NCREIF

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II. INTRODUCTION

Welcome to the National Council of Real Estate Investment Fiduciaries (NCREIF) data submission process.

This manual is your guide to the data collection and submission process used by NCREIF in the production and maintenance of the NCREIF Timberland Index (NTI) and the NCREIF Timberland Database (Database). This manual provides step-by-step instructions on:

- Quarterly Data Submission
- Property Disposition Submission

You will find within this manual all of the procedures and illustrations of all screens used to submit property data. Contact the NCREIF office if you have any questions regarding any portion of the data submission procedure. There is also valuable information in the appendices, including a 'Commonly Asked Questions' section.

It is our intent to make this manual compatible with the Real Estate Information Standards (REIS). However, the REIS is an ever-changing document, and inconsistencies may occur. These items will be addressed on an ongoing basis as we periodically revise this data collection manual.

Please take the time to read this manual thoroughly, and always feel free to contact our office with any questions you may have.

A. NCREIF Contacts

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III. OVERVIEW

A. History of NCREIF Indexes

Although June 17, 1982 marks the official beginning of NCREIF, the difficult task of uniting a highly competitive industry actually began in the late 1970s. Following several meetings, 14 commercial real estate investment managers agreed in principle to form a non-profit entity to foster research on the commercial real estate asset class. This led to the development of a database consisting of property-level operating information.

Working with the Frank Russell Company, a joint venture was formed in 1982 that provided NCREIF with the means for the collection, verification, and publication of what was then known as the FRC Property Index. The Index, then as today, measures rates of return for institutionally held real estate investments. Two of the primary purposes for constructing the Index are to measure changes in real property values and in net operating income. History was loaded into the database as far back as the first quarter of 1978.

In 1987, NCREIF began tracking property-level information on and producing performance results for a set of properties that were financed in excess of five percent of their gross market value. This led to the development of the Leveraged Property Database.

Over the next few years, NCREIF's index distribution and membership continued to increase. In 1991 the name of the index was modified to the Russell-NCREIF Property Index to reflect NCREIF's identity as the owner of the data.

In 1992, NCREIF's Research Committee began researching the possibilities of producing a "Combined Index." This project amounted to combining the performance results of properties in the Russell-NCREIF Property Index with those in the Leveraged Property Database in an effort to evaluate market-value-weighted performance results based on a substantially expanded set of data. Preliminary results were generated in the first quarter of 1992.

During 1994, it was mutually determined between NCREIF and the Frank Russell Company that NCREIF had evolved to the point where it should take over production of the growing NCREIF indexes. Thus, on January 1, 1995, thirteen years after its inception, NCREIF assumed full responsibility for the Index, its publication and distribution. The Inaugural Issue of the NCREIF Property Index was distributed in the first quarter of 1995.

With in-house production up and running, NCREIF was ready to produce the "Combined Index." It was formally introduced during the second quarter of 1995 and named the NCREIF Property Index.

It was also determined that the unleveraged data would continue to be published for a period of time and what remained was the dilemma of naming the Index previously referred to as the Russell-NCREIF Property Index. The NCREIF Classic Property Index was decided upon as the new name and was produced with this title for the first time in the first quarter of 1995. The word "Classic" was chosen to refer to the fact that this Index would report on the performance of the familiar set of data for those unleveraged properties upon which the industry benchmark was originally based.

The NCREIF Timberland Property Index was conceived in the early 1990s when several timberland investment managers joined NCREIF with the aim of creating a measure of timberland performance patterned after the NCREIF Property Index. NCREIF commenced publication of the Timberland Property Index in 1994, with historical data back to 1987. Shortly thereafter, NCREIF began regular publication of the NCREIF Timberland Index

IV. QUALIFICATION

A. Qualifying as a Data Contributing Member

In order for your company to maintain status as a Data Contributing Member, you must report quarterly on at least $50 million of timberland real estate, and report on all qualifying properties and funds.

B. General Definition of Timberland Index-Qualifying Property

To qualify for inclusion in the NCREIF Timberland Index, a property must be:

- Held in a fiduciary setting for either tax-exempt or taxable investors,
- Accounted for in a manner substantially in compliance with the NCREIF Market Value Accounting Policy Manual, which can be found in the Real Estate Information Standards Report (please contact the NCREIF office or see the NCREIF website if you would like a copy of this report),
- Valued -internally or externally -on a quarterly basis, Externally appraised in accordance with USPAP standards by an independent third-party expert at a minimum of once every year,
- Comprised primarily of fee simple ownership, as opposed to timber leases, cutting rights, or timber deeds (specifically, at least 80 percent of the property's acres must be in fee simple ownership).

Qualifying properties can be either unleveraged or leveraged. As described later in the manual, data for leveraged properties are reported on a de-leveraged basis.

Currently, data is not collected for timberland properties held by NCREIF members that do not qualify for inclusion in the NCREIF Timberland Property Index. Data for non-qualifying properties may be collected in the future.

On rare occasions, investors may request that a NCREIF Data Contributing Member not report on the investor's otherwise eligible properties. In such instances, the member must provide NCREIF with a written copy of the investor's request to exclude the property from the data collection process.

C. Reports and Products Received

Once quarterly data has been collected and processed, NCREIF releases a wide variety of data products. As a Data Contributing Member of NCREIF, you are entitled to receive all of the products via the Data Access Login area of the NCREIF website. For more information on other NCREIF products, please contact the NCREIF office or website.

V. DATA SUBMISSION

A. Data Contact

You must determine who will be your company's Data Contact. NCREIF strongly recommends that your contact be an individual who is familiar with timberland real estate data, attends the NCREIF conferences, and participates in committee sessions. The individual should have a strong personal computer and technical background with experience in performance measurement. In addition, the individual should have a close proximity to the compilation of the numbers (e.g., an individual from the accounting or portfolio management department).

It is also strongly recommended that the NCREIF Designated Representative, the Data Contact, and an alternate Data Contact read this manual, discuss the procedures, and devise a timely quarterly data submission plan.

Quarterly, the Data Contact's responsibilities typically include:

- Completing Submission File
- Reviewing data submission for accuracy
- Understanding and explaining significant return variances
- Reporting and repairing data errors on a timely basis
- Preparing the Data Transmittal letter to facilitate NCREIF's data review
- Submitting completed files and comments to NCREIF
- Responding to questions from NCREIF about submitted data

B. Timing

Approximately three weeks before your data is due, NCREIF will notify you via a submission notification email that the user portal is available to data contributing members. The completed data should be uploaded to the NCREIF website no later than the 20th day of the month following the end of each quarter.

On or around the 21stday of the month following the end of the quarter after the data has been compiled and reviewed by NCREIF staff, a Prelim Index, along with Proof Sheets are made available to the Data Contributor Members from the dimensional model. It is the responsibility of the data contact to approve the proof sheets. This further ensures that the published returns and data are reasonably stated. Once that process is complete and all Timberland Data Contributes send approval via email, the NTI information is posted on the NCREIF web site.

C. Initial Property Setup Overview

PLEASE NOTE REGARDING INITIAL PROPERTY SUBMISSION:

A full quarter of ownership is not required before submitting a new property, provided that you are able to submit a valid end-of-quarter market value along with the initial property submission data. **PLEASE NOTE: Two quarters of data are required before a return is included in the Timberland Index.**

Information should be submitted for a new property when:

- A firm investment cost is available and suitable for use as the initial, valid end-of-quarter market value, or:
- An end-of-quarter appraised, or fair market value is available after acquisition (via purchase or transfer). This may be after a full or partial quarter of ownership.

The property will then enter the NTI when it consecutively amasses either: 1) one partial quarter with a fair value end-of-quarter market value followed by one full quarter of data, or 2) two full quarters of data.

The primary way to add a new property is through the Excel file. If the Property information is being uploaded for the first time, it must be accompanied with a corresponding Transaction record of Type "Acquisition".

D. Submission File Overview – change from prior submission

1. Tabs

The original excel submission template has been redesigned and now splits the required data into meaningful collections that help you to more easily identify the fields that need to be completed.

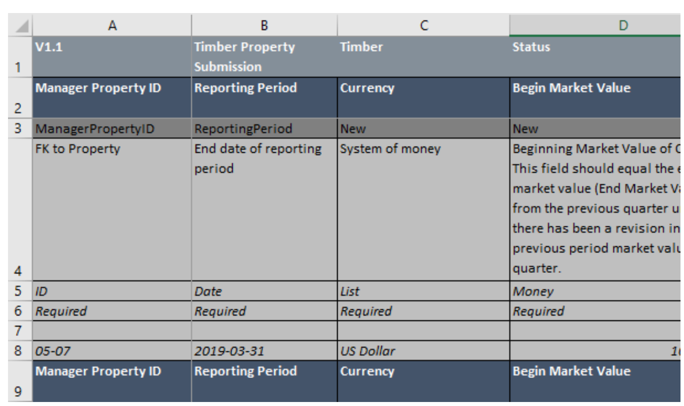
It contains four tabs:

Static	Infrequently changing data
Status	Used to record the current metrics/ valuation of the entity
Transaction	To record detailed transactional information for entities that are affected in this submission
Activity	Used to record financial transactions or additional metrics for the entity

Each tab will be explained in further detail in the Submission File Tabs section of this document.

The header in each tab of the submission template, is structured the same way

Row 1 Meta Data about the template
Row 2 Name of Data Field to be submitted
Row 3 Legacy field (name of field in the old templates)
Row 4 Description of the field
Row 5 Data Type
Row 6 Whether data point is compulsory
Row 7 Example data



	A	B	C	D
1	V1.1	Timber Property Submission	Timber	Status
2	Manager Property ID	Reporting Period	Currency	Begin Market Value
3	ManagerPropertyID	ReportingPeriod	New	New
4	FK to Property	End date of reporting period	System of money	Beginning Market Value of C This field should equal the e market value (End Market Va from the previous quarter u there has been a revision in previous period market valu quarter.
5	*ID*	*Date*	*List*	*Money*
6	*Required*	*Required*	*Required*	*Required*
7				
8	*05-07*	*2019-03-31*	*US Dollar*	*1*
9	Manager Property ID	Reporting Period	Currency	Begin Market Value

2. Templates

Two files are available in the Portal for this submission

Farmland Property Submission Template	This is the base template that should be populated. It contains only those tabs required for submission.
Farmland Property Packaged Template	The packaged version provides additional information; it includes the List of Values, Chart of Accounts, Business rules and a change log (details of changes from version to version of the template)

3. Data Types

Numbers	Must be supplied as numbers; can also contain commas, decimal points, and minus signs, but cannot include any other characters e.g. $
Text	Alphanumeric values including special characters
ID	Can be alphanumeric. Used as an identifier for Properties or Portfolio
Percentages	Percentage values must be supplied as decimals e.g. 1 represents 100%, 0.8 represents 80%
Lists	You should refer to the List of Values provided for this field and ensure that you are providing a value that matches one of these.

4. List of Values

The list of Values, sometimes referred to as a Value List, is provided as part of the packaged template.

In each tab of the template there are columns identifying the data that is required. In the 5th row is the data type. When the datatype is shown as List, you should refer to the List of Values provided in the LOV Tab (packaged version of the template) for this field and ensure that you are providing a value that matches one of these.

LIST OF VALUES					
Timber Property					
	Currency	Country	State	Region	Appraisal Type
Legacy Field	New	New	State	New	Appraisal
Tab	Status	Status	Static	Status	Status
Constraints	Required	Required	Required	Required	Required
Notes					
	AUD	Argentina	Alaska	South	Internal
	BRL	Australia	Alabama	Northeast	External
	CAD	Austria	Arkansas	Northwest	None
	CHF	Belgium	Arizona	Hawaii	
	CNY	Brazil	California	Lake States	
	COP	Canada	Colorado	Other US	
	CZK	Chile	Connecticut	Other non-US	
	DKK	China	Washington DC		

- The accepted values for each field are listed from row 8.
- Row 5 details the tab where the value list is used. If the list is noted as being derived, then these are the values used e.g. Region is derived from the supplied County value
- Row 2 details the field that the list is being validated against
- Row 4 shows the legacy field used in the old template

E. Submission File Tabs

1. Static Data

The static tab is provided for you to record the data that changes infrequently for a property. You must include data on a property when you first wish to record its status. You only need to complete data for an existing property if any fields have changed. If nothing has changed e.g. static data remains unchanged and no properties have been acquired/ merged/ split/ renumbered, this tab can be left empty.

New properties (or properties with a new code) will be rejected without the accompanying transaction record.

New fields

Country	Country where the Property is based Refer to the list of Values to populate the correct Country value.
Currency	Reporting currency for the property. Refer to the list of Values to populate the correct Currency code.
Region	Select the correct Region for the state the property is in. Refer to the list of Values to populate the correct Region value.
Owned by Fund	Flag to record if the property is owned by a fund. Should only be set to Y if the Fund has been approved by NCREIF and you have been provided with a NCREIF Portfolio ID. Accepts a Y or N.

2. Status Data

The status tab contains the fields required to record the valuation/ performance of the property

New fields

Currency	Reporting currency for the property Refer to the list of Values to populate the correct country
Begin Market Value	Beginning Market Value of Quarter. This field should equal the ending market value (End Market Value) from the previous quarter unless there has been a revision in previous period market value this quarter.
Prior Period End Market Value Adjustment	Any adjustments made to the market value of the property as at the end of the prior period.

3. Activity Data

The Activity tab contains the financial metrics/ measures for the property. The Chart of Accounts tab in the packaged template provides the list of expected accounts (type field) and each listed account must be supplied for each property, even if the value is 0.

New fields

Currency	Must match the Reporting currency for the property Refer to the list of Values to populate the correct Currency code.
Type	The name of the accounts that must be provided for each property. Refer to the Chart of Accounts tab in the packaged template for the list of valid Types.
Current Value	Amount of activity in period
Period Duration	Any adjustments made to the market value of the property as at the end of the prior period.

4. Transactions

The Transactions tab is a new inclusion for the submissions process. It has been added to reduce the number of queries/ issues that have historically been raised through the varying changes to properties.

The transactions tab needs to be completed when

1. This is your first submission, then an acquisition transaction is required to register each property you are submitting
2. Properties have been acquired or disposed in the current reporting period
3. Properties have been merged/ Split in the current reporting period
4. Properties have been renumbered in the current reporting period

Each of the above should be identified by the 'transaction type'. Each type is explained below.

a) Default Fields required for all transaction types

These fields are required for every transaction.

Manager Property ID	Provide the identifier you use for the property
NCREIF Portfolio ID	Identifier provided by NCREIF for the owning fund. Must be provided if the flag at the property (owned by fund) is set to Y
Reporting Period	Date for the reporting period in yyyy-mm-dd format.
Transaction Date	Date the transaction completed
Transacting Member	This will be your organization or the organization you are transacting with. Provided for informational purposes.
Transaction Type	A valid transaction must be included, this must match one of the values provided in the Transaction Type value list.
Ownership percentage	The percentage of legal ownership must be supplied as a decimal value. E.g. 1=100% (following an Acquisition) 0=0% (following a True Sale).
Gross Price	Record the Gross Acquisition or Sale price

Net Price	Record the Net Acquisition or Sale price
Transaction Cost	Record the costs of Acquisition or Sale

b) Non-Default field required for an internal sale

Prior Manager Property ID	Manager Property ID of the split property or Manager Property ID's that have been consolidated/merged

c) Acquisition

Each new property is required to have an acquisition transaction. This includes your first submission and for any new property acquired. Two types of transaction are possible and must be recorded:

External
When a property is acquired from an external party the default fields listed above should be completed.

The transacting member will be recorded as the organisation you are buying from.

Internal

An internal Acquisition is used to record the transfer of ownership of a property between Funds/ portfolios that you hold.

The default fields should be completed; it is expected that there is an accompanying disposition record.

- If the property was previously submitted, the Prior Manager Property ID should be provided to assist the tracking of the transaction.
- The transacting Member will be your organization
- Ownership percentage is set to 1

d) Disposition/ True Sale

When a property is sold, the transaction must be recorded. Two types of transaction are possible:

External

When a property is sold to an external party the default fields listed above should be completed.

The transacting member will be recorded as the organisation you are selling to.

Internal

An internal sale record (True Sale) is used to record the transfer of ownership of a property between Funds/ portfolios that you hold.

- The default fields should be completed
- The Transacting Member will be recorded as your organization
- Ownership percentage is set to 0
- Sales figures are supplied

e) Renumbering
It is possible that you have been required to change the identifiers you use for your properties. When this occurs, you are required to provide a renumbering transaction for each property affected.

- Fill in the default fields
- Manager Property ID will reflect the new identifier for your property
- Prior Manager Property ID will hold the identifier previously used in submissions

f) Consolidation/ Merging of properties

A consolidation transaction is used to record the merging of properties. For each property that is being merged, there will a record recorded in the transaction tab. The transactions are used to identify which properties have been merged and what the new identifiers will be.

- Prior Manager Property ID will contain the identifier of the property that one or more properties are being merged into.
- Any transacting figures should be recorded

g) Split into Multiple Properties

A "split into multiple properties" transaction is used to record the creation of new properties from a single entity.

- Prior Manager Property ID will contain the identifier of the original property hat is being split.
- Any transacting figures should be recorded.

VI. APPENDICIES

A. Appendix 1: Expanded File Definitions

Field	Definition
AcquisitionDate	For acquisition properties, indicate the month and year that the original investment was made by the purchasing entity (i.e., the open-end fund, the closed-end fund, or the individual account). For existing properties entering the database from new Data Contributing Members, indicate the date applicable to the Beginning Market Value (YYYYMM (Year/Month) format)
Acres - Gross Acres	Total acres acquired, rounded to the nearest full acre as of the end of the quarter. Include acreage of land on which timber cutting rights are leased from another owner.
Acres - Initial Useable Acres	For acquisitions, indicate the acreage acquired initially. If a property is purchased in a series of staged takedowns, report only the acreage acquired during the initial stage. Acreage obtained in subsequent takedowns is included in the Acres field on the quarterly data submission. For existing properties for existing properties entering the acreage at the Beginning Market Value Date.
Appraisal Type	Property appraisal type for the quarter. External - appraisal by an independent appraiser. Internal - or in-house appraisal None - no appraisal has been performed."
CapEx Total	The reported total of all expenditures that are capitalized to the property (as opposed to expensed) in accordance with the policy of the fund or investment. If the accounting policy of the fund is to revalue a property annually, adjust the current market value during interim quarters by the total amount of all expenditures capitalized subsequent to the last market value adjustment.
CostBasis	Cost basis is comprised of acquisition cost plus capital improvements, less partial sales. No previously reported unrealized appreciation or negative appreciation should be included in this amount.
Current Value	Amount of activity in period
Fund Type	The type of fund the property belongs to: • Open-end Fund - A commingled fund* with no finite life, that allows continuous entry and exit of investors, and typically engages in ongoing investment purchase and sale activities. • Closed-end Fund - A commingled fund* with a finite life (i.e., with a stated maturity or termination date) and few or no additional investors after the initial formation of the fund.

	• Single Client Account - A separate account established for a singular investor (e.g., a pension fund, a foundation, or an endowment) and in which is held only the properties or property interests purchased by that investor. • Not Elsewhere Classified - The fund is not classified in the above three types. For properties held as joint venture investments, only the primary position holder reports any joint venture investments and reports them at 100% holding. Therefore, the vehicle structure in which the reporting entity holds its investment is the appropriate designation for joint venture properties. * A commingled fund is a pooled investment vehicle that is designed for institutional tax-exempt investors and may be organized as a private REIT, group trust, partnership, corporation, insurance company separate account, or other multiple ownership entity.
FundName	The name of the fund or single client account the property belongs to
Gross Price	The gross sales price paid/received for a property sale before deduction for selling costs and expenses For an acquisition, indicate the total dollars expended (or total consideration paid for the property) on the date of acquisition by the purchasing entity. Any additional costs related to the purchase of the property incurred after closing are capitalized and are reported in the Capital Expenditures field in the quarterly operating data submission in the period they are paid. Examples include a legal bill or engineering bill that is received, paid, and capitalized at some point after closing which is directly related to the purchase of the property. If a property is purchased in a series of staged takedowns, report in the Property Descriptor form only the dollars expended during the initial stage. Subsequent takedowns are reported in the Partial Purchase field in the quarterly operating data submission. When a new NCREIF member begins reporting data for a property, the Beginning Market Value is the property's value at the beginning of the first quarter for which quarterly operating results are reported. Both Acquisition Cost and Beginning Market Value for leveraged properties is the sum of equity and debt interests.
Is Timber Property Excluded	Yes or No to indicate if the property does not meet the appraisal policy guidelines and should be excluded from the aggregate calculation
Manager Property ID	Unique ID used to identify the property. It must be unique in your accounting system and not change from quarter to quarter.
Market Value - Begin Market Value	Beginning Market Value of Quarter is the property's value at the beginning of the first quarter for which quarterly operating results are reported. This field should equal the ending market value (End Market Value) from the previous quarter unless there has been a revision in previous period market value this quarter.

Market Value - End Market Value	The current value of the property at the end of the quarter as reported to clients in financial statements. If there have been purchases or sales during the quarter, their effect should be reflected in the market value. If the property has been appraised, the appraisal value is always the value to report for the quarter. For properties that are leveraged, report the full value of the property including both equity and debt interests.
Market Value - Prior Period End Market Value Adjustment	Any adjustments made to the market value of the property as at the end of the prior period.
NCREIF Portfolio ID	Unique Identifier assigned to NCREIF approved funds. The NCREIF Portfolio ID must be used when submitting quarterly fund results. Data contributing members can apply by submitting a completed Fund Set-up Excel file and submitting it in the New Fund section of the Data Manager Portal.
Net Operating Income (Operating EBITDDA)	Earnings before interest, taxes, depreciation, depletion, and amortization for the three months ended at the end of the quarter. To most accurately reflect the nature of timberland operating revenues, net operating income is used as a measure of EBITDDA. Most classifications of income and expense used to account for timberland operations are universal. Where alternative accounting treatments exist, the reports to the Index should be consistent with the accounting practices required by your client. All revenues from the sale of land, with or without timber, are excluded from net operating income. Instead, they are classified as a Partial Sale. Proceeds from the one-time sale of a conservation easement are also classified as a Partial Sale rather than net operating income. Other ancillary revenue (e.g., hunting leases, recreational usage fees, mineral rights) are included in net operating income. Investment management fees charged by NCREIF members, which are typically charged at the fund rather than property level, are excluded from this calculation. However, appraisal and property management fees are included as a property-level expense
Net Price	Gross Price net of any selling costs and expenses, and before debt. This is mathematically determined, taking into account Adjustments, Gross Adjusted Sales Price, and Selling Expenses. Prorating of operating expenses and any holdbacks should not affect this amount.
Owned by Fund	Flag to determine if the Property is owned by a Fund
Ownership Percentage	Percentage of Asset owned after the transaction. The percentage is represented as a decimal e.g. 1=100% 0.8 = 80%

Partial Purchase	Total purchase cost/price of additional acreage obtained during the quarter. Partial purchases consist of land, with or without timber, that is added to the property after the initial acquisition. Report the gross acquisition cost, including purchase expenses. Include here dollars expended in staged takedowns subsequent to the initial stage. Remember that a partial purchase will affect the market value of the property, and the new adjusted market value should be shown.
Partial Sales	Partial sales consist of land, with or without timber, that is removed from the property, including conservation easements. Report the net sales proceeds, after sales expenses. Remember that a partial sale of property will affect the market value of the remaining real estate, and the new adjusted market value should be shown.
Period Duration	Duration of period in months
Prior Manager Property ID	Manager Property ID of the split property or Manager Property ID's that have been consolidated/merged
Property Name	Indicate the in-house name of each property (e.g., Wolf River). Note that a property is defined as an aggregation of Timberland acreage classified as a single unit for market value appraisal
Region	Region where the property is located
Reporting Period	End date of reporting period YYYY-MM-DD
State	The state in which the property resides. If the property crosses state borders, then select the state that contains the largest acreage.
Transacting Member	Provide the name of the portfolio for internal sales, splits, and merges. For an external sale or acquisition, provide the company name of the buyer or seller
Transaction Cost	Selling and acquisitions costs - Prorations closing statement, money to buyer and seller and prorated costs
Transaction Date	Date of purchase/sale transaction for disposition. For acquisition, indicate the date that the original investment was made by the purchasing entity
Transaction Type	Type of transaction (e.g. Disposition, Split, Acquisition, True Sale, Transfer of ownership, etc..)
Type	Type of financial metric or measure

B. Appendix 2: Index Formulas

Below are the formulas used to calculate quarterly property level income and appreciation returns for the NCREIF Timberland Property Index

Income Return:

- Measures the portion of total return attributable to each property's net operating income or NOI. Net operating income (NOI) is gross income less operating expenses
- It is computed by dividing NOI by the average daily investment for the quarter
- The formula takes into consideration any capital improvements and any partial sales that occurred during the quarter

$$\frac{\text{Net Operating Income}}{\text{Beginning Market Value} + 1/2\,(\text{Capital Improvements} - \text{Partial Sales} + \text{Partial Purchases} - \text{NOI})}$$

Capital Appreciation Return:

- Measures the change in market value adjusted for any capital improvements or partial sales or purchases that occurred during the quarter
- A property's value can go up (appreciation), or it can decline (depreciation) depending on market forces
- When a property enters the Index, the appreciation return is not impacted until the second quarter of inclusion

$$\frac{(\text{Ending Market Value} - \text{Beginning Market Value}) + \text{Partial Sales} - \text{Capital Improvements} - \text{Partial Purchases}}{\text{Beginning Market Value} + 1/2\,(\text{Capital Improvements} - \text{Partial Sales} + \text{Partial Purchases} - \text{NOI})}$$

Total Return:

- Includes appreciation (or depreciation), realized capital gain (or loss), and income
- It is computed by adding the Income return and Capital Appreciation return on a quarterly basis

$$\text{Total Return} = \text{Income Return} + \text{Capital Appreciation Return}$$

C. Appendix 3: Ncreif Timberland Property Index Geographic Regions

NCREIF Timberland Property Index Geographic Regions

LAKE STATES
Michigan
Minnesota
Wisconsin

NORTHEAST
Connecticut
Massachusetts
Maine
New Hampshire
New York
Pennsylvania
Rhode Island
Vermont

HAWAII
Hawaii

NORTHWEST
California
Oregon
Washington
Idaho

SOUTH
Alabama
Arkansas
Florida
Georgia
Kentucky
Louisiana
Maryland
Mississippi
Missouri
North Carolina
Oklahoma
South Carolina
Tennessee
Texas
Virginia
West Virginia

OTHER
Alaska
Arizona
Colorado
Delaware
Illinois
Indiana
Iowa
Kansas
Montana
Nebraska
Nevada
New Jersey
New Mexico
North Dakota
Ohio
South Dakota
Utah
Washington, DC
Wyoming

D. Appendix 6: Annualized Rates of Return-Definition and Calculation

The annualized rate of return is sometimes technically called the geometric annual rate of return. It is comparable to the rate quoted by a savings and loan. For example, if you were to invest $1.00 at 5% per year compounded annually, you would have $1.05 at the end of the year. The ending value of your investment would be 1.05 times its value at the beginning of the year.

If you were to leave the full amount (original investment plus interest) invested for another year, it would be worth 1.05 times as much at the end of the second year. You would have 1.05 x $1.05 = $1.1025 at the end of two years. If you would subtract your original $1.00 you would find that you had earned $.1025 or 10.25%. Your total rate of return for the two-year period is 10.25%. Your annualized rate of return would still be 5.0% (the rate at which you invested your $1.00).

In the example above, we knew the annual compound rate of return and found the rate of return for two years. More commonly, we know a two-year rate of return and need to find the annualized rate, the equivalent of a compound rate. For instance, we might know that we had in the bank $1.1025 from an investment of $1.00 exactly two years ago. The ending market value of $1.1025 is 1.1025 times the original value of $1.00. The figure 1.1025 is called the return relative. The total two-year rate of return of 10.25% is calculated from the return relative as follows:

$$100(1.1025 - 1) = 10.25\%$$

The annualized rate of 5% can be calculated by taking the square root of the two-year return relative in this manner:

$$1.1025 \text{ ^}2 = 1.05$$
$$100(1.05 - 1) = 5\%$$

The idea of an annualized rate of return for a portfolio of securities is a little more complex than that for a fixed-income investment because of the uneven earnings pattern. The annualized rate of return is calculated from four or more quarterly rates of return. Portfolio A is a hypothetical portfolio with the following rates of return as of September 30, 2021:

PORTFOLIO A	2019	2020	2021
1st Quarter	-3.0%	20.0%	10.0%
2nd Quarter	(8.0)	15.0	2.5
3rd Quarter	(25.0)	(10.0)	2.0
4th Quarter	9.0	5.0	0.0

The first step in calculating an annualized rate of return is to find the return relative of each quarterly rate. The return relatives for the third quarter of 2021 and the first quarter of 2019 are calculated from the rates of 2.0% and -3.0% respectively, below:

1+ (2.0/100) = 1 + .020 = 1.020

1+ (-3.0/100) = 1 - .030 = 0.970

The return relatives for January 2002 through September 2021 are:

PORTFOLIO A	2019	2020	2021
1st Quarter	0.970%	1.200%	1.100%
2nd Quarter	0.920	15.0	2.5
3rd Quarter	0.750	(10.0)	2.0
4th Quarter	1.090	5.0	0.0

To find the annualized rate of return for the year ending September 30, 2021, use the last four quarterly return relatives as follows:

1) 1.050 x 1.100 x 1.025 x 1.020 = 1.208
2) 100(1.208 - 1) = 20.8%

The portfolio earned 20.8% during the year ending September 30, 2021.

To find the annualized rate of return for the last two years requires an additional step. First, find the two-year return relative:

1) 1.090 x 1.200 x 1.150 x 0.900 x 1.050 x 1.100 x 1.025 x 1.020 = 1.635

The total two-year return is 100(1.635 -1) = 63.5%. The annualized rate of return is calculated from the square root of the two-year return relative:

2) 1.635^1/2 = 1.279
3) 100(1.279 - 1) = 27.9%

The annualized rate of return of 27.9% tells you that you would have been equally well off at the end of the two years to have had your funds in the portfolio with the uneven return earned in the example given above, or in a fund with a return of 27.95% in each of two years.

1. Compounding Income and Appreciation Components of Total Returns

Linking Component Returns Beyond One Quarter

Institutional investors often require that total performance results from real estate be separated into income and appreciation components. Component return information is helpful in understanding the source of performance and this is particularly important with real estate because real estate is relatively less liquid than alternative asset classes. A majority of institutional investment managers and consultants follow an industry practice of calculating time-weighted returns on a quarterly basis and subsequently linking the quarterly returns over longer time periods using a geometric mean linking methodology.

An inherent limitation of component return presentation in conjunction with the current industry practice of linking quarterly returns is that, for time periods beyond one quarter, the sum of the cumulative compounded income return plus the cumulative compounded appreciation return will not equal the cumulative compounded total return. This article examines the problem of compounding component returns beyond one quarter.

2. The Mathematics

The compounding problem may not be intuitive, although it can be described mathematically as shown by the two period geometric mean return linking formula below:

(1+I1+A1) x (1+I2+A2) = (1+I1) x (1+I2) x (1+A1) x (1+A2)

Where I = income return (decimal) and A = appreciation return (decimal)

The left side of the equation represents the compounding of total investment return over two periods while the right side separately compounds the income and appreciation returns and adds the results together. Multiplying out the terms on the left shows that there are two missing terms on the right: income earned on appreciation and appreciation earned on income:

(I1 x A2) + (A1 x I2)

This may be clearer with an example:

Year	Income	Appreciation	Total Return
1	4.0%	6.0%	10.0%
2	2.0	3.0	5.0
3	5.0	7.0	12.0

Using the same geometric mean return linking methodology, over the three-year period, the average annual total return is 29.4% (1.10 x 1.05 x 1.12 - 1) and the average annual appreciation return is 16.8% (1.06 x 1.03 x 1.07 - 1). The difference between these two is 12.6%. Applying the compounding formula to the annual returns produces an average annual income return of 11.4% (1.04 x 1.02 x 1.05 - 1). In this example, the difference between the compounded average annual total and appreciation returns exceeds the compounded average annual income return by 1.2%.

In Other Words

The compounded total return represents the average annual growth rate of dollars invested if income is reinvested each period and the compounded appreciation return represents the average annual growth rate of dollars invested if income is distributed each period. The compounded income return is the average annual growth rate of dollars invested if income is reinvested but appreciation is distributed each period. Distributing appreciation quarterly is not a feasible investment policy and for that reason, compounded income returns may not be meaningful to investors.

3. Alternative Solutions

Some investment managers and consultants have adopted a practice of manually adjusting either the compounded income return or compounded appreciation return, forcing the return components to add up to the total. While the results "add up", adjusting the calculated returns is a subjective process, which will most likely vary from manager to manager. These differing adjustment approaches lead to a lack of performance comparability between investment managers. For this reason, adjusting component returns in order to make them "add up" is not recommended by NCREIF.

As an alternative, some investment managers do not present component return information for time periods beyond one quarter. These investment managers may present component returns for each annual period and year-to-date for the current year, although, for time periods beyond one quarter, only total return is presented. This approach is consistent with the presentation of returns for alternative asset classes (e.g., the S&P 500 Index for common stocks or the Lehman Brothers Bond Index). While this type of return presentation is theoretically sound and not disputed by NCREIF, it may not satisfy institutional investors' desire for real estate component return data.

A third and final alternative is to calculate and present component returns for extended time periods, without making adjustments that force the components to "add up." As stated previously, compounded income returns may not be meaningful to investors.

4. Conclusion

In conclusion, the sum of the component parts does not always equal the whole. NCREIF recognizes the need to be responsive to the needs of institutional investors. We also need to make them aware of what performance numbers really mean and whether or not the calculations are meaningful. We believe the preferred approach to presenting performance components is to show each component separately, but not to attempt to compound the income component so the numbers "add up."