 | 135 | 3.52 | 38 | 61.5 |
| 1961 | 1,232.59 | 1,171 | 1,205 | 0.9308 | 90 | 3.81 | 24 | 60.5 |
| 1962 | 5,940.05 | 5,598 | 5,759 | 0.9234 | 478 | 4.10 | 117 | 59.5 |
| 1964 | 18,983.94 | 17,601 | 18,107 | 0.9084 | 1,826 | 4.68 | 390 | 57.5 |
| 1965 | 3,056.19 | 2,810 | 2,891 | 0.9008 | 318 | 4.97 | 64 | 56.5 |
| 1966 | 143,317.20 | 130,649 | 134,400 | 0.8931 | 16,083 | 5.27 | 3,051 | 55.5 |
| 1967 | 161,052.17 | 145,537 | 149,716 | 0.8853 | 19,389 | 5.57 | 3,478 | 54.5 |
| 1968 | 806,161.69 | 721,976 | 742,707 | 0.8774 | 103,763 | 5.88 | 17,638 | 53.5 |
| 1969 | 49,712.30 | 44,110 | 45,377 | 0.8693 | 6,821 | 6.20 | 1,101 | 52.5 |
| 1971 | 35,288.82 | 30,706 | 31,588 | 0.8525 | 5,466 | 6.85 | 798 | 50.5 |
| 1972 | 423,317.91 | 364,546 | 375,014 | 0.8437 | 69,470 | 7.19 | 9,657 | 49.5 |
| 1973 | 29,001.76 | 24,707 | 25,416 | 0.8346 | 5,035 | 7.55 | 667 | 48.5 |
| 1974 | 16,140.20 | 13,596 | 13,986 | 0.8253 | 2,961 | 7.91 | 374 | 47.5 |
| 1976 | 36,819.79 | 30,275 | 31,144 | 0.8056 | 7,516 | 8.68 | 866 | 45.5 |
| 1977 | 299,565.32 | 243,149 | 250,131 | 0.7952 | 64,413 | 9.08 | 7,095 | 44.5 |
| 1978 | 6,271.01 | 5,021 | 5,166 | 0.7845 | 1,419 | 9.50 | 149 | 43.5 |
| 1979 | 516,956.94 | 408,091 | 419,809 | 0.7734 | 122,996 | 9.93 | 12,390 | 42.5 |
| 1980 | 243,249.46 | 189,177 | 194,609 | 0.7619 | 60,803 | 10.37 | 5,862 | 41.5 |
| 1981 | 178,300.70 | 136,511 | 140,430 | 0.7501 | 46,785 | 10.83 | 4,319 | 40.5 |
| 1982 | 1,478,135.25 | 1,113,244 | 1,145,209 | 0.7379 | 406,833 | 11.31 | 35,975 | 39.5 |
| 1983 | 320,357.51 | 237,151 | 243,961 | 0.7253 | 92,415 | 11.80 | 7,832 | 38.5 |
| 1984 | 2,770,584.09 | 2,014,235 | 2,072,070 | 0.7123 | 837,043 | 12.30 | 68,027 | 37.5 |

# MDU Common

Account #: 390.00 - Structures & Improvements

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF December 31, 2021

| Year | Original Cost | Calculated Accumulated Depreciation | Allocated Actual Booked Amount | Accumulated Depreciation Factor | Net Book Value | ALG Remaining Life | Annual Accrual | Average Age |
|------|---------------|-------------------------------------|--------------------------------|----------------------------------|----------------|--------------------|----------------|-------------|
| 1985 | 505,787.81 | 360,806 | 371,166 | 0.6989 | 159,912 | 12.82 | 12,469 | 36.5 |
| 1986 | 233,540.28 | 163,317 | 168,007 | 0.6851 | 77,210 | 13.36 | 5,779 | 35.5 |
| 1988 | 4,844.35 | 3,246 | 3,339 | 0.6565 | 1,747 | 14.47 | 121 | 33.5 |
| 1989 | 4,397.52 | 2,880 | 2,963 | 0.6416 | 1,655 | 15.05 | 110 | 32.5 |
| 1991 | 59,438.01 | 37,055 | 38,119 | 0.6108 | 24,291 | 16.25 | 1,495 | 30.5 |
| 1992 | 153,963.54 | 93,480 | 96,164 | 0.5948 | 65,498 | 16.87 | 3,882 | 29.5 |
| 1993 | 301,888.43 | 178,276 | 183,395 | 0.5786 | 133,588 | 17.50 | 7,632 | 28.5 |
| 1994 | 2,219,352.92 | 1,272,963 | 1,309,515 | 0.5619 | 1,020,806 | 18.15 | 56,244 | 27.5 |
| 1995 | 552,945.17 | 307,591 | 316,423 | 0.5450 | 264,169 | 18.81 | 14,045 | 26.5 |
| 1996 | 288,535.48 | 155,421 | 159,884 | 0.5277 | 143,078 | 19.48 | 7,345 | 25.5 |
| 1997 | 643,800.12 | 335,236 | 344,862 | 0.5102 | 331,129 | 20.16 | 16,422 | 24.5 |
| 1998 | 182,161.40 | 91,529 | 94,157 | 0.4923 | 97,112 | 20.86 | 4,656 | 23.5 |
| 1999 | 182,391.90 | 88,260 | 90,794 | 0.4741 | 100,717 | 21.57 | 4,670 | 22.5 |
| 2000 | 631,714.02 | 293,778 | 302,214 | 0.4556 | 361,086 | 22.28 | 16,204 | 21.5 |
| 2001 | 167,019.55 | 74,475 | 76,613 | 0.4369 | 98,757 | 23.01 | 4,291 | 20.5 |
| 2002 | 407,136.47 | 173,635 | 178,621 | 0.4178 | 248,872 | 23.75 | 10,477 | 19.5 |
| 2003 | 190,452.63 | 77,472 | 79,696 | 0.3985 | 120,279 | 24.50 | 4,909 | 18.5 |
| 2004 | 1,226,294.00 | 474,335 | 487,955 | 0.3790 | 799,654 | 25.26 | 31,651 | 17.5 |
| 2005 | 3,894,785.97 | 1,427,704 | 1,468,698 | 0.3591 | 2,620,827 | 26.04 | 100,664 | 16.5 |
| 2006 | 20,003.59 | 6,923 | 7,122 | 0.3391 | 13,882 | 26.82 | 518 | 15.5 |
| 2007 | 171,416.43 | 55,767 | 57,369 | 0.3187 | 122,619 | 27.61 | 4,442 | 14.5 |
| 2008 | 797,951.24 | 242,851 | 249,825 | 0.2982 | 588,024 | 28.41 | 20,701 | 13.5 |
| 2010 | 2,282,936.10 | 597,345 | 614,497 | 0.2564 | 1,782,586 | 30.03 | 59,356 | 11.5 |
| 2011 | 428,832.46 | 102,907 | 105,861 | 0.2351 | 344,413 | 30.86 | 11,161 | 10.5 |
| 2012 | 1,104,436.85 | 240,834 | 247,749 | 0.2136 | 911,910 | 31.69 | 28,773 | 9.5 |
| 2013 | 321,593.54 | 63,012 | 64,821 | 0.1920 | 272,852 | 32.54 | 8,386 | 8.5 |
| 2014 | 15,844,968.08 | 2,750,706 | 2,829,689 | 0.1701 | 13,807,528 | 33.39 | 413,565 | 7.5 |
| 2015 | 566,977.13 | 85,649 | 88,108 | 0.1480 | 507,218 | 34.25 | 14,811 | 6.5 |

# MDU Common

Account #: 390.00 - Structures & Improvements

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF December 31, 2021

| Year | Original Cost | Calculated Accumulated Depreciation | Allocated Actual Booked Amount | Accumulated Depreciation Factor | Net Book Value | ALG Remaining Life | Annual Accrual | Average Age |
|------|--------------|-------------|-------------|--------|-------------|-------|-----------|-----|
| 2016 | 1,365,272.00 | 175,199 | 180,230 | 0.1257 | 1,253,306 | 35.11 | 35,695 | 5.5 |
| 2017 | 3,759,904.19 | 396,279 | 407,658 | 0.1033 | 3,540,242 | 35.98 | 98,381 | 4.5 |
| 2018 | 2,511,103.30 | 206,614 | 212,547 | 0.0806 | 2,424,112 | 36.87 | 65,756 | 3.5 |
| 2019 | 1,491,116.43 | 87,951 | 90,477 | 0.0578 | 1,475,196 | 37.75 | 39,075 | 2.5 |
| 2020 | 7,809,961.18 | 277,351 | 285,315 | 0.0348 | 7,915,144 | 38.65 | 204,805 | 1.5 |
| 2021 | 72,597.36 | 862 | 887 | 0.0116 | 75,341 | 39.55 | 1,905 | 0.5 |
| TOTAL | 57,959,115.14 | 16,797,415 | 17,279,728 | | 43,577,343 | | 1,490,513 | |

**COMPOSITE ANNUAL ACCRUAL RATE**      2.57%

**THEORETICAL ACCUMULATED DEPRECIATION FACTOR**      0.30

**COMPOSITE AVERAGE AGE (YEARS)**      14.00

**DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)**      28.96

# MDU Common

Account #: 391.10 - Office Furniture & Equipment

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF December 31, 2021

| Year | Original Cost | Calculated Accumulated Depreciation | Allocated Actual Booked Amount | Accumulated Depreciation Factor | Net Book Value | ALG Remaining Life | Annual Accrual | Average Age |
|---|---|---|---|---|---|---|---|---|
| 2007 | 168,807.34 | 163,180 | 158,867 | 0.9411 | 9,941 | 0.50 | 9,940 | 14.5 |
| 2008 | 81,864.85 | 73,678 | 71,731 | 0.8762 | 10,134 | 1.50 | 6,756 | 13.5 |
| 2010 | 32,157.67 | 24,654 | 24,002 | 0.7464 | 8,155 | 3.50 | 2,330 | 11.5 |
| 2011 | 74,683.24 | 52,278 | 50,896 | 0.6815 | 23,787 | 4.50 | 5,286 | 10.5 |
| 2012 | 216,594.23 | 137,176 | 133,550 | 0.6166 | 83,044 | 5.50 | 15,099 | 9.5 |
| 2013 | 137,346.05 | 77,829 | 75,772 | 0.5517 | 61,574 | 6.50 | 9,473 | 8.5 |
| 2014 | 551,783.78 | 275,892 | 268,599 | 0.4868 | 283,185 | 7.50 | 37,758 | 7.5 |
| 2015 | 232,350.52 | 100,685 | 98,024 | 0.4219 | 134,327 | 8.50 | 15,803 | 6.5 |
| 2016 | 76,630.17 | 28,098 | 27,355 | 0.3570 | 49,275 | 9.50 | 5,187 | 5.5 |
| 2017 | 62,199.61 | 18,660 | 18,167 | 0.2921 | 44,033 | 10.50 | 4,194 | 4.5 |
| 2018 | 37,293.50 | 8,702 | 8,472 | 0.2272 | 28,822 | 11.50 | 2,506 | 3.5 |
| 2019 | 53,306.88 | 8,884 | 8,650 | 0.1623 | 44,657 | 12.50 | 3,573 | 2.5 |
| 2020 | 356,250.74 | 35,625 | 34,683 | 0.0974 | 321,567 | 13.50 | 23,820 | 1.5 |
| 2021 | 48,827.31 | 1,628 | 1,585 | 0.0325 | 47,243 | 14.50 | 3,258 | 0.5 |
| TOTAL | 2,130,095.89 | 1,006,971 | 980,352 | | 1,149,744 | | 144,983 | |

| | |
|---|---|
| COMPOSITE ANNUAL ACCRUAL RATE | 6.81% |
| THEORETICAL ACCUMULATED DEPRECIATION FACTOR | 0.46 |
| COMPOSITE AVERAGE AGE (YEARS) | 7.09 |
| DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS) | 7.91 |

# MDU Common

Account #: 391.30 - Computer Equipment - PC

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF December 31, 2021

| Year | Original Cost | Calculated Accumulated Depreciation | Allocated Actual Booked Amount | Accumulated Depreciation Factor | Net Book Value | ALG Remaining Life | Annual Accrual | Average Age |
|------|--------------|-------------------------------------|-------------------------------|--------------------------------|---------------|--------------------|----------------|-------------|
| 2017 | 475,481.03 | 427,933 | 347,848 | 0.7316 | 127,633 | 0.50 | 127,633 | 4.5 |
| 2018 | 961,371.69 | 672,960 | 547,019 | 0.5690 | 414,352 | 1.50 | 276,235 | 3.5 |
| 2019 | 495,525.06 | 247,763 | 201,395 | 0.4064 | 294,130 | 2.50 | 117,652 | 2.5 |
| 2020 | 1,420,457.68 | 426,137 | 346,388 | 0.2439 | 1,074,070 | 3.50 | 306,877 | 1.5 |
| 2021 | 285,966.55 | 28,597 | 23,245 | 0.0813 | 262,722 | 4.50 | 58,383 | 0.5 |
| TOTAL | 3,638,802.01 | 1,803,390 | 1,465,895 | | 2,172,907 | | 886,780 | |

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|---|---|
| COMPOSITE ANNUAL ACCRUAL RATE | 24.37% |
| THEORETICAL ACCUMULATED DEPRECIATION FACTOR | 0.40 |
| COMPOSITE AVERAGE AGE (YEARS) | 2.48 |
| DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS) | 2.52 |

# MDU Common

Account #: 391.50 - Computer Equipment - Other

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF December 31, 2021

| Year | Original Cost | Calculated Accumulated Depreciation | Allocated Actual Booked Amount | Accumulated Depreciation Factor | Net Book Value | ALG Remaining Life | Annual Accrual | Average Age |
|------|--------------|-------------------------------------|-------------------------------|--------------------------------|---------------|-------------------|---------------|-------------|
| 2017 | 260,962.58 | 234,866 | 191,278 | 0.7330 | 69,684 | 0.50 | 69,684 | 4.5 |
| 2018 | 223,116.29 | 156,181 | 127,196 | 0.5701 | 95,920 | 1.50 | 63,947 | 3.5 |
| 2019 | 656,663.26 | 328,332 | 267,397 | 0.4072 | 389,266 | 2.50 | 155,706 | 2.5 |
| 2020 | 904,563.36 | 271,369 | 221,006 | 0.2443 | 683,557 | 3.50 | 195,302 | 1.5 |
| TOTAL | 2,045,305.49 | 990,748 | 806,878 | | 1,238,428 | | 484,639 | |

| | |
|---|---|
| COMPOSITE ANNUAL ACCRUAL RATE | 23.70% |
| THEORETICAL ACCUMULATED DEPRECIATION FACTOR | 0.39 |
| COMPOSITE AVERAGE AGE (YEARS) | 2.42 |
| DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS) | 2.58 |

# MDU Common

Account #: 392.10 - Transportation Equipment - Trailers

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF December 31, 2021

| Year | Original Cost | Calculated Accumulated Depreciation | Allocated Actual Booked Amount | Accumulated Depreciation Factor | Net Book Value | ALG Remaining Life | Annual Accrual | Average Age |
|---|---|---|---|---|---|---|---|---|
| 2011 | 7,414.01 | 1,857 | 1,828 | 0.2900 | 4,474 | 17.63 | 254 | 10.5 |
| 2012 | 8,585.60 | 1,955 | 1,924 | 0.2637 | 5,374 | 18.30 | 294 | 9.5 |
| 2013 | 2,482.58 | 508 | 500 | 0.2371 | 1,610 | 18.98 | 85 | 8.5 |
| TOTAL | 18,482.19 | 4,321 | 4,252 | | 11,458 | | 633 | |

| | |
|---|---|
| COMPOSITE ANNUAL ACCRUAL RATE | 3.42% |
| THEORETICAL ACCUMULATED DEPRECIATION FACTOR | 0.23 |
| COMPOSITE AVERAGE AGE (YEARS) | 9.77 |
| DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS) | 18.12 |

# MDU Common

Account #: 392.20 - Transportation Equipment

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF December 31, 2021

| Year | Original Cost | Calculated Accumulated Depreciation | Allocated Actual Booked Amount | Accumulated Depreciation Factor | Net Book Value | ALG Remaining Life | Annual Accrual | Average Age |
|---|---|---|---|---|---|---|---|---|
| 2002 | 12,889.32 | 8,700 | 6,380 | 0.6187 | 3,932 | 1.56 | 2,515 | 19.5 |
| 2007 | 26,914.31 | 16,167 | 11,856 | 0.5506 | 9,676 | 2.49 | 3,883 | 14.5 |
| 2010 | 38,523.34 | 21,013 | 15,409 | 0.5000 | 15,409 | 3.18 | 4,843 | 11.5 |
| 2011 | 186,957.73 | 99,052 | 72,638 | 0.4857 | 76,928 | 3.38 | 22,777 | 10.5 |
| 2012 | 333,845.03 | 171,905 | 126,064 | 0.4720 | 141,012 | 3.56 | 39,572 | 9.5 |
| 2013 | 168,225.10 | 83,656 | 61,348 | 0.4558 | 73,233 | 3.78 | 19,353 | 8.5 |
| 2014 | 598,467.61 | 282,723 | 207,330 | 0.4330 | 271,444 | 4.09 | 66,289 | 7.5 |
| 2015 | 926,067.25 | 404,588 | 296,698 | 0.4005 | 444,156 | 4.54 | 97,855 | 6.5 |
| 2016 | 1,374,862.37 | 535,713 | 392,857 | 0.3572 | 707,033 | 5.13 | 137,840 | 5.5 |
| 2017 | 851,173.46 | 282,506 | 207,171 | 0.3042 | 473,767 | 5.85 | 80,969 | 4.5 |
| 2018 | 961,071.79 | 255,519 | 187,380 | 0.2437 | 581,477 | 6.68 | 87,091 | 3.5 |
| 2019 | 1,845,860.99 | 358,718 | 263,060 | 0.1781 | 1,213,629 | 7.57 | 160,304 | 2.5 |
| 2020 | 994,864.15 | 118,052 | 86,572 | 0.1088 | 709,320 | 8.52 | 83,285 | 1.5 |
| 2021 | 233,226.92 | 9,313 | 6,830 | 0.0366 | 179,752 | 9.50 | 18,920 | 0.5 |
| TOTAL | 8,552,949.37 | 2,647,624 | 1,941,593 | | 4,900,766 | | 825,496 | |

| | |
|---|---|
| **COMPOSITE ANNUAL ACCRUAL RATE** | 9.65% |
| **THEORETICAL ACCUMULATED DEPRECIATION FACTOR** | 0.23 |
| **COMPOSITE AVERAGE AGE (YEARS)** | 4.58 |
| **DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)** | 6.13 |

# MDU Common

Account #: 393.00 - Stores Equipment

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF December 31, 2021

| Year | Original Cost | Calculated Accumulated Depreciation | Allocated Actual Booked Amount | Accumulated Depreciation Factor | Net Book Value | ALG Remaining Life | Annual Accrual | Average Age |
|------|--------------|-------------------------------------|-------------------------------|--------------------------------|---------------|-------------------|---------------|-------------|
| 1995 | 10,272.04 | 9,074 | 10,231 | 0.9960 | 41 | 3.50 | 12 | 26.5 |
| 1999 | 9,502.32 | 7,127 | 8,036 | 0.8456 | 1,467 | 7.50 | 196 | 22.5 |
| 2000 | 12,486.01 | 8,948 | 10,089 | 0.8081 | 2,397 | 8.50 | 282 | 21.5 |
| 2007 | 4,385.78 | 2,120 | 2,390 | 0.5450 | 1,996 | 15.50 | 129 | 14.5 |
| 2014 | 41,481.25 | 10,370 | 11,693 | 0.2819 | 29,788 | 22.50 | 1,324 | 7.5 |
| 2017 | 15,127.75 | 2,269 | 2,559 | 0.1691 | 12,569 | 25.50 | 493 | 4.5 |
| 2018 | 15,273.31 | 1,782 | 2,009 | 0.1315 | 13,264 | 26.50 | 501 | 3.5 |
| 2019 | 22,339.62 | 1,862 | 2,099 | 0.0940 | 20,241 | 27.50 | 736 | 2.5 |
| 2020 | 13,367.66 | 668 | 754 | 0.0564 | 12,614 | 28.50 | 443 | 1.5 |
| 2021 | 30,283.24 | 505 | 569 | 0.0188 | 29,714 | 29.50 | 1,007 | 0.5 |
| TOTAL | 174,518.98 | 44,725 | 50,428 | | 124,091 | | 5,123 | |

| | |
|---|---|
| **COMPOSITE ANNUAL ACCRUAL RATE** | 2.94% |
| **THEORETICAL ACCUMULATED DEPRECIATION FACTOR** | 0.29 |
| **COMPOSITE AVERAGE AGE (YEARS)** | 7.69 |
| **DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)** | 22.31 |

# MDU Common

Account #: 394.10 - Tools, Shop & Garage Equipment

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF December 31, 2021

| Year | Original Cost | Calculated Accumulated Depreciation | Allocated Actual Booked Amount | Accumulated Depreciation Factor | Net Book Value | ALG Remaining Life | Annual Accrual | Average Age |
|------|---------------|-------------------------------------|--------------------------------|--------------------------------|----------------|--------------------|----------------|-------------|
| 2004 | 46,034.92 | 40,281 | 46,035 | 1.0000 | 0 | 2.50 | 0 | 17.5 |
| 2005 | 30,657.04 | 25,292 | 30,657 | 1.0000 | 0 | 3.50 | 0 | 16.5 |
| 2006 | 34,082.71 | 26,414 | 34,083 | 1.0000 | 0 | 4.50 | 0 | 15.5 |
| 2007 | 15,616.53 | 11,322 | 15,617 | 1.0000 | 0 | 5.50 | 0 | 14.5 |
| 2008 | 46,070.14 | 31,097 | 46,070 | 1.0000 | 0 | 6.50 | 0 | 13.5 |
| 2009 | 6,617.89 | 4,136 | 6,618 | 1.0000 | 0 | 7.50 | 0 | 12.5 |
| 2010 | 29,472.55 | 16,947 | 29,473 | 1.0000 | 0 | 8.50 | 0 | 11.5 |
| 2011 | 64,949.37 | 34,098 | 64,949 | 1.0000 | 0 | 9.50 | 0 | 10.5 |
| 2012 | 39,091.97 | 18,569 | 39,092 | 1.0000 | 0 | 10.50 | 0 | 9.5 |
| 2013 | 33,002.84 | 14,026 | 33,003 | 1.0000 | 0 | 11.50 | 0 | 8.5 |
| 2014 | 97,204.70 | 36,452 | 97,205 | 1.0000 | 0 | 12.50 | 0 | 7.5 |
| 2015 | 68,621.75 | 22,302 | 68,622 | 1.0000 | 0 | 13.50 | 0 | 6.5 |
| 2016 | 42,870.94 | 11,790 | 24,282 | 0.5664 | 18,589 | 14.50 | 1,282 | 5.5 |
| 2017 | 120,692.81 | 27,156 | 49,697 | 0.4118 | 70,996 | 15.50 | 4,580 | 4.5 |
| 2018 | 25,947.90 | 4,541 | 8,310 | 0.3203 | 17,638 | 16.50 | 1,069 | 3.5 |
| 2019 | 27,070.16 | 3,384 | 6,192 | 0.2288 | 20,878 | 17.50 | 1,193 | 2.5 |
| 2020 | 11,763.56 | 882 | 1,615 | 0.1373 | 10,149 | 18.50 | 549 | 1.5 |
| 2021 | 19,751.73 | 494 | 904 | 0.0458 | 18,848 | 19.50 | 967 | 0.5 |
| TOTAL | 759,519.51 | 329,182 | 602,422 | | 157,098 | | 9,640 | |

| | |
|---|---|
| **COMPOSITE ANNUAL ACCRUAL RATE** | 1.27% |
| **THEORETICAL ACCUMULATED DEPRECIATION FACTOR** | 0.79 |
| **COMPOSITE AVERAGE AGE (YEARS)** | 8.67 |
| **DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)** | 11.33 |

# MDU Common

Account #: 394.30 - Vehicle Maintenance Equipment

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF December 31, 2021

| Year | Original Cost | Calculated Accumulated Depreciation | Allocated Actual Booked Amount | Accumulated Depreciation Factor | Net Book Value | ALG Remaining Life | Annual Accrual | Average Age |
|------|--------------|-------------------------------------|-------------------------------|--------------------------------|----------------|--------------------|----------------|-------------|
| 2003 | 9,575.67 | 8,857 | 8,858 | 0.9251 | 718 | 1.50 | 478 | 18.5 |
| 2004 | 3,101.37 | 2,714 | 2,714 | 0.8750 | 388 | 2.50 | 155 | 17.5 |
| 2006 | 8,048.09 | 6,237 | 6,237 | 0.7750 | 1,811 | 4.50 | 402 | 15.5 |
| 2007 | 25,864.74 | 18,752 | 18,752 | 0.7250 | 7,113 | 5.50 | 1,293 | 14.5 |
| TOTAL | 46,589.87 | 36,560 | 36,561 | | 10,028 | | 2,328 | |

**COMPOSITE ANNUAL ACCRUAL RATE**      5.00%

**THEORETICAL ACCUMULATED DEPRECIATION FACTOR**      0.78

**COMPOSITE AVERAGE AGE (YEARS)**      15.69

**DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)**      4.31

# MDU Common

Account #: 394.40 - Vehicle Refueling Equipment

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF December 31, 2021

| Year | Original Cost | Calculated Accumulated Depreciation | Allocated Actual Booked Amount | Accumulated Depreciation Factor | Net Book Value | ALG Remaining Life | Annual Accrual | Average Age |
|---|---|---|---|---|---|---|---|---|
| 2005 | 3,814.65 | 3,147 | 3,815 | 1.0000 | 0 | 3.50 | 0 | 16.5 |
| TOTAL | 3,814.65 | 3,147 | 3,815 | | 0 | | 0 | |

| | |
|---|---|
| COMPOSITE ANNUAL ACCRUAL RATE | 0.00% |
| THEORETICAL ACCUMULATED DEPRECIATION FACTOR | 1.00 |
| COMPOSITE AVERAGE AGE (YEARS) | 16.50 |
| DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS) | 3.50 |

# MDU Common

Account #: 397.10 - Radio Communications Equipment - Fixed

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF December 31, 2021

| Year | Original Cost | Calculated Accumulated Depreciation | Allocated Actual Booked Amount | Accumulated Depreciation Factor | Net Book Value | ALG Remaining Life | Annual Accrual | Average Age |
|---|---|---|---|---|---|---|---|---|
| 2007 | 6,750.02 | 6,525 | 6,334 | 0.9383 | 416 | 0.50 | 416 | 14.5 |
| 2008 | 25,327.84 | 22,795 | 22,127 | 0.8736 | 3,201 | 1.50 | 2,134 | 13.5 |
| 2009 | 678,246.85 | 565,206 | 548,639 | 0.8089 | 129,608 | 2.50 | 51,843 | 12.5 |
| 2010 | 67,374.52 | 51,654 | 50,140 | 0.7442 | 17,235 | 3.50 | 4,924 | 11.5 |
| 2011 | 91,653.20 | 64,157 | 62,277 | 0.6795 | 29,376 | 4.50 | 6,528 | 10.5 |
| 2012 | 27,015.84 | 17,110 | 16,609 | 0.6148 | 10,407 | 5.50 | 1,892 | 9.5 |
| 2013 | 155,578.42 | 88,161 | 85,577 | 0.5501 | 70,001 | 6.50 | 10,769 | 8.5 |
| 2014 | 184,685.25 | 92,343 | 89,636 | 0.4853 | 95,049 | 7.50 | 12,673 | 7.5 |
| 2015 | 54,109.51 | 23,447 | 22,760 | 0.4206 | 31,349 | 8.50 | 3,688 | 6.5 |
| 2016 | 92,224.08 | 33,816 | 32,824 | 0.3559 | 59,400 | 9.50 | 6,253 | 5.5 |
| 2017 | 127,555.40 | 38,267 | 37,145 | 0.2912 | 90,410 | 10.50 | 8,611 | 4.5 |
| 2018 | 158,855.85 | 37,066 | 35,980 | 0.2265 | 122,876 | 11.50 | 10,685 | 3.5 |
| 2019 | 140,371.08 | 23,395 | 22,709 | 0.1618 | 117,662 | 12.50 | 9,413 | 2.5 |
| 2020 | 345,707.09 | 34,571 | 33,557 | 0.0971 | 312,150 | 13.50 | 23,122 | 1.5 |
| 2021 | 298,839.12 | 9,961 | 9,669 | 0.0324 | 289,170 | 14.50 | 19,943 | 0.5 |
| TOTAL | 2,454,294.07 | 1,108,474 | 1,075,983 | | 1,378,311 | | 172,894 | |

**COMPOSITE ANNUAL ACCRUAL RATE**                                   7.04%

**THEORETICAL ACCUMULATED DEPRECIATION FACTOR**            0.44

**COMPOSITE AVERAGE AGE (YEARS)**                                    6.77

**DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)**   8.23

# MDU Common

Account #: 397.20 - Radio Communications Equipment - Mobile

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF December 31, 2021

| Year | Original Cost | Calculated Accumulated Depreciation | Allocated Actual Booked Amount | Accumulated Depreciation Factor | Net Book Value | ALG Remaining Life | Annual Accrual | Average Age |
|------|---------------|-------------------------------------|-------------------------------|--------------------------------|----------------|---------------------|----------------|-------------|
| 2007 | 1,255.68 | 1,214 | 1,189 | 0.9473 | 66 | 0.50 | 66 | 14.5 |
| 2008 | 95,101.86 | 85,592 | 83,851 | 0.8817 | 11,251 | 1.50 | 7,501 | 13.5 |
| 2009 | 265,292.40 | 221,077 | 216,581 | 0.8164 | 48,711 | 2.50 | 19,485 | 12.5 |
| 2010 | 61,810.83 | 47,388 | 46,425 | 0.7511 | 15,386 | 3.50 | 4,396 | 11.5 |
| 2011 | 56,091.35 | 39,264 | 38,465 | 0.6858 | 17,626 | 4.50 | 3,917 | 10.5 |
| 2012 | 64,821.15 | 41,053 | 40,218 | 0.6205 | 24,603 | 5.50 | 4,473 | 9.5 |
| 2013 | 51,295.64 | 29,068 | 28,476 | 0.5551 | 22,819 | 6.50 | 3,511 | 8.5 |
| 2014 | 97,289.52 | 48,645 | 47,655 | 0.4898 | 49,634 | 7.50 | 6,618 | 7.5 |
| 2015 | 232,388.11 | 100,702 | 98,654 | 0.4245 | 133,735 | 8.50 | 15,733 | 6.5 |
| 2016 | 72,591.10 | 26,617 | 26,075 | 0.3592 | 46,516 | 9.50 | 4,896 | 5.5 |
| 2017 | 44,636.05 | 13,391 | 13,118 | 0.2939 | 31,518 | 10.50 | 3,002 | 4.5 |
| 2018 | 11,664.67 | 2,722 | 2,666 | 0.2286 | 8,998 | 11.50 | 782 | 3.5 |
| 2020 | 15,034.10 | 1,503 | 1,473 | 0.0980 | 13,561 | 13.50 | 1,005 | 1.5 |
| TOTAL | 1,069,272.46 | 658,235 | 644,848 | | 424,424 | | 75,385 | |

| | |
|---|---|
| COMPOSITE ANNUAL ACCRUAL RATE | 7.05% |
| THEORETICAL ACCUMULATED DEPRECIATION FACTOR | 0.60 |
| COMPOSITE AVERAGE AGE (YEARS) | 9.23 |
| DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS) | 5.77 |

# MDU Common

Account #: 397.30 - General Telephone Communication Equipment

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF December 31, 2021

ALG - Remaining Life
Survivor Curve: SQ
ASL: 10
Net Salvage: 0%
Truncation Year:

| Year | Original Cost | Calculated Accumulated Depreciation | Allocated Actual Booked Amount | Accumulated Depreciation Factor | Net Book Value | ALG Remaining Life | Annual Accrual | Average Age |
|------|--------------|-------------------------------------|--------------------------------|--------------------------------|----------------|---------------------|----------------|-------------|
| 2012 | 22,514.99 | 21,389 | 20,349 | 0.9038 | 2,166 | 0.50 | 2,166 | 9.5 |
| 2013 | 368,021.74 | 312,818 | 297,602 | 0.8087 | 70,420 | 1.50 | 46,947 | 8.5 |
| 2014 | 48,423.02 | 36,317 | 34,551 | 0.7135 | 13,872 | 2.50 | 5,549 | 7.5 |
| 2015 | 145,186.63 | 94,371 | 89,781 | 0.6184 | 55,406 | 3.50 | 15,830 | 6.5 |
| 2017 | 97,398.06 | 43,829 | 41,697 | 0.4281 | 55,701 | 5.50 | 10,127 | 4.5 |
| TOTAL | 681,544.44 | 508,725 | 483,979 | | 197,565 | | 80,619 | |

| | |
|---|---|
| COMPOSITE ANNUAL ACCRUAL RATE | 11.83% |
| THEORETICAL ACCUMULATED DEPRECIATION FACTOR | 0.71 |
| COMPOSITE AVERAGE AGE (YEARS) | 7.46 |
| DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS) | 2.54 |

# MDU Common

Account #: 397.50 - Supervisory & Telemetering Equipment

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF December 31, 2021

| Year | Original Cost | Calculated Accumulated Depreciation | Allocated Actual Booked Amount | Accumulated Depreciation Factor | Net Book Value | ALG Remaining Life | Annual Accrual | Average Age |
|---|---|---|---|---|---|---|---|---|
| 2012 | 3,111.92 | 2,956 | 1,954 | 0.6280 | 1,158 | 0.50 | 1,158 | 9.5 |
| 2013 | 10,073.86 | 8,563 | 5,660 | 0.5619 | 4,413 | 1.50 | 2,942 | 8.5 |
| 2021 | 2,517.81 | 126 | 83 | 0.0331 | 2,435 | 9.50 | 256 | 0.5 |
| TOTAL | 15,703.59 | 11,645 | 7,698 | | 8,006 | | 4,356 | |

| | |
|---|---|
| COMPOSITE ANNUAL ACCRUAL RATE | 27.74% |
| THEORETICAL ACCUMULATED DEPRECIATION FACTOR | 0.49 |
| COMPOSITE AVERAGE AGE (YEARS) | 7.42 |
| DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS) | 2.58 |

# MDU Common

Account #: 397.80 - Network Equipment

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF December 31, 2021

| Year | Original Cost | Calculated Accumulated Depreciation | Allocated Actual Booked Amount | Accumulated Depreciation Factor | Net Book Value | ALG Remaining Life | Annual Accrual | Average Age |
|------|---------------|-------------------------------------|--------------------------------|----------------------------------|----------------|--------------------|----------------|-------------|
| 2017 | 7,670.26 | 6,903 | 5,113 | 0.6666 | 2,557 | 0.50 | 2,557 | 4.5 |
| 2018 | 8,414.86 | 5,890 | 4,363 | 0.5184 | 4,052 | 1.50 | 2,702 | 3.5 |
| 2019 | 332,413.29 | 166,207 | 123,097 | 0.3703 | 209,316 | 2.50 | 83,726 | 2.5 |
| 2020 | 25,144.25 | 7,543 | 5,587 | 0.2222 | 19,557 | 3.50 | 5,588 | 1.5 |
| 2021 | 14,293.86 | 1,429 | 1,059 | 0.0741 | 13,235 | 4.50 | 2,941 | 0.5 |
| TOTAL | 387,936.52 | 187,973 | 139,218 | | 248,718 | | 97,514 | |

| | |
|---|---|
| **COMPOSITE ANNUAL ACCRUAL RATE** | 25.14% |
| **THEORETICAL ACCUMULATED DEPRECIATION FACTOR** | 0.36 |
| **COMPOSITE AVERAGE AGE (YEARS)** | 2.42 |
| **DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)** | 2.58 |

# MDU Common

Account #: 398.00 - Miscellaneous Equipment

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF December 31, 2021

| Year | Original Cost | Calculated Accumulated Depreciation | Allocated Actual Booked Amount | Accumulated Depreciation Factor | Net Book Value | ALG Remaining Life | Annual Accrual | Average Age |
|---|---|---|---|---|---|---|---|---|
| 2002 | 49,732.75 | 38,792 | 49,733 | 1.0000 | 0 | 5.50 | 0 | 19.5 |
| 2003 | 14,581.60 | 10,790 | 14,582 | 1.0000 | 0 | 6.50 | 0 | 18.5 |
| 2004 | 19,429.45 | 13,601 | 18,626 | 0.9587 | 803 | 7.50 | 107 | 17.5 |
| 2005 | 11,868.04 | 7,833 | 10,282 | 0.8664 | 1,586 | 8.50 | 187 | 16.5 |
| 2006 | 230,098.97 | 142,661 | 187,273 | 0.8139 | 42,826 | 9.50 | 4,508 | 15.5 |
| 2007 | 14,821.03 | 8,596 | 11,284 | 0.7614 | 3,537 | 10.50 | 337 | 14.5 |
| 2008 | 48,220.36 | 26,039 | 34,182 | 0.7089 | 14,039 | 11.50 | 1,221 | 13.5 |
| 2010 | 74,799.68 | 34,408 | 45,167 | 0.6038 | 29,632 | 13.50 | 2,195 | 11.5 |
| 2011 | 31,820.28 | 13,365 | 17,544 | 0.5513 | 14,277 | 14.50 | 985 | 10.5 |
| 2012 | 385,182.19 | 146,369 | 192,140 | 0.4988 | 193,042 | 15.50 | 12,454 | 9.5 |
| 2013 | 44,771.16 | 15,222 | 19,982 | 0.4463 | 24,789 | 16.50 | 1,502 | 8.5 |
| 2014 | 123,724.15 | 37,117 | 48,724 | 0.3938 | 75,000 | 17.50 | 4,286 | 7.5 |
| 2015 | 10,522.97 | 2,736 | 3,592 | 0.3413 | 6,931 | 18.50 | 375 | 6.5 |
| 2016 | 8,540.63 | 1,879 | 2,467 | 0.2888 | 6,074 | 19.50 | 311 | 5.5 |
| 2017 | 12,051.42 | 2,169 | 2,848 | 0.2363 | 9,204 | 20.50 | 449 | 4.5 |
| 2018 | 21,759.78 | 3,046 | 3,999 | 0.1838 | 17,761 | 21.50 | 826 | 3.5 |
| 2019 | 170,767.52 | 17,077 | 22,417 | 0.1313 | 148,351 | 22.50 | 6,593 | 2.5 |
| 2020 | 67,708.05 | 4,062 | 5,333 | 0.0788 | 62,375 | 23.50 | 2,654 | 1.5 |
| 2021 | 203,213.70 | 4,064 | 5,335 | 0.0263 | 197,879 | 24.50 | 8,077 | 0.5 |
| TOTAL | 1,543,613.73 | 529,827 | 695,508 | | 848,105 | | 47,067 | |

| | |
|---|---|
| COMPOSITE ANNUAL ACCRUAL RATE | 3.05% |
| THEORETICAL ACCUMULATED DEPRECIATION FACTOR | 0.45 |
| COMPOSITE AVERAGE AGE (YEARS) | 8.58 |
| DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS) | 16.42 |

SECTION 9

# 9   ESTIMATION OF SURVIVOR CURVES

## 9.1   Average Service Life

All assets have a service life, which is defined as "the period of time from its installation until it is retired from service"[3].  All account groups of property are made up of various assets with differing service lives and investment values.  To calculate a depreciation rate, one must first calculate an average life for all assets in a single account.  This can be done by ascertaining the age at retirement for every asset in an account and plotting it as a percentage of the units surviving at each age interval (a "Survivor Curve").  From the average life for each account, remaining lives can then be found which are then used to calculate the annual depreciation accruals and ultimately depreciation rate.  A discussion of the general concept of survivor curves is presented and the Iowa type survivor curves are reviewed.

## 9.2   Survivor Curves

A survivor curve is defined as "a graph of the percent of units remaining in service expressed as a function of age"[4].  To calculate the average life of the group, the remaining life expectancy, the probable life and the frequency curve, one must first create a survivor curve.  Figure 1 shows a typical 40-R4 smoothed survivor curve as well as the accompanying derived curves.  The type 40-R4 refers to the Iowa type curve, whose designation will be explained in further detail in the next section

To calculate the average service life, one must calculate the area under the survivor curve and divide by the percent surviving at age zero.  The remaining life is equal to the area under the survivor curve and to the right of the current age, divided by the percent surviving at the current age.  In Figure 1, for example, the hatched area to the right of age 45 divided by 28.9 percent surviving balance represents the remaining life for an asset that has reached that age.  The probable life is "the total life expectancy of the property surviving at any age and is equal to the remaining life plus the current age."[5]  If the probable life of the property is calculated for each year of age, the probable life curve shown in the chart can be developed.  The frequency curve is calculated by taking the difference between the percent surviving on successive years on the survivor curve[6].  Alternatively, frequency can be empirically determined by finding the amount of retirements at any given age.  Plotting retirement frequency from the youngest to oldest ages and then taking the cumulative frequencies will generate percent surviving versus age.

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[3] Wolf, Frank K. and W. Chester Fitch, Depreciation Systems (Iowa State University Press, 1994), 21.
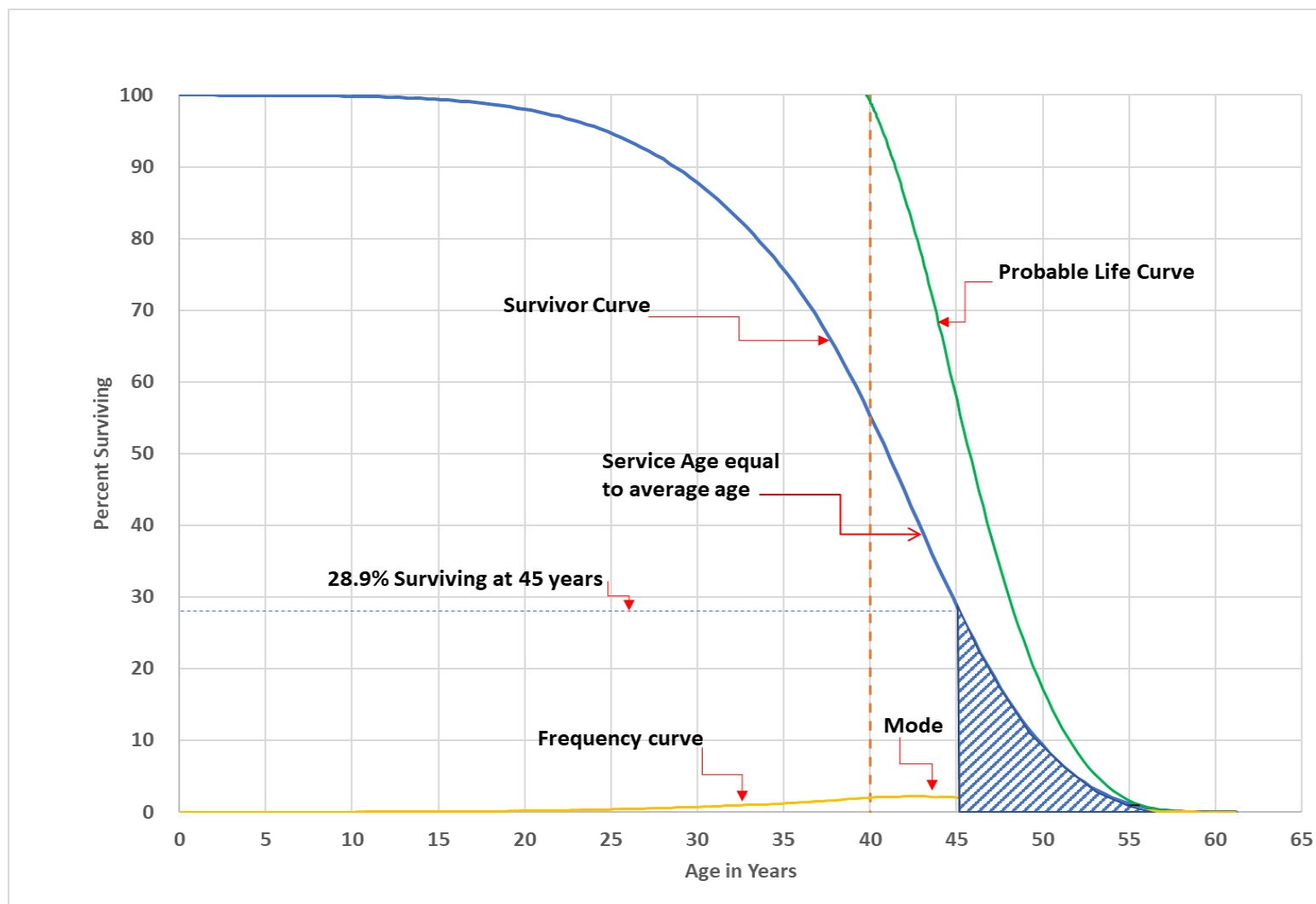
[4] *Ibid*, 23.

[5] *Ibid*, 29.

[6] *Ibid*, 23-24.

FIGURE 1: TYPICAL SURVIVOR CURVE (40-R4) AND DERIVED CURVES

## 9.3 Iowa Type Curves

In 1931, Robley Winfrey and Edwin Kurtz of the Engineering Research Institute at Iowa State University published Bulletin 103, which laid the groundwork for what would eventually be known as the Iowa Curves. "The 13 type curves can be used as valuable aids in forecasting the probable future service lives of individual items and of groups of items of different kinds of physical equipment"[7]. The 13 curves described in Bulletin 103 eventually became a series of 22 generalized survivor curves which are used throughout the regulated utility industry. These 22 curves were described in Bulletin 125, published in 1967 by Harold A. Cowles, which became known as the Iowa curves.

The Iowa curves are organized with three variables: the average life of the plant; the location of the mode; and the variation of the life. All Iowa curves have both a letter and a number to represent the shape and height of the mode. The L curves, or left-moded curves, are used when the mode of the curve should be to the left of the average life. There are six L curves presented in Figure 2. The R curves, or right-moded, are used when the mode of the curve should be to the right of the average life. There are five R curves, which are presented in Figure 3. The S curves, or symmetrically-moded, are used when the mode is equal to the average life. There are seven S curves, which are presented in Figure 4. The O curves, or origin curves, are used when the mode occurs at age 0. There are four O curves, which are presented in Figure 5. There are some occasions where it is appropriate to use a half curve. In these cases, the curve is assumed to be exactly half way between the two curves.

In addition to Bulletin 125, Iowa curves have also been presented in subsequent Experiment Station bulletins and in the text Engineering Valuation and Depreciation[8]. In 1957, Frank V. B. Couch, Jr., an Iowa State College graduate student, submitted a thesis[9] presenting his development of the fourth family consisting of the four O-type survivor curves.

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[7] *Ibid*, 21

[8] Marston, Anson, Robley Winfrey and Jean C. Hempstead, Engineering Valuation and Depreciation (The Iowa State University Press, 1953)

[9] Couch, Frank V. B., Jr., Classification of Type O Retirement Characteristics of Industrial Property Unpublished M.S. Thesis (Engineering Valuation, Library, Iowa State College, Ames, Iowa, 1957)
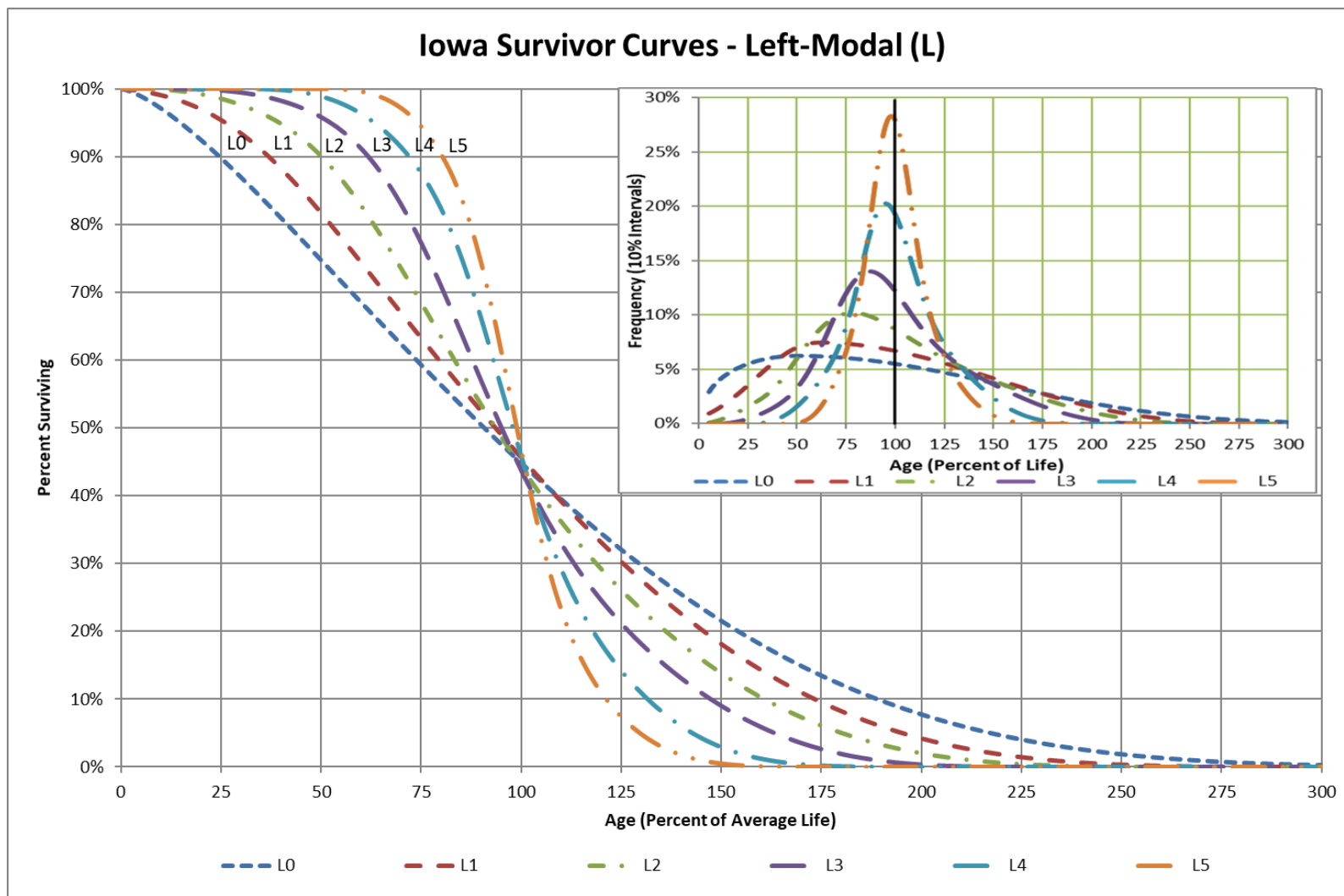
FIGURE 2: LEFT MODAL OR "L" IOWA TYPE SURVIVOR CURVES

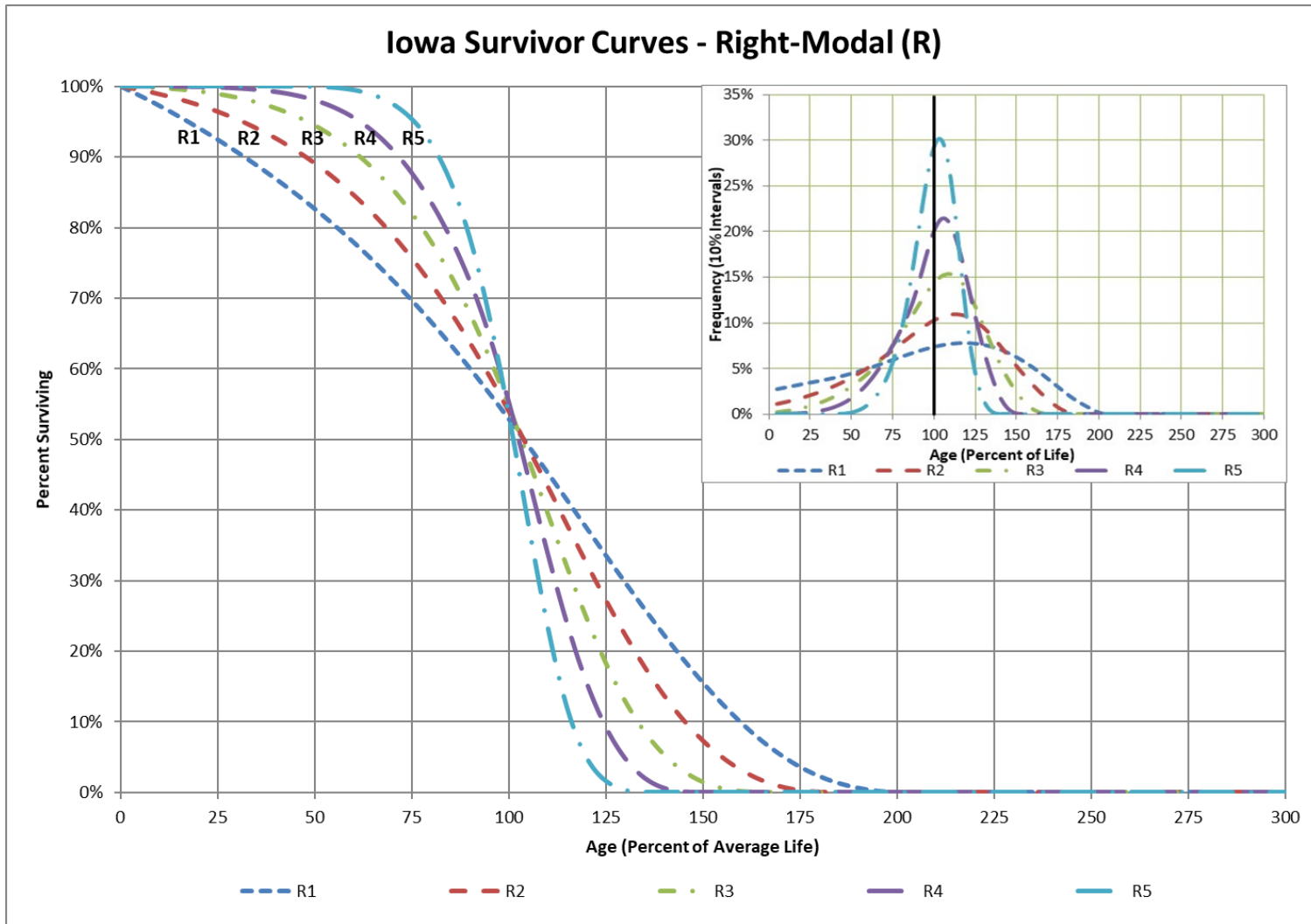FIGURE 3: RIGHT MODAL OR "R" IOWA TYPE SURVIVOR CURVES

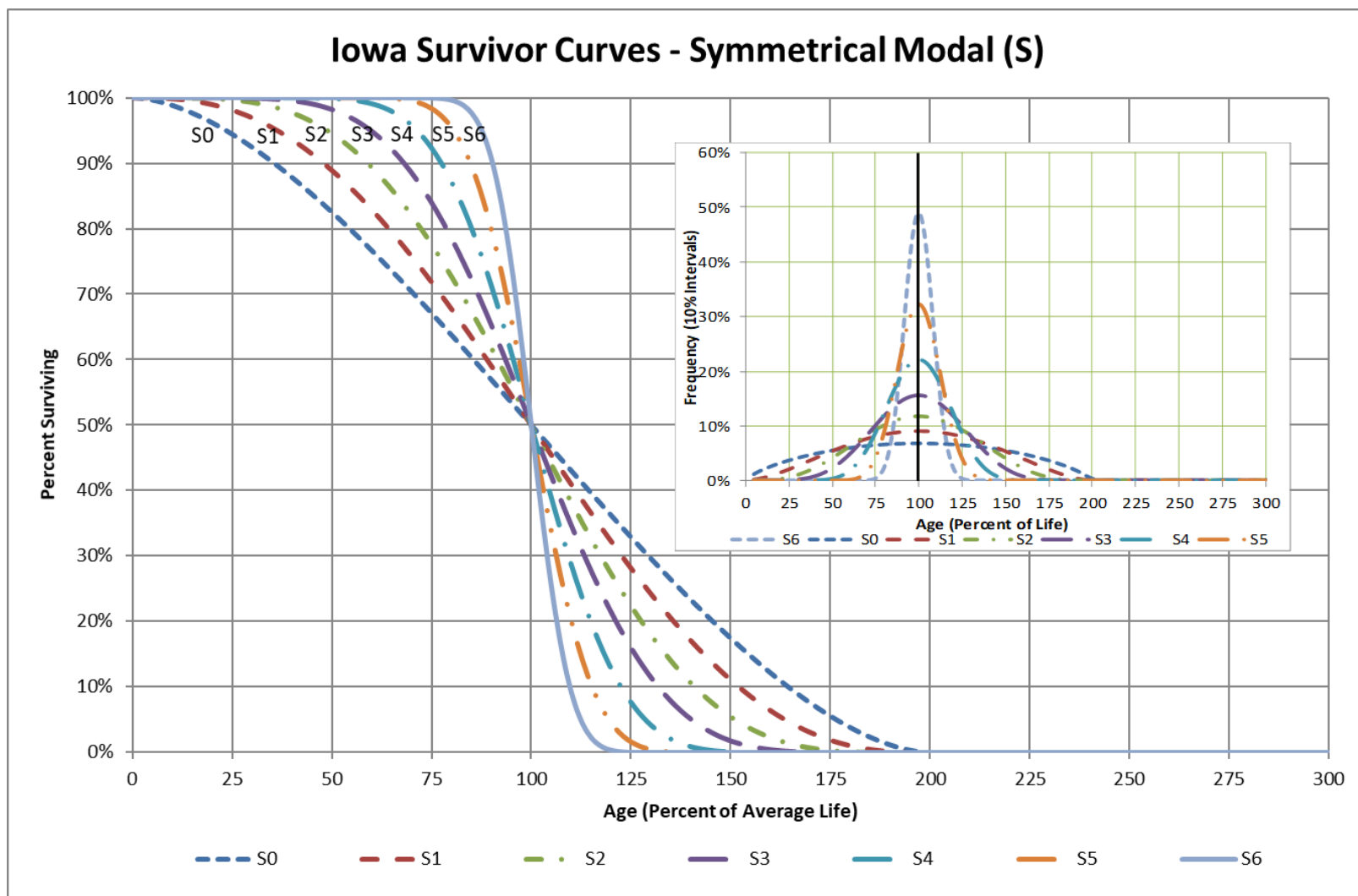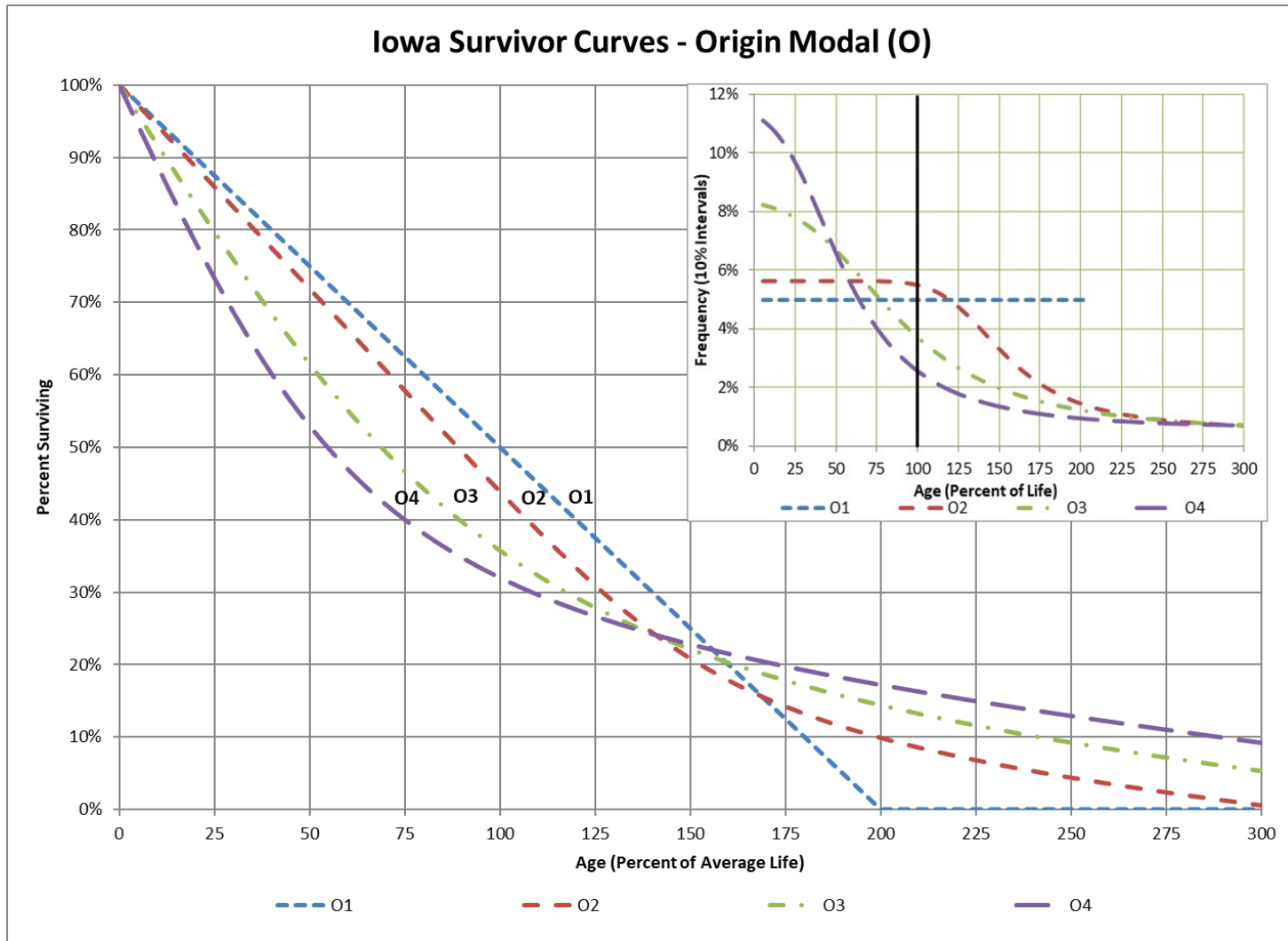FIGURE 4: SYMMETRICAL OR "S" IOWA TYPE SURVIVOR CURVES

FIGURE 5: ORIGIN MODAL OR "O" IOWA TYPE SURVIVOR CURVES

## 9.4   Retirement Rate Method of Analysis

The retirement rate method is a widely accepted actuarial method used to create survivor curves. This method is also referred to as an original life table.  These survivor curves can then be used to determine the average service life of a plant account.  The retirement rate method is thoroughly explained in several publications, including Statistical Analyses of Industrial Property Retirements,[10] Engineering Valuation and Depreciation[11] and Depreciation Systems[12].

The retirement rate method is a subgroup of the placement and the experience band methods, as described in "Depreciation Systems".  The placement band method creates a survivor curve which describes the life characteristics of assets placed into service during a selected timeframe.  The experience band method creates a survivor curve which describes the life characteristics of assets removed from service during a selected time frame.  The retirement rate method creates both placement and experience bands to give the most complete or representative data.  An example of the calculations used in the development of a life table follows.  The example includes schedules of annual aged property transactions, a schedule of plant exposed to retirement, a life table and illustrations of smoothing the stub survivor curve.

## 9.5   Schedules of Annual Transactions in Plant Records

The property group used to illustrate the retirement rate method is observed for the experience band 2008-2017 during which there were placements during the years 2003-2017.  In order to illustrate the summation of the aged data by age interval, the data was compiled in the manner presented in Schedules 1 and 2.  In Schedule 1 (page 9-10), the year of installation (year placed) and the year of retirement are shown.  The age interval during which a retirement occurred is determined from this information.  In the example which follows, $10,000 of the asset invested in 2003 were retired in 2008.  The $10,000 retirement occurred during the age interval between 4 ½ and 5 ½ years (2008 - 2003) on the basis that approximately one-half of the amount of property was installed prior to and after July 1 of each year.  That is, on the average, property installed during a year is placed in service at the midpoint of the year for the purpose of the analysis.  All retirements also are stated as occurring at the midpoint of a one-year age interval of time, except the first age interval which encompasses only one-half year.

The total retirements occurring in each age interval in a band are determined by summing the amounts for each transaction year-installation year combination for that age interval.  For example, the total of $143,000 retired for age interval 4½-5½ is the sum of the retirements entered on Schedule 1 immediately above the stair step line drawn on the table beginning with the 2008 retirements of 2003 installations and ending with the 2016 retirements of the 2011 installations.  Thus, the total amount of $143,000 for age interval 4½-5½ equals the sum of:

$$\$10 + \$12 + \$13 + \$11 + \$13 + \$13 + \$15 + \$17 + \$19 + \$20 = \$143 \text{ k}$$

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[10] Anson, Winfrey & Hempstead, supra note 7

[11] Anson, Winfrey & Hempstead, supra note 7

[12] Wolf & Fitch, supra note 2

Other transactions which affect the group are recorded in a similar manner in Schedule 2 (page 9-11).  The entries illustrated include transfers and sales.  The entries which are credits to the plant account are shown in parentheses.  The items recorded on this schedule are not totaled with the retirements but are used in developing the exposures at the beginning of each age interval.

SCHEDULE 1. RETIREMENTS FOR EACH YEAR 2008-2017 – SUMMARIZED BY AGE INTERVAL

Experience Band 2008-2017

Placement Band 2003-2017

**Retrements (Thousands of Dollars)**
**Annual Survivors at the Beginning of the Year**

| Year Placed (1) | 2008 (2) | 2009 (3) | 2010 (4) | 2011 (5) | 2012 (6) | 2013 (7) | 2014 (8) | 2015 (9) | 2016 (10) | 2017 (11) | Total Durring Age Interval (12) | Age Interval (13) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2003 | 10 | 11 | 12 | 13 | 14 | 16 | 23 | 24 | 25 | 26 | 26 | 13½-14½ |
| 2004 | 11 | 12 | 13 | 15 | 16 | 18 | 20 | 21 | 22 | 19 | 44 | 12½-13½ |
| 2005 | 11 | 12 | 13 | 14 | 16 | 17 | 19 | 21 | 22 | 18 | 64 | 11½-12½ |
| 2006 | 8 | 9 | 10 | 11 | 11 | 13 | 14 | 15 | 16 | 17 | 83 | 10½-11½ |
| 2007 | 9 | 10 | 11 | 12 | 13 | 14 | 16 | 17 | 19 | 20 | 93 | 9½-10½ |
| 2008 | 4 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 20 | 105 | 8½-9½ |
| 2009 | | 5 | 11 | 12 | 13 | 14 | 15 | 16 | 18 | 20 | 113 | 7½-8½ |
| 2010 | | | 6 | 12 | 13 | 15 | 16 | 17 | 19 | 19 | 124 | 6½-7½ |
| 2011 | | | | 6 | 13 | 15 | 16 | 17 | 19 | 19 | 131 | 5½-6½ |
| 2012 | | | | | 7 | 14 | 16 | 17 | 19 | 20 | 143 | 4½-5½ |
| 2013 | | | | | | 8 | 18 | 20 | 22 | 23 | 146 | 3½-4½ |
| 2014 | | | | | | | 9 | 20 | 22 | 25 | 150 | 2½-3½ |
| 2015 | | | | | | | | 11 | 23 | 25 | 151 | 1½-2½ |
| 2016 | | | | | | | | | 11 | 24 | 153 | ½-1½ |
| 2017 | | | | | | | | | | 13 | 80 | 0-½ |
| **Total** | **53** | **68** | **86** | **106** | **128** | **157** | **196** | **231** | **273** | **308** | **1,606** | |

SCHEDULE 2. OTHER TRANSACTIONS FOR EACH YEAR 2008-2017 – SUMMARIZED BY AGE INTERVAL

Experience Band 2008-2017                                              Placement Band 2003-2017

**Acquisitions, Transfers and Sales (Thousands of Dollars)**
**Annual Survivors at the Beginning of the Year**

| Year Placed (1) | 2008 (2) | 2009 (3) | 2010 (4) | 2011 (5) | 2012 (6) | 2013 (7) | 2014 (8) | 2015 (9) | 2016 (10) | 2017 (11) | Total Durring Age Interval (12) | Age Interval (13) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2003 | - | - | - | - | - | - | 60[a] | - | - | - | - | 13½-14½ |
| 2004 | - | - | - | - | - | - | - | - | - | - | - | 12½-13½ |
| 2005 | - | - | - | - | - | - | - | - | - | - | - | 11½-12½ |
| 2006 | - | - | - | - | - | - | - | (5)[b] | - | - | 60 | 10½-11½ |
| 2007 | - | - | - | - | - | - | - | 6[a] | - | - | - | 9½-10½ |
| 2008 | - | - | - | - | - | - | - | - | - | - | (5) | 8½-9½ |
| 2009 | | - | - | - | - | - | - | - | - | - | - | 7½-8½ |
| 2010 | | | - | - | - | - | - | - | - | - | - | 6½-7½ |
| 2011 | | | | - | - | - | - | (12)[b] | - | - | - | 5½-6½ |
| 2012 | | | | | - | - | - | - | 22[a] | - | - | 4½-5½ |
| 2013 | | | | | | - | - | (19)[b] | - | - | 10 | 3½-4½ |
| 2014 | | | | | | | - | - | - | - | - | 2½-3½ |
| 2015 | | | | | | | | - | - | (102)[c] | (121) | 1½-2½ |
| 2016 | | | | | | | | | - | - | - | ½-1½ |
| 2017 | | | | | | | | | | | | 0-½ |
| | | | | | | | | | | | | |
| **Total** | **-** | **-** | **-** | **-** | **-** | **-** | **60** | **(30)** | **22** | **(102)** | **(50)** | |

[a] *Transfer Affecting Exposures at Beginning of Year*
[b] *Transfer Affecting Exposures at End of Year*
[c] *Sale with Continued Use*
*Parentheses denote Credit amount.*

## 9.6  Schedule of Plant Exposed to Retirement

The development of the amount of plant exposed to retirement at the beginning of each age interval is illustrated in Schedule 3 (page 9-13).  The surviving plant at the beginning of each year from 2007 through 2016 is recorded by year in the portion of the table titled "Annual Survivors at the Beginning of the Year."  The last amount entered in each column is the amount of new plant added to the group during the year.  The amounts entered in Schedule 3 for each successive year following the beginning balance or addition, are obtained by adding or subtracting the net entries shown on Schedules 1 and 2.  For the purpose of determining the plant exposed to retirement, transfers-in are considered as being exposed to retirement in this group at the beginning of the year in which they occurred, and the sales and transfers-out are considered to be removed from the plant exposed to  retirement  at the  beginning  of  the following year.  Thus, the amounts of plant shown at the beginning of each year are the amounts of plant from each placement year considered to be exposed to retirement at the beginning of each successive transaction year.  For example, the exposures for the installation year 2013 are calculated in the following manner:

| | | | | |
|---|---|---|---|---|
| Exposures at age 0 | = | amount of addition | = | $750,000 |
| Exposures at age ½ | = | $750,000 - $ 8,000 | = | $742,000 |
| Exposures at age 1½ | = | $742,000 - $18,000 | = | $724,000 |
| Exposures at age 2½ | = | $724,000 - $20,000 - $19,000 | = | $685,000 |
| Exposures at age 3½ | = | $685,000 - $22,000 | = | $663,000 |

For the entire experience band 2008-2018, the total exposures at the beginning of an age interval are obtained by summing diagonally in a manner similar to the summing of the retirements during an age interval (Schedule 1).  For example, the figure of 3,789, shown as the total exposures at the beginning of age interval 4½-5½, is obtained by summing:

$$\$255 + \$268 + \$ 284 + \$311 + \$334 + \$374 + \$405 + \$448 + \$501 \ \$ \ \$609 = \$3,789k$$

SCHEDULE 3 – PLANT EXPOSED TO RETIREMENT AT THE BEGINNING OF EACH YEAR, 2008 -2017 – SUMMARIZED BY AGE INTERVAL

Experience Band 2008 - 2017                                                                  Placement Band 2003-2017

**Exposures (Thousands of Dollars)**
**Annual Survivors at the Beginning of the Year**

| Year Placed (1) | 2008 (2) | 2009 (3) | 2010 (4) | 2011 (5) | 2012 (6) | 2013 (7) | 2014 (8) | 2015 (9) | 2016 (10) | 2017 (11) | Total at Beginning of Age Interval (12) | Age Interval (13) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2003 | 255 | 245 | 234 | 222 | 209 | 195 | 239 | 216 | 192 | 167 | 167 | 13½-14½ |
| 2004 | 279 | 268 | 256 | 243 | 228 | 212 | 194 | 174 | 153 | 131 | 323 | 12½-13½ |
| 2005 | 307 | 296 | 284 | 271 | 257 | 241 | 224 | 205 | 184 | 162 | 531 | 11½-12½ |
| 2006 | 338 | 330 | 321 | 311 | 300 | 289 | 276 | 262 | 242 | 226 | 823 | 10½-11½ |
| 2007 | 376 | 367 | 257 | 346 | 334 | 321 | 307 | 267 | 280 | 261 | 1,097 | 9½-10½ |
| 2008 | 420ᵃ | 416 | 407 | 397 | 386 | 374 | 361 | 347 | 332 | 316 | 1,503 | 8½-9½ |
| 2009 | | 460ᵃ | 455 | 444 | 432 | 419 | 405 | 390 | 374 | 356 | 1,952 | 7½-8½ |
| 2010 | | | 510ᵃ | 504 | 492 | 479 | 464 | 448 | 431 | 412 | 2,463 | 6½-7½ |
| 2011 | | | | 580ᵃ | 574 | 561 | 546 | 530 | 501 | 482 | 3,057 | 5½-6½ |
| 2012 | | | | | 660ᵃ | 653 | 639 | 623 | 628 | 609 | 3,789 | 4½-5½ |
| 2013 | | | | | | 750ᵃ | 742 | 724 | 685 | 663 | 4,332 | 3½-4½ |
| 2014 | | | | | | | 850ᵃ | 841 | 821 | 799 | 4,955 | 2½-3½ |
| 2015 | | | | | | | | 960ᵃ | 949 | 923 | 5,719 | 1½-2½ |
| 2016 | | | | | | | | | 1,080ᵃ | 1,069 | 6,579 | ½-1½ |
| 2017 | | | | | | | | | | 1,220ᵃ | 7,490 | 0-½ |
| | | | | | | | | | | | | |
| Total | 1,975 | 2,382 | 2,724 | 3,318 | 3,872 | 4,494 | 5,247 | 5,987 | 6,852 | 7,796 | 44,780 | |

ᵃ Additions during the year.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1555 | 1922 | 2214 | 2738 | 3212 | 3744 | 4397 | 5027 | 5772 | 6576 | 44780 |
| 420 | 460 | 510 | 580 | 660 | 750 | 850 | 960 | 1080 | 1220 | 0 |
| 1975 | 2382 | 2724 | 3318 | 3872 | 4494 | 5247 | 5987 | 6852 | 7796 | 44780 |

## 9.7   Original Life Tables

The original life table, illustrated in Schedule 4 (page 9-15) is developed from the totals shown on the schedules of retirements and exposures, Schedules 1 and 3, respectively.  The exposures at the beginning of the age interval are obtained from the corresponding age interval of the exposure schedule, and the retirements during the age interval are obtained from the corresponding age interval of the retirement schedule.  The retirement ratio is the result of dividing the retirements during the age interval by the exposures at the beginning of the age interval.  The percent surviving at the beginning of each age interval is derived from survivor ratios, each of which equals one minus the retirement ratio.  The percent surviving is developed by starting with 100 percent at age zero and successively multiplying the percent surviving at the beginning of each interval by the survivor ratio, i.e., one minus the retirement ratio for that age interval.  The calculations necessary to determine the percent surviving at age 5½ are as follows:

| | | | | | |
|---|---|---|---|---|---|
| Percent surviving at age 4½ | = | 88.15 | | | |
| Exposures at age 4½ | = | $3,789,000 | | | |
| Retirements from age 4½ to 5½ | = | $143,000 | | | |
| Retirement Ratio | = | $143,000 ÷ $3,789,000 | = | 0.0377 | |
| Survivor Ratio | = | 1.000 - 0.0377 | = | 0.9623 | |
| Percent surviving at age 5½ | = | (88.15) x (0.9623) | = | 84.83 | |

The totals of the exposures and retirements (columns 2 and 3) are shown for the purpose of checking with the respective totals in Schedules 1 and 3.  The ratio of the total retirements to the total exposures, other than for each age interval, is meaningless.  The original survivor curve is plotted from the original life table (column 6, Schedule 4).  When the curve terminates at a percent surviving greater than zero, it is called a stub survivor curve.  Survivor curves developed from retirement rate studies generally are stub curves.

SCHEDULE 4: ORIGINAL LIFE TABLE - CALCULATED BY THE RETIREMENT RATE METHOD

| Experience Band 2008-2017 | | | | Placement Band 2003-2017 | |
|---|---|---|---|---|---|
| Age at Beginning of Interval | Exposures at Beginning of Age Interval | Retirements During Age Interval | Retirement Ratio | Survivor Ratio | % Surviving at Beginning of Age Interval |
| 0 | 7,490 | 80 | 0.0107 | 0.9893 | 100.00 |
| 0.5 | 6,579 | 153 | 0.0233 | 0.9767 | 98.93 |
| 1.5 | 5,719 | 151 | 0.0264 | 0.9736 | 96.62 |
| 2.5 | 4,955 | 150 | 0.0303 | 0.9697 | 94.07 |
| 3.5 | 4,332 | 146 | 0.0337 | 0.9663 | 91.22 |
| 4.5 | 3,789 | 143 | 0.0377 | 0.9623 | 88.15 |
| 5.5 | 3,057 | 131 | 0.0429 | 0.9571 | 84.83 |
| 6.5 | 2,463 | 124 | 0.0503 | 0.9497 | 81.19 |
| 7.5 | 1,952 | 113 | 0.0579 | 0.9421 | 77.11 |
| 8.5 | 1,503 | 105 | 0.0699 | 0.9301 | 72.65 |
| 9.5 | 1,097 | 93 | 0.0848 | 0.9152 | 67.57 |
| 10.5 | 823 | 83 | 0.1009 | 0.8991 | 61.84 |
| 11.5 | 531 | 64 | 0.1205 | 0.8795 | 55.6 |
| 12.5 | 323 | 44 | 0.1362 | 0.8638 | 48.9 |
| 13.5 | 167 | 26 | 0.1557 | 0.8443 | 42.24 |
| | | | | | 35.66 |
| **Total** | **44,780** | **1,606** | | | |

- Exposure and Retirement Amounts are in Thousands of Dollars
- Column 2 from Schedule 3, Column 12, Plant Exposed to Retirement.
- Column 3 from Schedule 1, Column 12, Retirements for Each Year.
- Column 4 = Column 3 divided by Column 2.
- Column 5 = 1.0000 minus Column 4.
- Column 6 = Column 5 multiplied by Column 6 as of the Preceding Age Interval.

## 9.8  Smoothing the Original Survivor Curve

The smoothing of the original survivor curve eliminates any irregularities and serves as the basis for the preliminary extrapolation to zero percent surviving of the original stub curve.  Even if the original survivor curve is complete from 100 percent to zero percent, it is desirable to eliminate any irregularities, as there is still an extrapolation for the vintages which have not yet lived to the age at which the curve reaches zero percent.  In this study, the smoothing of the original curve with established type curves was used to eliminate irregularities in the original curve.

The Iowa type curves are used in this study to smooth those original stub curves which are expressed as percentages surviving at ages in years.  Each original survivor curve was compared to the Iowa curves using visual and mathematical matching in order to determine the better fitting smooth curves.  In Figures 6, 7, and 8, the original curve developed in Schedule 4 is compared with the L, S, and R Iowa type curves which most nearly fit the original survivor curve.  In Figure 6, the L1 curve with an average life between 12 and 13 years appears to be the best fit.  In Figure 7, the S0 type curve with a 12-year average life appears to be the best fit and appears to be better than the L1 fitting.  In Figure 8, the R1 type curve with a 12-year average life appears to be the best fit and appears to be better than either the L1 or the S0.

In Figure 9, the three fittings, 12-L1, 12-S0 and 12-R1 are drawn for comparison purposes.  It is probable that the 12-R1 Iowa curve would be selected as the most representative of the plotted survivor characteristics of the group.

FIGURE 6: ILLUSTRATION OF THE MATCHING OF AN ORIGINAL SURVIVOR CURVE WITH A L1 IOWA TYPE CURVE ORIGINAL AND SMOOTH SURVIVOR CURVES
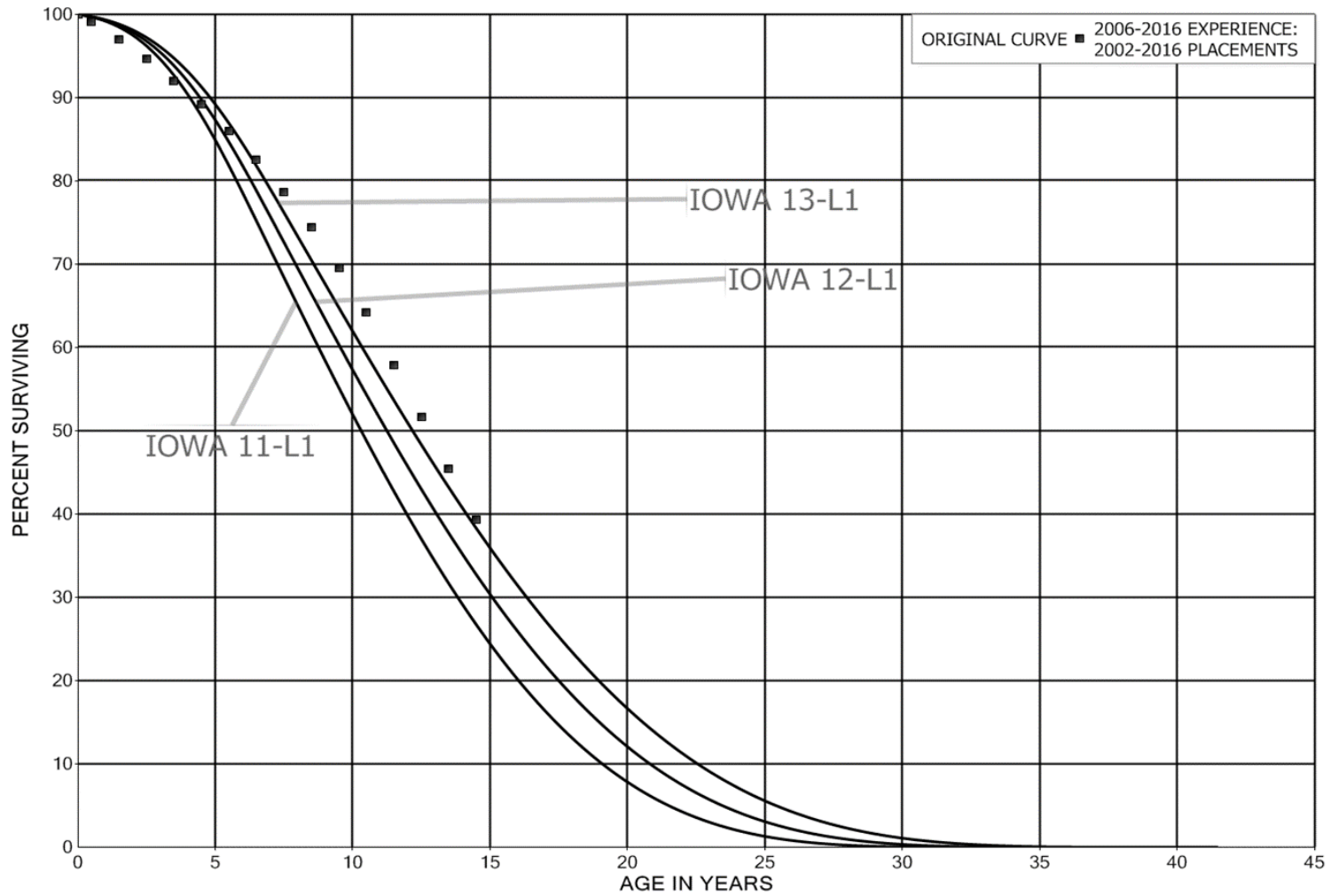
FIGURE 7: ILLUSTRATION OF THE MATCHING OF AN ORIGINAL SURVIVOR CURVE WITH A SO IOWA TYPE CURVE ORIGINAL AND SMOOTH SURVIVOR CURVES
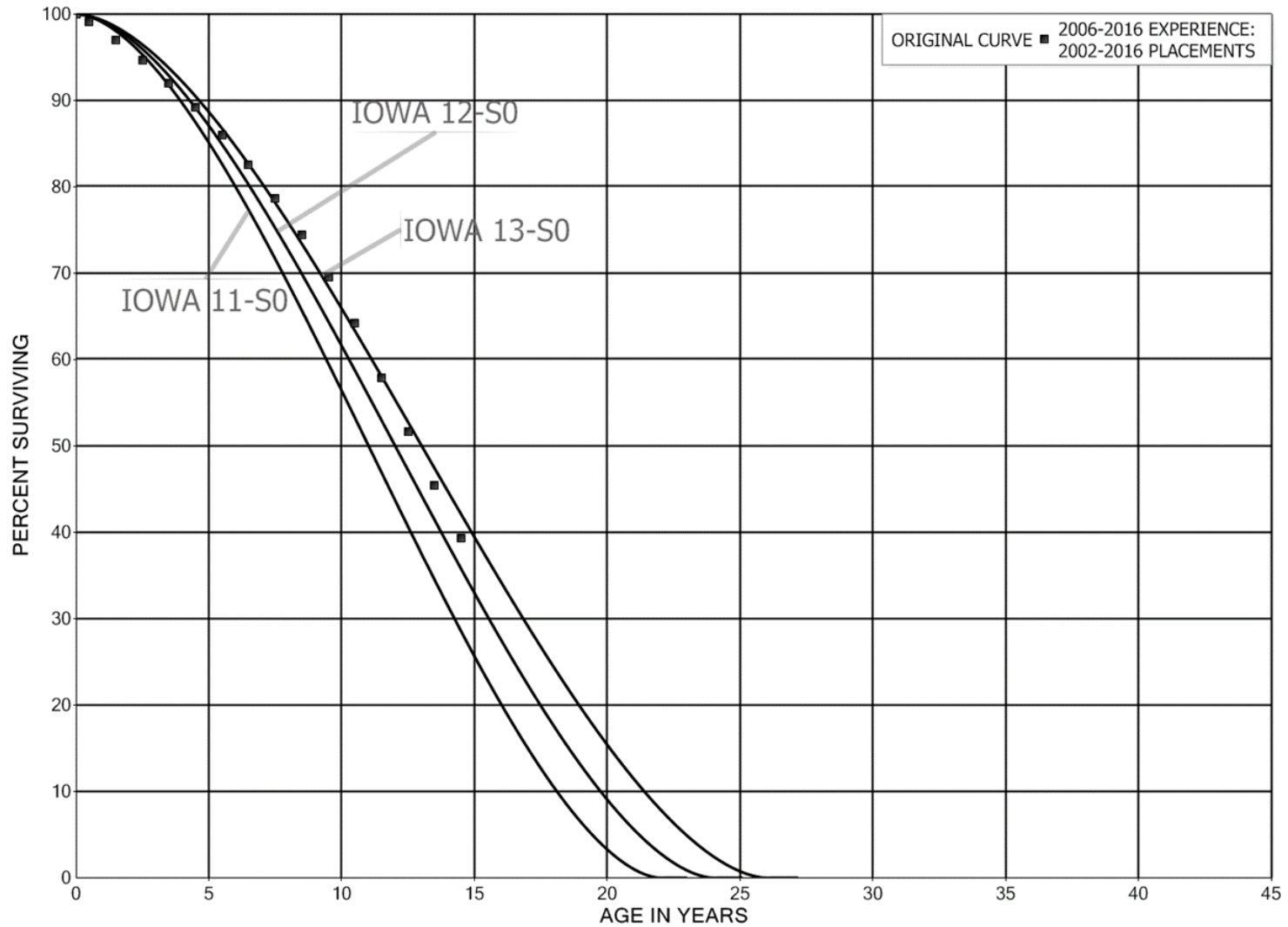
FIGURE 8: ILLUSTRATION OF THE MATCHING OF AN ORIGINAL SURVIVOR CURVE WITH A R1 IOWA TYPE CURVE ORIGINAL AND SMOOTH SURVIVOR CURVES
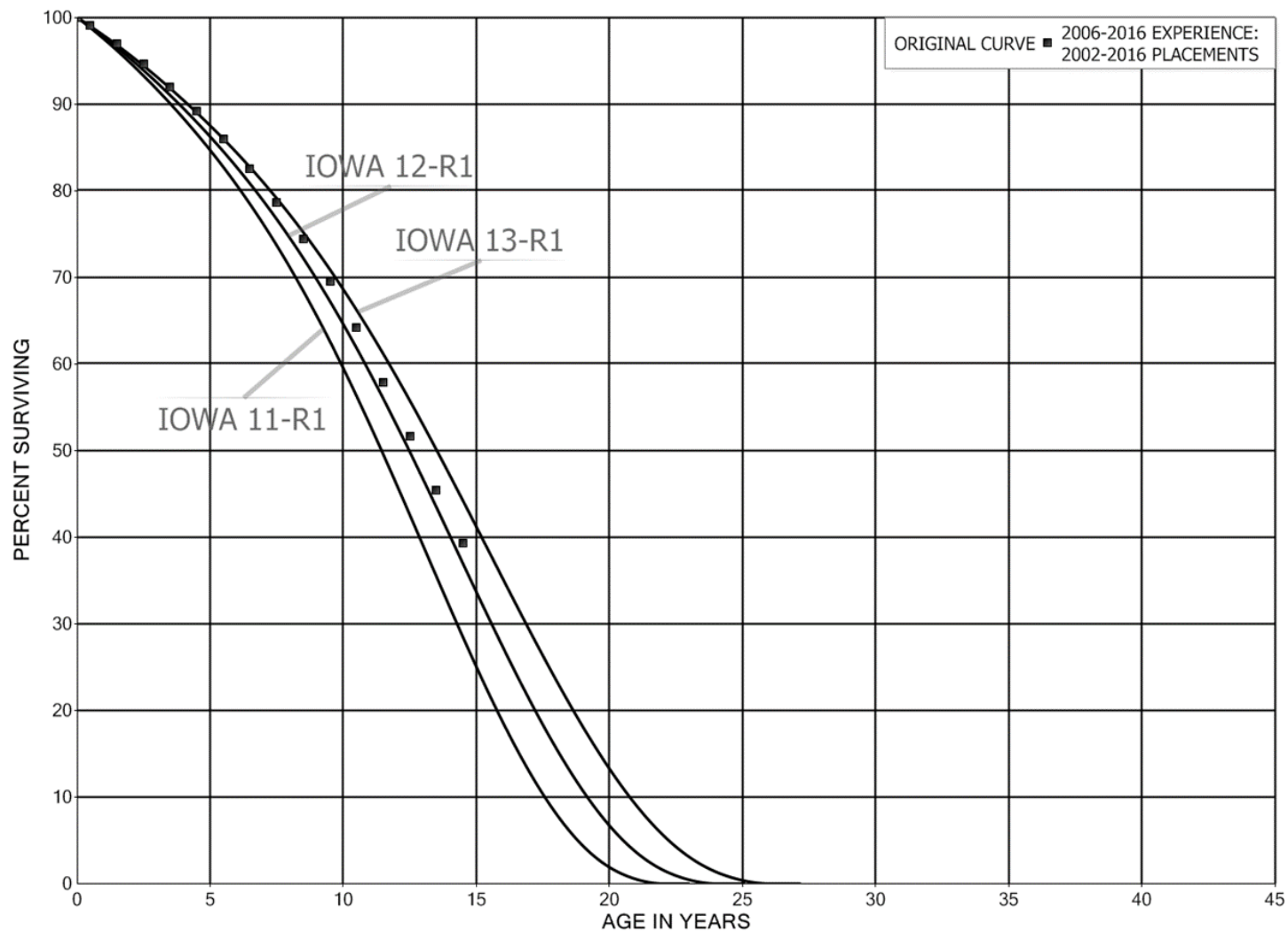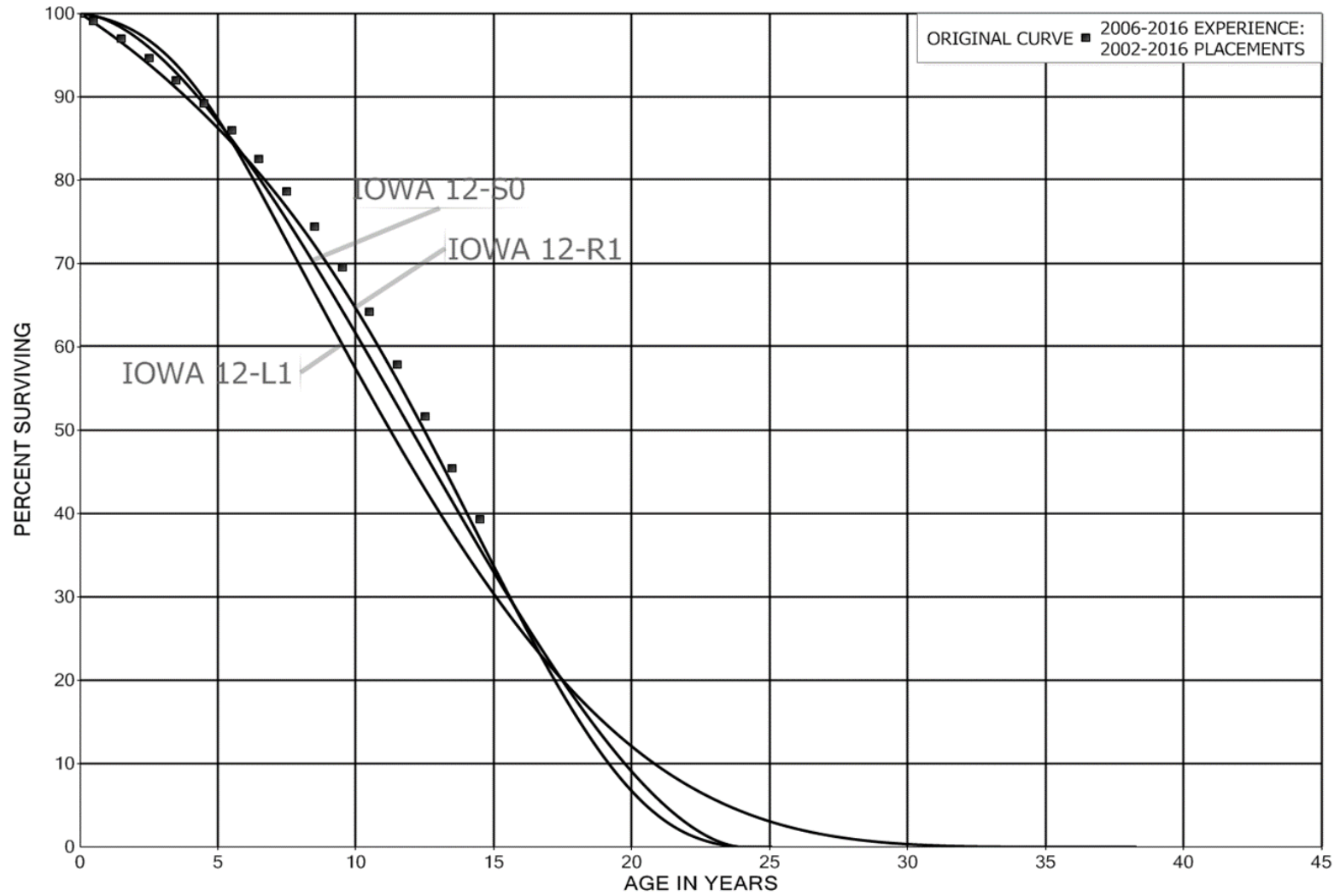
FIGURE 9: ILLUSTRATION OF THE MATCHING OF AN ORIGINAL SURVIVOR CURVE WITH A L1 IOWA TYPE CURVE ORIGINAL AND SMOOTH SURVIVOR CURVES

SECTION 10

# 10 ESTIMATION OF NET SALVAGE

The estimates of net salvage were based primarily on the professional judgment of Concentric, based in part on historical data, and in part through a comparison to Canadian peer companies. The analysis of historic net salvage activity considered gross salvage and cost of removal as recorded to the depreciation reserve account. Net salvages as a percentage of the cost of plant retired are calculated for each plant component on both annual and three-year moving average bases.

The net salvage percentages estimated are usually determined using the "Traditional Approach" for net salvage estimation. When a utility retires plant, the plant may be: (1) sold to a third party; (2) reused by the utility for additional service; (3) abandoned in place; or (4) physically removed. In the circumstances where the plant is sold or re-used, a salvage proceeds (or positive salvage amount) is normally recognized. In circumstances where the plant is abandoned in place or physically removed, a cost of removal expenditure (or negative salvage) is incurred. The net of these estimated gross salvage proceeds and the estimated costs of removal are expressed as a percentage of the account's original cost to determine a net salvage percentage. In the circumstances where the salvage proceeds exceed the costs of retirement, a net positive salvage percentage exists. In the circumstances where the costs of removal exceed the salvage proceeds, a net negative salvage as a percentage of the original cost is the result.

The estimation of the net salvage as a percentage of original cost as developed using the traditional approach, includes the following five steps.

1.  The annual retirement, gross salvage and cost of removal transactions for the period of analysis is extracted from the plant accounting systems.

2.  A net salvage amount (gross salvage proceeds less cost of retirement) is calculated for each historic year. Additionally, a net salvage amount is also calculated for each historic three-year rolling band and the most recent five-year rolling band.

3.  The net salvage amount determined above is compared to the original booked costs retired for each period in the manner described, which results in a net salvage percentage of original costs retired for each year, in addition to three-year rolling bands and the most recent five-year rolling band. The annual, the three-year rolling average, and the most recent five-year rolling average net salvage percentages are analyzed to determine a reasonable estimated net salvage percentage. At this point the net salvage percentage is based purely upon statistical analysis.

4.  Each account is then compared to the net salvage percentage currently approved, compared to Canadian peer companies, and discussed with company engineering staff. Based on the statistical analysis, the review of current and Canadian peer company net salvage percentages, and with the professional judgment of Concentric, a net salvage percentage is determined for each account.

5.  The net salvage percentage is then used in the depreciation rate calculations in the technical update or report.