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Table 1: Colliers Opinions

	col a	col b	col c	col d
row	**Colliers Opinion**	**11/14/2014 Original Appraisal (Bates 0261)**	**9/18/2015 Updated Appraisal (Bates 0193)**	**Market Change**
1	Corridor Market Value	$ 11,076,163	$ 11,360,038	2.6%
2	Corridor Market Rent - Annual (40 year stable for term option)*	$ 775,331	$ 795,203	2.6%
	* For comparitive purpse the stable rent for term option is used. Rent options reflecting rent increases were also generated. All rent options have a 7.1076 Internal Rate of Return			

Table 2: Colliers Valuation Formulas

	col A	col B	col C	col D
	Valuation Opinion	Formula[1]	Methodology	Ref
1	Corridor Market Value	Market Value = [At-the-fence value] X [Enhancement Factor]	Corridor Value Approach	b.241
2	Corridor Market Rent	Market Rent = [Market Value] X [Capitalization Rate]	Colliers defined	b. 0253

[1] Reference Table: Colliers Valuation Components for list of variables

Table 3: Colliers Valuation Components

col a	col b	col c	col d	col e
	Type[1] (formula , var)	Name	Colliers value	ref
A	var	At-the-fence (ATF)	$4,815,723	b.202
B1	var	Market Change 2014-2015	1.4%-2.7%	b.0187
B2	var	Market Change 2015-2017	--	
C	var	Enhancement Factor (EF) assemblage & other	2.3x	b.0187
D	formula & var	Corridor Market Value	$11,360,038	b.0187
E	var	Capitalization Rate	7%	b.0259
F	formula & var	Corridor Market Rent (Annual)[2]	$795,203	b. 1152
G	var	Reversion Value	$13,868,269	b.188
H	formula & var	Internal Rate Return (IRR)	7.1076%	b. 1152
I	formula	Net Present Value (NPV)	$11,360,044	b. 1152

[1] Variables (Var) are assumptions used in formula calculations. Formulas calculate results based on assumption variables. A variable can be the result of formula based calculations and or analysis.

[2] Stable rent option

Please describe any recent high voltage transmission right-of-way leases, purchases, or executable option agreements you were able to identify in your research.

The OCA identified three separate transactions for high voltage transmission system Right-Of-Ways ("ROW") that could serve as reference points when considering the market value of the proposed lease between PSNH and NPT.

Located in New York State, the first transaction is an easement granted by the New York State Office of Parks, Recreation, and Historic Preservation ("NYSOPRH") to Neptune Regional Transmission System, LLC ("NEPTUNE RTS") on June 23, 2015.[1] The easement was acquired by Neptune RTS for the purpose of siting 12 miles of a 600MW High Voltage Direct Current ("HVDC") Electric Transmission Line and associated facilities connecting Hempstead New York to similar facilities in Sayerville, New Jersey.[2] The easement was granted to Neptune RTS for a period of 75 years in exchange for $10,000,000 of compensation, taking the form of an up-front payment of $5,000,000, $750,000 upon operation, annual payments of $750,000 for five years, and then $500,000 for the sixth year.

Located in Massachusetts, the second transaction is an option agreement between the Massachusetts Bay Transportation Authority ("MBTA") and Eversource Energy ("Eversource") for a transmission line easement executed on May 30, 2017.[3] The option agreement represents Eversource's intent to acquire a right-of-way for the purpose of siting 8.63 miles of a 115kv subsurface electric transmission line between Sudbury, Massachusetts and Hudson, Massachusetts. As compensation for the non-exclusive perpetual easement, Eversource has agreed to compensate the MBTA $425,000 annually, plus a 1.5% escalator of the value paid for a period of 20 years, with the final payment being

[1] Neptune RTS-NYSOPRH Easement Agreement. June 23, 2015. Available at: https://drive.google.com/file/d/0B3EainYDlqr1cG96azJfbWUyVzQ/view?usp=sharing

[2] See generally, New York Public Service Commission. Case 02-T-0036. Neptune Transmission Project Environmental Management and Construction Plan. Available at: http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={0DE703F4-0969-4C67-97E4-B3FD4847A546}

[3] MBTA-Eversource Energy Option Agreement. May 30, 2017. Available at: https://drive.google.com/file/d/0B90L-xrTFLWfVTJaR0lqNHNsSG8/view

for $513,446. This agreement also includes in-kind compensation to the MBTA from Eversource in the form of up to $4,000,000 of potential environmental remediation needs their work may uncover, but not have caused.

Located in Vermont, the third transaction is a lease option agreement between the Vermont Agency of Transportation ("VTRANS") and TDI New England ("TDI") for a transmission line easement executed on July 17, 2015.[4] The lease option agreement represents TDI's intent to lease a right of way for the purpose of siting a 57miles of a subsurface 1000MW HVDC transmission line between Benson Vermont and Ludlow Vermont. As compensation for the 40 year lease, TDI has agreed to compensate VTRANS $4,000,000 annually for ten years, with an escalator of 1.5% each year thereafter for the remainder of the 40 years, and an option to extend for an additional 9.5 years. Using these figures, the average annual compensation to VTRANS for use of their right of way is approximately $86,000/mile. Aside from this monetary compensation, the agreement also includes in-kind compensation to VTRANS from TDI in the form of bandwidth on a fiber optic cable that is associated with the project.

Which of the three high voltage transmission ROWs identified by the Office of the Consumer Advocate are most comparable to the PSNH ROW?

Of the three projects named above, the ROW described in the Vermont agreement appears to be the most comparable to the PSNH ROW which is the subject of the instant petition because of their overall contemplated income, location, and compensation period.

Both the Vermont and PSNH ROWS are intended to site a 1000MW HVDC Transmission line and associated facilities, while New York agreement only contemplates a 600MW HVDC transmission line and associated facilities, and the Massachusetts agreement only contemplates a 115kv alternating

[4] VTRANS-TDI Lease Option Agreement. July 17, 2015. Available at: http://www.necplink.com/docs/regulatory/agreements/2015-07-17%20TDI-NE%20and%20VTrans%20Lease%20Option%20Agreement%20wAttachments.pdf

current transmission line and associated facilities. The shared 1000MW HVDC nature of the Vermont and New Hampshire projects, which will both offer energy and capacity to the ISO-NE wholesale markets, also implies a similar overall income for the transmission projects as a whole. Further, the Vermont and New Hampshire ROWs are similar because they are not located in densely-populated urban areas like the New York or Massachusetts projects listed above. Additionally, the Vermont project's overall compensation period of 40 years more closely mirrors the proposed project's compensation period than either the New York or Massachusetts projects, which are 75 years and perpetuity, respectively.

In the context of their comparable income, location, and compensation term, the Vermont ROW and PSNH ROW should be considered comparable projects. Any corridor valuation done for the purpose of determining the value of the PSNH ROW which doesn't consider the $86,000/mile/year compensation paid for the Vermont corridor should not be viewed providing adequate compensation for the PSNH corridor.

FINAL REPORT

FAIR MARKET VALUE ANALYSIS FOR A FIBER OPTIC CABLE PERMIT IN NATIONAL MARINE SANCTUARIES

August 2002

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE
NATIONAL MARINE SANCTUARY PROGRAM

TABLE OF CONTENTS

I. INTRODUCTION

The National Marine Sanctuary Program (NMSP) evaluates special-use permit applications by companies seeking to place and maintain fiber optic cables in National Marine Sanctuaries. The National Marine Sanctuaries Act allows the NMSP to issue a special-use permit for the presence of cables on the sanctuary floor and, if an application is approved, NMSP may collect certain administrative and monitoring fees. In addition, NMSP is entitled to receive fair market value for the permitted use of sanctuary resources.

This document develops an approach to assessing fair market value for the presence of a submarine fiber-optic cable in a National Marine Sanctuary. It is based on dozens of industry and government sources and draws on the collaboration and review of numerous experts in business, legal and technical arenas. A final determination of fair market value should include consideration of current market conditions and any available recent data, in addition to the analysis contained in this report.

The research and analysis is organized as follows: Part Two presents an overview of the marine sanctuary system, the fiber-optics industry, and the permitting process. Part Three describes the major approaches to valuing a right of way, the private-market analogue to granting sanctuary access. Part Four describes the protection of sanctuary resources and the importance of accommodating the telecommunications infrastructure. Part Five summarizes permitting activities at other government agencies. Part Six presents the analysis of fair market value for a sanctuary permit based on the relevant valuation methods. Part Seven presents recommendations and conclusions regarding the appropriate valuation approach.

II. BACKGROUND AND OVERVIEW

National Marine Sanctuaries

The National Marine Sanctuary Program was established in 1972, coinciding with the 100th anniversary of the founding of the first national park. The Program's mission is to designate areas of the marine environment that have special natural or cultural significance and manage and protect them for future generations. There are currently thirteen national marine sanctuaries encompassing ocean gardens, near-shore coral reefs, whale migration corridors, deep-sea canyons, and underwater archeological sites. They range in size from Fagatele Bay Sanctuary, covering one-quarter square mile in American Samoa, to Monterey Bay Sanctuary, one of the largest marine protected areas in the world, covering over 5,300 square miles along the coast of California. Total sanctuary territory encompasses just under 18,000 square miles, about the size of Vermont and New Hampshire combined.

The sanctuaries are monitored for water quality, the ecological impact of fishing, the accidental release of chemicals and other environmental concerns. Many lie adjacent to some of the country's most pristine coastlines, including protected coastal habitats and national parks. While some activities are regulated or prohibited, certain others are allowed or encouraged. For example, such economically significant uses as shipping and commercial fishing are generally allowed within sanctuaries, although these activities may be restricted to protect sanctuary resources. Recreation, research and educational activities are encouraged, along with outreach efforts to foster resource protection and conservation awareness.

Fiber Optics Industry Overview

Over the past two decades, the development and expansion of fiber-optic networks has transformed the telecommunications market. Through higher transmission capacity, decreased interruptions in service, greater security and improved cost efficiency, fiber optic telecommunications cables are meeting increased demand for high-quality telephone, Internet, and data-transmission services. In the United States, both land-based

networks and undersea intercontinental connections have added thousands of miles of new routes over the past few years.

As this report is written, a recession in the United States and an economic slowdown worldwide has dampened demand for telecommunications services and fiber-optic cable deployment. Many companies in the fiber-optics industry, with its high levels of up-front investment keyed to expectations of rapid growth, have experienced difficult financial conditions. But the drop-off in demand and investment is expected to be temporary. Industry analysts project a deviation from the upward trend in fiber-optic cable deployment coinciding with the dip in the business cycle. Total investment in submarine cable networks from 1986 to 1998 was $17 billion, representing about 400,000 route kilometers.[1]Investment in undersea optical-cable networks rose from less than $2 billion annually in 1998 to $6 billion in 2000. Projections by KMI Corporation, a leading industry analyst, indicate that the rate of new cable deployment is expected to return to an upward trend in 2003 and exceed previous levels in 2004.[2] Undersea cables were a part of the analysis, and followed a similar trend.

As of the date of this report, three fiber optic cable projects have been allowed to transit marine sanctuaries. They are the "Hibernia Transatlantic Project" (with a connection from Boston to Ireland that crosses the Stellwagen Bank Sanctuary), "Pacific Crossing 1" (from Japan to Seattle crossing the Olympic Coast sanctuary) and "Alaska United" (from Alaska to Seattle crossing the Olympic Coast sanctuary). The Alaska United project was completed before NMSP had examined the issue of fiber-optic cables in sanctuaries. The permits for the Pacific Crossing 1 and Hibernia projects included language that required payment of fair market value for the use of sanctuary resources once the appropriate value is assessed.

The Permitting Process and Fair Market Value

The National Marine Sanctuaries Act (NMSA) allows the Secretary of Commerce to issue special-use permits authorizing the conduct of specific activities in National Marine Sanctuaries and establishing conditions of access and use for marine sanctuary resources.

The presence of a fiber-optic cable on the floor of a sanctuary is a use for which a permit may be issued. According to the NMSA, the Secretary may assess and collect a fee that includes the cost of issuing the permit, as well as monitoring and other costs incurred as a result of the permitted activity. In addition, the fee must include "an amount which represents the fair market value of the use of the sanctuary resource."

In addition to issuing a special-use permit, sanctuary authorities must review and authorize an Army Corps permit for any cable project that includes a sanctuary crossing. The permitting process of the Army Corps of Engineers covers installation, maintenance and removal of a cable throughout U.S. waters. Potential harm to the undersea environment from cable installation is examined in an environmental review under the National Environmental Policy Act. NMSP is developing a set of principles to guide the installation of cables in marine sanctuaries and is working to ensure that, when a cable project is allowed, environmental impacts will be minimal and appropriately mitigated. Those principles were published for comment in an advance notice of proposed rulemaking (65 FR 51264, Aug. 23, 2000). NOAA is currently reviewing comments received on this notice.

Installation, maintenance, and removal of the cables are subject to sanctuary oversight through the Army Corps permitting process. Because some amount of injury may to occur during cable installation, and because by law the special-use permit cannot apply to any activity causing injury, the specific special use being authorized by NMSP is the long-term presence of the cables on the sanctuary seabed.

In 1993 the Office of Management and Budget (OMB) issued its most recent directive concerning fair market value and fees charged for the use of Federal resources. OMB Circular No. A-25[3] requires federal agencies to assess a user charge against each identifiable recipient for a service or privilege that confers special benefits. As with the granting of a fiber-optic permit, such a privilege "enables the beneficiary to obtain more immediate or substantial gains or values (which may or may not be measurable in monetary terms) than those that accrue to the general public." A government service is

also designated as a special benefit if it is "performed at the request of or for the convenience of the recipient." The directive further states, "user charges will be based on market prices."

Market prices involving the use of property for the presence of fiber-optic cables can be observed in the market for rights of way. Telecommunication companies typically do not own the land used for a fiber optic network. Rather, companies purchase easements from landholders allowing rights of access for cables and cable conduits across numerous properties. It is this system of right-of-way purchases that allows a cable network to be created.

The issue of "fair market value" or "market price" for cable access to sanctuaries is complicated by the presence of non-market amenities. The value of a marine sanctuary lies in the conservation of a marine environment deemed to have special significance. Many people receive pleasure in knowing that the sanctuaries exist and are protected. These individual values, added up over millions of people, may have tremendous value, but little economic information about the extent of this value is revealed in market transactions.

This report relies on a comparison between the granting of a sanctuary permit and the sale of a fiber-optic right of way on private land. Numerous private-market precedents exist for the appraisal and sale of such right-of-way easements. This report also considers the amenity value of a sanctuary, but for a number of reasons this value is not specifically estimated and is not part of the calculation of fair market value. It is believed that the analysis of market transactions alone results in a reasonable special-use fee based on sound and thorough economic and policy considerations.

III. VALUING RIGHTS OF WAY

As noted previously, right-of-way transactions are a close analogue to the issuance of a permit allowing a fiber optic cable to cross a marine sanctuary. This section explores the

concept of fair market value in the appraisal of right-of-way easements, relying on precedents and practices from several sources. Private sector practitioners use a variety of rules and methodologies to assist in easement negotiations. Numerous judicial proceedings have examined the appropriate use of fair market value in compensation for eminent domain takings. There is also a considerable body of literature in appraisal and real estate journals that explores the available approaches to assessing right-of-way values.

There is currently some debate regarding which set of legal and market precedents are appropriate for fair market analysis of fiber optic easements. On federal land, the focus has traditionally been loss to the seller. The decline in the value of a property due to buried cables was considered to be relatively small, and valuations reflected that. In the private sector, the gain to the buyer has received greater emphasis in price negotiations. The substantial revenues generated by the fiber optic industry have recently resulted in rapidly increasing prices for fiber-optic rights of way.

In the sections that follow, guidance from the available sources is presented and four general approaches to valuation are described. First, a set of land-based appraisal methods is examined. This traditional appraisal approach relies on the value of adjacent land and an assessment of relevant damage to solve the valuation problem. Second, the concept of a willing buyer and seller is described. By examining the incentives of the parties involved, characteristics of a fair market outcome can be explored. Next, examples of income-based valuation are presented. These methods employ the notion that a communications right of way is a valuable part of a business enterprise and that a portion of enterprise income should be allocated to this right-of-way asset. Finally, the use of comparable market transactions is described. Past transactions are rarely an exact precedent, but they serve as a guide to price levels and overall market trends, and they incorporate elements of the other valuation methods.

Land-Based Appraisal

Appraisal techniques for right-of-way transactions frequently rely on the value of the occupied land. Such land-based or "fee-simple" values focus on the property rights bestowed by the seller. The basis of value is the "before and after rule," using the difference between two estimates of a parcel's value: before the easement is granted and after the new use is in place. Ownership of a property is thought to entail a "bundle of rights" for the owner. Some of these rights are sold off when an easement is granted, but those rights remaining still retain value. The before-and-after rule results in modest value estimates based on loss to the seller.

In applying the before-and-after rule, some benchmark value is needed for the land under consideration. The across-the-fence (ATF) rule holds that a given parcel is worth about the same as similar neighboring land. The ATF approach generates a "fee-simple" value for a parcel. That is, it ignores any special use of the land that might create additional value. A railroad right of way that crosses several states, for example, would be valued based on total land area. The fact that the land is composed of a continuous corridor rather than a collection of disjointed parcels would not affect the ATF estimate of value.

In contrast to these approaches, the notion of "corridor value" explicitly accounts for the assemblage of land parcels into a contiguous right of way. ATF values for land along a right of way may be multiplied by an "assemblage factor" or "corridor enhancement factor" to reach an appropriate estimate. Alternatively, the corridor itself can be treated as an entity to be valued, and estimation can proceed based on analysis of the income generated or other considerations. Some analyses have determined that corridor values typically exceed ATF appraisals by a factor of two to six.[4] In more recent transactions involving fiber optic corridors, the prices paid exceed the ATF land values by much higher multiples.

The most important legal concept in the analysis of land-based values is "highest and best use." Defined as the "most profitable likely use"[5] at the time of appraisal, this standard of fair market value is frequently applied in eminent domain proceedings. Applying the

before-and-after rule, for example, would involve two distinct estimates of highest and best use, one with the easement and one without. Thus if the presence of a pipeline on a property prevents the construction of a home, the pipeline easement could have considerable value. The use under consideration must be physically possible, appropriately supported, and financially feasible for the given parcel.

Whether value realized by the purchaser of a right of way can be included in highest-and-best-use analysis is a matter of debate. In the *Appraisal Journal* (January 1989), George Karvel argues that the high rents arising out of value to the buyer must be ignored in eminent domain appraisals. "Regardless of the benefits to be derived or costs to be avoided, a public utility with the right of eminent domain is responsible only for the diminution in value or loss to the principal corridor occupant."[6] In a response, Charles Seymour agrees that compensation should not include any "special" value to the buyer. But one of the damages incurred by the occupant "is surely the loss of the right to sell to someone else who would pay more than [the buyer] suggests, as indicated by market data."[7] Both authors agree that appraisals for private market transactions should account for values to both the buyer and the seller.

A Willing Buyer and Seller

Private market outcomes reflect mutually beneficial agreements between a willing buyer and seller. One approach to fair market value estimation involves the attempt to replicate the results of free-market bargaining and negotiation. The following court opinion describes this approach as a legal standard for eminent domain proceedings:

> In determining this fair market value, a court must consider what a rational seller, willing but not obliged to sell, would take for the property, and what a rational buyer, willing but not obligated to buy, would pay for the property, and must take into account "[a]ll considerations that might fairly be brought forward and given substantial weight in bargaining between an owner willing to sell and a purchaser desiring to buy."[8]

In right-of-way transactions, the seller will be concerned with the value of alternative uses of the land and the likelihood of finding a better offer. The buyer will be concerned with the income generated and the costs of acquiring some other route. The difference between the seller's alternative value and the buyer's alternative cost represents the cooperative surplus of the potential right-of-way sale. In "Valuing Easements: A Simple Bargaining Framework"[9]authors Joseph Trefzger and Henry Munneke advocate dividing the surplus based on case-by-case considerations.

The cost of acquiring an alternative route, or "build-around cost," has played an increasingly important role in recent fiber-optic transactions. Much of this has to do with the rapid expansion of the market for fiber capacity and the competitive advantage that accrues to those with early access to a fiber network. The cost of delay in acquiring alternative routes is in many cases more significant than any drawbacks of additional construction or technical network constraints. While build-around cost represents an upper bound on the price of a right of way, a large build-around cost increases the buyer's willingness to pay and enhances the bargaining position of the seller.

Income-Based Methods

Numerous assets contribute to the income and value of an enterprise. These include the building in which a company's headquarters are housed, the patents a company owns, and even the intangible asset referred to as "good will." These assets produce value for an enterprise based on the role they play in an integrated business strategy. A corporate headquarters in Manhattan may be extremely valuable to one company or an egregious waste of money for another.

With income-based methods for valuing rights of way, the route used to create a fiber-optic network is viewed as an income-generating asset. Such an asset would be expected to earn a reasonable return. In some cases the owner of a right of way might wish to retain ownership and earn a return in the form of annual payments. An example of this would be the New York State Thruway Authority, which collects a percentage of "user fees" generated by the length of fiber-optic cable installed[10]. In other cases, projected

future returns can be added together as an estimate of current market value. An example of this approach will be presented later in this report.

Comparable Transactions

Prices paid in actual market transactions provide direct data on fair market value. This appraisal method depends on the availability of comparable sales data, verification of the data, and the degree of comparability. Proper analysis of comparable sales also requires adjustment for time differences and analysis of historical trends. Market prices fix the higher limit of value in a declining market and the lower limit of value in a static or advancing market.[11] A wide variety of conditions and prices can create difficulties in finding the right comparison. A verifiable set of comparable sales must be viewed as a tool for identifying market trends and a basis for establishing a range of possible appraisal values.

Three important factors used in comparing relevant transactions are worth describing. First is exclusivity. An agreement providing an exclusive right of way is worth more than a nonexclusive sale. Most fiber optic agreements are nonexclusive in nature. Any agreement significantly limiting access to competing fiber-optic companies can be subject to challenge under the Telecommunications Act of 1996. Second is geographic location. Traditionally, a right of way in an urban setting was worth more than a right of way that crosses rural terrain. This difference was based largely on the higher land values that prevail in populated areas. Today, the importance of geographic location is based more on the position of a route in a larger network. For example, a right of way that connects two major centers is especially valuable. Finally, the length of a right of way is significant. Longer right-of-way routes are typically assessed at a lower value per mile. This pricing pattern arises out of certain fixed costs to the seller associated with each transaction, such as the time and expense of the negotiation process. There may also be increased bargaining persistence on the part of the buyer when a larger total sum is involved.

An analysis of comparable transactions has the advantage that values in the marketplace account for much of the information described in previous sections. Market transactions are negotiated by willing buyers and sellers. Agents in the transactions have an incentive to investigate the value of a right-of-way corridor and the price of adjacent land. In a well functioning market, any right-of-way sale represents an implicit accounting of potential future income and a reasonable return.

IV. PUBLIC POLICY CONSIDERATIONS

The valuation methods described in the previous section provide guidance in determining the market value of a right of way. Two additional considerations have bearing on fair market value and are important in a public policy context. These are the value of protecting sanctuary resources and the value of supporting the telecommunications infrastructure.

Protecting Sanctuary Resources

There is an environmental loss associated with allowing cables in sanctuaries. There are direct impacts of installation, such as the digging of a trench for cable burial. There is also an amenity loss associated with the presence of fiber-optic cables on the sanctuary floor, which occurs apart from any direct environmental impacts. This reflects the value of the protected status of a sanctuary, sheltered from encroachment by new economic uses and managed with a bias toward relieving the burdens of human use rather than adding new ones. Trust is placed in decision-makers to conserve and protect these designated areas, even in the face of unforeseeable economic and political demands. If undersea cables could be routed around sanctuaries at a reasonable cost, many people would prefer to keep them out, and this preference has value.

From the standpoint of economic efficiency, the costs associated with crossing a sanctuary should be borne by the company seeking to do so. These include total costs for the granting of permits, cable installation, monitoring, and environmental loss. If the economic benefit of installing a fiber optic cable across a marine sanctuary exceeds the

total cost, the cable should be installed. If the cost exceeds the benefit, the cable should not be installed. Only if the relevant environmental costs are reflected in the price of access can government authorities ensure that the company seeking a permit will make the most appropriate decision.

While the monetary value of the relevant environmental loss has not been estimated, it is reasonable to believe such estimation may be unnecessary. Environmental amenity value effectively places a lower bound on the fair market fee. From a valuation perspective, the public would not be a willing seller at a price below this lower bound. From an economic efficiency standpoint, a lower bound on the fee would ensure that correct economic incentives are established. Since, by this line of reasoning, amenity value is not additive with market prices, it need not be explicitly calculated if market comparables are sufficiently high. It is left to the judgment of policymakers to determine whether market prices at a given time appropriately reflect the environmental value of a sanctuary.

Supporting the Telecommunications Infrastructure

There are significant benefits associated with the global expansion of fiber optic networks. Rapid, high-quality voice and data transmission allows companies throughout the economy to improve productivity. Consumers have benefited directly from access to better telecommunications and a wealth of on-line resources. It is an important objective of government to assist in the development of an advanced telecommunications infrastructure where such assistance is warranted, and to ensure that unreasonable obstacles to development are not imposed.

The value to consumers and businesses of a fiber-optic network is reflected in market transactions. A company seeking to expand an undersea cable network estimates the market demand for services it will provide, weighs these against the costs, and decides what and where to build. If benefits of cable networks exist which are not reflected in market prices, then government assistance to cable companies might be warranted. If obstacles are imposed on the expansion of cable networks, and these obstacles do not reflect genuine economic costs, they should be reduced if possible.

It is unlikely that any such benefits or obstacles exist in the context of placing undersea cables in marine sanctuaries. It should be noted that the relevant benefits would apply to placing a cable in a sanctuary as opposed to another route. Non-market benefits associated with cable networks generally, if they exist at all, should not influence the cost of sanctuary access. The need to reduce obstacles to cable expansion may militate against imposing a fair market fee that is too high. While a correct estimate of market value is based on asset valuation theory not economic efficiency, public policy considerations may be viewed as important in setting a fair market fee. This is especially true if there is a range of reasonable market-value estimates.

V. PERMITTING POLICIES AT OTHER FEDERAL AGENCIES

Several agencies of the federal government have authority over extensive public lands. These include the Bureau of Land Management, the Forest Service, the Fish and Wildlife Service, the National Park Service and the Bureau of Indian Affairs. In recent years the issue of permits for fiber-optic cables has come to the attention of all of these agencies. All of them are directed to collect fair market value for their permits under both OMB Circular A-25 and individual agency regulations. The current status of permit fee policies at these agencies is summarized below.

The Bureau of Land Management (BLM) and the Forest Service have been involved in a joint effort to determine the appropriate fair-market fee for fiber-optic permits. Ultimately, the agencies expect to incorporate revised, market-value fees into regulations governing their permitting activities. That effort is currently on hold.

The Bureau of Land Management (BLM) administers 264 million acres, most of it in the western states including Alaska. Public lands in the National Forest system amount to 192 million acres. Together, BLM and the Forest Service issue dozens of right-of-way permits to fiber-optic companies each year. Both agencies currently assess right-of-way fees based on land values using a schedule developed in the 1980s. Those fees are typically paid annually. Converted to a one-time fee in perpetuity, the fees amount to

$100 to $200 per mile. Forest Service and BLM permits include a clause requiring permit recipients to pay revised fair-market fees should an updated policy be established.

The trust lands of the Fish and Wildlife Service consist mainly of the National Wildlife Refuge system, totaling about 90 million acres. Right-of-way permits are issued if a refuge manager determines that the authorized use does not conflict with the management mission of conservation and resource protection. Fair market value is determined at the regional level in the Division of Realty using case-by-case appraisals. There is no system-wide policy regarding fiber-optic permits.

The National Park System comprises 378 areas covering more than 83 million acres in 49 States. Park Service appraisers in the various regional divisions assess fair market value for special-use permits. There is no standardized schedule of fees. Based on analysis of comparable transactions and guided by reports from both the General Accounting Office and the Inspector General urging higher fees, some park authorities have responded to the new fiber-optic market conditions.

The U.S. trust lands administered by the Bureau of Indian Affairs total 56 million acres, most of it consisting of Indian reservations. Indian tribes are free to negotiate right-of-way settlements on reservation territory and to agree to terms as they see fit. However, BIA officials have established rules requiring that right-of-way payments reflect fair market value. A selection of available data indicates that these payments range from $30,000 per mile to well over $100,000 per mile. Additional detail on these transactions is provided in the appendix containing a study by the Center for Applied Research.

VI. ANALYSIS OF FAIR MARKET VALUE

In the sections that follow, information and analysis from a variety of sources is presented regarding the determination of fair market value for a fiber-optic cable special use permit. First, recent price trends are examined, showing the rapid rise during the 1990s in right-of-way fees in the private sector. Next, the incentives of a willing buyer and seller are explored, including the minimum and maximum price of a freely negotiated

outcome. In the third section, values are estimated using an income-allocation approach. Finally, several right of way transactions are presented in detail. Each of them was based on a thorough research effort and they serve as reliable indications of important market characteristics. Ultimately, this report will recommend reliance on market comparables as the most appropriate approach to valuation. Much of the information presented below provides context for that recommendation. As noted previously, market conditions are subject to change. A final determination of fair market value should include consideration of the most recent data available, in addition to the analysis presented below.

Market Trends in Fiber Optic Rights Of Way

Right-of-way transactions traditionally involved oil and gas pipelines and cables for telephone and power transmission. The right-of-way buyers were typically government agencies or regulated utilities with the power of eminent domain. Valuation emphasized traditional appraisal techniques, such as across-the-fence values and the before-and-after rule, and compensation reflected measurable losses to the seller.

In 1984 MCI installed the world's first fiber-optic cable, running along the Amtrak right of way between Washington D.C. and New York City. Since then the market for right-of-way access has been transformed, as highly profitable, unregulated firms have responded to the burgeoning demand for fiber-optic capacity. Informed sellers, cognizant of the telecommunication industry's ability and willingness to pay, have negotiated easement values dramatically upward. Loss to the seller was discarded as a standard of value in the private sector, with greater emphasis placed on the value to the buyer and the costs to cable companies of selecting alternative routes.

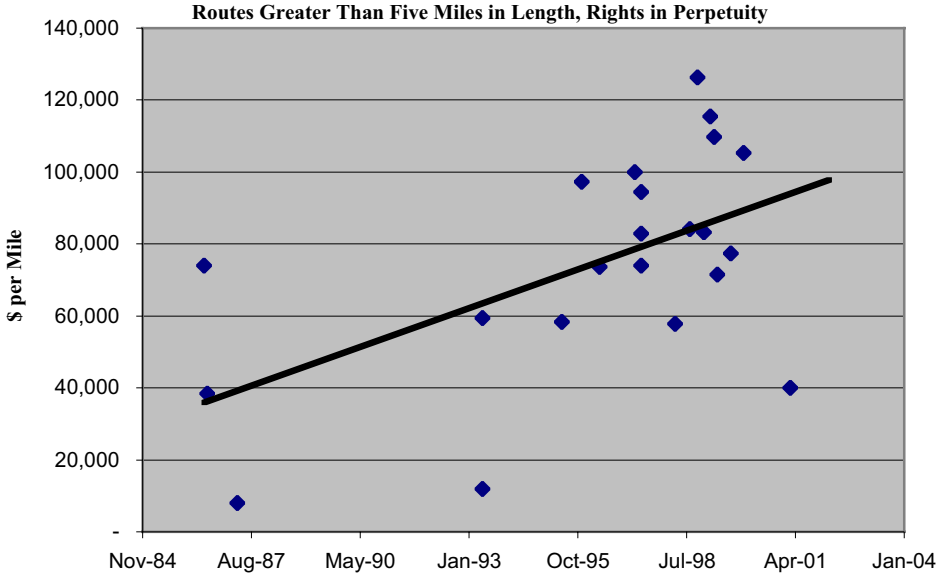
The current market is still in flux. Negotiated values vary widely as market participants attempt to learn from recent transactions while keeping pace with plans for new capacity expansion. The economic slowdown in 2001 and 2002 has caused a decline in new easement transactions and may have led to lower market right-of-way values. Despite the uncertainties, an increasing price trend was evident throughout the 1990s. A study performed for the National Park Service collected a series of historical right-of-way transactions. For purchases of underground fiber-optic rights of way greater than 5 miles

in length, price levels rose from $8,026 per mile in 1987 to $11,880 per mile in 1993 to $100,042 in 1997.[12] Other figures for shorter distances followed a similar trend. Throughout this paper, all figures are converted to per-mile one-time charges for easements in perpetuity unless otherwise noted. Values for shorter time periods can be determined using an appropriate discount rate.

Current right of way values and future price trends are somewhat uncertain. Availability of transactions data has been hindered by the reluctance of the telecommunication industry to reveal their negotiated prices. Current data has been especially scarce due to a decline in activity associated with the economic slowdown. Industry analysis projects a decline in new cable deployment in 2002, with a return to an increasing trend in 2003. Total new deployment worldwide is projected to reach new record highs in 2004.[13] While prices are more volatile than real economic activity, and past price trends may have been unsustainable, it is reasonable to believe that the range of right of way values observed in the 1990s are indicative of future values.

Figure 1 below shows the pattern of rising right-of-way fees for fiber-optic access over the past 15 years. The few data available for the mid-1980s show an average price per mile of about $35,000 in that period. Better data are available for the period 1993 to 1999, when the price trend increased from roughly $60,000 per mile to over $90,000 per mile. The trend line shown reflects an assumption of linear growth. Other possible assumptions about the form of the growth trend, such as an exponential or polynomial pattern, were similar in their statistical fit and reflected a similar upward trend. The most recent transaction shown is dated March 2001, for about $40,000 per mile. It was a class action legal settlement involving the telecommunications company T-Cubed. The lack of additional recent data and the somewhat lower value reflect the current economic climate. Also, NMSP was unable to devote resources to a more thorough investigation of the market as was conducted in earlier stages of its fair market value research.

Figure 1
Previous Transactions (Linear Trend)
Underground Fiber Optic Right-of-Way Fees, per Conduit
Routes Greater Than Five Miles in Length, Rights in Perpetuity



Any attempt to systematically analyze right-of-way transactions will be flawed due to the confidential nature of many agreements. Even data on transactions that are not confidential are only sporadically available, with much of it traded informally among appraisers and industry experts. Figure 1 presents all the data able to be obtained at the time of this report, with transactions limited to underground fiber-optic cables and routes at least five miles in length. Fees for shorter routes are excluded because they are comparatively erratic and are often not negotiated on a per-mile basis. Fees for overhead fiber-optic cables were deemed less relevant to a sanctuary special use permit. When several conduits are buried in a single right-of-way, the fee was averaged over the total length of all conduits to arrive at a conservative figure. Any transactions involving solely in-kind payments, such as free fiber-optic capacity, are difficult to value and are therefore excluded. Additional detail for the transactions shown is included later in the report and in the supporting table entitled "Calculation of Selected Right-of-Way Fees," available in the appendices.

The Willing Buyer and Seller Scenario

The range of possible outcomes in a market transaction is limited on the low end by the value to the seller on the high end by the value to the buyer. In the case of a sanctuary permit, value to the seller can be viewed as the environmental loss caused by the intrusion of cables in a sanctuary, along with any administrative and monitoring costs. This is the minimum price of access. The value to the buyer is the "build-around" cost, that is, the cost of acquiring some alternative route. As previously noted, the special-use permit does not apply to any direct environmental damage that may be caused by cable installation. An important part of the minimum price of the seller is therefore beyond the scope of this analysis.

Some conclusions can be drawn regarding value to the buyer. Sanctuaries typically cover large territories and cable companies have a limited number of preferred landing sites for undersea cables. Thus alternative routes of a reasonable cost in the company's view may not be available in some cases. In a free-market bargaining scenario, the negotiated price would therefore be high. However, a specific figure for build-around cost for a sanctuary would vary from project to project and would be difficult to estimate. The business strategies and technological constraints of a particular telecommunications company are unknown to policymakers. The costs of alternative routes involve additional construction, but also include the unknown variables of right-of-way negotiation and cable network reconfiguration. Furthermore, the size and location of sanctuary territory entails market power unlike what is typically observed in private market transactions. For these reasons, the willing-buyer-and-seller approach is not recommended as the most appropriate valuation methodology.

The Income Allocation Approach

Participants in fiber-optic transactions have increasingly taken the view that a right of way is an asset that has value to an enterprise and that income allocation is the key to asset valuation. These income-based transactions take two forms. Many recent agreements stipulate that a percentage of "user fees" for the installed cable must be paid to the right-of-way owner. Under such arrangements the landholder essentially retains

ownership of the route and collects periodic payments that represent a reasonable return for use of the asset. Other transactions involve the sale of a right of way, with the selling price based on discounted future cash flows.

NMSP commissioned two analyses of income-based fair market value. Those studies are contained in Appendix One of this report.[14] The studies were completed in May and September of 2000, and no attempt has been made to update the results based on recent data. They are described here for the purpose of illustration, with the caveat that current market conditions might lead to different results.

The income-based analysis by the Center for Applied Research applies industry-wide profitability figures the Global Crossing project that traverses the Olympic Coast sanctuary and is already complete. The full study, contained in the appendices, also addresses a project formerly proposed for the Monterey Bay Sanctuary. Since the permit application for that project has been withdrawn, it is not described here. Two figures are given for fair market value. The first is based on route-miles: that is, net income from fiber-optic operations is allocated based Crossing project, figures are calculated assuming a 25-year lease, a term length common on total miles traversed by a fiber-optic network. The second figure is based on fiber-miles. This means that income is allocated based on the total length of buried fiber in a cable network. The per-fiber value is then multiplied by the number of fibers in a particular cable segment. A fiber-optic cable might include as few as four fibers or may contain 144 or more. The route-miles analysis views a right of way as a land-based commodity, with a market price determined by the typical fiber-optic installation. This view is still common in the marketplace, especially with regard to comparable transactions, where route-miles are the standard unit of comparison. By contrast, the fiber-miles analysis accounts for differences in capacity and reflects recent transactions that charge based on the quantity of buried fiber.

A complete description of the methodology is contained in the Appendix. Generally, data was collected from a group of companies that operate fiber-optic networks. The study emphasizes large, mature companies and does not consider any companies whose profits

are negative. Many of these businesses are in the early phases of development, and it is reasonable to assume that their projections of future performance at least match the current performance of mature companies in the same industry.

For the companies chosen, a portion of each company's total income was allocated to its communications business. A portion of that income was allocated to its fiber-optic network. Of the income stream attributed to the network, 50 percent was then allocated to the use of the land and the right-of-way asset. This figure was then divided by either total route-miles or total fiber-miles, and 25 years of annual income was discounted to the present to arrive at the fees shown in Figure 2 below.

Figure 2

	Global Crossing: Olympic Coast Route-Mile Analysis	**Global Crossing: Olympic Coast** Fiber-Mile Analysis
Total Valuation	$8,426,444	$1,970,826
Miles	65	65
Per-Mile Fee	$129,638	$30,320

The choice to allocate 50 percent of network income to the land rights requires some discussion. First, the contractor who prepared the income study has used similar methodology to value rights of way in the past. These valuations, using the 50-percent figure, have been the basis for successful negotiations with fiber-optics companies. The relevant transactions are listed in a table that accompanies the study. Second, many market transactions using the "reasonable return" approach collect a similar percentage of income. For example, the New York State Thruway Authority collects 50 percent of cable income over the next twenty years on 540 right-of-way miles.[15] In another arrangement involving three miles of tunnels in Chicago, city authorities will collect at

least eight percent of the leasing company's gross revenues.[16] That charge could be similar to 50 percent of income, depending on the specifics of the agreement and the size of future cash flows.

The second income-based study estimates right-of-way value using projected revenues from the sale of undersea fiber-optic capacity, or circuits. This approach most closely resembles the type of business analysis a telecommunications company would use in evaluating the decision to install an undersea cable. An analysis using this approach was commissioned by NMSP and appears in Appendix One. The study was undertaken by KMI Corporation, a leading research consulting firm in the fiber-optics industry.

Two important trends were incorporated into the KMI study. First, technology is changing rapidly. The amount of capacity available for a given cable increases dramatically as characteristics of the transmission signal are improved. Second, market conditions are changing. The addition of new cables adds to available capacity and creates downward pressure on prices. Regarding the income a cable generates, increasing cable capacity offsets declining prices.

Using a range of possible assumptions about the technology employed, and relying as before on the allocation of 50 percent of income to the right of way, the KMI study computes two sets of potential right-of-way values. For Atlantic routes, the KMI study computes a range of $12,762 to $76,925 per mile. The average for Atlantic routes is $43,748. For Pacific routes, the range of estimates is $93,927 to $214,576, with an average per-mile fee of $141,733.

Selected Historical Transactions

The transactions described below were selected to illustrate market conditions and trends. The first transaction involves a Nevada Bell right of way on federal lands, and represents an early attempt by a government authority to respond to the changing fiber optics market. The remaining examples are private-sector transactions. They should be viewed

as reliable market indicators in that each of them is well documented and based on a thorough negotiating process between informed parties.

Nevada Bell: June 20, 1994

Nevada Bell sought a fiber optic easement running 14,144 feet along U.S. Highway 50A in Lyon County, Nevada. The Bureau of Reclamation (BOR) performed an appraisal based on highest and best use, arguing that a fiber-optic right of way was in fact the most profitable likely use, and that market value was therefore the appropriate standard. At that time, according to the BOR report, research indicated that market prices ranged from $1,000 to $50,000 per mile. A range of $2,000 to $8,000 per mile was determined to include the most representative market transactions. A fee of $1.05 per foot, or $5,544 per mile, was selected for the Nevada Bell easement.

The BOR report noted that government valuation of fiber optic easements up to that time had not responded to the changing market conditions. Traditional across-the-fence or "fee-simple" values were the most common approach. In the private sector, however, prices were being negotiated based on market factors such as the convenience of a particular geographical route, the income stream generated, and proximity to a metropolitan area. The report concluded "supply and demand influences have driven the value of this type of easement to levels way beyond the fee-simple value."[17]

Massachusetts Turnpike Authority: March 31, 1999

The Massachusetts Turnpike Authority, which built and maintains Interstate 90 for the state of Massachusetts, sold access to its 135-mile right of way in an arrangement valued at $50 million.[18] This non-exclusive fiber-optic agreement came on top of a similar agreement only a week earlier. The terms of the $50 million 25-year contract, signed with Level 3 Communications of Boulder, Colorado, included $2 million in up-front payments and annual fees for each fiber-optic conduit installed. The company planned to install up to 20 conduits all at once. Treating each conduit as a separate right of way, the stipulated payments are equivalent to a one-time fee of $112,477 per mile.[19] Treating the conduit

together as a single right-of-way purchase could imply a one-time right-of-way fee of well over $1 million per mile.

AT&T Class Action: May 12, 1999

In a closely watched legal settlement, AT&T agreed to pay $45,000 per mile for a perpetual right of way on 80 miles of abandoned railroad track in Indiana.[20] The case was part of a nationwide class action involving fiber optic lines installed along thousands of miles of abandoned and operating railroad tracks. The railroads sold right-of-way access for the lines to AT&T, but the plaintiffs argue that only a portion of the right of way was owned by the railroads in the first place. The remaining ownership stake belonged to thousands of landowners along the railroad routes. These landowners could potentially receive hundreds of millions of dollars in compensation as the remaining portions of the class action suit are litigated.

The settlement figure of $45,000 only pertains to the portion of ownership rights that allegedly did not belong to the railroads. AT&T had already paid at least $11,500 for the estimated one-third that did belong to the railroads. Furthermore, the settlement awards $15,000 per mile in attorney's fees. Based on these considerations, the total value of the fiber optic easement may be significantly greater than $45,000 per mile.[21]

The court determined that the class action settlement was fair and reasonable. "[A]nybody evaluating this settlement needs to recognize that it is the last or at least the latest chapter after several years of vigorous litigation, and then approximately a year of adversarial arm's length negotiation over the terms of the settlement. That is probably the best assurance that a proposed settlement will be fair, reasonable, and adequate to the class."[22]

California State Lands Commission

The state of California issued four permits charging a right-of-way fee for installation of submarine cables. The rights of way relate to submerged lands off the coast of San Luis Obispo County, extending from various points on the shoreline out to the three-mile limit

of state jurisdiction. The four routes vary in length from five miles (a single route) to nine miles (including a route into and out of a single landing station). The contract fees are described in terms of acreage, and range from $116,000 to $254,000 per year. With right-of-way width specified at 10 feet, the equivalent fee in linear terms comes to about $280,000 per mile for rights in perpetuity.[23]

This data point was excluded from the analysis of previous transactions presented in the earlier part of this section. If added to that analysis, it would raise the average significantly and point to a higher current trend value. It was excluded for the sake of keeping overland rights of way separate from undersea routes. The Lands Commission transaction is also a relatively short route leading to valuable landing sites, implying a greater-than-average value. As more information becomes available over time, it will become clear whether these recent undersea transactions represent a good estimate of fair market value.

VII. CONCLUSIONS AND RECOMMENDATIONS

The authors of this report recommend the analysis of comparable previous transactions as the appropriate approach to determining fair market value. Most appraisers have rejected land-based, across-the-fence methods as inadequate to address current market conditions in the fiber-optic communications market. While the scenario of the willing buyer and seller emphasizes build-around cost as an upper bound on market value for rights of way, the information required to evaluate build-around cost, particularly for submarine cables, is prohibitive. Income-based analysis also requires substantial information that is not readily available in most cases. Furthermore, expectations about future income are already incorporated into previous market transactions.

The comparable transactions methodology leads to a current recommended range of $40,000 to $100,000 per mile for the fair market value of a sanctuary permit. Valuation on a per-mile basis reflects common practice in the private right-of-way market. The

range of values reflects the variability in fees observed over time and from case to case, as presented in Figure 1 of this report. Any figure within that range would be considered appropriate from the standpoint of economic valuation, and it is left to the judgment of the decision makers involved to weigh any relevant policy considerations in making a final determination.

The fair market value of a permit will change over time. The set of comparable transactions used to assess fair market value should be updated to reflect current conditions at the time an assessment is made. As in the current assessment, emphasis should be place on selected transactions that are particularly relevant to the case of a sanctuary permit. For example, long-haul routes, especially submarine cable routes, are important market comparables. Recent transactions and those involving an informed buyer and seller should be emphasized. Also, adjustments in value should be made based on the number of conduits installed in a given right of way, and the term length of the contract. Finally, in a market characterized by rapid change and wide variation in transactions data, average price trends over time are an important indication of fair market value.

[1] "Undersea Fiber Business Thrives on Today's Demand for Global Connectivity." *Lightwave*, September 1999, page 1. (Tab 2)
[2] "Worldwide Optical Fiber and Fiberoptic Cable Markets," content summary for advertising purposes, KMI Corporation, http://www.kmicorp.com/fiberoptics_market_studies/worldwide_optical.htm.
[3] Circular No. A-25 Revised, *Memorandum for Head of Executive Department and Establishments*, July 8, 1993. (Tab 3)
[4] Estimates vary widely. Two good sources are Clifford A. Zoll, "A Logical Approach to Appraising Railroad Right of Ways," *The Appraisal Journal*, October 1998 (Tab 4) and Clifford A. Zoll "Rail Corridor Markets and Sale Factors," *The Appraisal Journal*, October 1991 (Tab 5).
[5] Eaton, J.D. *Real Estate Valuation in Litigation*, 1982, page 62. (Tab 6)
[6] Karvel, George R. "Easements in Railroad Right-of-Ways," *The Appraisal Journal*, January 1989, page 101. (Tab 7)
[7] Seymour, Charles F. "Letters to the Editor," *The Appraisal Journal*, October 1989, page 595. (Tab 8)
[8] *United States v. 104 Acres*, 666 F.Supp. 1017 (W.D. Mich. 1987). (Tab 9)
[9] Trefzger, Joseph and Henry Munneke. "Valuing Easements: A Simple Bargaining Framework," *Journal of Real Estate Research*, Number 2, 1998. (Tab 10)
[10] "Emerging Trends and Paradigms in Shared Resource Projects," Nossaman, Guthner, Knox & Elliot, LLP and Apogee/Hagler Bailly, 1998. (Tab 11)
[11] Eaton, J.D. *Real Estate Valuation in Litigation*, 1982, page 136.(Tab 12)
[12] See supporting table entitled "Calculation of Selected Right of Way Fees." (Appendix I)
[13] "Worldwide Optical Fiber and Fiberoptic Cable Markets," content summary for advertising purposes, KMI Corporation, http://www.kmicorp.com/fiberoptics_market_studies/worldwide_optical.htm.
[14] "Establishing the Value of Permits for Fiber Optic Installations in National Marine Sanctuaries," The Center for Applied Research, Inc., May 28, 2000; and "Revenue-Based Rights-of-Way Fee Estimates," KMI Corporation, September 2000. (Appendix I)
[15] "Emerging Trends and Paradigms in Shared Resource Projects," Nossaman, Guthner, Knox & Elliot, LLP and Apogee/Hagler Bailly, 1998. (Tab 15)
[16] "High Tech Help City Mine Tunnels," *The Chicago Tribune*, December 3 1985, page 4A. (Tab 16)
[17] Appraisal for 14,144-foot easement to Nevada Bell. Bureau of Reclamation, June 20 1994, page 7. (Tab 17)
[18] "Firm to Pay Pike $50 M for Use of Right of Way," *The Boston Herald*, April 1 1999, page 14. (Tab 18)
[19] The figure from the supporting table entitled "Calculation of Selected Right of Way Fees" is adjusted for inflation. 109,734 x 1.025 = 112,477. (Appendix I)
[20] *Hinshaw v. AT&T Corp*. "Certain Indiana 'Telecommunication Cable' Class Settlement Agreement," Civil Action No. IP99-0549-C-T/G, April 1999. (Tab 19)
[21] See supporting table entitled "Calculation of Selected Right of Way Fees." (Appendix I)
[22] *Hinshaw v. AT&T Corp*. Concluding Remarks by the Court, September 17 1999, page 6. (Tab 20)
[23] For the contract entitled "Calendar Item C11" we have 11 acres multiplied by 43,560 square feet per acre to get 479,160 square feet. Divided by the width of 10, we have 47,916 feet, or 9.075 miles, in length. The annual fee per mile is thus $242,075/9.075=$26,675 per year. Divided by 0.095 we get $280,788 per mile in perpetuity. The same calculation for the other three leases produces similar linear fees. (Tab 21)

Establishing the Value of Permits for Fiber Optic Installations in National Marine Sanctuaries

Prepared for:
The National Oceanic and Atmospheric Administration
Office of Ocean and Coastal Resource Management

Prepared by:
The Center for Applied Research, Inc.
Denver, Colorado

May 28, 2000

Table of Contents

PREFACE

This monograph has been prepared by the Center for Applied Research in consultation with The Ackerson Group and affiliates, (including Fitzgerald and Associates of British Columbia, Canada). Any errors and/or omissions in this document are solely the responsibility of the Center for Applied Research.

I. Purpose of this Monograph

The purpose of the monograph is to provide the National Oceanic and Atmospheric Administration (NOAA), Office of Ocean and Coastal Resource Management (OCRM) with valuations for two separate, five year fiber optic permits for projects requiring access to the Olympic Coast and Monterey Bay National Marine Sanctuaries (NMS). The projects of interest are the Pacific Crossing-1 (PC-1) fiber optic project, which crosses the Olympic Coast NMS, and the Global West fiber optic project, which crosses the Monterey Bay NMS.

This monograph, including the valuations for the PC-1 and Global West fiber optic permits, incorporates changes from the May 15, 2000 draft based on NOAA/OCRM project team comments and additional research and analysis by the Center for Applied Research. The monograph is intended to support and expand on permit valuation goals and concepts presented in a NOAA "White Paper".

II. Overview of the Enterprise Income-Based Model

The Center for Applied Research, Inc. has developed and employed an Enterprise Income-Based Model to supplement traditional appraisal methods for valuing right-of-way corridors that are not subject to condemnation through eminent domain. The Model apportions to a landowner (i.e., to the land) a share of the profits, or net income, earned by an enterprise (or by a representative selection of enterprises) whose operations require rights-of-way, such as for a pipeline, an electric transmission line or a fiber optic cable. This approach calculates the portion of overall net income allocated to the segment of infrastructure on a parcel of land (generally measured as a percentage of the enterprise's total infrastructure length), and determines the land's share of this allocated income. Other factors considered in the Model and associated analysis include the impact of the infrastructure on the land, the importance of the subject land parcel to the company's overall development, the cost of building around the subject land, and other relevant factors.

The Enterprise Income-Based Model requires first an understanding of the market in which the right-of-way applicant operates, both from the perspective of the specific enterprise and of the industry as a whole. The profitability of the project is first measured relative to the financial conditions of the enterprise at the level that most closely resembles its presence on the subject land. For example, if a proposed fiber optic line would serve only a limited regional market, the revenue and expenditures related to that limited market are used where possible to estimate project profitability and land value.

However, two features of fiber optic development necessarily require that this scope of analysis be expanded to include a larger market: (1) the proposed infrastructure connects the local or regional area to a national or global network, thereby rendering the project a regional extension of a national or global market; and (2) many fiber optic project developers are either newly-formed companies or joint ventures of more established companies, currently in an "investment phase" period of start-up losses but anticipating later net income returns. To address these issues, in specifying the Enterprise Income-Based Model the global fiber optic market is examined to determine an appropriate level of expected net income to impute to the subject enterprise, and to determine the appropriate share of that allocated income to attribute to the property.

In the Model, the allocation of net income to a parcel of land is a function of the "proportion of presence" of the enterprise or the industry on the subject land. In the case of longitudinal facilities such as natural gas pipelines, power lines and fiber optic lines, the measure of relative presence is generally the length of line on the subject parcel compared with the total length of line serving the market under study or, in the case of a national fiber optic network, the total length of fiber optic lines in the network.

Finally, the Enterprise Income-Based Model attributes a share of the allocated profit to the land (versus other factors of production). In general, as a beginning point for discussion, it is assumed that the land is entitled to one-half of the attributed profit of the enterprise. Key features of specific projects will influence the final determination of the attribution percentage. As a simplified example, if a pipeline generates $100,000 in annual net income over a 10-mile length, and if one mile is on a parcel under analysis, the income allocated to the subject parcel is $10,000; the

share attributed to the land is one-half of $10,000, or $5,000 per year. The capitalized value of the right-of-way would be the net present value of the $5,000 annual payments over the easement (permit) term (e.g., 20 years), discounted at a rate of interest that the applicant expects as a return on its conservative investments (e.g., 10 percent). Under this example, the net present value of $5,000 payments over a 20-year term, discounted at 10 percent, would equal a capitalized value of about $53,000.

The application of this method to a fiber optic line, although somewhat more complex due to its nature as part of a global network rather than as part of a discrete source-to-market infrastructure system, is nevertheless appropriate, as the method assumes essentially comparable utility and value throughout the entire fiber optic network. Although one might imagine that a mile of the network in urban New York would be more valuable than a mile in rural Wyoming, it can be argued that these locational differences are more appropriately expressed in terms of the share attribution than of the income allocation. That is, the cost of purchasing a mile of glass fiber is essentially the same in New York as in Wyoming, and a fiber optic developer's capital investment decision to buy that fiber is based on the need to extend the overall network in the locations that will optimize the developer's profitability. The Enterprise Income-Based Model assumes that the developer's total profitability is dependent upon the infrastructure extension under consideration, and that the per-mile profitability is therefore consistent with the company's overall capital investment plans. That is, as a general rule, a company (whose capital resources are finite) will invest in projects that will maximize profitability, whether an additional dollar is spent in New York or Wyoming. The attributed share of the per-mile income that a landowner should expect to receive as right-of-way compensation is circumscribed by, among other factors, the locational advantage of the subject land, the costs of building around the subject land, unique environmental impacts, timing considerations, and so forth.

The Attachment to this report contains excerpts of selected U.S. Department of the Interior grants of easements that illustrate the Federal government's acceptance and affirmation of right of way values derived using the net income method.

Section III provides an overview of the Pacific Crossing and Global West projects that serve to illustrate the application of the Enterprise Income-Based Model.

Section IV provides an analysis of the financial results for several selected companies representing a range of size, configuration and profitability in the fiber optic communications industry, and preliminary results of applying the Enterprise Income-Based Model to the two selected projects.

III. Industry Background and Geography of the PC-1 and Global West Projects

The PC-1 Fiber Optic Project

Tyco Submarine Systems, Inc. (Tyco), a subsidiary of Tyco International, Ltd., is the permit applicant. Tyco is installing a submarine fiber optic telecommunications system that will connect Japan with the western United States via a landing site in Seattle, Washington (at Mukilteo) and Grover Beach, California. The entire route consists of approximately 12,900 miles (20,800 Km) of 0.71-inch to 2.5-inch diameter submarine fiber optic cables that run parallel from each of the United States landing sites to two landing sites in Japan. Once the PC-1 project reaches land, it would be connected with the existing telecommunications systems. The design capacity of PC-1 would be enough to carry 10 gigabits per second (Gbps) simultaneous voice or data calls, with a service life of approximately 25 years, and the potential to be upgraded to 640 Gbps.

An important feature of the PC-1 project is to provide diversity and stability to existing telecommunications systems in both Japan and the United States. The parallel cables and the two landing sites in Japan and the two landing sites in the United States insure that, in the event of damage or accident to one line, telecommunications along the cable can be re-routed to the other line, making the system operational at all times. Figure 1 illustrates the basic route of the PC-1 project and shows that the project enters U.S. territorial waters at the mouth of the Juan de Fuca Strait and crosses the northern boundary of the Olympic Coast NMS. According to the U.S. Army Corps of Engineers' environmental assessment, the PC-1 route has been selected to minimize, to the greatest extent possible, impacts on fishing grounds, dredge spoil sites, military activities, and existing and/or planned cabling.

The fact that the PC-1 project crosses the Olympic Coast NMS makes the route somewhat unique and serves to differentiate it from a permit application that simply

affects open ocean waterways. The special status of the Olympic Coast NMS (and of National Marine Sanctuaries in general) and the specific charge NOAA/OCRM has to maintain and manage the resources of the sanctuary in the public's interest, warrant a more in-depth evaluation of the PC-1 project in order to render a value, or range of values, which should be placed on the PC-1 permit. In order to prepare such an analysis, information about the telecommunications industry, and about the telecommunications systems specifically benefitted by the PC-1 project, needs to be compiled.

Figure 1. Pacific Crossing Fiber Optic Project Route

Figure 1. Pacific Crossing Fiber Optic Project Route

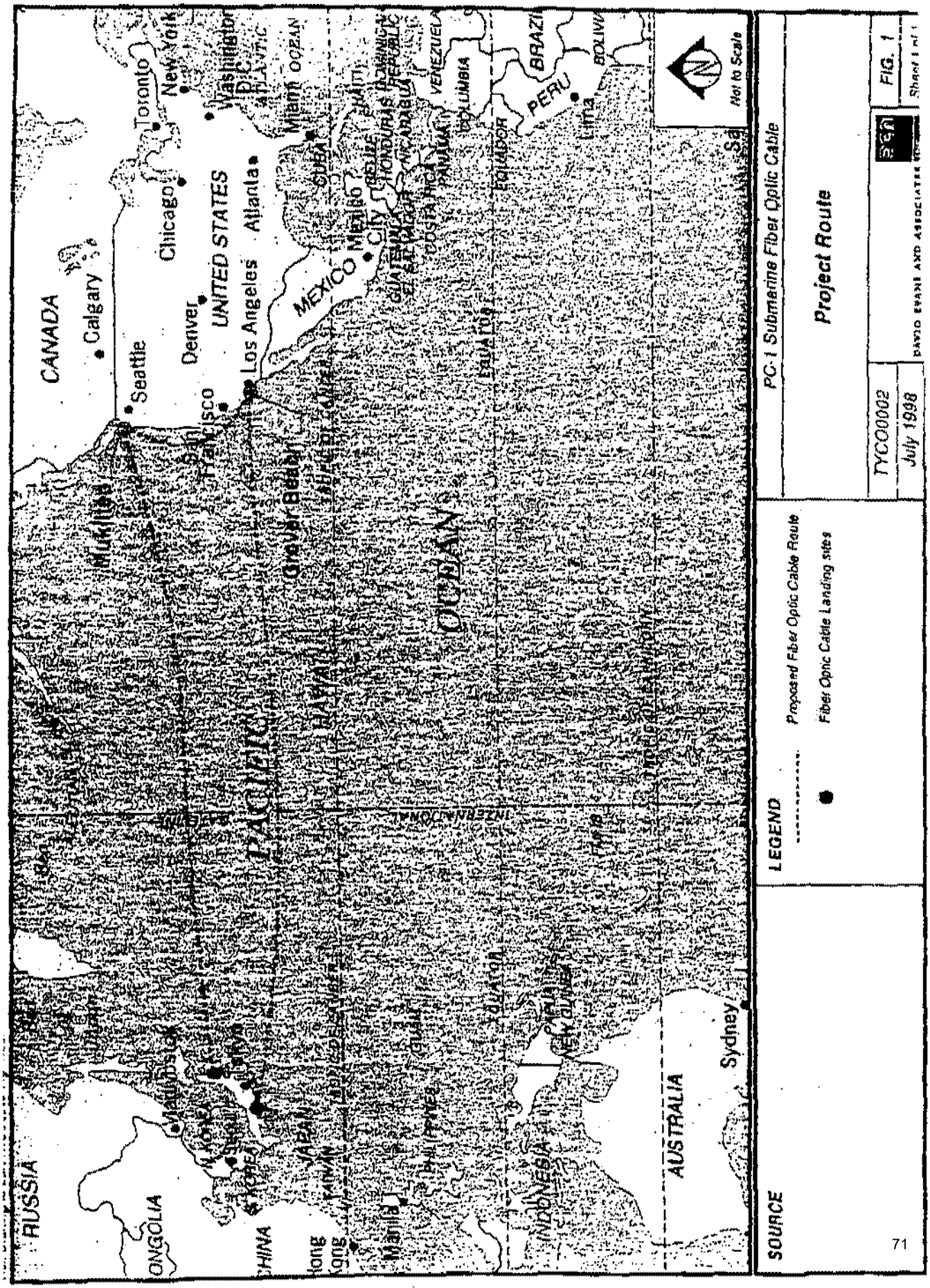


FIGURE 1

The Global West Project

Global Photon Systems, Inc. (Global Photon) is the permit applicant for the Global West fiber optic project. The Global West project is a high-capacity telecommunications system capable of transporting voice, data, video, cable TV, Internet traffic, and other digital data. The system is comprised of a fiber optic cable that would be buried along the California coastline 3 to 12 miles offshore that would be brought to land at seven separate sites -- San Diego, Los Angeles, Santa Barbara, San Louis Obispo, Monterey, San Jose, and San Francisco.

Currently, all high-speed telecommunications access along the California coast is available only through terrestrial systems along the U.S. 101 corridor. The Global West system serves several important purposes. First, it will provide high-speed transport to and from the "International Gateways" in San Luis Obispo by providing important connections and redundancy to the existing telecommunications systems connecting the major cities of the California coastline. Second, is anticipated that the Global West system will alleviate congestion on the existing telecommunications networks and will provide for expansive growth in the telecommunications industry and in the anticipated need for increased telecommunications capacity to support traffic from north to south along the California coast. Third, the Global West system will provide important security and reliability not present in the existing terrestrial system by protecting the California telecommunications network from damage, such as a natural disaster (e.g., an earthquake).

The proposed route for the Global West system consists of five sea cable segments and seven landing sites (an extra site in Monterey is required to avoid the Monterey Canyon) that totals approximately 920 km of undersea cable. Figure 2 illustrates the route for the Global West project from San Francisco to San Diego, which includes five continuous sea cable segments:

1. San Francisco to Monterey Bay (150 km);
2. Monterey Bay to Estero Bay (San Luis Obispo near Morro Bay) (210 km);
3. Estero Bay to Santa Barbara (220 km);
4. Santa Barbara to Manhattan Beach (150 km);
5. Manhattan Beach to San Diego (190 km).

Figure 2. Global West Fiber Optic Project Route

Figure 2. Global West Fiber Optic Project Route

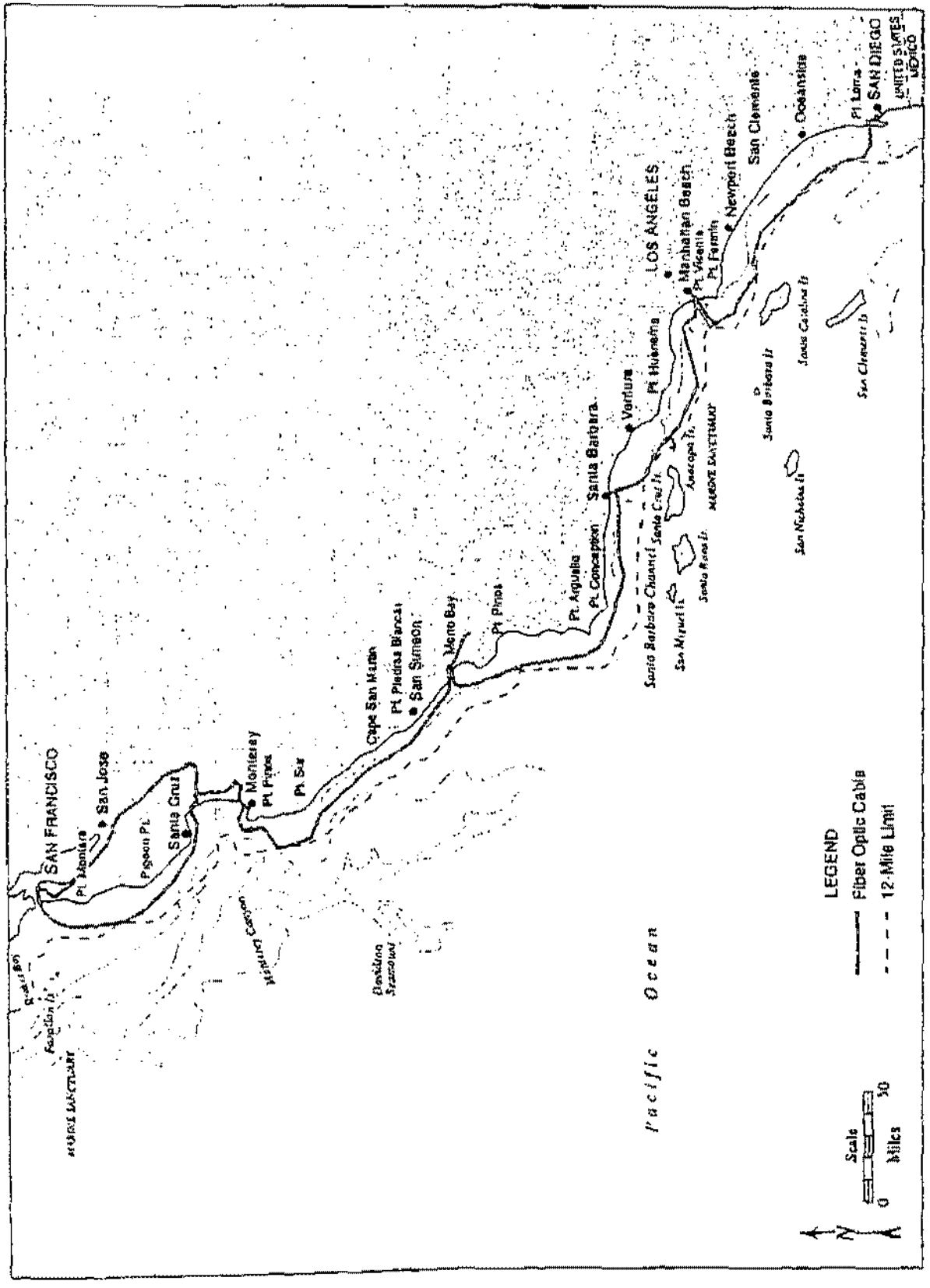


Figure 2.1-1. Global Photon Cable Route from San Francisco to San Diego

FIGURE 2

Because the Global West project affects the Monterey Bay NMS and serves several important, diverse objectives, the NOAA valuation of the subject permit must reflect the unique status of the Monterey Bay NMS and the strategic purposes and value of the Global West system.

IV. Utilizing the Enterprise Income-Based Model to Determine National Marine Sanctuary Permit Values

Table IV-1 contains certain corporate financial and operational data that have been used in the Enterprise Income-Based Model to calculate the permit values for the Pacific Crossing I and Global West fiber optic projects. The entities selected represent a range of size, configuration and maturity among businesses currently involved in installing and maintaining fiber optic lines for telecommunications.

Companies were selected for inclusion in the valuation model based on the availability during the study period of reliable information on the mileage of fiber infrastructure, expressed as either route miles or fiber miles. Route miles represent the number of miles of right-of-way in which fiber is laid, and fiber miles represent the total length of glass fiber in the network (equal to the route miles times the number of fibers in each route mile). Excluded from the analysis are those companies in the "investment phase" of development, in which capital costs overwhelm current revenues in anticipation of future profitability.[1] In 1998, revenues for the selected US companies ($162.9 billion) represented approximately 66 percent of total revenues ($246.4 billion) among telecommunications companies in the United States.[2]

The companies selected for this study include three broad types: (1) those whose fiber infrastructure includes primarily long distance, long-haul terrestrial routes; (2) those whose fiber assets support primarily regional or local telecommunications; and (3) those whose assets are devoted more or less equally to long distance and local communications. The first two categories include primarily US companies whose business have emerged or evolved since the break-up of AT&T (including regional Bell operating companies or RBOCs, other incumbent local exchange carriers or

[1]Table IV.I. reflects data acquired as of May 21, 2000.

[2]Federal Communications Commission, *Telecommunications Industry Revenue: 1998*, September of 1999.

ILECs, and competitive local exchange carriers or CLECs), and the third includes primarily international companies developing a mixture of local service (operating under a variety of regulatory regimes) and long distance service that includes significant undersea assets. Although this categorization is complicated by the large number of intercompany and international alliances and joint ventures, it can help explain some of the variability in per-mile profitability, particularly in the short run. It is a basic premise of this analysis that the dynamic evolution of business associations within and among countries and companies, as well as the tendency toward global deregulation, will lead to a convergence in rates of return to capital investment in fiber—national vs. international, terrestrial vs. undersea, and local vs. long-haul.

Table IV-1 thus includes a range of data collected to date for utilization in the valuation model. Data included in the table is listed by telecommunication company:

Column 1: ***Gross revenues for communications units.*** This column shows the reported receipts of corporate units that include some telecommunications services, including wireline-based services (local or long-distance) as well as wireless services. "Wireless" services are included because calls made from or to mobile telephones inevitably include some wireline transmission, and usually a substantial majority of the length of transmission between callers is by wireline. The first two items in column 1 are reported gross revenues for fiscal years ending in 1999 (including many unaudited quarterly corporate reports obtained during the first quarter of 2000), compared with 1998 for the same units; the third unit in column 1 is the percentage change from 1998 to 1999. In many cases, companies have undergone reorganization, acquisitions or divestitures between periods. The data reported in column 1 is generally adjusted by the company to include only continuing operations.

Column 2: ***Gross revenues for all units.*** This column shows the reported receipts of all corporate units for each company, including 1998 vs. 1999 comparisons.

Column 3: ***Communications units revenue as percentage of total revenues.*** This column shows the results of dividing column 1 by column 2.

Column 4: ***Net income excluding extraordinary items.*** This column shows the reported net income of companies after taxes, interest expenses, depreciation and amortization, but before extraordinary items such as gains from sale of outside stock, writeoffs of major assets or other items not related to current period primary operations.

Column 5: ***Fiber line percentage of net income.*** As an indicator of the importance of fiber optic infrastructure to the selected companies, we have used the following factors for attributing the contribution of fiber optics to net income: for companies that are essentially fiber optic network developers, 100 percent; for companies whose business is predominantly devoted to long distance and Internet backbone operation, 90 percent; for regional Bell operating companies (RBOCs), other incumbent local exchange carriers (ILECs), competitive LECs, and their extended operations, 70 percent; and for companies whose business is predominantly devoted to wireless communications, 40 percent.

Column 6: ***Net income attributable to fiber lines.*** This column shows the results of multiplying column 4 by column 5.

Column 7: ***Infrastructure miles.*** This column shows the mileage of fiber optic infrastructure for each reporting company. As this table suggests, the availability of usable measures of infrastructure length is sporadic and even those companies that report fiber length generally indicate only route mileage or fiber mileage, but not both. Although this inconsistency presents some complication for the analysis, the data available can be used to test alternative measures of valuation. Column 7 shows total route miles or fiber miles for each selected company (with fiber miles indicated by underlining) .

Column 8: ***Net income per mile.*** This column shows the results of dividing column 6 by column 7. Income per fiber mile is indicated by underlining; income per route mile is not underlined.

Using the information in Table IV-I (excluding companies showing net losses), an average income per route mile of $28,564 per year and an average income per fiber mile of $835 per year has been calculated. Using an attribution factor of 50 percent (i.e., attributing to the land or to the seabed one-half of the net income earned by the infrastructure), the attributed value per year would yield a value for compensation to the NMS of $14,282 per route mile or $418 per fiber mile.

Table IV.I.

Profits Attributable to Fiber Optic Lines
Selected Companies, 1998-1999

Sources: The Center for Applied Research, Inc., 2000, based on sources identified

	1			2			3		4			5		6
	Gross revenues for communications unit(s)			Gross revenues, all units			Comm. unit % of gross		Net inc, excl nonrecurr items			Fiber line % of net		Net attr a
	1999	1998	% change	1999	1998	% change	1999	1998	1999	1998	% change	1999	1998	1999
Alltel	*$4,421*	*$3,839*	*15.2%*	*$6,302*	*$5,627*	*12.0%*	*70.1%*	*68.2%*	*$822*	*$660*	*24.6%*	*70%*	*70%*	*$576*
AT&T	*$59,572*	*$51,902*	*14.8%*	*$62,391*	*$53,223*	*17.2%*	*95.5%*	*97.5%*	*$5,450*	*$5,235*	*4.1%*	*90%*	*90%*	*$4,905*
BCE	$12,583	$12,405	1.4%	$12,583	$12,405	1.4%	100.0%	100.0%	$1,300	$1,275	2.0%	90%	90%	$1,170
Bell Atlantic	*$30,707*	*$29,205*	*5.1%*	*$33,174*	*$31,566*	*5.1%*	*92.6%*	*92.5%*	*$4,202*	*$2,965*	*41.7%*	*70%*	*70%*	*$2,941*
Bell South	*$22,934*	*$21,119*	*8.6%*	*$25,224*	*$23,123*	*9.1%*	*90.9%*	*91.3%*	*$3,825*	*$3,359*	*13.9%*	*70%*	*70%*	*$2,678*
British Telecom	£14,096	£13,287	6.1%	$16,953	$15,640	8.4%	83.1%	85.0%	£3,474	£3,461	0.4%	90%	90%	$3,127
Broadwing	$1,032	$885	16.6%	$1,032	$885	16.6%	100.0%	100.0%	$339	$290	16.9%	100%	100%	$339
Cable & Wireless	*£7,484*	*£6,634*	*12.8%*	*£7,944*	*£7,001*	*13.5%*	*94.2%*	*94.8%*	*£1,646*	*£1,651*	*-0.2%*	*90%*	*90%*	*£1,483*
Cable & Wireless HKT	$31,415	$34,047	-7.7%	$32,411	$35,041	-7.5%	96.9%	97.2%	$13,142	$14,315	-8.2%	90%	90%	$11,828
CapRock	$193	$122	58.2%	$193	$122	58.2%	100.0%	100.0%	$0	-$4	-106.3%	100%	100%	$0
Centurytel	$1,006	$961	4.8%	$1,143	$1,092	4.7%	88.2%	88.1%	$236	$194	22.7%	70%	70%	$167
China Telecom														
Covad														
Deutsche Telekom														
France Telecom	€ 27,233	€ 24,645	10.5%	€ 27,233	€ 24,645	10.5%	100.0%	100.0%	€ 2,768	€ 2,299	20.4%	90%	90%	€ 2,491
Global Crossing	$3,972	$2,591	18.6%	$4,292	$3,739	14.8%	71.6%	69.3%	-$169	$56	-401.6%	100%	100%	-$169
GTE	*$25,336*	*$23,299*	*8.7%*	*$25,336*	*$23,299*	*8.7%*	*100.0%*	*100.0%*	*$3,412*	*$2,974*	*14.7%*	*70%*	*70%*	*$2,386*
Hellenic Telecommunications														
ICG Communications														
INPSAT Fiber Networks														
Japan Telecom														
Korea Thrunet														
Level 3	$515	$392	31.4%	$515	$392	31.4%	100.0%	100.0%	-$467	-$126	269.5%	100%	100%	-$467
MATAV Hungarian Telecom														
MCI WorldCom	*$33,341*	*$28,683*	*16.2%*	*$33,835*	*$29,126*	*16.2%*	*98.5%*	*98.5%*	*$3,865*	*$1,243*	*210.9%*	*90%*	*90%*	*$3,479*
McLeod USA														
Mediterranean Fiber Network														
...ni Communications														
...n Telegraph & Telephone	JPY 7,746,000	JPY 7,535,000	2.8%	JPY 9,730,000	JPY 9,450,000	3.0%	79.6%	79.7%	JPY 176,576	JPY 823,900	-78.6%	90%	90%	JPY 158,920
...thEast Optic Network														
Orange plc														
Pathnet	$1	$1	94.0%	$1	$1	94.0%	100.0%	100.0%	-$19	-$11	65.1%	100%	100%	-$19
Philippine Long Distance														
Portugal Telecom														
Qwest Communications	*$3,928*	*$2,243*	*75.1%*	*$3,928*	*$2,243*	*75.1%*	*100.0%*	*100.0%*	*$459*	*-$844*	*-154.3%*	*100%*	*100%*	*$459*
RCN														
SBC Communications	*$49,489*	*$46,207*	*7.1%*	*$49,489*	*$46,207*	*7.1%*	*100.0%*	*100.0%*	*$6,573*	*$7,735*	*-15.0%*	*70%*	*70%*	*$4,601*
Sprint FON Group	$17,016	$16,764	7.9%	$17,016	$15,764	7.9%	100.0%	100.0%	$431	$454	-5.1%	90%	90%	$388
Stet Hellas Telecomm														
Swisscom														
TeleDanmark														
Telecom Argentina STET														
Telecom Corp New Zealand														
Telecom Italia														
Telecom de Sao Paolo														
Telefonica SA														
Telefonica de Argentina														
Telefonos de Peru														
Telefonos de Mexico														
US West	$13,182	$12,395	6.3%	$13,182	$12,395	6.3%	100.0%	100.0%	$1,102	$1,506	-26.9%	70%	70%	$771
Williams Communications	$2,041	$1,765	15.6%	$2,041	$1,765	15.6%	100.0%	100.0%	-$316	-$193	64.3%	100%	100%	-$316
Winstar Communications														

Total revenue, selected US companies (million)	*$202,658*
Total revenue, US telecom companies (million)	*$246,892*
Percentage of US telecom revenues	*82.3%*
Average annual net income per	
-Route mile	*$28,564*
-Fiber mile	*$535*

per unit 1998	7 Route miles or Fiber miles 1999	1998	8 Net income per mile 1999	1998	% change	9 Sources
$463	13,500		$42,648			Alltel, 1999 annual report and corporate data, website; Center calculations
$4,712	53,000	41,000	$92,547	$114,915	-19.5%	AT&T, 1999 annual report and corporate data, website; Center calculations
$1,148						BCE, 1999 annual report, website; Center calculations
$2,076	5,100,000	4,500,000	$577	$461	25.0%	Bell Atlantic, 1999 4th quarter report and corporate data, website; Center calculations
$2,351	2,000,000	1,700,000	$1,399	$1,385	-3.2%	Bell South, 1999 annual report and corporate data; Center calculations
$3,115						British Telecom, summary financial statement and business review for year ended March 31, 1999, website; Center calculations
$290						Broadwing, 1999 4th quarter report and corporate data, website; Center calculations
£1,486	265,630		£5,169			Cable & Wireless, profit and loss account and corporate data, year ended 31 March 1999, website; Center calculations
$12,864						Cable & Wireless HKT, profit and loss account and corporate data, year ended 31 March 1999, website; Center calculations
-$4	3,000	800	$74	+$4,426	-101.7%	CapRock, 1999 4th quarter report and corporate data, website; Center calculations
$135						Centurytel, 1999 4th quarter report and corporate data, website; Center calculations
€2,089						France Telecom, 1999 consolidated financial highlights, website; Center calculations
$96						Global Crossing, 1999 4th quarter report and corporate data, website; Center calculations
$2,082	147,387		$16,205			GTE, 1999 annual report and corporate data, website; Center calculations
-$126	8,000		-$60,875			Level 3, 1999 annual report and corporate data, website; Center calculations
$1,319	45,000		$77,300			MCI, 1999 4th quarter report and corporate data, website; Center calculations
						NTT, annual report and corporate data, year ended March 31, 1999, website; Center calculations
-$11	6,800	2,000	-$2,739	-$5,641	-51.5%	Pathnet, 1999 4th quarter report and corporate data, website; Center calculations
-$844	3,400,000		$135			Qwest, 1999 annual report and corporate data; Center calculations
$5,415	5,000,000		$920			SBC, 1999 annual report and corporate data; Center calculations
$409						Sprint, 1999 4th quarter report and corporate data, website; Center calculations
$1,095						US West, 1999 annual report and corporate data; Center calculations
-$193	25,679	18,671	-$12,391	-$10,337	19.9%	Williams, 1999 annual report and corporate data; Center calculations

A. Applying the Enterprise Income-Based Model to the PC-1 Olympic Coast Sanctuary Fiber Optic Project

The Pacific Crossing I route through the Olympic Coast NMS includes about *30* miles for Segment N and about *35* miles for Segment E (based on maps included in Appendix A of the PC-I Environmental Assessment). Using this estimate of 65 route miles, times the Enterprise Income-Based Model per-mile factor of $14,282 per route mile, would yield an attributed income estimate of $928,335 per year. For a 25-year term and assuming a 10 percent discount rate, the present value of attributed income for cable within the Olympic Coast NMS would total $8,426,444 using the route-mile factor

Using the fiber mile factor, the factor of $418 would be multiplied by 520 fiber miles for the Pacific Crossing 1 project (65 route miles times 8 fibers per cable), yielding an estimate of annual attributed income of $217,122. Over the permit period, and using the 10 percent discount rate, the present value of the Pacific Crossing 1 project permit in the Olympic Coast NMS would be $1,970,826 using the fiber-mile factor.

B. Applying the Enterprise Income-Based Model to the Global West and Monterey Bay Sanctuary Project

The Global West route through the Monterey Bay NMS includes about *135* miles for the San Francisco to North Monterey Bay (La Selva Beach) segment and about *100* miles for the South Monterey Bay (Fort Ord) to San Luis Obispo (Estero Bay) segment of the line (based on maps in Appendices A and C to the draft Global West Environmental Impact Report). Multiplying 235 route miles times the Enterprise Income-Based Model factor of $14,282 per route mile, the total attributed income for cable within the Monterey Bay NMS is $3,356,252 per year attributed to the seabed. Over the 25-year permit period and using the 10 percent discount rate, the present value of the Global West project permit in the Monterey Bay NMS would be $30,464,835 using the Enterprise Income-Based Method and the route-mile factor.

Using the fiber-mile method, the factor of $418 would be multiplied by 5,640 fiber miles for the Global West project (235 route miles times 24 fibers per cable). This would equal $2,354,940 per year attributed to the seabed. Over the permit period, using a 10 percent discount rate, the present value of the Global West project permit in the Monterey Bay NMS would be $21,375,885 using the fiber-mile factor.

V. A Comparative Analysis of Other Fiber Optic Rights-Of-Way Transactions

This section presents a consolidated analysis of precedent fiber optic right of way transactions. The purpose of the analysis is to formulate comparative values to those presented in the preceding section (i.e., obtained from the Enterprise Income-Based Model). This is done by deriving a common unit of measure by which the values of various fiber optic rights of way can be compared. The heart of the analysis is revealed in Column 7 in Table V-I which expresses the values of selected fiber optic rights of way in terms of U.S. dollar compensation per mile per year.[3]

[3]Table V-I consolidates fiber optic transaction data derived from right-of-way settlements in which the Center for Applied Research has been directly or indirectly involved.

Table V.I.

TABLE V-1: Table of Precedent Transactions Reflecting Values Derived From Net Income Model
May, 2000
Source: The Center for Applied Research, Inc.

Grantor	Grantee	Date	Location	Use	Length	Compensation/ Mile/Year	Term	Total Monetary Compensation
Hinshaw Class Action	AT & T	1999	Indiana	Fiber Optic	80 miles	$4,930	20 yrs	$3.6 million
Isleta Indian Reservation	Qwest	1997	New Mexico	Fiber Optic	8 miles	$12,073	10 yrs	$1 million
Isleta Indian Reservation	USWest	1999	New Mexico	Fiber Optic	14 miles	$10,222	10 yrs	$700,000
Isleta Indian Reservation	AT & T	1999	New Mexico	Fiber Optic	8 miles	$51,653	10 yrs	$4.7 million
Isleta Indian Reservation	Public Service Company of New Mexico (PNM)	1997	New Mexico	Electric Transmis. Line	8 miles	$41,909	20 yrs	$400,000
San Felipe Indian Reservation	Qwest	1997	New Mexico	Fiber Optic	14 miles	$2,909	25 yrs	$400,000
Santo Domingo Indian Reservation	Qwest	1997	New Mexico	Fiber Optic	15 miles	$2,715	25 yrs	$4
Acoma Indian Reservation	USWest	1998	New Mexico	Fiber Optic	12 miles	$3,101	25 yrs	$300,000
Santa Ana Indian Reservation	Qwest	1997	New Mexico	Fiber Optic	6 miles	$4,242	25 yrs	$250,000
Average:						$10,269		

The average[4] of the various transactions listed in Table V-1 ($10,269 per mile per year) has been applied to the NMS mileage in the two subject permits to obtain values for the two five year permits.[5]

Applying this average of $10,269/mile/year to the Olympic Coast NMS, for example, yields a value of a 25-year permit in the Olympic Coast NMS of $6,058,788 and the value of a 25-year permit in the Monterey Bay NMS of $21,904,849 (at an assumed discount rate of 10 percent). These values compare to the income-based values of $1,970,826-$8,426,444 and $21,375,885-$30,464,835 respectively, for the two NMS permits.

Tables V.II and V.III below, summarize these alternative calculations of permit values, citing the data utilized.

Table V.II. Route Mile and Fiber Mile Permit Values
(Source: The Center for Applied Research, based on 1998, 1999 corporate data.)

Value Basis	PC-1 Olympic Coast NMS	Global West-Monterey Bay NMS
Route Mile	$8,426,444	$30,464,835
Fiber Mile	$1,970,826	$21,375,885
Comparative Transaction Per Mile Factor	$6,058,788	$21,904,849

[4]The average was computed by taking the equivalent payment per year and dividing it by the mileage associated with each transaction.

[5]This valuation does not include amenity values that may be associated with any given NMS. Also, these values do not reflect present value discount factors. See Section IV calculations that incorporate present value discounting for the proposed five-year permit periods.

Table V.III. Route Miles, Fiber Miles, and Net Income by Company
(Source: The Center for Applied Research, based on 1998, 1999 corporate data.)

Company	Corporate Net Income (millions)	Route Miles	Average Net Income Per Mile Per Year
Alltel-1999	$576	13,500	
AT&T-1999	$4,905	53,000	
C&W	$2,390	285,830	
MCI/WC	$3,479	45,000	
Totals	$11,349	397,330	$28,564
Company	**Corporate Net Income (millions)**	**Fiber Miles**	**Average Net Income Per Mile Per Year**
Bell Atlantic-1999	$2,941	5,100,000	
Bell South-1999	$2,678	2,000,000	
GTE	$2,388	147,387	
Qwest Communications	$459	3,400,000	
SBC Communications	$4,601	5,000,000	
Totals	$13,067	15,647,387	$835

METHODOLOGY OF REVENUE-BASED RIGHTS-OF-WAY FEE ESTIMATES IN MARINE SANCTUARIES

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NOTICE

The information contained herein is based on KMI's in-house databases and includes statistical data compiled from interviews and other reports that we deem reliable, but whose completeness cannot be guaranteed. In no instance has any company proprietary or confidential information provided to KMI by any sources been used in the preparation of this report.

This report is not intended as a guide for the purchase of securities or other investments.

1.0 PROJECT OVERVIEW

The National Oceanic and Atmospheric Administration (NOAA) has been tasked with determining what fee or fees it should charge telecommunication carriers who have received permits to install submarine cables in marine sanctuaries. Determining a fair market value for marine sanctuary ROWs (rights of way) is an unusual task. In general, the "wet" portion of undersea installations are not subject to ROW fees. This fact contributes to the economic viability of a technology that is more expensive than terrestrial systems. However, marine sanctuaries are a unique case. The purpose of the NOAA report is not to argue for or against the U.S. government's ability to charge for ROWs in marine sanctuaries, but rather to help determine the fair market value of its ROWs.

One method to determine market value of ROW fees is based on the revenue generated by a particular cable. To facilitate NOAA in determining fair market value of marine sanctuary ROWs, KMI developed a model to determine revenues on transoceanic telecommunications cables. To estimate revenues, KMI took a high-level approach using capacity and average-price data. Revenues were calculated as the amount of available capacity multiplied by an average price per unit of capacity. Revenues were forecast over a five year period.

Because this market is changing rapidly, four scenarios in two different geographic markets, transatlantic and transpacific, were derived. In each of the four different scenarios, the available capacity of the undersea cable is different. These are hypothetical systems based on current technology, but not specific systems. The derived system revenue was based solely on the sale of circuits. While there are a variety of product offerings such as wavelengths and varying circuit sizes, KMI used an STM-1 circuit, 155.5 Mbps, as the standard unit of sale for the model.

1.1 CIRCUIT PRICE FORECAST

Two circuit price forecasts were used, one for the Atlantic and one for the Pacific. In both regions, prices were forecast through the year 2007. In the past three years, the general trend in undersea circuit pricing has been steep decline.

KMI maintains data on circuit prices of fiberoptic undersea cable systems throughout the world. The data come from the following sources:

- FCC 214 (and other) filings
- Interviews with network operator
- Interviews with consortia member
- Interviews with carriers purchasing capacity on the network
- Conference proceedings
- Bandwidth exchanges

Bandwidth exchanges are the least relied upon sources. On bandwidth exchanges, the system on which the capacity is available is generally not reported. Until the purchase proceeds, the terms for the capacity are not well defined, making comparisons difficult.

Often times, restoration is not included in the posted prices. These prices do, however, provide benchmarking information.

1.1.1 Transatlantic Circuit Prices

From 1996 to 1999, transatlantic STM-1 circuit prices have fallen annually by just over 30%. There are several causes for this decline—more available capacity, the introduction of competition, and a perception of even greater competition in the future. In 1997, the Gemini system came into operation. Although the Gemini system was developed by two carriers, MCI and Cable & Wireless, it was not a traditional consortia-owned system. In 1998, Global Crossing cutover the Atlantic Crossing-1 system and competition and the amount of available capacity increased. In 2000, TAT-14, a consortium cable, came online.

While Gemini, AC-1, and TAT-14 brought in competition and 780 Gbps of new capacity, a third factor contributed to circuit price erosion, the announcement of future systems. Project Oxygen, 360atlantic, FLAG Atlantic-1, and Level 3's Yellow system were all slated to be installed into the Atlantic in short order. Although Project Oxygen is no longer planning to build an undersea network, other system developers have announced plans to build transatlantic systems: most notably, the TyCom system. Carriers looking to purchase capacity in the Atlantic now have options, if they can wait for the new systems to become operational. As capacity becomes more abundant, the motivation to purchase capacity in advance of need is lessening. And, even though the numbers of competitors currently offering capacity is small, there are now multiple companies with sales departments vying for the carriers' future business.

These factors suggest that prices will continue their downward trend. To forecast STM-1 circuit prices through the year 2005, KMI looked at several factors—historical trends, advances in transmission technologies and the number of competing operators along similar routes. With these factors in consideration, KMI forecasts an average STM-1 circuit in the Atlantic will cost $74,000 in 2005. This represents a compound annual growth rate (CAGR) of -48% from 2000.

1.1.2 Transpacific Circuit Prices

Like the Atlantic, the Pacific is seeing dramatic circuit price erosion as well. Unlike the Atlantic, the price erosion is greater and following a less smooth path. Because of the shear size of the Pacific, systems are more challenging to design and more costly to build. Despite these factors, the Pacific will soon have more competition than the Atlantic.

In the past, the transpacific fiberoptic undersea cable market was considered to be about two years behind the transatlantic market. The Atlantic was seen as more stable and mature. Now, with four new systems online or coming online by the end of this year—Pacific Crossing-1, Japan-US, China-US, and Southern Cross—the Pacific is on its way to eclipsing the Atlantic. To further this trend, there are four additional transpacific systems announced—FLAG Pacific-1, 360pacific, TyCom, and Golden Thread.

Looking historically at pricing in the Pacific is difficult because TPC-5 was the last system installed before the four mentioned above. TPC-5 is a consortium cable and came online in 1995. Although historical pricing is difficult to gauge, there are multiple data points for current pricing. Based on pricing data from Pacific Crossing-1, Japan-US, and China-US, the average price for a transpacific STM-1 is approximately $5 million. Southern Cross was omitted from this average, as the routing is different. The cost of an STM-1 on the Southern Cross Cable Network starts at $12.9 million. Discounts for larger purchases are given.

KMI forecasts an average transpacific STM-1 circuit will cost $274,000 in 2005. This is a CAGR of –44% from 2000.

1.2 UNIT SALES PROJECTION

To derive revenue, KMI applied the circuit prices to four different sales forecasts. The four scenarios are based on differing potential capacities of fiberoptic undersea cables. The capacities used are based on announced technologies by various vendors including TyCom and Alcatel.

In the higher capacity systems, KMI assumed that the potential capacity was not sold completely. Dense Wave Division Multiplexing (DWDM) is the current transmission technology being deployed on fiberoptic undersea cables. DWDM technology allows multiple waves of light to travel down a fiber strand. The number of potential wavelengths has been increasing, as has the transmission speed along these wavelengths. Additionally, the number of fibers in each cable is increasing. These factors (and other technological advances) are allowing the potential capacity of an undersea cable to grow significantly. For example, in 1998 the maximum capacity a transoceanic cable could achieve was 80 Gigabits per second (Gbps). By yearend 2002, a 5.12 Terabits per second (Tbps) cable system is slated to be installed. Therefore, the 2002 cable will have 64 times the potential capacity that the 1998 cable has. Given that the costs for installing a 5.12 Tbps cable are less than 64 times an 80 Gbps cable, the higher capacity cable will be able to achieve higher margins or sell circuits at a lower cost per bit.

It should be noted, however, that 5.12 Tbps is the potential capacity of a cable system. The initial capacity will, in all likelihood, be much less than that amount. DWDM technology allows the system operator to incrementally increase the amount of capacity on the cable system up to its maximum by adding opto-electronic equipment at the shore-ends. A system owner, therefore, can add capacity as needed and reduce the upfront costs.

Because technology is increasing the bandwidth potentials on undersea cable systems rapidly, installing a new system could be less expensive, in terms of cost per bit, than paying to upgrade an older system. With this possibility in mind, KMI forecast that the systems with 1.92 Tbps and greater potential capacity will not sell 100% of their potential capacity. This is not to imply that demand for bandwidth will fall off in the next few

years, but rather that lowest cost capacity will be most desirable and the newer systems will meet the demand. Therefore, 60% of the capacity is assumed to be sold.

1.2.1 Pre-sales

Undersea cables were first installed 150 years ago. The first transoceanic fiberoptic undersea cable was installed in 1988. Since 1988, the market has changed dramatically. Undersea cables used to be installed exclusively by consortia of telecom carriers. This model worked well when each country had but one long-distance and international telecommunications operator. The monopoly operator would join the consortia, control the landing station in its country and get half circuits to other countries. The market was not open to competition and all the capacity of a system would be allocated in the planning phase. Today, factors such as deregulation, privatization, an influx of investments and staggering bandwidth demand have altered the telecommunications undersea market.

Non-consortium owned cables have been installed all over the world and more are planned. In this new market, the manner in which capacity is sold is changing. When consortiums controlled the market, a new entrant would have to purchase capacity through a consortia member or wait for the next consortia to be formed and join as a member. Carriers would have months, even years, to plan their capacity needs. Today, a spot market is emerging and the need to buy capacity in advanced is diminishing. Because more capacity is becoming available, carriers can purchase capacity as needed. Carriers still make some advance purchases, as system operators generally offer incentives for such purchases, but not as much as they used to. To reflect this trend, KMI decreased the amount of capacity that was purchased in advance for the newer cables.

1.3 PER MILE DERIVATION

Once the revenues of the four different cable systems were forecast, KMI derived an estimate for revenue per mile. Two system lengths were used, one for the Atlantic systems, 14,000 km, and one for the Pacific, 20,000 km. Kilometers were converted to miles and a revenue per mile forecast was created.

1.4 ROW ASSIGNMENT

The final step was to assign a percentage of the revenue per mile to the ROW valuation. KMI used 50% of the revenue per mile figure based on terrestrial ROW valuations cited to KMI by NOAA.

1.5 MODEL RESULTS

The resulting valuation of the sanctuaries on a per mile basis varies significantly for the Atlantic versus the Pacific. This is a direct result of higher circuit prices in the Pacific. For transatlantic systems, the ROW valuation average was $43,700 per mile. The systems installed in 2000 had a resulting valuation much higher than the 2001 and 2002

installed systems—$76,900 per mile and $67,400 per mile vs. $17,900 per mile and $12,800 per mile.

For transpacific systems, the ROW valuation average was $141,700 per mile. As was the case in the Atlantic, the systems installed in 2000 had a resulting valuation much higher than the 2001 and 2002 installed systems—$214,600 per mile and $167,200 per mile vs. $91,300 per mile and $93,900 per mile.

The table below shows a summary of the results for the four hypothetical systems in both the Atlantic and the Pacific.

Atlantic: Four Scenarios				
Hypothetical System	**Revenue (less cost) in Year 5**	**Revenue / Mile**	**50% of Revenue/mile**	
640 Gbps Atlantic Ring System: 2000	$3,465,620	$153,850	$76,925	
1.92 Tbps Atlantic Ring System: 2000	$3,036,422	$134,796	$67,398	
2.56 Tbps Atlantic Ring System: 2001	$806,703	$35,812	$17,906	
5.12 Tbps Atlantic Ring System: 2002	$574,975	$25,525	$12,762	
			Atlantic Average	$43,748
Pacific: Four Scenarios				
Hypothetical System	**Revenue (less cost) in Year 5**	**Revenue / Mile**	**50% of Revenue/mile**	
640 Gbps Pacific Ring System: 2000	$13,810,080	$429,151	$214,576	
1.92 Tbps Pacific Ring System: 2000	$10,759,049	$334,340	$167,170	
2.56 Tbps Pacific Ring System: 2001	$5,873,406	$182,517	$91,259	
5.12 Tbps Pacific Ring System: 2002	$6,045,168	$187,855	$93,927	
			Pacific Average	$141,733

THE CENTER FOR APPLIED RESEARCH, INC.

July 2, 2001

Mr. David Chapman
Senior Economist
National Oceanic & Atmospheric Administration
1305 East-West Highway, Suite 10218
Silver Spring, MD 20912

Dear Mr. Chapman:

In the spring of 2000, the Center for Applied Research completed for NOAA the report "Establishing the Value of Permits for Fiber Optic Installations in National Marine Sanctuaries," relying on financial and operational data on fiber optic and telecommunications businesses for the years 1998 and 1999. Since that report was completed, U.S. businesses in general--and the fiber optics and telecommunications sectors in particular--have experienced significantly lower earnings than in 1999. In light of these circumstances, you have asked whether the Center would modify the findings in our 2000 report. In a word, our conclusion is that we would not.

The Center's Enterprise Income-Based Approach to fiber optic right-of-way valuation is based on the premise that companies seeking to install fiber optic lines do so in the expectation of long-term profitability well above the depressed rates encountered in 2000. If a company seeks to install a fiber optic line in a National Marine Sanctuary, we conclude that it expects that profitability on that line will equal or exceed the high rates experienced in 1998 and 1999, not the much lower rates of 2000 and early 2001. In general, companies make capital investment decisions on the basis of comparative profitability of the asset vis a vis all other potential investments. If a company concludes that submarine fiber optic cables will contribute to overall profitability at or above average rates, it will invest in those cables; if it concludes otherwise, it will not. A landowner would be wise to base valuation decisions on the bullishness of the long-term future, not the bearishness of the recent past.

Also, the general downturn in telecom profitability is not uniform, but varies significantly from company to company and, within a company, among its business components. It appears from a preliminary analysis of current industry conditions that telecom companies' submarine assets retain a higher profitability than their land-based long-haul fiber lines.

Finally, conventional wisdom manifested through the financial press is that the current downturn in telecom profitability is cyclical, and will likely rebound in future periods. Among the reasons for a recovery in long-haul fiber optic operations is the prospect for accelerated (and perhaps explosive) growth in demand when end users (business and residential) improve their access to high-speed and capacity-intensive telecom uses. If, for example, fiber to the home becomes a cost-effective reality, the demand for capacity in all components of the fiber infrastructure (including both land-based and submarine long-haul networks) will almost certainly expand significantly. This future scenario is among the expectations of profitability that might motivate an applicant for a submarine fiber optic permit.

For these reasons, the Center for Applied Research continues to believe that the calculations of value in our May 2000 report remain useful for consideration by the National Marine Sanctuaries Program. As we noted in our work effort for NOAA, we believe that the process of estimating value must be continuously monitored and the values calculated for NMS permits will be modified from time to time as long-term conditions warrant. However, we continue to believe that values for prospective permits should be based as closely as possible on the profitability expectations of applicants, and not on periodic market aberrations or cyclical (and short-term) downturns in the overall economy.

Sincerely,

Robert F. Robinson
Senior Economist

cc: Eric English

PRELIMINARY STATEMENT

The lower court failed to properly determine the amount of just compensation due to Claimant-Respondent-Cross Appellant New York Central Lines, Inc. ("CSX").

Having found that the highest and best use of the Subject Property was as a rail corridor and that the Comparable Sales method was the correct means by which to value it, the lower court then erred in applying the proper methodology. It used one component of value, the ATF value (a/k/a land value), but disregarded the second component, the Corridor Factor. In doing so, not only did the lower court disregard a key component of value, but it disregarded the marketplace, as the marketplace values corridors with the use of a Corridor Factor.

The Reply Brief of the Defendant-Appellant-Cross Respondent State of New York ("State") fails to persuasively argue to the contrary. First, the State mischaracterized the nature of the property taken, repeatedly claiming that "no rail corridor was taken here." But in point of fact, the State's appropriation took title to the actual rail corridor, including the tracks, ballast, sub-ballast and the like. Indeed, all parties were in agreement at trial that the highest and best use of the property was for "continued use as a railroad corridor." Accordingly, the State's arguments based on

this false factual premise must fail.

The State's critique of CSX's comparable corridor sales is equally lacking, failing to cite to evidence from any witness, expert appraiser, treatise or other document supporting its claims. Its argument is no more than empty assertions. Furthermore, the evidence at trial conclusively showed that CSX's comparable sales were carefully chosen, reasonably adjusted, and deserving of the highest weight.

In light of the above, the lower court's decision should be reversed and the Subject Parcels should be valued using a Corridor Factor of 2.5.

ARGUMENT

I. CSX Is Entitled to Direct Damages for the Railroad Corridor That Was Appropriated

The State's Reply Brief mischaracterized the property that was appropriated, repeatedly claiming that "no rail corridor was taken here."[1] It is unclear whether the State actually believes that to be true or if it was mere literary license meant to illustrate some larger point. Regardless however, as the assertion is patently incorrect the arguments on which it is based must fail.

First and foremost, the State did, in fact, take title to the rail corridor of CSX, including portions of the track, ballast, sub-ballast and the like. Many of the parcels taken literally go right through the center of CSX's former rail line.[2] Had no remedial measures been taken, CSX's rail line would have been severed. Consequently, both CSX and the State agreed that the highest and best use of the Subject Property prior to the State's appropriation was as a railroad corridor.[3] The lower court came to the same conclusion.[4]

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[1] Reply Brief for the State of New York at pp. 2, 8, 14
[2] R. 1408-1409, 1453, 1459, 1465, 1471, 1483, 1489, 1495, 1501, 1504, 1510, 1513
[3] R. 232-234, 1531-1534, 2553-2554, 2811

In light of the above, it remains a mystery how the State can plausibly claim that "no rail corridor was taken here" when even the State's own appraiser agreed that "the highest and best use of the subject property, as improved, before the taking, is for continued use as a railroad corridor."[5]

The State's mischaracterization of the Subject Property as "not a railroad corridor" appears linked to its argument that the application of a Corridor Factor constitutes a "premium" that gives CSX a "higher value" above and beyond the mere value of the land.[6] However, the application of the Corridor Factor is not a "premium," to be awarded like bonus money for special owners. The Subject Property is a rail corridor and the Corridor Valuation method is the well established means by which to determine the value of a corridor,[7] the industry standard, and what is used by buyers and sellers in order to determine price.[8] The validity of this methodology is also attested to by numerous real estate appraisal articles, including ones cited to by the State.[9]

In making this argument the State misperceives its own case. Not only is the

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[4] R. 8
[5] R. 2554
[6] State's Brief in Opposition, at p. 8-9
[7] R. 1428-1429
[8] R. 244, 247

application of the Corridor Factor *not* a premium, it results in a significantly lower value than the Cost Approach advocated by the State.

Under the Cost Approach, there would be certain costs associated with assembling all of the property. For example: the properties must be surveyed, the properties must be appraised, there are costs involved in the purchase of real estate, people must be hired to negotiate the sales, there may be legal fees and court costs, damages may be owed to the former owners including for the land, any improvements and severance damages, relocation assistance may need to be provided, environmental impact and mitigation will need to be studied and ultimately, properties may need to be condemned.[10] Similar to a Corridor Factor, the cost of assemblage is accounted for by applying a multiplier called the Assemblage Factor.

According to CSX's appraiser, state Department of Transportation studies from across the country have shown that when constructing a corridor, the Assemblage Factor is 4x to 10x the ATF value.[11] For example, Mr. Rex testified that he did a study of a sixty to seventy mile pipeline in California where the Assemblage Factor was 9.6x

[9] R. 1194, 1655, 1669, 1967, 2005, 2029-2038, 3409
[10] R. 302-303, 684-685, 2043-2044
[11] R. 245

the ATF value.[12]

The State, while agreeing in principle that an Assemblage Factor was appropriate, declined to calculate it for various, contradictory reasons.[13] Said the State in its appraisal report:

> *Overall, the subject property meets [the criteria for an assemblage factor]...especially as a transportation corridor in the before and after.* The assemblage factor reflects the increment in value of the assembled corridor entity, over and above its total across the fence value, and accounts for its special purpose utility and characteristics as a transportation corridor. In order to estimate the assemblage

[12] *Id.*

[13] The State proffered three contradictory excuses,

> (1) According to the State, an assemblage factor was not used was simply because it would be the same "before" and "after." (R. 1083-1084, 2586-2587, 2848) However, this explanation is a clearly incorrect. If one were to assume that the ATF value of the condemned land was $100,000 "before" and $100,000 "after", with an assemblage factor of 1, the damages would be $100,000, and with an assemblage factor of 3, the damages would be $300,000. The State's appraiser later disavowed this rationale at trial claiming that the statements in his report were "worded poorly" and that "english [was] never his strongest language." (R. 1083-1087)
>
> (2) The State contended in order to properly use an assemblage factor, there must be an economic incentive to build the corridor and that there was no such economic incentive in the underlying matter. (R. 922-925, 984, 1073) Yet, the State presented no proof that the corridor was financially infeasible. Moreover, in both the State's report and at trial it contended that the highest and best, and financially feasible, use of the property was as a rail corridor. (R. 1076, 2552, 2811) Indeed, the State's appraiser stated that "for the purposes of this analysis, we have assumed the operation of the railroad is profitable." (R. 910, 1078, 2812-2813, 2553-2554, 2586)
>
> (3) The State claimed that an assemblage factor was not necessary because the corridor was already assembled. (R.1081-1082) This is illogical. If the State is using the Cost Approach, it must account for the fact that there is a cost to assemble the corridor.

> factor applicable to the subject corridor, we have reviewed a number of sales of corridors...comparing the price paid to the "across the fence" value of the corridor land. *Although the subject's location and other attributes may justify an assemblage factor, the adjustment would be the same in the "before and after" scenario. Therefore, no assemblage factor was applied.*[14]

Obviously, the State's rationale for declining to use an Assemblage Factor is mathematically incorrect. For example, with an Assemblage Factor of 1 and an ATF value of $100,000, the damages would be $100,000; and with an Assemblage Factor of 3, the damages would be $300,000. Not surprisingly, the State's appraiser admitted at trial that the above rationale was incorrect.[15]

Taking this point to its conclusion, were the Cost Approach to be used, the ATF value of the Subject Property must be multiplied by an Assemblage Factor of between 4 and 10, as the only evidence of an Assemblage Factor was proffered by CSX. As set forth by the Second Department in *Gyrodyne*, "having rejected the State's appraisal, the trial court was bound to either accept the claimant's appraisal or explain the basis for any departure."[16]

In this context, CSX's Corridor Factor of 2.5 was not a "premium," but a well-

[14] R. 2586-2587 (emphasis added)
[15] R. 1083-1087

supported determination that actually yields a lower value than the application of the Cost Approach promoted by the State. Indeed, in the article cited by the State in its Brief at page 8, "ATF Appraisal in Eminent Domain Cases," the Cost Approach is characterized as "the upper limit of value for corridor transactions,"[17] in no small part due to the cost of assemblage.[18]

In claiming that "no rail corridor was taken here" perhaps the State was also confused by the fact that CSX's rail line had to be relocated and rebuilt as a result of the appropriation. Such was done and paid for by the State because had it not done so, the State would have been responsible for that cost in any event as part of the "Cost to Cure."[19]

Yet the rebuilding of the rail line elsewhere does nothing to change the nature of what was taken in the first place. As of the date of title vesting, the Subject Property held a working freight rail line and that is what must be valued here. As is well established, the direct damages to CSX are based upon those property rights that were lost, not the fact that some property rights may remain.[20] Or to put it another way,

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[16] *Gyrodyne v. State*, 89 AD3d 988, 989 (2d Dept 2011), citing cases
[17] R. 2044
[18] R. 2043-2044
[19] R. 118, 121-122, 126, 148-149
[20] *Boston Chamber of Commerce*, 217 US 189, 195 (1910)

simply because CSX suffered no consequential damages, does not mean that the State can value the Subject Property as something other than the railroad corridor that it was as of the date of title vesting. Moreover, all of the property within the railroad corridor is valued as the same, irrespective of whether it is the property directly underneath the railroad tracks or the property adjacent to the railroad tracks.[21] Using the analogy set forth in CSX's original brief, in valuing a residential home, the land underneath the house is the same price as the land in the backyard and the same price as the land underneath the driveway. For railroad corridors it is no different. At trial, the State was in agreement.[22]

Equally unavailing is the State's citation to an article entitled "ATF Appraisal in Eminent Domain Cases."[23] According to the State, it stands for the proposition that the Corridor Valuation method doesn't apply if the taking does not affect railway operations.[24] Yet a review of the article shows that the five word snippet referenced by the State only pertains to instances where the condemnation was a transverse taking for

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[21] R. 507-511

[22] R. 948 (when asked whether the property's value was "dependent on whether or not the track is actually located on them? Or is it their presence within the corridor?" the State's appraiser responded, "It is their presence within the corridor. I had a railroad corridor, that is what we valued before and that is what we valued after. And, basically, there has been no change in the functional utility of that corridor in the before and after"), R. 1172-1173 (same), R. 2844-2845 (the State's appraiser valued the property within the corridor based on the adjacent land use and did not differentiate as to whether any particular parcel or portion thereof contained the tracks, ballast, etc.)

[23] State's Brief in Opposition, at p. 8

a street crossing over the railway.[25] That is not the case here where the State appropriated the tracks, ballast, etc., leaving CSX's rail line severed and inoperable absent remedial measures.

Importantly, the article also states that "if, in the appraiser's opinion, the highest and best use of the site is for continued corridor use, then the ATF methodology [ATF value x an "enhancement factor" a/k/a corridor factor] is the correct method to be used."[26]

Coincidently enough, here the State's appraiser concurred that the highest and best use was for "continued use as a railroad corridor."[27]

The article relied on by the State goes on:

> The ATF methodology for corridor evaluation has a long history, stretching back more than 80 years. Established by the ICC [Interstate Commerce Commission] as a means of making railroads account for their land holdings, ATF has been promulgated by some of this country's most respected appraisers, it has been upheld in court, and is the predominant method used by both buyers and sellers in completing corridor transactions.[28]

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[24] State's Brief in Opposition, at p. 8
[25] R. 2044-2045
[26] R. 2041
[27] R. 2554, 2811
[28] R. 2045

In light of the above, it was error for the lower court to depart from the Corridor Valuation methodology. It is the industry standard with which to value a corridor,[29] the methodology relied on by buyers and sellers in the marketplace[30] and is supported by numerous treatises.[31] Having properly determined that the highest and best use of the Subject Property was as a rail corridor[32] and that the comparable sales methodology was the proper valuation technique,[33] it was error for the lower court to then disregard a key component of value within the Corridor Valuation methodology.

Accordingly, the lower court's decision should be reversed and the Subject Property should be valued using a Corridor Factor of 2.5.

[29] R. 1428-1429
[30] R. 244, 247
[31] R. 1194, 1655, 1669, 3409
[32] R. 8
[33] R. 10

II. CSX's Corridor Sales Were Comparable and Properly Adjusted

The State also claimed that CSX's corridor sales were not comparable. Notably however, the lower court made no such finding.[34] The State's argument, therefore, represents an invitation for the Appellate Division to independently assess the weight and credibility of all of the evidence, documents, appraisal reports, rebuttal reports and testimony presented and to come to a de novo conclusion about the expert evidence. This Court should not take the bait.

More importantly, the State's contentions are entirely unsupported. Its critiques are tantamount to a shotgun approach alleging that the corridor sales are not comparable because not all were secondary lines, because the comparable sales were of different length than the Subject rail corridor, and because the adjustments made by CSX's appraiser were allegedly improper. And yet conspicuously absent from the State's Brief are citations to the testimony of any witness or expert appraiser, or any treatises, articles or other documents endorsing the interpretations of the evidence made by the State's appellate counsel. In fact, the State has pointed to nothing to prove that the methodology or implementation of that methodology relied upon by CSX was incorrect. It is all bluster, no backing. Anyone can claim that a corridor sale is

unreliable. But simply making the claim with no underlying support or proof to the contrary is an exercise in futility.

Similarly, the State's claim that the corridor sales were not comparable because they were not located near the Subject Property reflects a lack of understanding as to how a Corridor Valuation works. The purpose of the comparable corridor sales is simply to quantify the importance of the corridor.[35] Whether the corridor is located in New York or Des Moines the Corridor Factor reflects, for example, that a frequently used passenger line is more valuable than a rarely used industrial line. Location has nothing to do with it. Rather, the value of the location itself is reflected by the ATF value.[36]

In stark contrast to the State's Reply Brief, there is ample evidence in the Record to support the fact that CSX's corridor sales were conscientiously chosen and reasonably and fairly adjusted.

CSX's appraiser, Charles Rex, has been a real estate appraiser for 35 years[37] and

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[34] generally, R. 7-20
[35] R. 153, 230, 1419
[36] R. 153, 243, 463, 1419
[37] R. 150

spent the last 15+ years specializing in the valuation of corridors.[38] In that time, he has valued approximately 100 corridors,[39] primarily rail corridors, but also utility corridors and "rails-to-trails" corridors.[40] He has studied the corridor market extensively and attempted to obtain and analyze every corridor sale across the country that he could find.[41] In fact, the State's appraiser noted at trial that many appraisers get their information regarding corridors from Mr. Rex.[42] Mr. Rex is even one of the authors of the definition of a "corridor" in the Dictionary of Real Estate Appraisal.[43] Throughout his career, Mr. Rex has been retained by a multitude of railroads including the CSX, Union Pacific Railroad, Norfolk Southern Railroad, Canadian Pacific Railroad, NYS&W Railroad, Central Oregon Railroad, Arizona Pacific Railroad and Florida East Coast Railroad.[44]

CSX's fourteen comparable sales were more than sufficient to determine the applicable corridor factor and culled from the approximately 100 corridor sales in Mr. Rex's files.[45] For each sale, Mr. Rex confirmed the information with the buyer and/or

[38] R. 152
[39] R. 153
[40] R. 152
[41] R. 155
[42] R. 1139
[43] R. 362
[44] R. 155-156
[45] R. 250

seller, including that the sale was an arms-length transaction.[46] He also confirmed what "in-kind consideration" may have been a part of the sale,[47] the ATF value that was used by the parties to that particular transaction,[48] and the Corridor Factor relied upon by the parties to the transaction (further evidence that the market determines the price of a corridor using a Corridor Factor).[49]

His adjustments to these comparable corridor sales were discussed at great length at trial and in Mr. Rex's report.[50] He made measured adjustments based on the corridor's type, whether the buyer purchased an entire corridor or just a portion thereof, and the corridor's length.[51]

Also impacting the Corridor Factor were the particular characteristics of the Subject rail corridor. Namely, that the Fremont Secondary Line is the only direct freight rail link between Long Island, Brooklyn and Queens and the rest of the mainland[52] and that the only other way to get a freight car back and forth is to float it

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[46] R. 249, 258, 1213-1214, 1593 *et seq.*
[47] *Id.*
[48] R. 245, 1593 *et seq.*
[49] R. 1593 *et seq*
[50] R. 264-275, 288-307, 1543-1550
[51] R. 269-275, 1543-1549
[52] R. 163, 216, 230, 1423-1424

on a barge from New Jersey to Brooklyn.[53] Furthermore, since CSX's acquisition of the Subject Property from Conrail in 1999,[54] freight traffic has almost doubled.[55] As of the dates of title vesting, the corridor was used by CSX, Canadian Pacific Railroad and Providence & Worcester Railroad. CSX operated five trains per week, each consisting of approximately 100 cars.[56] Canadian Pacific and Providence & Worchester each used the line approximately three times per week, for a total of an additional 50 cars each way.[57] As of the dates of title vesting, it was anticipated that freight traffic along Fremont Secondary would further increase over time.[58]

With the above in mind, Mr. Rex determined that the corridor sales that were most comparable to the Subject Property were his Sales 7, 13, 102 and 7199.[59] These four sales represented those most similar in importance to the Subject Property.[60] Corridor Sale 7199 closed a mere 6 months prior to the date of title vesting.[61] Sale 013 was in a dense urban area, as was the Subject. Moreover, although this sale was for a mainline track, its importance as such was somewhat lessened by the availability of

[53] R. 1423-1424
[54] R. 1424
[55] R. 1428
[56] R. 217, 1425
[57] R. 218, 1425
[58] R. 230, 1424-1426
[59] R. 304-307, 1549-1550
[60] R. 304-307, 1549-1550
[61] R. 304-307, 1543, 1549-1550

alternate routes, increasing its similarity to the Subject Property.[62] Sale 102 was an industrial line, also in a dense urban area.[63] Corridor Sale 7 was a mainline sale with freight traffic similar to the Subject's.[64]

In light of the above, CSX's determination that the applicable Corridor Factor was 2.5 was reasonable, well supported and substantiated by the Record.[65] The same cannot be said of the State's unfounded critiques.

Accordingly, the lower court's decision should be reversed and the Subject Property should be valued applying a Corridor Factor of 2.5.

[62] R. 304-307, 1549-1550
[63] R. 304-307, 1549-1550
[64] R. 304-307, 1549-1550
[65] R. 305, 1550

CONCLUSION

For all of the reasons set forth above and within CSX's Brief dated February 16, 2012, the lower court's decision should be reversed, the Subject Parcels should be valued using a Corridor Factor of 2.5, and Parcels 130-A, 193-F, 194-J and 195-H should be valued at $724,470. Furthermore, the State's appeal should be dismissed in its entirety, with costs, together with such other and further relief as may be appropriate.

Dated: New York, New York
April 9, 2012

Respectfully Submitted,

By: _____

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Principle Valuation LLC
A Member of Prism Healthcare Partners

Establishing Fair Market Value for Rent

By Thomas J. Griffith, MAI, ASA

Recently, we discussed establishing fair market value for physician compensation. But physician compensation is not the only item requiring establishment of fair market value. Hospital-owned entities require any real estate lease to be at fair market value when it involves a referral source: in other words, rent that reflects fair market value.

The market value (synonymous with fair market value) is the most probable price which a property should bring in a competitive and open market. Fair market value assumes the following:

- The buyers and seller are typically motivated
- Both parties are well informed or well advised, and acting in what they consider their best interests
- A reasonable time is allowed for exposure in the open market
- Payment is made in terms of cash in United Stated dollars or in terms of financial arrangement comparable thereto
- The price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale

Fair market rent is the rent a typical market participant would pay based on market metrics. This can be calculated multiple ways:

- Cost approach, which estimates rent by determining the annual return to the land based on its fair market value plus the annual return on the depreciated replacement cost of the improvements (building and site) over the remaining life of those improvements. This can also include furniture, fixtures and equipment if included in the lease. Expense structure also needs to be considered.
- Market approach, which estimates rent based on what other comparable properties in the market have rented for.
- Income approach, which estimates the rent based on the income that can be produced by the space and what other similar tenants have paid in rent for similar space, typically based on a percentage of net operating income.

These three approaches (or less depending on relevance) would then be reconciled to determine the fair market rent for the leased space.

When having a fair market rent analysis performed for your entity, make sure the following steps are included:

- Discussions with senior management and advisors about the prospective business operation and markets served
- An analysis of local demographic trends
- A review of local and national healthcare trends and transactions
- Conversations with commercial real estate brokers to better understand the local market and confirm land sales

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REPORT

To The

VERMONT AGENCY OF TRANSPORTATION

RIGHT-OF-WAY SECTION

An

APPRAISAL and RECOMMENDATIONS

Regarding

FAIR MARKET VALUE RATES

For

FIBER OPTIC FACILITIES

Located in

LONGITUDINAL AND LATERAL

PROPERTIES AND RIGHTS-OF-WAY

Owned and Operated by

Vermont Agency of Transportation

Prepared by

KINGSTON COLE & ASSOCIATES

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TABLE OF CONTENTS

I. INTRODUCTION

Kingston Cole & Associates ("KC&A") was tasked by the Vermont Agency of Transportation's ("VTrans") Project Right-of-Way Section ("PROWS") to develop a report and appraisal regarding the fair market value ("FMV") of specified commercial fiber optic occupancies in VTrans' longitudinal and transverse crossing rights-of-way ("ROW"). To develop our FMV rate recommendations and others findings required a scope of work ("SOW"), discussed in more detail below.

A. Scope of Work

For this report, KC&A reviewed spreadsheets, documents, maps and schematics provided by PROWS staff and other VTrans personnel. We also conducted follow-up telephone interviews with other VTrans and State of Vermont personnel, as needed.

Completion of the SOW comprised the following steps:

- Research of cotemporary descriptions and capacities of fiber optic conduit
- Research of existing VTrans policies (e.g., Uniform Accommodation Plan ["UAP"] for telecommunications occupancies in various VTrans ROW
- Research of existing VTrans-specified ROW for appraisal purposes, including:
    - Limited Access Highways (both Full and Partial)
    - VTrans-owned railroads
        - Fremont Railroad
        - Vermont Railroad
        - Washington Railroad
    - The ROW to be occupied by the TDI 1000 MW electrical cable
- Research and development of contract forms for both standard longitudinal fiber optic occupancies in conduit and dark fiber[1] occupancies.
- Conducting a survey of other government agencies with dedicated ROW to develop comparable rates, one-time fees, cost of living adjustments ("COLA") and in kind considerations for the VTrans-specified ROW
- Contacting national and State-owned and operated utilities (fiber optic construction companies, Vermont-specific telephone companies, cable television ("CATV") providers, electric cooperatives, etc.) to determine interest in developing the specified ROW
- Development of a FMV rate structure/schedule with necessary differentiation for locations or zones, e.g., urban, suburban, rural
- Preparation of various iterations of a written report, culminating in a final report

[1] [1] Dark (unlit) fiber is unused fiber through which no light is transmitted; in other words, an installed fiber optic strand (in a cable) that does not carrying a signal. Dark fiber is licensed or leased by a provider without the accompanying transmission service, i.e., an electronic switch or related equipment to "light up" the fiber/cable. Customers are responsible for providing and maintaining the electronic equipment/switches to "light-up" these fiber strands. A basic business model is to provide dark fiber connectivity to users/customers that require large amounts of bandwidth to operate their businesses.

As part of the analysis, KC&A analyzed fee structures for telecommunications and other types of fiber optic occupancies imposed by eight different government agencies. They were:

- Massachusetts Department of Transportation ("Mass DOT")
- North Carolina Department of Transportation ("NCDOT")
- New York Metropolitan Transportation Authority ("NYMTA")
- New York State Transportation Authority "NYSTA")
- Bay Area Rapid Transportation Authority ("BART")
- Tri County Metropolitan Transportation Authority ("TriMet," Portland, OR)
- Sacramento Regional Transportation Authority ("SacRT")
- Burbank Water and Power ("BWP") (dark fiber rates only)
- Silicon Valley Power ("SVP")(dark fiber rates only)

The result of these efforts and tasks is an analysis and set of recommendations (See section III, below) for reasonable and fair recurring rates for VTrans' various ROW. Lastly, we have recommended various general contract terms and conditions, as well as well in kind services that reflect the realities of the competitive Vermont marketplace—and the fair market value due and owing to VTrans in that marketplace. Form contracts for both standard longitudinal occupancies and dark fiber licensing are also included as Attachments 1 and 2.

B. Current Telecommunications Industry Demand

1. National Build-Outs to Cellular Networks

The telecommunications industry is now more concentrated than ever. Companies such as Verizon and AT&T are heavily invested in both their wireline (landline phones, fiber optic and copper networks, etc.) and their wireless (cell phones, towers, etc.) market segments. These two components are also increasingly interdependent.

The massive fiber optic network build outs of the 1990's are a thing of the past. Now, with the advent of smart phones and requirements for high-speed connections to the Internet, fiber optic networks are being built out to support wireless systems. Specifically, all of the major carriers are expending billions of capital investment to provide fiber optic connections to their cell towers and other wireless network equipment.

2. Fiber to the Home/Premises and other Construction

AT&T, Verizon and some of the CATV providers have been touting their fiber to the home ("FTTH") and fiber to business premise ("FTTP") networks. Google is also extending large broadband (1 Gigabit) to homes in select cities (Kansas City, Missouri, Charlotte, North Carolina, etc.). The more common practice for AT&T, Verizon and the cable television companies that compete in the residential markets is to push their fiber ever closer to retail customers; i.e., fiber is being built out to central nodes that then connect to homes and businesses. The rule of thumb is: The fewer the customers

connected to a node, the faster the speeds (more bandwidth) that can be offered to those customers.

These commercial carrier/CATV provider construction build-out efforts generally rely on already existing longitudinal fiber optic networks. They are extensions, i.e., laterals, from these larger, more robust longitudinal networks. (Google is the exception: building out its own residential fiber networks.). Most of these networks were developed with spare capacity, i.e., additional dark fiber strands that can be activated or "lit" as demand increases. Comcast is the leading CATV carrier in Vermont. It is keeping pace with its national fiber build out plans; albeit with limits imposed by Vermont's small population.

This does not mean however, that these companies, as well as local providers (e.g., Vermont Telephone, VTel, etc.) do not want to modernize their networks, increase security and bandwidth capacity and otherwise take advantage of ROW opportunities that become available. With the exception of Velco (because of its particular relationship with the State and the TDI dark fiber), we did not interview smaller Vermont-based telcos and CATV companies.

As discussed further below, the demand for more bandwidth, whether delivered to a cell phone, home or business is nevertheless increasing—in Vermont and all other parts of the country.

3. Ultra High Speed Proprietary Networks

The only other major longitudinal fiber optic network construction demand is for very high speed, low latency (no degradation of data speeds signaling strength) networks that interconnect large investments firms, particularly hedge funds, with the various markets. Since these firms make almost instantaneous transactions and demand complete security, they are now paying for their own networks—building out to all the major investment centers, including New York City, Boston, Chicago, etc.

II. EXECUTIVE SUMMARY

A. Vermont Demographics and Geography

We considered several aspects of Vermont in developing our analysis and recommendations. The State is a difficult one in which to operate and do business. Vermont is the second least populated state in the country. Almost half of the State's population in concentrated in the northwestern corner, the Burlington/South Burlington Metropolitan Statistical Area ("MSA"); plus the Montpelier/Barre area. There are other large concentrations of population, commercial or governmental activity. Customers for broadband services outside the MSA are extremely difficult to reach and serve.

Another complicating factor is Vermont's famously rocky (marble, granite, etc.) soil. In our discussions with public utilities in the State, as well as VTrans staff, it became very clear that construction costs for fiber optic (and other utility) networks are three to four times national averages.

B. Fiber Optic Network Development in New England

Vermont missed the large fiber optic build outs of the last 15 years. Much of the broadband traffic now flowing to and from Canada (Montreal primarily) to New York and Boston was developed using roadways in upstate New York and New Hampshire. No new major fiber optic networks that might potentially pass through Vermont are planned by any of the companies we surveyed.

C. Future Broadband Development in Vermont

Without any discerned, large scale interest in developing Vermont's Limited Access Highways, railroad ROW and the TDI dark fiber route, we believe fiber optic build outs will be piecemeal in nature. That is, public utilities (telcos, CATV companies, etc.) may come to VTrans on a project-by-project basis to extend their fiber optic networks over limited stretches of these ROW; particularly the Limited Access Highways.

The TDI dark fiber is currently stranded and of little value. It ends at a substation in Ludlow; without any commercial means of extending to the south of the State. The Vermont Public Service Board is managing the State's interest in that fiber, and may come up with ways in which to extend that fiber (PSB representative indicated the State is going to build a fiber optic network to connect to the TDI fiber; no funding is currently or planned to be available for the effort.). If that network becomes available, our rate recommendations should apply.

The railroads are all in the Exurban Zone. Our recommended rates should apply to their ROW.

D. Fiber Rates and Other Recommendations

Our rate recommendations (See next section for specifics) are at the low end of national rates—again, based on demographic and geographic conditions in the State. We do not foresee any changes to those limiting factors in the future.

We have also provided other recommendations regarding contract forms (See attachments 1 and 2.) cost of living adjustments, project fees, etc. We find VTrans inability to collect any meaningful recurring and non-recurring fees to be a serious, major problem. Not only does the current permit approach (one fee covers all projects) require VTrans to incur significant administrative expenses, it is inconsistent with customs, practices and fees for all of the agencies we surveyed. Recommendations for recurring and non-recurring fees are detailed below.

Given Vermont's current statutory limitations, we believe opening the State's Limited Access Highways to development while charging FMV rates will not become a major new source of revenue for VTrans. Public utilities of all types will continue to build out their networks using other State roads and ROW. Given those obdurate conditions, the various recommended rates and fees do reflect the realities of the fair market valuation—and Vermont's position in that marketplace.

III. RECOMMENDATIONS

A. Recommended VTrans Fiber Optic Rates

Based on our research, analysis the following are the proposed rates for VTrans-specified ROW. They apply to all SOW-designated ROW, including:

- Limited Access Highways
- Railroads
- FDI designated dark fiber

The zones, described in detail below are as follows:

- **Urban Zone:** Burlington/South Burlington MSA, plus Limited Access Highways to and around cities of Montpelier and Barre
- **Exurban Zone:** Remainder of Vermont

A complete explanation of the approach, methodology, etc., for development of these specific rates follows in sections below.

1. Longitudinal Rates*

Zone	Rate (Per-lineal-foot-per-year)	Cost of Living Adjustment (COLA)	Per-Strand Multiplier
Urban	$1.50	4%	$.05 per-fiber
Exurban	$1.00	4%	$.02 per-fiber

* 216-strand cable is minimum price/rate for any installation. Multiplier is per-strand charge for each additional fiber above 216 (industry standard) strands and 432 strand cable (next industry standard cable size). Above 432, VTrans should conduct separate negotiations.

2. Transverse Crossing Rates

Underground Fiber Optic Cable Rates, Per-Year-Per-Cable (Raw Land/Installed by Carrier) up to and including 150 Feet of ROW

	ZONE 1 (URBAN)	ZONE 2 (SUBURBAN)
108 strand (or less) cable (minimum size)*	$ 600.00	$300.00
216 strand cable	$920.00	$470.00
432 strand cable	$1600.00	$800.00
More than 432 strand cable	Separate negotiation	Separate negotiation
Extra (odd number) of strands:		
-Above 108 strands (to 215)	Add 10 cents per strand	Add 10 cents per strand
-Above 216 strands (to 432)	Add 7.5 cents per strand	Add 7.5 cents per strand

* Also applicable to undivided flexible conduit or other medium of comparable size, e.g., coaxial cabling.

3. Dark Fiber Rates:

Zone	Rate (Per-Fiber-Per-foot-per-year)	Cost of Living Adjustment (COLA)
Urban	$500	4%
Exurban	$420	4%

B. Other Recommendations

1. Zone Map Recommendation

As explained in detail in section IV. D. below, we are recommending that VTrans adopt two zones (Urban and Exurban) for ratemaking purposes. Briefly, they are:

Urban Zone comprising:

a. The three-county Metropolitan Statistical Area ("MSA") of Burlington/ South Burlington
b. Interstate Route 89 from MSA to Montpelier
c. Cities of Montpelier and Barre
d. Partial Controlled Access Roads from 89 to Barre and Montpelier

Exurban Zone: Comprising remainder of the State

(See Attachment 3 for the "Zone Map.")

2. Cost of Living Adjustment ("COLA")

We recommend the following option: either the 4% COLA or the Consumer Price Index ("CPI") for the Burlington/South Burlington MSA, **whichever is greater** (emphasis mine). The Department of Commerce's Bureau of the Census defines and tracks this data on its Web site.

The 4% COLA approach is an industry-acceptable standard and sets the floor for yearly increases. It also provides uniformity for all ROW occupants.

Using the alternative (Burlington/South Burlington MSA) in higher inflation years will protect VTrans in case there is an outbreak of inflation, as we endured during the 1970's and early 1980's. Given the current economic uncertainties, as well as the long-term nature of these contracts, we believe this dual option approach is a prudent move for VTrans.

We recommend that the COLA be applied annually instead of at longer, fixed intervals, i.e., every five years with a "true up." It should be applied to all new license agreements, as well as any renewals.

3. Standard Cable Size/Multiplier (Fiber Optic Cabling)

Per our survey of agencies, the current standard for longitudinal occupancies is to assume a minimum 216-strand cable in innerduct of 1.5 inches or larger. The most successful licensing programs, including Mass DOT, BART and MBTA, all assume this 216-strand cable as a minimum for pricing considerations. NYMTA uses a 288-strand count; and is the outlier among the surveyed agencies. We recommend that VTrans use the 216-strand cable as the standard, with adjustments and increased rates for larger strand cables, as described the same.

All successful fiber optic revenue producing programs apply a multiplier effect for each fiber above the 216-strand cable count—up to and including a 432-strand cable. The multiplier can be relatively low (less than $ .02 per-strand for Mass DOT). Other agencies, e.g., Mass DOT and BART, use a $ .05 per-strand-per-year for every strand over the 216 standard. The average, on a non-differentiated basis, for all of our surveyed agencies was approximately $. 04 per-strand. We therefore recommend this multiplier rate for VTrans agreements.

Any cable of larger size than 432 strands (E.g., AT&T and Verizon will generally opt to deploy 864-strand cables) should be the subject of case-by-case negotiations, which rarely occur outside of large, densely populated MSA's.

4. Spare Innerduct Space

Most of the surveyed agencies demand one innerduct in any proposed new conduit system as prerequisite to an agreement. Telecommunications carriers typically demand that the space be used only for the agency's use—or more generally, for "governmental use only." They simply do not want the spare innerduct space to be used by a competitor; hence the restrictions.

This is often a major point of contention in negotiations. We recommend adopting a simpler, more market-friendly approach. That is, for each longitudinal or transverse crossing agreement, VTrans should demand a receive one spare innerduct in the conduit arrangement for broadly defined "government use." This will allow other State and local agencies to benefit from this in kind asset. At the same time, this approach will be perceived as a non-threatening compromise to the installing carrier(s).

5. In Kind Contributions

We recommend that VTrans always ask for a minimum of twelve strands of dark fiber, preferably in a separate, VTrans-designated innerduct, as an in kind contribution from a carrier building a new fiber optic system.

6. One-Time Permitting Fees

Currently, VTrans is annually processing approximately 800 to 1000 omnibus/all-purpose permits for PSB-designated public utilities without charge. It cannot charge for management and surveillance (force account) at construction project sites. No VTrans personnel were able to provide us with a cost estimate for all this *gratis* labor.

Unfortunately, VTrans permitting process is not unique. Many transit and transportation agencies for whom we have provided services report the same problem. The following

are fair and reasonable permitting fees and approaches that we have found our survey, as well as the more successful agency programs. We recommend them to VTrans:

***a*. Permit Fees:** We recommend that VTrans require a front-end, one-time permitting fee of $1000 for each fiber optic installation, either longitudinal or transverse crossings. This will bring VTrans in line with other agencies. The permit fees should be on a case-by-case basis; not an omnibus permit for several projects.

b. Hourly Support Costs (Force Account) for VTrans Employees: We recommend that VTrans and its divisions develop a uniform set of force account fees, on an hourly basis for different types of employees (e.g., flag men, supervisors, etc.). All surveyed agencies have adopted these fee structures. VTrans should always be able to recover fees that cover actual time spent in monitoring installations—and change these fees as needed.

7. Standard Contract Forms

We have provided VTrans with standard contract forms used by other agencies; for both conduit and dark fiber licensing (See attachments 1 and 2). VTrans attorneys should review and edit these documents to suit specific statutory considerations unique to Vermont. Standard form contracts are acceptable to the industry and make negotiations with interested parties much more expeditious.

IV. FIBER OPTIC RATES/DEVELOPMENT

A. Introduction

The most successful ROW rate programs that we contacted during our survey used zones to set rates for all types of encroachments. Zones are based on density of population, volume of business activity (measured by size of buildings, numbers of business parks, hospitals, etc.) that is likely to demand higher bandwidth for communications. Zones are generally sorted into three types: Urban (often with a premium for "Congestion Pricing", Suburban and Exurban. In order to develop fiber optic rates for VTrans, KC&A analyzed fee structures, as well as best customs and practices, imposed by nine different government agencies. They were:

Agencies with Fiber Optic Revenue Programs

- Massachusetts Department of Transportation (Mass DOT)
- North Carolina Department of Transportation (NCDOT)
- New York Metropolitan Transportation Authority (NMYTA)
- Bay Area Rapid Transportation Authority (BART)
- Tri-County Metropolitan Transportation Authority (TriMet, Portland, OR)
- Sacramento Regional Transit (Sacramento RT)
- Burbank Water & Power (dark fiber rates only)
  Silicon Valley Power (dark fiber rates only)

Following this approach, KC&A has determined a set of rates that will be applicable for VTrans ROW. The recommended rates, as well as the Zone Map, for VTrans may be found in the tables in Section III, above.

The following is a more detailed explanation of how the rates were developed. The results of our survey are also included.

B. Fiber Optic Pricing Considerations

1. Background Information

a. Basic Rates for "Bare Land", Pole Attachments and Conduit Capacity

All clients, whether they are government agencies, public utilities, private companies or individuals, want to know what their rights-of-way are worth. The answers are often not simple, linear responses.

Bare, unimproved land is often of little value, particularly in states that allow carriers to claim "public utility" status. This generally means a competitive local exchange carrier ("CLEC"), incumbent local exchange carrier ("ILEC" such as AT&T, Verizon or the Vermont Telephone Company [formerly a "Baby Bell" operating company]), CATV company or other Vermont Public Services Commission ("PSC")-designated public

utility can trench State, county and municipal streets, place conduit in them and pay the local agency little more than a permit fee. Bare land, however, that is "dedicated" to a specific use may have separate and distinct value; particularly if the land in question is the optimum, secure way for a carrier or other public utility to go from point A to point B.

Transactions involving fiber optics and dedicated ROW are now occurring in myriad ways. While "annual per linear foot dollars" remains the industry standard measurement, private parties are offering investor-owned public utilities and government agencies different types of "in kind" compensation as well; including dark and lit fiber at various speeds and rates. All types of ROW-owners, including small municipal electrics, are also adding surplus duct space to existing construction projects for leasing purposes. Private landowners developing or refurbishing business parks and other facilities are putting "dark" fiber (inert, unlit fiber reserved for future lighting) in existing or planned conduit space. All these factors affect the eventual value of the underlying ROW—and the benefits of any bargain to both parties.

The first measurement of value is as basic to fiber optics as it is to any construction project: What is the total cost of construction? The total cost of constructing fiber optic systems varies extensively, based on terrain conditions. For example, burying cable in rural farmland is less expensive than digging through rock or crossing rivers and streams. Construction expenses also increase as more populated areas are encountered. Aerial transmission facilities (poles or attachments to existing structures such as bridges) are considerably less expensive to construct, albeit much less secure in inclement weather, than underground conduit facilities.

The comparative cost to a carrier of competing ROW offered by railroads, other government agencies, etc., must also be included in the final analysis. The "next best economic alternative" will always be a factor.

Carriers' costs are in turn ROW-owners' revenues. The data below were developed on a generic, national basis, without reference to any ROW-owner's specific routes and dedicated right of way. They are revenues (carriers' costs) that a typical lessor could expect to receive for use of its "dedicated" and improved (with poles or duct space) rights-of-way, on an annualized basis:

b. Generic, National Rates

The following are national, industry-provided data that provide a baseline, or starting point, for discussion and development of rates for an agency such as VTrans.

- Category 1: Aerial Transmission on Existing Poles (per-cable):
  - Rural Areas: $1,500 to $2,750 per mile
  - Exurban/Suburban Areas: $4,000 to $4,750 per mile
  - Urban Areas: $5,000 to $12,500 per mile

- Category 2: Existing Conduit Space (per inner duct space)
  - Rural Areas: $2,500 to $3,750 per mile
  - Exurban/Suburban Areas: $3,000 to $6,000 per mile
  - Major Metropolitan Areas: $25,000 to $40,000 per mile

- Category 3: Dark Fiber in Existing Conduit (per fiber strand-per-mile-per-year):
  - $420 to $1500 (See discussion in next section)

These estimates provide an admittedly broad-gauge perspective. They do not include any evaluation of the undeveloped land because of the wide fluctuations in the costs of construction, i. e., a minimal street cut in a small town can cost $10,000 per mile; directional boring through solid rock can cost as much as $1 million per mile. (Discussions with VTrans staff elicited an estimate of $350,000 per-mile for construction through some of Vermont's famous hard rock strata.

These data do establish a foundation for a client to evaluate the relative values of all possible construction scenarios, and future offers (whether actual cash value or "in kind" values) *vis-`a- vis* the client's available ROW. No analysis is complete, however, without a determination of the value of two other markets that are just now opening up opportunities for joint development with the private sector: 1.) Dark fiber strand licenses/IRUs; and, 2.) Actual sale of operational, or lit fiber.

2. Dark Fiber Leasing/Licensing

This segment of the telecommunications industry is one of the fastest growing. Carriers are now offering dark fiber to customers (as a "sweetener" to general service offerings) that will allow these customers to develop their own wide area or local area networks ("WAN"s or "LAN"s).

After more than six years of a so-called "dark fiber glut" that followed the "Dot Com Bust" of the early 2000's, the sheer demand for bandwidth is once again creating a "fiber hungry" environment. Carriers are ordering more fibers in larger-capacity cables in order to provide more connectivity and bandwidth into each building or office complex that may have potential customers. Proof positive of this phenomenon is the increasing backlog of orders for fiber optic cables at the major manufacturing plants.

The following are general commercial rates charged by carriers to either companies or other carriers for use of their dark fiber, on a PFPMPY (per-fiber strand-per-mile-per year) basis:

- **Long Haul (50 + miles)**
  - US average price is $420-$480 PFPMPY
  - Price rises to around $840 PFPMPY, if the provider is using premium fiber and the route is unique

- **Short Haul (1 to 50 miles)**
    - U.S. average is $960-$2,100 PFPMPY

Dark fiber rates dropped during the early years of the new century. They have since climbed (Burbank Water & Power and Silicon Valley Power, discussed herein, have both raised rates substantially in the last two years.). Not to belabor the point, but these are commercial rates, charged by carriers and a limited number of government agencies that have taken a substantial economic risk, developed a business plan and raised the capital to enter a very chaotic market.

3. The Value of "Lit" Fiber

Selling a telecommunications service such as video service (to the entertainment industry), or moving high-speed data through fully operational lit fiber networks (e.g., Internet service), is the ultimate commercial valuation. The potential fair market value of lit fiber is therefore always of significance—whether a company decides to enter the telecommunications business or parlay its ROW in some other type of relationship with a carrier.

We know of only two public agencies (Burbank Water & Power and Los Angeles Department of Water & Power) that are actively marketing services over their (conjoined) lit fiber networks. They have unique circumstances, described in the next section.

We do not recommend that public agencies, particularly transit systems, develop active, lit fiber networks as a business strategy. The telecommunications marketplace is simply too dynamic and competitive. Nevertheless, as the chart in Attachment 4 indicates, carriers can generate maximum revenues from their lit fiber networks.

This section is included to provide a full understanding of the full gamut of fiber optic options is important to our clients—no matter what type of arrangement or business plan they may choose to adopt or create.

C. Current Fiber Optic Telecommunications Industry Demand

1. National Trends

The greatest revolution of our times is the transition from paper to electronic information. And the Internet is where all these forms of data will be increasingly transmitted and stored (in "Clouds"). There is only one telecommunications technology that can transport these huge data demands: Fiber optics. This is the only medium that operates at the speed of light, i.e., photons, or light impulses that comprise data, are sent through glass tubes (fiber strands) from one computer/server to another. Fiber optic technology is thus the vital underpinning, or "road" on which the Internet operates.

The Internet itself was created by the Defense Department in the 1970's. Widespread commercial usage of it did not occur until massive fiber optic networks were deployed by the private sector in the 1980's and 1990's. This construction began with the breakup of the Bell System and essentially ended in the early 2000's with the "Dot Com Bust Recession."

Today, with the advent of smart phones and requirements for their high-speed connections to the Internet, fiber optic networks are being built out to support and expand current wireless systems. Specifically, all of the major carriers are expending billions of capital investment to provide fiber optic connections to their cell towers and other wireless network equipment.

The only other major fiber optic network construction demand is for very high speed, low latency (no degradation of data speeds signaling strength) networks that interconnect large investments firms, particularly hedge funds, with the various markets. Since these firms make almost instantaneous transactions and demand complete security, they are now paying for their own networks—building out to all the major investment centers, including New York City, Boston, Chicago, etc.

VTrans may receive inquiries regarding these high speed networks in the future. (We were unable to discern any current interest, based on discussing with two fiber optic construction companies.) Most of the fiber optic growth for all types of commercial activity (businesses, government, non-profits, etc.) is now occurring over relatively short distances, as these entities seek fiber optic connections to Internet hubs (direct connection to the Internet) or server farm (a storage facility for data).

Companies may elect to contract with a carrier such as AT&T to connect them—the most common way. Or they may elect to lease (or license) dark fiber from a company (Level 3 and Zayo are two of the largest such dark fiber leasing companies) or government entity (municipal or rural electric). In both cases, the entity must "light up" the fiber with its own electronic switches and then transmit its data over the now-lit fiber to either the server farm or Internet hub.

2. Vermont and Fiber Optic Trends

a. Longitudinal Fiber Optic Development in the Region

In order to obtain information regarding development in the New England region, we interviewed carriers, as well as two companies that have long histories of building multiple-occupant fiber optic systems. The consensus was that no new systems are planned through Vermont or adjoining states.

In the last ten years, the major system that was constructed from Montreal down to the New York region was built along Interstate 87 and parallel New York State routes; bypassing Vermont and reaching New York City. The Montreal to Boston route was

built using local roadways through New Hampshire to reach Massachusetts and eventually the Turnpike.

Future plans for fiber optic network development within Vermont, including the TDI dark fiber, are discussed below. In general, most of the build outs will be on a piecemeal basis, i.e., building out existing networks to increase bandwidth to customers on a projected, as-needed basis. Vermont Telephone, which serves most of the State (and more service areas by far than any other telephone company) will be the prime candidate for these types of short-haul arrangements; particularly on Limited Access Highways. Comcast, as the leading CATV company in the State is another candidate for these types of fiber optic build outs.

b. Physical Inspection

We travelled by car through much of the state, emphasizing the northwest portion because of the much higher population and business development—particularly in the three-county Burlington MSA, as well as the Montpelier/Barre area. On non-limited access ROW, we discerned fiber optic placements both aerial and underground (orange stakes are the markers for these latter deployments).

In VTrans staff interviews as well as discussions with various public utilities in the State with fiber optic networks, it became very obvious that the underlying rock strata that is omnipresent in Vermont is a major impediment to future growth. We were provided with estimates of $250,000 to $350,000 per-mile (national average is $50,000 to $100,000) for construction costs. These very high end average costs for underground conduit arrangements will continue to be major impediments to future construction along all State highways (Limited Access and others).

Aerial construction is considerably less expensive. Our review of the VTrans Utility Accommodation Policy would seem to preclude this option along the Limited Access Highways.

Most of the remaining State growth will follow national trends. That is, existing cell towers and other facilities will be retrofitted with fiber optic cabling to accommodate the broadband requirements of an ever increasing and mobile public. Dark fiber companies (e.g., Level 3) will continue to offer connections for large entity connections to the Internet or storage/server farms. Large telecommunications companies such as Verizon, as well as CATV companies, will continue to provide their traditional commercial/governmental agency interconnections. Smaller companies, e.g. VTel, as well as other public utilities, e.g., Velco, will follow suit in the less populated areas.

c. Discussions with Vermont Telecommunications Providers/Utilities

We conducted telephone interviews with several providers of telecommunications service providers, i.e., public utilities, in the State. They included: Vermont Telephone (Telephone Operating Company of Vermont, LLC), VTel, and the Vermont Electric

Cooperative. We also conducted an Internet search of the larger telecommunications companies, including Level 3; as well as a local fiber optic network provider, First Light Fiber. This research does provide some indication of the future build-out patterns of the major companies. The following are our findings:

- They acknowledge that Vermont's lack of population density, rocky soil and lack of large business concentrations makes fiber optic network deployment difficult and expensive
    - Many use microwave towers and relays to provide bandwidth to sparsely populated areas for a fraction of the cost for fiber optic systems
    - Bandwidth requirements in these areas are substantially less
- Most of these companies have existing fiber optic networks that support their business and interconnection needs, including build-outs to cell tower locations
- Future network growth will be handled on a case-by-case basis that may be on or near VTrans Limited Access highways
    - They were unwilling to provide any estimates or projections for future growth, either number of cell towers or fiber optic facilities
        - All viewed this information as proprietary in nature
- They are opposed to recurring fees, i.e., FMV rates, for the right to occupy space in VTrans Limited Access ROW
- They are willing to discuss in kind trades of circuits (live connections at megabit or gigabit speeds over their respective networks) rather than recurring fees
    - This is a standard compensation offer to government agencies from carriers and other public utilities
- They are willing to discuss with VTrans non-recurring permit fees that reflect actual cost of services provided by the agency
- They will continue their existing practices of building out their respective networks; using existing non-Limited Access Highways, wherever possible.

We also discussed past fiber optic network development in the New England area with two companies involved in some of those projects, e.g., the New York State Throughway, etc. These companies confirmed that all major fiber optic build outs that might have used VTrans Limited Access Highways have already occurred in other states. They also indicated that no new major north/south or east/west routes are contemplated by major carriers for the near term future.

d. Vermont Telco Interest

i. Telephone Operating Company of Vermont, LLC: This telephone operating company is owned by Northern New England Telephone Operations. The company was created following Verizon's 2008 sale of its telephone lines in Maine, New Hampshire and Vermont to FairPoint. All of Verizon's assets in those states were grouped into a new holding company that was sold off and merged into FairPoint, Northern New England Spinco. These states had been served by Verizon New England, formerly New England

Telephone, a Bell Operating Company. The company provides service in 105 different area; more than all the other Vermont telcos combined.[2]

We believe this company will be most likely to use the Limited Access Highways to build out its existing network. The company has the most to gain in extending its already extensive fiber network throughout the State. Nevertheless, we believe the build out along the State's ROW will be piecemeal in nature; no long haul routes will be needed. The factors that support this appraisal are the static Vermont population and lack of a more dynamic business environment and activity. Company representatives did not share specific plans, but indicated interest if rates and fees are reasonable.

ii. Other Companies

The smaller telcos, e.g., Vtel, will adopt the same pattern: Using the Limited Access Highways to build out their fiber optic networks on as-needed basis. The same may be said about the various CATV providers in the State. Other companies providing broadband services as part of their offerings to customers, e.g., Velco, were more resistant to accepting charges for access to Limited Access Highways. Velco's in kind receipt of dark fiber from the TDS cable negotiations would seem to be the reason for the company's reluctance to commit to paying rates.

D. Methodology for Determining Fair Market Value

1. Comparable Metropolitan Statistical Areas ("MSA")

a. Fiber Optic Demand and Demographics

The highest fiber optic (aerial, in conduit, dark fiber) rates are paid for ROW in urban areas. That is because of the demand for interconnection is highest in these areas because of the sheer demand from companies, educational, medical and other facilities that demand access. Congested areas, including tunnels, bridges and downtown areas demand a premium above and beyond these urban rates. Other rates, for suburban and exurban areas, are proportionally much less. And they are generally derived from the top end, "Urban Rate" on a pro-rated basis, i.e., Suburban is generally half the Urban rate; Exurban is usually half the Suburban rate, or less, depending upon demographics. Selecting the top tier urban rate is therefore the initial (and most important) step in establishing uniform fiber optic rates for a government agency.

The first criterion used for determining FMV for VTrans is therefore the demographics of the various MSA's in which the agency's ROW is located. This is the identical criterion

[2] (The company is not connected to FairPoint Vermont, an operating company consisting of former General Telephone ("GTE") lines that FairPoint has owned and operated prior to acquiring the Verizon assets.)

used by major telecommunications companies to determine what they are willing to pay for dedicated ROW.

2. Vermont's Demographics

Per the U.S. Census (2010) Vermont has only one MSA: The three-county Burlington-South Burlington MSA. The three counties are: Chittenden, Franklin, and Grand Isle. The principal cities are Burlington and South Burlington. As of the 2013 U.S. Census Estimate, the combined population of the three counties is 214,796.

We also considered this additional demographic data in developing our FMV rates for the entire state:

- Vermont is the 6th smallest state in area
- Vermont is the second least populous state (leading only Wyoming)
- Montpelier, with a population of 7,855, is the least populous state capital in the country.
- Burlington, with an estimated 2013 population of 42,284 (U.S. Census Bureau), is the least populous city in the United States to be the largest city within a state.

3. Selecting Comparable MSA's

In telecommunications industry parlance, New York, Philadelphia and Los Angeles are Tier One metropolitan areas; Boston and the San Francisco Bay Area are Tier Two metropolitan areas; Portland and Sacramento are marginal Tier Two/Tier Three metropolitan areas. These MSA comparisons form the starting point for our recommended rates.

a. Urban Zone

Based on our research and agencies' survey, we selected TriMet (Portland OR/MSA pop. 2.3 million) and Sacramento RT (MSA pop. 2.4 million) for the best comparables to develop VTrans rates. These agencies' Suburban rates reflect the population density and business concentration levels that are comparable to the Burlington-South Burlington MSA, i.e., approximately 200,000 to 250,000 population living in mixed suburban/rural environment with some manufacturing and extensive small business and government/civic development.

This three-county MSA therefore comprises the baseline rate ("Urban Rate") for developing FMV for Limited Access Highways within that MSA. We have also included the following Limited Access Highways as part of that same rate:

- The 44 plus miles of Interstate 89 between Burlington and Montpelier
- The Partial Control of Access Highways off of 89 to Barre and South Barre

The economic/public sector nexus between the capital and the State's most populous area warrants these inclusions. This area, and all the Limited Access Highways within it is designated as the Urban Zone for ratemaking purposes.

b. Exurban Zone

The remainder of the State, due to the lack of population, commercial and government agency concentrations is designated as the Exurban Zone for ratemaking purposes. The recommended rates are for all types of fiber optic occupancies in either:

- Limited Access Highways
- TDI dark fiber route (See separate dark fiber discussion below.)
- The VTrans owned and operated train routes.

Again, the comparable rates for the Exurban rates for the Portland and Sacramento MSA's provided the best comparables.

c. Other Factors: Vermont's Granite, Marble, etc.

In our discussions with VTrans staff, as well as companies providing telecommunications services in Vermont, we received several comments regarding the high cost of either boring or trenching fiber optic systems in the State's famously rocky soil, i.e., construction estimates four to five times ordinary and usual costs. We have therefore discounted both the Portland and Sacramento MSA comparables accordingly to reflect this higher cost.

4. Dark Fiber Comparables

There are two situations in which government agencies obtain dark fiber:

a. Agency Owned and Installed Fiber

If an agency builds its own fiber optic system and installs spare capacity for commercial development. We have recommended that such government-owned systems reserve a minimum of 48 strands for commercial development.

One client, the Cal Train in Silicon Valley, installed an extra 288-strand cable as a low cost addition to its federally financed requirement for positive train control ((“PTC”: a federally mandated computer assisted train safety requirement). It is currently marketing the dark fiber along its ROW in Silicon Valley from San Francisco to San Jose. Because the agency paid for and installed the dark fiber, there are no marketing restrictions—other than standardized rates—on its sale to all types of customers, e.g., CATV companies, carriers, municipal electrics, etc.

b. Agency Obtained Fiber as In Kind Contribution

If a new, multi-innerduct system is being installed by a carrier (or carrier consortium) in agency-owned and dedicated, we recommend that agency demand an in kind contribution of a spare innerduct for its own use, as well as a minimum of 12 strands of dark fiber. The carrier(s) almost universally demand that the government agency's dark fiber be dedicated to its own, exclusive use; or (more expansively) to other government agencies' use. The stated reason for these restrictions is that the carrier does not want the government agency competing with it.

With one or two exceptions, we have never encountered an agency that was able to negotiate around this “non-compete clause.” (The exceptions involved carriers'

bankruptcies in which agencies were able to take back the dark fiber without restrictions in lieu of lost revenues/breach of contract negotiations.)

c. Developing Dark Fiber Comparables

Two agencies (BWP and SVP) with vibrant dark fiber programs were interviewed. We used the same two zone population overlay (1. Burlington MSA plus Montpelier; 2. The remainder of the State) to develop dark fiber rates. We also reviewed our consulting recommendations for the Cal Train route through Silicon Valley (Those rates are not finalized and therefore must be kept confidential.).

We then used the same population/zone/MSA model and extrapolated our findings to the State, i.e., Urban Zone for the three county Burlington/South Burlington MSA (plus Montpelier route) and Exurban Zone for the rest of Vermont.

d. Interest in VTrans and Public Service Board Dark Fiber

***i*. Limited Access Highway Interest:** In our interviews with interested state and national companies, we did not discern any immediate interest in developing new longitudinal fiber optic systems in which VTrans (or the Public Service Board) might obtain fiber. There was limited, piecemeal interest in developing portions of the Limited Access Highways. We recommend requiring that VTrans require the minimum 12 strand dark fiber sheath, preferably in a separate innerduct, as part of any such construction. The above mentioned limitations on use will no doubt apply.

***ii*. TDI Fiber:** Per the PSB, The TDI dark fiber comprises either a 216 or 288 strand cable (Final size still to be determined in negotiations). Twelve strands are reserved for VTrans exclusive use; not for re-sale. Velco is to receive 72 strands as part of a joint enterprise arrangement for transmission/distribution purposes with TDI. The remaining fiber will be allocated by the PSB to other State agencies. Per our PSB interview, the State is building a fiber optic network through the Green Mountains that will interconnect with the TDI Fiber.

The TDI dark fiber is located in the Exurban Zone for rate making purposes, except for a small portion of ROW in the Urban Zone. As with conduit, the marketability of dark fiber is directly related to the location of the fiber. Much of the TDI fiber is essentially stranded, i.e., it does not connect important business or highly populated areas. If the State, either by itself or in conjunction with the private sector, were to extend beyond the southernmost point (a substation in Ludlow) to the Massachusetts border, then the recommended rates would apply. We do not believe that, in its current stranded status, the Exurban Zone dark fiber is of any real value in the commercial marketplace. The PSB indicated that they may have other plans, i.e., using grants, etc., to extend fiber to other agencies in the State.

***iii*. Railroads:** The PSB representative indicated that at least one of the three railroads has 12 dark strands of fiber in its ROW. He was unable to determine if any restrictions on leasing/licensing of these strands to third parties apply. We were unable to discern any market interest in the fiber in our industry interviews. Should any occur, Exurban Zone rates should apply.

V. GOVERNMENT AGENCIES SURVEY

A. Agencies Surveyed

In order to develop fiber optic rates for VTrans, KC&A analyzed fee structures, as well as best customs and practices, imposed by nine different government agencies. They were:

- Mass DOT
- NCDOT
- NMYTA
- BART
- TriMet (Portland, OR)
- Sacramento RT
- Burbank Water & Power ("BWP"/dark fiber rates only)
- Silicon Valley Power ("SVP"/dark fiber rates only)

B. General Findings

All of the government agencies participating in the survey employ permanent easements as their primary contract document for dealings with other public agencies. Government agencies of all types generally require greater permanence than newer telecommunications or CATV providers. In general (but not in all cases), public utilities were granted easements; some, however, were granted lesser property interests, e.g., leases.

Per the scope of work, we did not just ask these agencies for data regarding normal longitudinal and transverse crossings. We also queried them regarding specialized treatment, i.e., congestion or choke point pricing, their approach to cost of living adjustments, standard permit fees, special one-time fees (e.g., for inspections of occupancies to validate fiber counts), etc. The agencies with the most comprehensive programs for all types of occupancies had the most answers. Those were:

- Mass DOT
- NYMTA
- Tri Met
- Sacramento RT

The various agencies' programs methods and practices varied widely. New York MTA, TriMet and Sacramento RT had the most comprehensive licensing programs—by far and away. These programs address electrical cables and all types of pipelines (pressurized, hazardous, etc.) as well as telecommunications occupancies. Surprisingly, many public agencies have not created programs for dealing with laterals, or transverse crossings of their ROW. Some of the agencies polled were interested in developing these types of rates, but had simply not made the effort to date. These issues, and the comparisons

needed to develop comparable rates for VTrans by zones, metropolitan statistical areas, etc., are dealt with in this report.

For this specific report, we focused our queries particularly on three major areas:

- General longitudinal occupancies and transverse crossings, or laterals
- Information on one-time fees, adjustments (cost of living factors) and any other unique terms and conditions that might be beneficial, if included in a VTrans easement or licensing agreement
- Dark fiber rates, contract terms, etc.

The following are our findings on an agency-by-agency basis:

C. Government Agency Survey Findings

1. Massachusetts Department of Transportation/MBTA

In 2012, the State of Massachusetts mandated that Boston's transit district, the MBTA, and its Board of Directors, become a part of the Mass DOT For this survey, we contacted both agencies. The agencies were merged in 2013. MBTA's original program, developed in the early 1990's was a template for other agencies; particularly in the creation of zones (Urban, Suburban and Exurban) as well as extra charges for congested or restricted areas (e.g., tunnels, bridges).

Mass DOT's revenue program was revised in 2012-2013. It followed the MBTA format, with adjustments for sparsely populated areas outside of the Greater Boston Area. That MSA, the sole large population area in Massachusetts comprises over 4.3 million people.

a. Longitudinal Rates*

Zone	Rate (Per-lineal-foot-per-year)	Cost of Living Adjustment (COLA)	Per-Strand Multiplier
Tunnels	$46.33	4%	$.07 per-fiber
Urban	$10.96	4%	$.05 per-fiber
Suburban	$5.10	4%	$.03 per-fiber
Exurban	$2.26	4%	$.02 per-fiber

b. Transverse Crossing Rates*

Zone	Rate (Per-lineal-foot-per-year) for 100 feet or Less	COLA	Per-Strand Multiplier
Urban	10.00	4%	$ .05 per-fiber
Suburban	$4.50	4%	$ .03 per-fiber
Exurban	$2.26	4%	$ .02 per-fiber

* Rates apply to any fiber optic cable with 216 strands or less. Multipliers are applied to all strands above 216 strands on a per-strand-basis. Cables with 432 strands or more are subject to negotiations.

iii. Dark Fiber Rates:

Per-Fiber-Per- Month-Per-Mile	TURNPIKE/495 CORRIDOR	SUBURBAN	EXURBAN
	$400.00	$200.00	$100.00

c. Relevant Rates

Mass DOT was selected for its geographic relevancy, i.e., its proximity to Vermont as another New England state. The outlying areas, e.g., Suburban and Exurban rates, comprised the relevant demographic comparisons we used to develop VTrans rates. Boston is the epicenter of the State in all respects.

Springfield and Worcester are the only other sizeable population centers, albeit not warranting more than Suburban rate designation for rate making purposes. They provided excellent comparables for the three-county Burlington/South Burlington MSA rates.

2. NCDOT

This department of transportation's statutory position regarding limited access highways is similar to that of VTrans. The legislature and governor are currently considering opening up their interstate system for fiber optic developing, *via* public private partnership arrangements. Telecommunications companies, CATV providers and other public utilities have been using other ROW, e.g., state and county highways to meet their bandwidth/network needs—without being charged any type of fee (recurring or non-recurring) by the State. This situation is strikingly similar to that of VTrans, with the exception of the recent statutory change regarding Limited Access Highways in Vermont.

At the request of NCDOT, KC&A developed the following rates in 2014-2015:

a. Longitudinal Rates*

Zone	Rate (Per-lineal-foot-per-year)	Cost of Living Adjustment (COLA)	Per-Strand Multiplier
Tunnels	$25.22	4%	$.07 per-fiber
Urban	$10.96	4%	$.05 per-fiber
Suburban	$5.10	4%	$.03 per-fiber
Exurban	$2.26	4%	$.02 per-fiber

b. Transverse Crossing Rates*

Zone	Rate (Per-lineal-foot-per-year) for 100 feet or Less	COLA	Per-Strand Multiplier
Urban	10.00	4%	$ .05 per-fiber
Suburban	$4.50	4%	$ .03 per-fiber
Exurban	$2.26	4%	$ .02 per-fiber

* Rates apply to any fiber optic cable with 216 strands or less. Multipliers are applied to all strands above 216 strands on a per-strand-basis. Cables with 432 strands or more are subject to negotiations. (See discussion of multipliers below.)

iii. Dark Fiber Rates:

Per-Fiber-Per- Month-Per-Mile	TURNPIKE/495 CORRIDOR	SUBURBAN	EXURBAN
	$400.00	$200.00	$100.00

These proposed rates will be used in negotiations with broadband-provider public utilities seeking access to NCDOT's limited access ROW, after appropriate legislation is passed. North Carolina's Interstate system (with one small gap) comprises a natural fiber optic ring between the three major MSA's (Raleigh/Durham, Greensboro and Charlotte). As discussed in the next section of this report, "Ring Topology" provides critical redundancy and security for fiber optic networks.

There is therefore considerable support—from telecommunications companies of all types (including Google)—for the opening for development of these limited access ROW. Again, legislation is pending and not certain.

3. New York MTA

This agency established new rates for all types of occupancies (fiber, copper, cable TV, pipelines, electrical cabling, etc.) last year. The rates are the most comprehensive in the United States for a major transportation/transit agency. Broken out by category, they are as follows:

i. Tunnel Rates: NYMTA's longitudinal rates for its tunnels across the East River are as follows:

NYMTA Tunnel Rates	288 Strands or Less	289-432 Strands	433-576 Strands	577-864 Strands
	$36.54	$44.98	$53.98	$73.73

ii. Special Non-Comparable Rates: NYMTA developed rates for occupancies in and around Grand Central Terminal and for the 3.3 mile long Park Avenue Tunnel. These rates were considered so exceptional because of the unique properties that they are not included as comparables in this report. They are not relevant to this survey, but we will be more than happy to discuss them with you.

iii. Manhattan Longitudinal Fiber Optic Rates: NYMTA has two categories for longitudinal occupancies in Manhattan. The reason for this is that lower Manhattan (below 59th Street) has a larger concentration of financial and business sector buildings than upper Manhattan (above 59th Street). The rates are as follows:

a. Aerial Fiber Optic Rates: Per-Foot-Per-Year

Almost all utilities are in underground facilities in Manhattan. Nevertheless, there are aerial pedestrian walkways, bridges, tunnels and other structures than can support aerial facilities. We therefore have included NYMTA aerial rates to provide a complete, comprehensive rate structure.

	BELOW 59TH STREET	ABOVE 59TH STREET
1 fiber cable	$ 10.00	$7.50
2 fiber cables	$ 12.50	$9.00
3 fiber cables	$ 15.00	$11.00
4/fiber cables	$ 17.50	$12.50
Premium (%)		
Fiber Cable over 216 strands	50%	50%

iv. NYMTA Underground Fiber Optic Rates/Existing Conduit

ZONE	RATE PER-FOOT PER-YEAR	MULTIPLIER*
Below 59th Street	$20.00	.0175 per-strand
Above 59th Street	$15.00	.0150 per-strand

* Multiplier is per-strand charge for each additional fiber above 288-strand NYMTA standard size; up to and including a 432-strand cable. Above that strand count, NYMTA should conduct separate negotiations

v. Other NYMTA Longitudinal Rates: NYMTA then developed rates, using three zones, for occupancies outside of Manhattan, i.e., those less-populated, less-business-oriented (compared to Manhattan) areas that include the five boroughs, Connecticut and New Jersey served by Metro North Rail Road, the Long Island Railroad and New York City Transit. Those rates are as follows:

(a.) Aerial Fiber Optic Cabling: Per-Foot-Per-Year

	ZONE 1 (URBAN)	ZONE 2 (SUBURBAN)	ZONE 3 (EXURBAN)
1 fiber cable	$ 2.00	$1.50	$ 1.00
2 fiber cables	$ 2.50	$2.00	$ 1.50
3 fiber cables	$ 3.00	$2.50	$ 1.75
4 fiber cables	$ 4.00	$3.00	$ 2.00
Premium (%)			
-Fiber Cable over 216 strands	50%	50%	50%

(b.) NYMTA Underground Fiber Optic Rates/Existing Conduit

ZONE	RATE PER-FOOT PER-YEAR	MULTIPLIER*
1 (Urban)	$4.00	.0175 per-strand
2 (Suburban)	$2.50	.0150 per-strand
3 (Exurban)	$1.50	.0110 per-strand

* Multiplier is per-strand charge for each additional fiber above the 288-strand MTA cable standard, up to and including a 432 strand cable. Above 432, NYMTA or specific agency conducts separate negotiations

vi. Transverse Crossings: NYMTA charges a flat fee of $1500 per year for lateral occupancies, up to 100 feet. Longer occupancies are negotiated on a case-by-case basis.

vii. Dark Fiber Rates: New York MTA does not have any dark fiber in Manhattan. Long Island Railroad and Metro North, two of the agencies under NYMTA aegis, do have fiber in outlying areas of Long Island and Connecticut. The following are the rates for these areas:

- Zone 1 (Urban): $125 per FMM ($1,500 per-year)
- Zone 2 (Suburban): $75 per FMM (($900 per-year)
- Zone 3 (Exurban): $60 per FMM ($500 per-year)

NYMTA really provides a glimpse of the high end of the FMV fiber optic marketplace. Only the low end Exurban rates were considered for VTrans comparables.

4. BART

a. Longitudinal Per-Linear-Foot-Per-Year Rates

BART has recently raised its rates for its most expensive route, through the Trans Bay Tube ("TBT") that separates San Francisco and Oakland, to $14.53 per-linear-foot-per-year ("PLFPY," the standard measurement for the industry) for fiber cabling up to a maximum of a 216-strand cable. Any cable above that strand count requires a separate negotiation. BART considers the TBT to be a classic "choke point." There is almost no way for a telecommunications carrier to get around this passageway from Oakland to San Francisco without incurring large construction costs, time delays, multiple permit and licensing fees and other costs. Eleven carriers are in the TBT (AT&T has three 864-strand cables with an option to install two more.), paying premium rates.

Those rates were established at the beginning of the fiber optic licensing program in 1995, when a base rate of $7 PLPFPY was set for a standard 216-strand cable. Volume discounts were offered for larger strand cables. The premium was based on a survey of other agencies and their standard rates. BART then determined that a doubling of the average suburban rate ($3.50 PLFPY) was FMV for TBT occupancy.

BART applies a 4% COLA to its agreements.

b. Longitudinal Fiber Optic Rates, Per-Foot-Per-Year

	ZONE 1 (TBT)	ZONE 2 (SUBURBAN)	ZONE 3 (EXURBAN)
216 strand cable	$14.53	$7.20	$3.58
More than 216 strand cable	Separate negotiation	Separate negotiation	Separate negotiation

c. Transverse Crossings: BART has never developed a formal set of rates for these types of occupancies. The agency generally charges $500 for a lateral; but may elect to charge more if the occupancy is longer than 50 feet.

d. Dark Fiber Rates: This agency has some dark fiber located in the TBT as the result of the bankruptcy of a tenant carrier in 2004. Most of the dark fiber has been licensed to a WiFi company (WiFi Rail) to provide connections for TBT WiFi service as well as support BART's CCTV security cameras. BART will not disclose the rate paid by this company. Two other transactions were between BART and carriers for $60 PFPMPM. We were unable to discern the background information and research necessary to develop this dark fiber rate. We therefore consider it an outlier for our appraisal purposes

5. TriMet (Portland, OR)

TriMet has a comprehensive program that was developed in 2006. It covers lateral and longitudinal occupancies of all types. As with Sacramento RT, TriMet and its Portland MSA—particularly the Suburban and Exurban rates—were determined to be useful comparables for developing the VTrans rates and zones. TriMet personnel have asked that their rate structure be kept as confidential as possible. The agency's 2014 rates are as follows:

a. Underground Fiber Optic Rates/Existing Conduit

ZONE 1 (URBAN)	SPECIFIC LOCATION	RATE PER-FOOT PER-YEAR	MULTIPLIER*
-Red Line	Downtown Portland	$5.75	1.75 per-strand
-Blue Line(1)	Portland City Limits to Beaverton	$4.00	1.50 per-strand
-Blue Line (2)	Portland City Limits to Gateway East	$4.00	1.25 per-strand
-Yellow Line	Portland City Limits to Expo Center	$4.00	1.25 per-strand
Zone 2 (Suburban)			
-Red Line	Portland City Limits to Beaverton	$4.00	1.1 per-strand
-Blue Line	Gateway East to Gresham	$2.30	1.1 per-strand
-Lake Oswego Area Streetcar		$1.75	1.1 per-strand
Zone 3 (Exurban)			
-Beaverton to Wilsonville		$1.20	1.1 per-strand
-Willamette Extension		$1.20	1.1 per-strand

Multiplier is per-strand charge for each additional fiber above 216 (industry standard) strands and 432 strand cable (next industry standard cable size). Above 432, Tri-Met conducts separate negotiations. (216-strand cable is minimum price/rate for any installation.).

(Congestion Rate, i.e., doubling of existing rate, should be applied to any location where only one innerduct remains available in a conduit system.)

b. Transverse Crossings

This agency has a full set of rates for all types of transverse crossings by all types of occupancies, including fiber optic cabling, pressurized, non-pressurized pipeline systems.

For transverse crossing of fiber optics facilities, up to 100 feet, the TriMet rates are as follows:

Underground Fiber Optic Rates, Per-Year-Per-Cable (Raw Land/Installed by Carrier)

	ZONE 1 (URBAN)	ZONE 2 (SUBURBAN)	ZONE 3 (EXURBAN)
108 strand (or less) cable (minimum size)	$ 900.00	$600.00	$237.50
216 strand cable	$1400.00	$924.00	$370.00
432 strand cable	$2500.00	$1650.00	$660.00
More than 432 strand cable	Separate negotiation	Separate negotiation	Separate negotiation
Extra (odd number) of strands:			
-Above 108 strands (to 215)	Add 10 cents per strand	Add 10 cents per strand	Add 10 cents per strand
-Above 216 strands (to 431)	Add 7.5 cents per strand	Add 7.5 cents per strand	Add 7.5 cents per strand

6. Sacramento RT

The Greater Sacramento MSA comprises almost 2 million people with its epicenter in the state capital. It consists of seven counties, however, with several that are very sparsely populated—much like much of Vermont. We therefore found Sacramento RT rates for Suburban and Exurban areas of to be most useful.

SacRT has a comprehensive set of rates, not only for fiber, but for pipelines of all sizes, electrical cabling, etc. All of these occupancies provide revenues for the agency. The zones in and around the center of Sacramento were used to develop the zones for the VTrans fiber optic map/rates.

a. Aerial: Longitudinal Fiber Optic Cable, Fixed, Per-Year

	ZONE 1	ZONE 2	ZONE 3
1 cable	$265.00	$132.00	$ 66.00
2 cables	$340.00	$170.00	$ 85.00
3 cables	$400.00	$200.00	$100.00
4cables	$420.00	$210.00	$105.00
Premium (%)			
-Fiber cable w/ more than 216 strands	$1.50 per-strand		

b. Underground Fiber Optic Cable Rates, Per-Year-Per-Cable (Raw Land/Installed by Carrier)

ZONE	RATE PER-FOOT PER-YEAR	MULTIPLIER*
1 (Urban)	$4.00	1.75 per-strand
2 (Suburban)	$2.50	1.50 per-strand
3 (Exurban)	$1.50	1.1 per-strand

* Multiplier is per-strand charge for each additional fiber above 216 (industry standard) strands and 432 strand cable (next industry standard cable size). Above 432, Sac RT conducts separate negotiations. (216-strand cable is minimum price/rate for any installation.).

c. Transverse Crossings

The following are rates for transverse crossings of Sacramento RT ROW.

Aerial: Fiber Optic Cable, Fixed, Per-Year

	ZONE 1	ZONE 2	ZONE 3
1 cable	$265.00	$132.00	$ 66.00
2 cables	$340.00	$170.00	$ 85.00
3 cables	$400.00	$200.00	$100.00
4cables	$420.00	$210.00	$105.00
Premium (%)			
-Fiber cable w/ more than 216 strands	$1.50 per-strand		

Underground Fiber Optic Cable Rates, Per-Year-Per-Cable (Raw Land/Installed by Carrier)

	ZONE 1 (URBAN)	ZONE 2 (SUBURBAN)	ZONE 3 (EXURBAN)
108 strand (or less) cable (minimum size)*	$ 900.00	$600.00	$300.00
216 strand cable	$1400.00	$920.00	$470.00
432 strand cable	$2400.00	$1600.00	$800.00
More than 432 strand cable	Separate negotiation	Separate negotiation	Separate negotiation
Extra (odd number) of strands:			
-Above 108 strands (to 215)	Add 10 cents per strand	Add 10 cents per strand	Add 10 cents per strand
-Above 216 strands (to 431)	Add 7.5 cents per strand	Add 7.5 cents per strand	Add 7.5 cents per strand

* Also applicable to undivided flexible conduit or other medium of comparable size, e.g., coaxial cabling.

7. Burbank Water & Power (BWP): Dark Fiber Rates

The City of Burbank, California was charging $3.75 per-linear-foot-per-year for fiber optic cabling (216-strand standard) access by CLECs to its city streets—until a recent California state decision (the *City of Riverside decision,* 2004*)* effectively ended the ability of California cities to charge for access into their ROW. BWP, however, maintains a highly successful dark fiber program. In existence for ten years, this program was initially justified as a more efficient means of monitoring electrical cables, sub stations and other parts of the BWP power grid. When fiber cabling was placed in the system, surplus conduit and fibers were also put in.

BWP has been licensing dark fiber at a rate of $2,100 per-fiber-per-per-mile-per year (FPFMY). Revenues have exceeded $1 million per year for the last three years. With the major headquarters and studios for Disney, Fox and NBC located in Burbank, the business case for the dark fiber rentals was not a difficult one to make within the city.

8. Silicon Valley Power (SVP): Dark Fiber Rates Only

SVP fiber lease rates are negotiated based on long-term fiber lease terms (i.e. 3, 5, 10 and 20-year leases), fiber mileage, and number of fibers leased. Under the fiber lease agreement, customers pre-pay quarterly to lease fiber. Customers pay construction fees for connection to the network. Quarterly lease fees are adjusted annually for CPI. SVP also offer a 15% discount for up-front payments. Actual lease fees range from $95/fiber mile/month to $200/ fiber mile/month, depending upon strands available to the specific location and distance of the connection.

SVP does provide service to clients outside (generally immediately adjacent) of their service area. They used an RFP process to select a qualified fiber optic installer/construction company. SVP uses this approach to avoid using a CLEC/reseller for the "last mile" connection between a client's facilities inside and outside of its service area. (The latter approach would result in a marked diminution of potential revenues for SW.). The selected installer (Daleo, Inc.) follows standard encroachment permitting process for any work in Santa Clara city streets or adjacent, County-owned ROW. No concerns from carriers have arisen in the last decade, when SVP adopted this practice.

VI. APPRAISAL FACTORS and METHODOLOGIES

The following information is offered to provide the rationale and foundation for our approach to determining FMV for our clients. This section is specific to the factors taken into consideration in developing a fiber optic proposal.

A. Telecommunications Industry Factors Affecting Fair Market Value

The following section deals exclusively with factors related to development of fiber optic rates for access into VTrans ROW for members of the telecommunications and cable television industries.

1. Traditional Valuation: The "Club"

Although easements, leases, licenses, indefeasible rights of use ("IRU"s) and other contractual arrangements that convey interests in land are sometimes recorded, their true, fair market value are generally not available to the public. Simply put, the various carriers of the fiber optic/carrier industry consider them highly proprietary. If there were an organized market (or trustworthy Internet database) that published rates for all commercially available ROW, the valuation process would be vastly facilitated. Unfortunately, no such market or database exists.

Custom and practice between carriers therefore often determine industry valuations of ROW. Swaps and barters of ROW are common. Knowledgeable "old hands" in the ROW game change employment, and are now lured to new companies by rapacious "headhunters." This close-knit club, as well as their arcane practices, therefore often operates to the detriment of public agencies that have marketable ROW.

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2. Valuation Factors: The Tangibles

In the telecommunications business, the competitive value of a ROW-owner's various assets depends on:

- The direct costs to the carrier(s) of leasing or licensing alternative approaches and properties, and;
- Other factors, e.g., terrain problems, "choke points", etc. that cause variations in the costs and benefits of installing infrastructure on the ROW-owner's properties.

Tangible factors that determine fair market for value, and variations in value, for a ROW-owner's properties include the following:

a. Location: Whether a ROW-owner's properties are in urban, suburban, exurban and rural areas—or some mix of all—have significance in determining fair market value. The cost of alternatives to these assets, i.e., a carrier assembling and leasing individual parcels of land, or leasing access along an adjacent railroad longitudinal ROW, is the major cost factor in industry determination of whether to negotiate with an ROW-owner or not.

Vermont's "Location" poses several problems. The State has already been bypassed by major north-south fiber optic networks and carriers—running from Montreal down through New York. Another route, from Canada to Boston and points south bypassed Vermont and used New Hampshire and Massachusetts roadways. These actions occurred over the last 15 years. No new large scale projects are planned for this area that might use VTrans ROW.

The TDI dark fiber appears to be "Stranded" and not of much use to anyone, unless the State builds a larger, concentric ring network throughout the rest of the State. This project, providing major broadband throughout Vermont, is an admirable project. The cost may, however, be prohibitive.

Vermont's famous rocky infrastructure poses significant financial costs for any carrier or other public utility proposing to use Limited Access (or any other) Highways. In interviews with VTrans personnel as well as interviewed public utilities, we confirmed estimates of four to five times the low end national average for underground fiber optic network construction.

b. Allocation of financial responsibility for unplanned events and the risk of damage and relocation: The chance that an unplanned event may actually occur figures significantly in financial calculations of all types of telecommunications carriers. The greater the risk assumed by a carrier—particularly if a ROW-owner demands unilateral terms and conditions (e g., unilateral rights to force a relocation of fiber optic conduit without consideration)—the less the value of the contractual relationship to the carrier.

c. Term of the contract: The longer the contract, the greater the guaranteed use by the telecommunications carrier. Although shorter contracts may be renewed and extended into longer-term contracts, the risk of non-renewal does increase financial risk.

Industry demands have changed, however, over the past few years. Fiber optics companies were accustomed to in perpetuity easements fifteen years ago. Now, a twenty- year lease/license term with the option to re-negotiate fair market value before granting an extension, has become standard for longitudinal ROW arrangements.

Lateral entries into ROW are also affected by the term. While telecommunications carriers insist on longer terms, i.e., similar to their longitudinal access arrangements, custom and practice with transit agencies (See our findings below) indicate they will accept shorter terms. Month-to-month, and/or stringent relocation terms that favor the transit agency are common practice and reluctantly accepted by fiber optic network owners.

d. Proximity to population centers: The closer a ROW-owner's properties are to a major metropolitan area, or to other population centers or destinations, the more value it has for the carrier. Sites or ROW in rural, un-travelled areas, because of the sparse population are commensurately less valuable.

Half of the State's population located around or in the Burlington/South Burlington MSA. This accounts for the Zone Map we designed for ratemaking purposes.

e. Proximity to major thoroughfares: Major thoroughfares are of major interest to wireline carriers because they invariable connect (some albeit over greater distances) large population hubs. Most state transportation agencies have either statutory preclusions, or agency rules, that prevent carriers from entering their ROW, except on a lateral, incidental basis. Other, private owners of large tracts of longitudinal ROW (e.g., railroads), particularly if these tracts traverse distances between large metropolitan areas, will command a higher market value.

f. Creating an effective, error-free network: For the wireline telecommunications industry, an effective network is one that has redundancy. Carriers have a great concern, often substantiated by excavation projects that break their cables, that service will be interrupted. Carriers' clients will then either terminate their contracts or sue for damages (assuming something more than third party negligence). Neither of these options is acceptable to a telecommunications company in a very competitive marketplace.

Fiber optic networks are therefore designed in ring patterns. If a signal is cut at one point, it can be re-routed (e. g., an original signal moving clockwise can be re-routed in a counterclockwise fashion.) using the sophisticated, "self-healing" ability of current fiber networks. Fiber networks have the capacity to monitor themselves—and re-route signals—on an almost instantaneous basis. Redundancy, or diversity as it is also known, is a key component of every fiber optic network's development.

g. Timing: This is an implicit, yet extremely important factor because the demand for ROW of any kind strengthens or weakens as market situations shift, competition changes and new technology emerges. We have observed several, lucrative deals that simply "went away" because a public agency was not able to reach a decision within a timeframe that was required by marketplace conditions.

B. Valuation Methods for Telecommunications Occupancies

Traditional Appraisal Methodologies

In the development of all types of telecommunications/public agency relationships involving ROW, the parties are almost always negotiating terms and conditions for a possessory interest in the properties of the large ROW-owner. The value of such interest can be ascertained by the use of one of several, standard approaches. The basic approaches are:

1. Traditional Real Estate Appraisals

Traditional real estate appraisals employ three approaches to valuation: the cost, market and income approaches. We believe these traditional approaches have limited utility in evaluating lengthy, longitudinal or lateral ROW and properties—particularly for

telecommunications ventures. They are more often than not too static in their approach to dynamic, highly competitive market conditions. They are also based on traditional land valuations that do not reflect the true value to a carrier with a highly specialized use for the proposed occupancy/license/lease of ROW. These methodologies must, however, be understood before any reasonable alternatives or approaches can be developed by a ROW-owner. Briefly, the traditional appraisal approaches are as follows:

a. Cost Approach: The cost approach rests upon the principle of substitution, which acknowledges that the value of an item is limited by the cost of reproducing or replacing it. By measuring the costs associated with procuring acceptable substitutes for a particular asset, it is possible to draw inferences regarding the price a rational buyer is willing to pay for a particular asset. Its counterpart, discussed below, is the valuation of adjacent land.

b. Market Approach: The market approach is frequently used to determine the value of assets that are routinely traded between buyers and sellers. The value of an asset is reflected in the prices paid by buyers and accepted by sellers for similar items in contemporary arm's length transactions. The value of the possessory interest is necessarily based upon the land actually occupied and the uses to which the property is subjected.

The market approach rests upon the willingness of buyers and sellers to evaluate prices in view of the determinations and actions of other, willing and informed buyers and sellers of comparable property. This valuation methodology is quite useful in instances where assets are traded in a broad, undifferentiated and active market. The market approach has some, limited utility for large ROW-owners, if understood and employed correctly.

c. Income Approach: A third valuation methodology is the income approach. The income approach employs the principles of investment theory to measure the value of an asset using the income it is expected to generate.

The relationship between the amount of income attributable to a particular asset and its market value is affected by such considerations as growth expectations, the time value of money, inflation, risk, potential for appreciation or depreciation, and the period during which income is anticipated. The income approach typically quantifies these elements through a mathematical analysis of an income stream, incorporating appropriate capitalization rates, horizon periods, terminal values, and the like. The quantitative process is often referred to as "capitalization."

This approach is commonly used to determine the value of business enterprises, as well as individual assets to which it is possible to ascribe specific income streams. This methodology, for example, is useful in establishing the values of such assets as annuities, commercial rental properties and restaurants. It has only marginal utility for transactions between carriers and ROW-owners.

2. Other Valuation Techniques

Large-scale owners of longitudinal ROW have generally been frustrated when they have employed traditional real estate appraisers. These experts' techniques simply do not provide the proper context for more dynamic resource sharing arrangements and concomitant negotiations. The following is an analysis of the more specialized approaches employed by ROW-owners to date. They are:

a. Competitive Auction: In theory, if the number of buyers/lessees/licensees (licensees, hereinafter) exceeds the number of contracts to be awarded, bidding in a competitive auction can be used to make a selection and to establish compensation levels. This is the approach used by the FCC in its auctions for available bandwidth to the wireless industry that has created the demand for the public agencies' lands and ROW. This is a public agency approach, however, generally mandated by statute that does not work particularly well with private landowners and their assets.

b. Valuation of Adjacent Land (also Known as Across the Fence, or ATF) and the Next Best Alternative: This methodology is a variation on the market approach traditionally employed by real estate appraisers. Proximate or adjacent property values are useful as a guide to a ROW-owner's property values. It is misleading, however, to simply correlate the real estate costs of easements or other property rights on adjacent land and assume fair market value has been achieved.

This methodology ignores cost differentials in constructing fiber optic conduit systems over various terrains (Boring through mountains is more expensive, by an order of magnitude, than trenching through flat land.). This methodology also fails to illustrate the economies of scale that can be achieved by negotiating a single longitudinal access agreement with one large ROW-owner, as opposed to negotiating a number of individual, one-time transactions. Thus the argument that carriers can always "go next door" is only partially true. Their true costs of "going next door" to construct a comparable fiber optic/wireline network can be significantly higher—if a carrier must negotiate a series of one-time agreements with a variety of private and or public property owners.

c. Historical Experience: Historical precedents, where sufficient data are available, have provided a sound valuation approach in the private sector. This technique serves the fiber optics carriers well. A carrier will often construct a system with more ducts than is needed; expressly intending to fill the empty ducts with competitors' fiber and defray its costs. Over time, this industry has therefore developed-at least for the non-dominant companies such as Verizon, AT&T and Comcast—a series of relationships, trade-offs and reciprocity arrangements that are mutually beneficial. They do not, however, extend these same courtesies, and information, to large, ROW owners.

For these owners, historical precedent has proved to be problematic at best. First, data from previous, completed transactions may understate the licensee's willingness to pay. That is, the terms and conditions of completed agreements indicated only that private licensees were willing to pay a given level at a particular point in time. But the

compensation paid may be less (or more) than they are actually prepared to pay the particular large ROW-owner now.

Second, the telecommunications marketplace has changed significantly in the last few years. There was a major "boom" in the industry, at all levels, from the late 1980's to the "Dot Com Bust" that occurred in early 2001. One might assume that ROW rates have been depressed since then. That is not the case, according to our findings, discussed below. ROW rates have been either stable or risen in the last three years for major government agency ROW owners—completely repudiating the conventional wisdom that they should adjust to the marketplace.

Third, several large ROW-owners, primarily public government agencies and investor-owned public utilities, have entered into long term, fixed agreements without conducting market surveys or even minimal investigations as to what rates for comparable sites or ROW really are. Other ROW-owners that subsequently rely upon these historical data re-commit the same sin by undervaluing their assets.

Nonetheless, historical precedent, particularly if it is investigated and queried fully, is a better guide than none at all—and provides a useful starting point for ROW transactions.

d. Market Research: The value of a ROW-owner's properties is ultimately determined by the willingness of telecommunications carriers to pay fair market value. One method of determining that willingness is to interview all potentially interested carriers. Their estimates of the needed ROW may be indicative of industry demand. The problem with this technique is the conflicting motives of the carriers. Although they may wish to develop some or the entire ROW in question, it is certainly not in their best economic interests to give any indication of the fair market value of the ROW or other terms and conditions they are willing to offer in negotiations.

Carriers' best interests are served by overstating their objectives and insisting on the lowest rates and most favorable terms and conditions, e. g., demanding a 50 year contract term instead of a 10 - 20 year term with a number of option years

e. Empirical Evidence and Studies: This type of research—speaking candidly to a ROW-owner's counterpart(s)—has been used as a successful appraisal technique primarily in the last ten to fifteen years. Dedicated ROW owners have been able to obtain empirical evidence simply because more and more terms and conditions are being negotiated with private communications carriers all the time—the result of increased competition and demand for ROW and specific routes property from the telecommunications industry.

KC&A maintains an ongoing database of market rates and other activities, primarily updated through client-specific surveys. A typical survey for a client will involve interviews of from eight to twenty comparable companies or government agencies. The results and concomitant recommendations are forwarded to the client.

In summary, we have found that comprehensive market research provides the most reliable, empirical information needed to truly develop a successful ROW licensing program.

VII. CONCLSIONS

This concludes our analysis and recommendations for VTrans regarding fiber optic occupancies in various, designated ROW. Should you have any questions or concerns, please do not hesitate to contact us.

Submitted by:

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EVERSOURCE ENERGY NYSE-ES

RECENT PRICE **59.35** | P/E RATIO **19.1** (Trailing: 19.7 Median: 17.0) | RELATIVE P/E RATIO **0.97** | DIV'D YLD **3.3%** | **VALUE LINE**

TIMELINESS 3 Lowered 6/10/16
SAFETY 1 Raised 5/22/15
TECHNICAL 3 Lowered 5/19/17
BETA .65 (1.00 = Market)

2020-22 PROJECTIONS

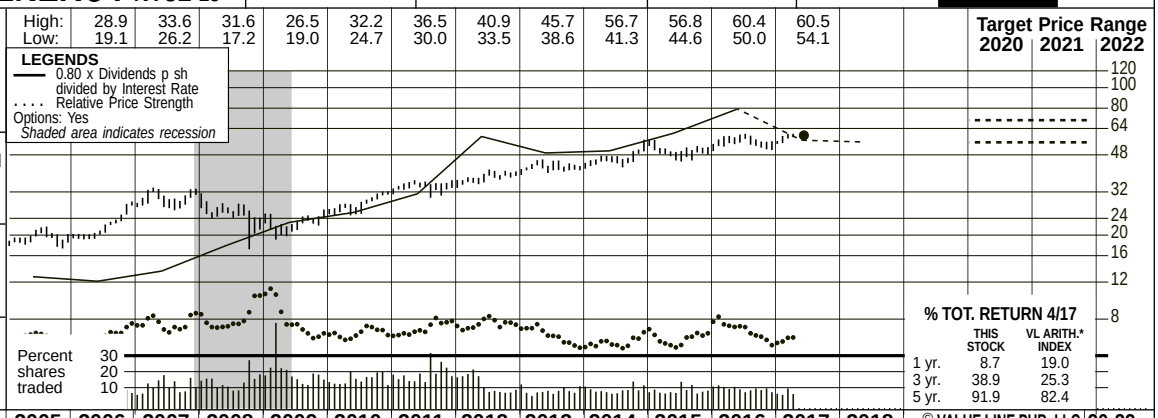
	Price	Gain	Ann'l Total Return
High	70	(+20%)	*8%*
Low	55	(-5%)	*2%*

Insider Decisions

	J	A	S	O	N	D	J	F	M
to Buy	0	0	1	0	0	0	0	0	0
Options	1	0	0	1	0	0	12	9	2
to Sell	0	0	1	0	1	0	0	3	3

Institutional Decisions

	2Q2016	3Q2016	4Q2016
to Buy	277	254	260
to Sell	205	226	244
Hld's(000)	222452	219375	223907



2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	© VALUE LINE PUB. LLC	20-22
52.82	40.89	47.53	51.82	41.85	44.64	37.27	37.22	30.97	27.76	25.21	19.98	23.16	24.42	25.08	24.11	***24.00***	***24.45***	Revenues per sh	***27.25***
10.48	6.32	5.80	5.00	5.46	3.69	4.82	6.16	4.96	5.68	4.88	4.03	5.22	4.56	4.94	5.46	***5.80***	***6.25***	"Cash Flow" per sh	***7.50***
1.37	1.08	1.24	.91	.98	.82	1.59	1.86	1.91	2.10	2.22	1.89	2.49	2.58	2.76	2.96	***3.10***	***3.30***	Earnings per sh [A]	***4.00***
.45	.53	.58	.63	.68	.73	.78	.83	.95	1.03	1.10	1.32	1.47	1.57	1.67	1.78	***1.90***	***2.00***	Div'd Decl'd per sh [B] ■	***2.30***
3.40	3.86	4.31	4.85	5.89	5.49	7.14	8.06	5.17	5.41	6.08	4.69	4.62	5.06	5.44	6.24	***8.55***	***8.75***	Cap'l Spending per sh	***5.25***
16.27	17.33	17.73	17.80	18.46	18.14	18.65	19.38	20.37	21.60	22.65	29.41	30.49	31.47	32.64	33.80	***35.00***	***36.35***	Book Value per sh [C]	***41.00***
130.13	127.56	127.70	129.03	131.59	154.23	156.22	155.83	175.62	176.45	177.16	314.05	315.27	316.98	317.19	316.89	***316.89***	***316.89***	Common Shs Outst'g [D]	***316.89***
14.1	16.1	13.4	20.8	19.8	27.1	18.7	13.7	12.0	13.4	15.4	19.9	16.9	17.9	18.1	18.7	*Bold figures are Value Line estimates*		Avg Ann'l P/E Ratio	***15.5***
.72	.88	.76	1.10	1.05	1.46	.99	.82	.80	.85	.97	1.27	.95	.94	.91	.99			Relative P/E Ratio	***.95***
2.3%	3.0%	3.5%	3.3%	3.5%	3.3%	2.6%	3.2%	4.2%	3.6%	3.2%	3.5%	3.5%	3.4%	3.3%	3.2%			Avg Ann'l Div'd Yield	***3.7%***
5822.2	5800.1	5439.4	4898.2	4465.7	6273.8	7301.2	7741.9	7954.8	7639.1	***7600***	***7850***	Revenues ($mill)	***8650***
251.5	296.2	335.6	377.8	400.3	533.0	793.7	827.1	886.0	949.8	***990***	***1065***	Net Profit ($mill)	***1300***
30.3%	29.7%	34.9%	36.6%	29.9%	34.0%	35.0%	36.2%	37.9%	36.9%	***37.5%***	***37.5%***	Income Tax Rate	***37.5%***
13.9%	15.8%	4.6%	7.1%	8.6%	2.3%	1.4%	2.4%	2.9%	3.9%	***5.0%***	***4.0%***	AFUDC % to Net Profit	***2.0%***
59.2%	60.4%	57.2%	55.1%	53.4%	43.7%	44.3%	45.9%	45.6%	44.8%	***45.5%***	***46.0%***	Long-Term Debt Ratio	***47.5%***
39.2%	38.1%	41.5%	43.6%	45.3%	55.4%	54.8%	53.2%	53.6%	54.4%	***53.5%***	***53.0%***	Common Equity Ratio	***52.0%***
7431.1	7926.2	8629.5	8741.8	8856.0	16675	17544	18738	19313	19697	***20675***	***21700***	Total Capital ($mill)	***25000***
7229.9	8207.9	8840.0	9567.7	10403	16605	17576	18647	19892	21351	***23350***	***25350***	Net Plant ($mill)	***28500***
5.0%	5.4%	5.4%	5.8%	5.9%	4.2%	5.5%	5.3%	5.5%	5.8%	***5.5%***	***6.0%***	Return on Total Cap'l	***6.0%***
8.3%	9.4%	9.1%	9.6%	9.7%	5.7%	8.1%	8.2%	8.4%	8.7%	***9.0%***	***9.0%***	Return on Shr. Equity	***10.0%***
8.4%	9.6%	9.2%	9.8%	9.8%	5.7%	8.2%	8.2%	8.5%	8.8%	***9.0%***	***9.0%***	Return on Com Equity [E]	***10.0%***
4.3%	5.3%	4.7%	5.0%	5.0%	1.6%	3.4%	3.5%	3.4%	3.5%	***3.5%***	***3.5%***	Retained to Com Eq	***4.5%***
50%	45%	50%	49%	50%	72%	59%	58%	61%	60%	***62%***	***60%***	All Div'ds to Net Prof	***57%***

CAPITAL STRUCTURE as of 3/31/17
Total Debt $11017 mill. **Due in 5 Yrs** $4675.7 mill.
LT Debt $9267.9 mill. **LT Interest** $370.7 mill.
(LT interest earned: 4.9x)
Leases, Uncapitalized Annual rentals $14.1 mill.
Pension Assets-12/16 $4076.0 mill.
Oblig $5242.3 mill.
Pfd Stock $155.6 mill. **Pfd Div'd** $7.6 mill.
Incl. 2,324,000 shs $1.90-$3.28 rates ($50 par) not subject to mandatory redemption, call. at $50.50-$54.00; 430,000 shs 4.25%-4.78% not subject to mandatory redemption, call. at $102.80-$103.63.
Common Stock 316,885,808 shs. **as of 4/30/17**
MARKET CAP: $19 billion (Large Cap)

ELECTRIC OPERATING STATISTICS

	2014	2015	2016
% Change Retail Sales (KWH)	-1.6	+.3	-1.8
Avg. Indust. Use (MWH)	NA	NA	NA
Avg. Indust. Revs. per KWH (¢)	6.14	5.86	6.04
Capacity at Peak (Mw)	NA	NA	NA
Peak Load, Winter (Mw)	NA	NA	NA
Annual Load Factor (%)	NA	NA	NA
% Change Customers (yr-end)	NA	NA	NA
Fixed Charge Cov. (%)	426	447	436

ANNUAL RATES of change (per sh)

	Past 10 Yrs.	Past 5 Yrs.	Est'd '14-'16 to '20-'22
Revenues	-6.0%	-2.5%	*2.0%*
"Cash Flow"	.5%	-.5%	*7.0%*
Earnings	12.0%	6.0%	*6.5%*
Dividends	9.5%	10.5%	*5.5%*
Book Value	6.0%	8.5%	*4.0%*

QUARTERLY REVENUES ($ mill.)

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2014	2290	1677	1892	1881	7741.9
2015	2513	1817	1933	1691	7954.8
2016	2056	1767	2040	1776	7639.1
2017	2105	***1795***	***1900***	***1800***	***7600***
2018	***2200***	***1850***	***1950***	***1850***	***7850***

EARNINGS PER SHARE [A]

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2014	.74	.40	.74	.69	2.58
2015	.80	.65	.74	.57	2.76
2016	.77	.64	.83	.72	2.96
2017	.82	***.70***	***.85***	***.73***	***3.10***
2018	***.90***	***.75***	***.90***	***.75***	***3.30***

QUARTERLY DIVIDENDS PAID [B] ■

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2013	.367	.367	.367	.367	1.47
2014	.393	.393	.393	.393	1.57
2015	.417	.417	.418	.418	1.67
2016	.445	.445	.445	.445	1.78
2017	.475				

BUSINESS: Eversource Energy (formerly Northeast Utilities) is the parent of utilities that have 3.1 million electric, 504,000 gas customers. Supplies power to most of Connecticut and gas to part of Connecticut; supplies power to three fourths of New Hampshire's population; supplies power to western Massachusetts and parts of eastern Massachusetts & gas to central & eastern Massachusetts. Acquired NSTAR 4/12. Electric revenue breakdown: residential, 52%; commercial, 36%; industrial, 5%; other, 7%. Fuel costs: 33% of revenues. '16 reported deprec. rate: 3.0%. Has 7,800 employees. Chairman: Thomas J. May. President & CEO: James J. Judge. Inc.: Massachusetts. Address: 300 Cadwell Drive, Springfield, MA 01104. Tel.: 413-785-5871. Internet: www.eversource.com.

Eversource's utilities in Massachusetts have electric rate cases pending. The utilities in the eastern and western parts of the state are seeking a total increase of $96 million, based on a return of 10.5% on a common-equity ratio of 53.3%. The utility in eastern Massachusetts is also asking for the institution of a regulatory mechanism that decouples electric revenues and volume, similar to what its counterpart in the Bay State already has. An order is due in time for new tariffs to take effect at the start of 2018.

Eversource has postponed the electric rate case it was required to file in Connecticut. The application had been planned for the start of June, with new rates taking effect six months later. Instead, the utility will file a case in late 2017, which will be effective in midyear.

Earnings will probably advance nicely in 2017 and 2018. Each year, Eversource benefits from spending on its transmission system. (More on this below.) The company is effecting reductions in operating and maintenance expenses. Heating customers are converting from oil to gas. Finally, Eversource should receive some rate relief next year. Our 2017 earnings estimate is within management's targeted range of $3.05-$3.20 a share.

Eversource got some potentially good news affecting its transmission business. Transmission customers have made four complaints with the Federal Energy Regulatory Commission, stating that allowed ROEs for transmission owners in New England are too generous. FERC agreed, and lowered the allowed ROE based on the first complaint. However, a federal court has vacated this ruling, stating that FERC had to demonstrate why the previous allowed ROE was unreasonable. This is significant, considering that Eversource plans to spend $3.9 billion on its transmission system from 2017 through 2020. Every tenth of a percentage point change in the allowed ROE for transmission affects the company's net profit by $3 million. Thus, our estimates and projections might prove conservative.

This top-quality stock has a dividend yield and 3- to 5-year total return potential that are close to the utility averages.

Paul E. Debbas, CFA *May 19, 2017*

(A) Dil. EPS. Excl. nonrec. gains (losses): '02, 10¢; '03, (32¢); '04, (7¢); '05, ($1.36); '08, (19¢); '10, 9¢. '14 EPS don't add due to rounding. Next earnings report due early Aug. **(B)** Div'ds historically paid late Mar., June, Sept., & Dec. ■ Div'd reinvest. plan avail. **(C)** Incl. def'd chgs. In '16: $22.59 sh. **(D)** In mill. **(E)** Rate all'd on com. eq. in MA: (elec) '11, 9.6%; (gas) '16, 9.8%; in CT: (elec.) '15, 9.02%; (gas) '15, 9.5%; in NH: '10, 9.67%; earned on avg. com. eq., '16: 9.0%. Regulatory Climate: CT, Below Avg.; NH, Avg.; MA, Above Avg.

Company's Financial Strength	A
Stock's Price Stability	100
Price Growth Persistence	80
Earnings Predictability	80

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 15-464

Date Request Received: 06/19/2017 **Date of Response: 07/07/2017**
Request No. OCA 1-001 **Page 1 of 1**
Request from: Office of Consumer Advocate

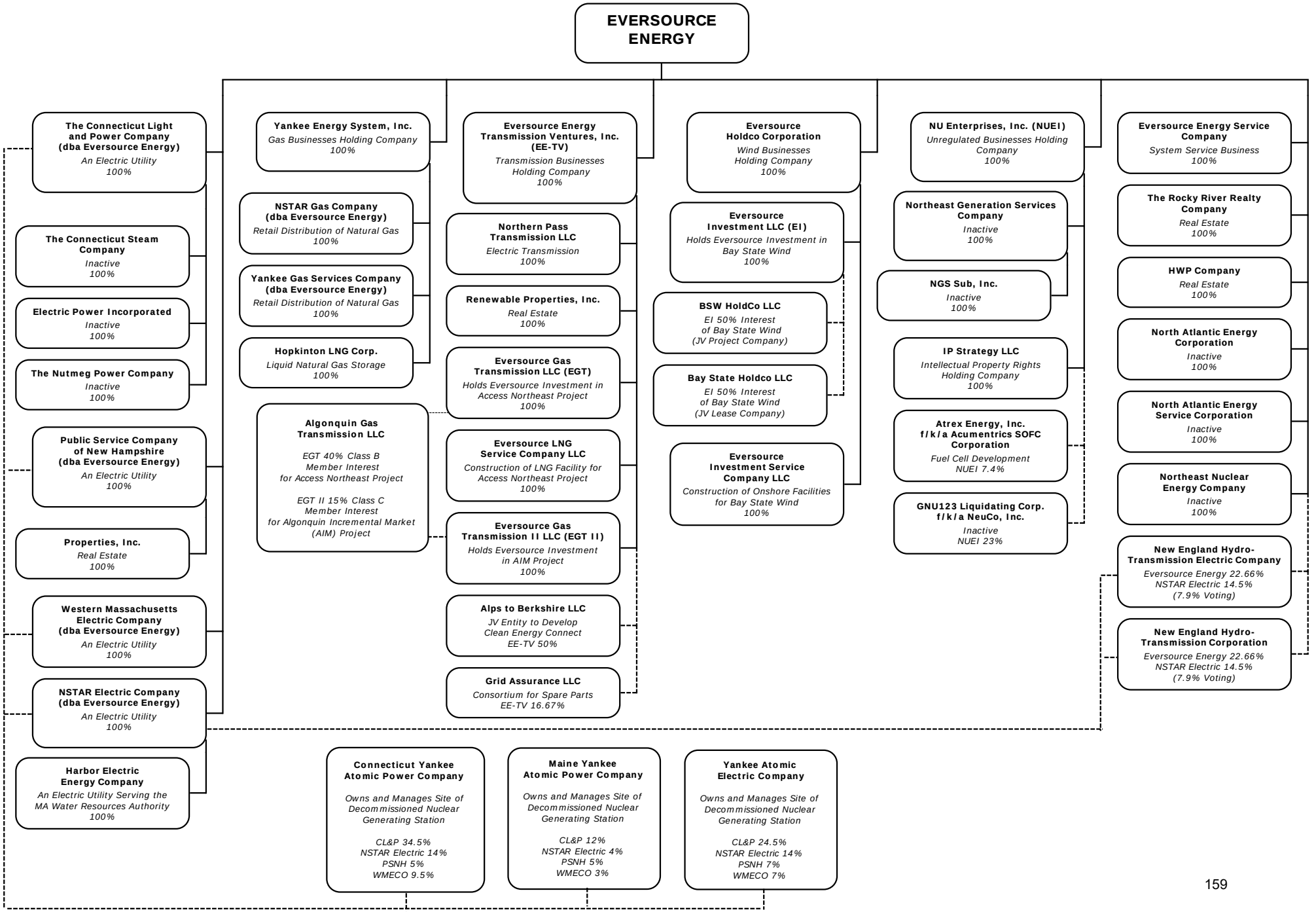
Witness: Eric H. Chung

Request:
Reference Eversource Lease Agreement, Bates Page 0013. Please define the terms "Direct subsidiary" and "Indirect subsidiary" as used in Paragraph B and provide a comprehensive organizational chart of all Eversource Energy business entities. For each business entity, include the following detail:

a. Legal name
b. DBA name
c. Date of formation
d. Type entity (corporation, partnership, etc.)
e. Address
f. Ownership
g. Primary business
h. Number employees

Response:
Eversource Energy owns 100% of the common stock of PSNH and 100% of the common stock of Eversource Energy Transmission Ventures, Inc. (EE-TV), making each entity a "wholly owned direct subsidiary" of Eversource Energy. EE-TV owns 100% of the common stock of NPT, making it "wholly owned direct subsidiary" of EE-TV, and a "wholly owned indirect subsidiary" of Eversource Energy. Attached are the corporate chart for Eversource Energy which shows the relationships of all of its affiliated entities, a list describing the primary business of each entity, and a list showing the additional information requested.

EVERSOURCE ENERGY CORPORATE CHART
EFFECTIVE JANUARY 1, 2017



EVERSOURCE ENERGY SUBSIDIARIES AND AFFILIATES

Eversource Energy, previously known as Northeast Utilities, is the parent company of one of the largest utility systems in the country and the largest in New England.

The Connecticut Light and Power Company (CL&P), dba Eversource Energy, is Connecticut's largest electric utility, serving approximately 1.2 million customers throughout the state of Connecticut.

The Connecticut Steam Company, Electric Power Incorporated, and The Nutmeg Power Company are inactive specially chartered companies.

Public Service Company of New Hampshire (PSNH), dba Eversource Energy, is New Hampshire's largest electric utility serving about 510,000 customers throughout the state of New Hampshire.

Properties, Inc. owns non-utility real estate in New Hampshire.

Western Massachusetts Electric Company (WMECO), dba Eversource Energy, is an electric utility serving more than 200,000 customers throughout the western portion of the Commonwealth of Massachusetts.

NSTAR Electric Company (NSTAR Electric), dba Eversource Energy, is an electric utility serving more than 1.1 million customers in 81 cities and towns (including Boston) in the Commonwealth of Massachusetts.

Harbor Electric Energy Company provides retail distribution and other services to the Massachusetts Water Resources Authority.

Yankee Energy System, Inc. (YES) is the holding company for the following subsidiaries:

NSTAR Gas Company (NSTAR Gas), dba Eversource Energy, is a natural gas distribution company serving approximately 300,000 customers in 51 cities and towns in the Commonwealth of Massachusetts.

Yankee Gas Services Company, dba Eversource Energy, is Connecticut's largest natural gas distribution company, serving approximately 222,000 customers in 71 cities and towns.

Hopkinton LNG Corp. owns and controls liquid natural gas storage facilities used by NSTAR Gas during the winter heating season.

Eversource Energy Transmission Ventures, Inc. is the holding company for the following entities:

Northern Pass Transmission LLC will construct, own and operate The Northern Pass transmission project with Hydro Quebec.

Renewable Properties, Inc. was formed to own real estate in New Hampshire in connection with activities relating to The Northern Pass transmission project.

Eversource Gas Transmission LLC was formed to hold Eversource Energy's 40% Class B member interest in Algonquin Gas Transmission, LLC, the owner of the existing Algonquin gas pipeline that is building the Access Northeast Project.

Eversource LNG Service Company LLC was formed to contract for the construction and operation of the LNG facility to be built at the Acushnet site as part of the Access Northeast Project.

Eversource Gas Transmission II LLC was formed to hold Eversource Energy's 15% Class C member interest in Algonquin Gas Transmission, LLC, the owner of the existing Algonquin gas pipeline that is building the Algonquin Incremental Market (AIM) Project.

Eversource Holdco Corporation is the holding company for Eversource Energy's wind businesses.

Eversource Investment LLC (EI) holds Eversource Energy's investment in Bay State Wind through its 50% ownership interest in BSW HoldCo LLC and 50% interest in Bay State Holdco LLC.

Eversource Investment Service Company LLC was formed to contract for the construction of the onshore facilities for Bay State Wind.

NU Enterprises, Inc. (NUEI) is the holding company for Eversource Energy's competitive businesses.

Northeast Generation Services Company (NGS) has completed all of its contractual operating obligations.

NGS Sub, Inc. The company was previously known as E.S. Boulos Company, and under such name, provided electrical contracting services in New England. Substantially all of its assets were sold on April 13, 2015, after which the company changed its name to NGS Sub, Inc.

IP Strategy LLC is an intellectual property rights holding company.

Eversource Energy Service Company provides centralized accounting, administrative, information resources, engineering, financial, legal, regulatory, operational, planning, purchasing and other professional services to Eversource Energy and its subsidiaries.

The Rocky River Realty Company (RRR) owns and leases non-utility real estate in Connecticut and Massachusetts. NorConn Properties, Inc., formerly a subsidiary of YES, and The Quinnehtuk Company, formerly a direct subsidiary of Eversource Energy, were merged into RRR on August 31, 2009.

HWP Company, formerly known as Holyoke Water Power Company, owns limited, non-utility real estate in Holyoke, Massachusetts.

North Atlantic Energy Corporation (NAEC) owned PSNH's share of the Seabrook nuclear generating facility (Seabrook) which was sold to FPL in 2002. NAEC is in the process of winding down its business.

North Atlantic Energy Service Corporation (NAESCO) was agent for the joint owners of Seabrook prior to its sale. NAESCO is in the process of winding down its business.

Northeast Nuclear Energy Company (NNECO) was agent for the joint owners of the Millstone nuclear generating facilities, which were sold to Dominion Resources in 2001. NNECO is in the process of winding down its business.

Eversource Energy ownership in other entities:

Atrex Energy, Inc. is a fuel cell development company of which NUEI owns 7.4%. Atrex Energy, Inc. changed its name from Acumentrics SOFC Corporation in April 2016 following completion of its migratory merger to Delaware in September 2015.

Alps to Berkshire LLC is the joint venture entity formed by Eversource and Brookfield to develop Clean Energy Connect, a transmission line between the Alps Substation in New York and the Berkshire Substation in Western Massachusetts, of which Eversource Energy Transmission Ventures, Inc. owns 50%.

Algonquin Gas Transmission LLC is the owner of the Algonquin gas pipeline, of which Eversource Gas Transmission LLC owns 40% of the Class B member interest with respect to the Access Northeast Project, and Eversource Gas Transmission II LLC owns 15% of Class C member interest with respect to the Algonquin Incremental Market (AIM) Project.

BSW HoldCo LLC, of which Eversource Investment LLC owns 50%, is the joint venture entity formed by Eversource and DONG Energy as the project company to develop an offshore wind farm to be located approximately 15-25 miles south of Martha's Vineyard.

Bay State Holdco LLC, of which Eversource Investment LLC owns 50%, is the joint venture entity formed by Eversource and DONG Energy to hold the offshore leases for Bay State Wind.

Grid Assurance LLC, of which Eversource Energy Transmission Ventures, Inc. owns 16.67%, is a consortium of electric utilities maintaining and storing spare parts.

GNU123 Liquidating Corp., formerly known as NeuCo, Inc., was a provider of power plant optimization software solutions. The assets of NeuCo, Inc. were sold in April 2016. Following the asset sale, the name of the company was changed to GNU123 Liquidating Corp. NUEI owns 23% of this shell corporation which is pending dissolution.

New England Hydro-Transmission Electric Company is an electric transmission company of which Eversource Energy owns 22.66% and NSTAR Electric owns 14.5%.

New England Hydro-Transmission Corporation is an electric transmission company of which Eversource Energy owns 22.66% and NSTAR Electric owns 14.5%.

Eversource Energy ownership interests in companies that own and manage the sites of decommissioned nuclear generating plants:

Connecticut Yankee Atomic Power Company
- CL&P – 34.5%
- NSTAR Electric – 14%
- PSNH – 5%
- WMECO – 9.5%

Maine Yankee Atomic Power Company
- CL&P – 12%
- NSTAR Electric – 4%
- PSNH – 5%
- WMECO – 3%

Yankee Atomic Electric Company
- CL&P – 24.5%
- NSTAR Electric – 14%
- PSNH – 7%
- WMECO – 7%

EVERSOURCE ENERGY AFFILIATE LIST

Company Name	DBAs	State of Formation	Entity Type	Primary Address	Number of Eversource Employees
Eversource Energy		MA	Business Trust	300 Cadwell Drive Springfield, MA 01104	
The Connecticut Light and Power Company (CL&P)	'"Eversource" and "Eversource Energy"	CT	Corporation	107 Selden Street Berlin, CT 06037	1,258
The Connecticut Steam Company		CT	Corporation	107 Selden Street Berlin, CT 06037	
Electric Power Incorporated		CT	Corporation	107 Selden Street Berlin, CT 06037	
The Nutmeg Power Company		CT	Corporation	107 Selden Street Berlin, CT 06037	
Public Service Company of New Hampshire (PSNH)	'"Eversource" and "Eversource Energy"	NH	Corporation	780 North Commercial Street Manchester, NH 03101	928
Properties, Inc.		NH	Corporation	780 North Commercial Street Manchester, NH 03101	
Western Massachusetts Electric Company (WMECo)	'"Eversource" and "Eversource Energy"	MA	Corporation	300 Cadwell Drive Springfield, MA 01104	297
NSTAR Electric Company (NSTAR Electric)	'"Eversource" and "Eversource Energy"	MA	Corporation	800 Boylston Street Boston, MA 02199	1,627
Harbor Electric Energy Company		MA	Corporation	800 Boylston Street Boston, MA 02199	
Yankee Energy System, Inc.		CT	Corporation	107 Selden Street Berlin, CT 06037	
NSTAR Gas Company	'"Eversource" and "Eversource Energy"	MA	Corporation	800 Boylston Street Boston, MA 02199	418
Yankee Gas Services Company	'"Eversource" and "Eversource Energy"	CT	Corporation	107 Selden Street Berlin, CT 06037	394
Hopkinton LNG Corp.		MA	Corporation	800 Boylston Street Boston, MA 02199	
Eversource Energy Transmission Ventures, Inc. (EE-TV)		CT	Corporation	107 Selden Street Berlin, CT 06037	
Northern Pass Transmission LLC		NH	Limited Liability Company	780 North Commercial Street Manchester, NH 03101	
Renewable Properties, Inc.		NH	Corporation	780 North Commercial Street Manchester, NH 03101	
Eversource Gas Transmission LLC (EGT)		MA	Limited Liability Company	800 Boylston Street Boston, MA 02199	
Eversource Gas Transmission II LLC (EGT II)		MA	Limited Liability Company	800 Boylston Street Boston, MA 02199	
Eversource LNG Service Company LLC		MA	Limited Liability Company	800 Boylston Street Boston, MA 02199	

EVERSOURCE ENERGY AFFILIATE LIST

Company Name	DBAs	State of Formation	Entity Type	Primary Address	Number of Eversource Employees
Eversource Holdco Corporation		MA	Corporation	800 Boylston Street Boston, MA 02199	
Eversource Investment LLC (EI)		MA	Limited Liability Company	800 Boylston Street Boston, MA 02199	
Eversource Investment Service Company LLC		MA	Corporation	800 Boylston Street Boston, MA 02199	
NU Enterprises, Inc.		CT	Corporation	107 Selden Street Berlin, CT 06037	
Northeast Generation Services Company		CT	Corporation	107 Selden Street Berlin, CT 06037	
NGS Sub, Inc.		CT	Corporation	107 Selden Street Berlin, CT 06037	
IP Strategy LLC		DE	Limited Liability Company	107 Selden Street Berlin, CT 06037	
Eversource Energy Service Company		CT	Corporation	56 Prospect Street Hartford, CT 06103	2,840
The Rocky River Realty Company		CT	Corporation	107 Selden Street Berlin, CT 06037	
HWP Company		MA	Corporation	300 Cadwell Drive Springfield, MA 01104	
North Atlantic Energy Corporation		NH	Corporation	780 North Commercial Street Manchester, NH 03101	
North Atlantic Energy Service Corporation		NH	Corporation	780 North Commercial Street Manchester, NH 03101	
Northeast Nuclear Energy Company		CT	Corporation	107 Selden Street Berlin, CT 06037	
Partial joint ownership by the following companies: CL&P, PSNH, WMECo and NSTAR Electric:					
Connecticut Yankee Atomic Power Company		CT	Corporation	362 Injun Hollow Road Haddam, CT 06423	
Maine Yankee Atomic Power Company		ME	Corporation	Edison Drive August, ME 04330	
Yankee Atomic Electric Company		MA	Corporation	49 Yankee Road Rowe, MA 01367	

EVERSOURCE ENERGY AFFILIATE LIST

Company Name	DBAs	State of Formation	Entity Type	Primary Address	Number of Eversource Employees
Partial joint ownership by the following companies: Eversource Energy and NSTAR Electric:					
New England Hydro-Transmission Electric Company		MA	Corporation	25 Research Drive Westborough, MA 01582	
New England Hydro-Transmission Corporation		MA	Corporation	25 Research Drive Westborough, MA 01582	
40% Class B Member Interest through EGT and 15% Class C Member Interest through EGT II:					
Algonquin Gas Transmission LLC		DE	Limited Liability Company	5400 Westheimer Ct. Houston, TX 77056	
50% ownership interest through EE-TV:					
Alps to Berkshire LLC		MA	Limited Liability Company	300 Cadwell Drive Springfield, MA 01104	
16.67% ownership interest through EE-TV:					
Grid Assurance LLC		DE	Limited Liability Company	1200 Main Street P.O. Box 41869 Kansas City, MO 64105	
50% ownership interest through EI:					
BSW HoldCo LLC		MA	Limited Liability Company	c/o DONG Energy Wind Power (U.S.) Inc One International Place, 26th Fl. 100 Olivier Street, Suite 1400 Boston, MA 02110	
50% ownership interest through EI:					
Bay State Holdco LLC		MA	Limited Liability Company	c/o DONG Energy Wind Power (U.S.) Inc One International Place, 26th Fl. 100 Olivier Street, Suite 1400 Boston, MA 02110	
7.4% voting power through NUEI equity investment:					
Atrex Energy, Inc. f/k/a Acumentrics SOFC Corporation		DE	Corporation	19 Walpole Park South, Suite 4 Walpole, MA 02081	
23% voting power through NUEI ownership interest:					
GNU123 Liquidating Corp. f/k/a NeuCo, Inc.		MA	Corporation	12 Post Office Square, 4th Floor Boston, MA 02109	

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 15-464

Date Request Received: 06/19/2017 **Date of Response: 07/07/2017**
Request No. OCA 1-011 **Page 1 of 1**
Request from: Office of Consumer Advocate

Witness: Robert P. LaPorte

Request:
Reference Laporte Testimony Attachment, Bates Page 0250. The four factors are listed as determinative of the enhancement factor are: #1 Interviews with market participants; #2 a. Regarding Interviews (#1 above) professional literature; #3 experience of Colliers; #4 cost of substitute corridor; #5 specific characteristics of subject property rights. Pleases discuss in detail the following:

a. Regarding Interviews (#1 above)
   i. Provide the enhancement factors discussed in any market participant interview listed in the first paragraph of the "Interviews with Market Participants" section of Bates Page 0242, but then not listed in the subsequent four paragraphs.
   ii. Did any market participants suggest specific enhancement factors above 2.3?

b. Regarding cost of substitute corridor (#4 above):
   i. Did Colliers identify a substitute corridor for the NPT project? If so, please provide any cost estimate for acquisition of that corridor.
   ii. Has another party identified a substitute corridor for the NPT project? If so, please provide their cost estimate.

Response:
a.i. Please see the response to OCA 1-010 and Bates pages 242, 243 and 245.
a.ii. None responded higher than 2.3.

b.i. No substitute corridor was considered as part of our scope of work.
b.ii. We have no knowledge of a substitute corridor.

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 15-464

Date Request Received: 06/19/2017 **Date of Response: 07/07/2017**
Request No. OCA 1-015 **Page 1 of 1**
Request from: Office of Consumer Advocate

Witness: Robert P. LaPorte

Request:
Reference Laporte Testimony, Bates Page 0168, Lines 1-24. This page presents a summary of Colliers' 11/14/2014 and 8/4/2015 value opinions which include corridor market value and fixed year annual rent, where both are increasing in the 2015 update.

a. What are the key factors that have changed to result in increase in market value in the 2015 update?
b. Was a revised ATF calculated for the 2015 update? Why or why not?
c. What inflation rate was used for each value (where applicable) presented on this summary page. What is source of this assumption?
d. What is the purpose of "Year 1 rent with annual 0.5% adjustments $750,622" at line 24.

Response:
a. The key factor was based on real estate pricing changes as reported by the Warren Group and the New England Real Estate Network (NNEREN) for the 19 corridor located cities and towns. Please see Bates pages 185-187.

b. Yes. Eversource requested an update to the appraisal.

c. Values were increased by town based on the reported price increase from the Warren Group and NNEREN. Please see Bates 186 and 187.

d. Eversource requested that the rent under the proposed lease be adjusted at the rate of 0.5% per year. We calculated the adjusted rent to equal the same Internal Rate of Return ("IRR") as if there was no rent adjustment.

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 15-464

Date Request Received: 06/19/2017 **Date of Response: 07/07/2017**
Request No. OCA 1-022 **Page 1 of 1**
Request from: Office of Consumer Advocate

Witness: Eric H. Chung, Lisa M. Cooper

Request:
Reference Cooper-Chung Testimony, Bates Page 1140, Lines 20-22 and Cooper-Chung Testimony Attachment, Bates Pages 1147-1152, Exhibit LMC-2. Ms. Cooper and Mr. Chung note that "93.7% (of fair market value of land involved in the lease) is PSNH transmission property."

a. Is Exhibit LMC-2 the most logical source for understanding of the 93.7% , 4.9% and 1.4% allocation calculations? If not, please provide clarification or an alternative source.

b. Please provide a modified version of LMC-2 by adding two new columns (instructions below) below, and populate data for Lines 1,2 and 3 in these new columns:

i. Column (D) "Book Value on Balance Sheet ($)"

1. Instruction: Provide book value of asset on the balance sheet. If the asset is not accounted for at book value discuss accounting treatment and provide the value listed on the balance sheet.

ii. Column (E) "Owner of Assets"

1. Instruction #1: Provide the name of entity that owns the PSNH-Transmission assets (Line No 1) and PSNH-Distribution assets (Line 2) and Non-Utility Property (Line No 3)

2. Instruction #2: Provide account numbers, page and line number on 2016 FERC Form 1 (or appropriate audited statement) where the asset is reported.

Response:
a. Page 3 of Exhibit LMC-2 shows the calculation of the 93.7%, 4.9% and 1.4% allocation and is the appropriate source for understanding the allocation ratios, which are based upon the fair market value of Transmission, Distribution and non-utility plant as a percentage of the total fair market value of leased assets. See Attachment 1, Column B.

b. i. Please refer to Attachment 1, which updates Exhibit LMC -2, Page 3 of 5 to show the requested information. Column D provides the book value of the assets involved in this lease.

ii. Please refer to Attachment 1, Column E, F and G which show the property owner name, the FERC Account Nos. and FERC Form 1 references, respectively, for the Transmission, Distribution and non-utility property listed on lines 1 through 3.

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 15-464

Date Request Received: 08/11/2017 **Date of Response: 08/25/2017**
Request No. OCA 2-005 **Page 1 of 1**
Request from: Office of Consumer Advocate

Witness: Robert P. LaPorte, Kenneth B. Bowes

Request:
Reference LaPorte Attachment, Bates Page 0187. Many of the corridor properties cited in the updated corridor summary host existing transmission facilities.

a. Do you agree that the NPT corridor, which has been improved to enable the construction and operation of transmission lines, has greater market value than if this exact same corridor was unimproved? Explain.
b. What percentage (based on miles) of the corridor hosts existing transmission?
c. Does Colliers' valuation take into account the improvements made to the corridor to support PSNH's existing electric transmission lines?
d. If the answer to c is yes, based on your professional judgement, please indicate the direction and estimated magnitude of change to the corridor valuation assuming the corridor were unimproved land. Please explain your basis for your projection.
e. If the answer to c is no, please explain why the valuation does not account for the existing transmission facilities.

Response:
a. The proposed lease corridor is partly wooded and partly on cleared land. Where it has existing power line(s) located within the proposed lease area that is an encumbrance (not an advantage) in our opinion, since those lines (structures) have to be relocated at significant cost to the lessee to accommodate their new line. *We do note that our appraised market rent has not adjusted the ground rent for the potential extraordinary costs to be incurred by the lessee.*

b. Assuming that the request relates to the leased corridor within the wider transmission corridor, we do not know, but it is much less than 100%. From the inspection and aerial photographs we can see that there are stretches of the entire corridor where existing lines do not have to be relocated to accommodate the new line, but that has not been quantified for the purposes of this appraisal.

c. See "a" above. No. The enhancement factor is neutral with respect to the "site improvements" since neither the cost or quantity is known and the off-setting additional expense of relocating existing lines is not known. The enhancement factor predominately reflects the benefit of having a very long already assembled corridor as evidenced by other sales of corridors.

d. n/a

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Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 15-464

Date Request Received: 08/11/2017 **Date of Response: 08/25/2017**
Request No. OCA 2-007 **Page 1 of 1**
Request from: Office of Consumer Advocate

Witness: Robert P. LaPorte

Request:
Reference LaPorte Attachment, Bates Page 0253 and Bates Page 0193. Are the terms "capitalization rate" and "equity rate" (see Bates Page 253) and "initial rate" and "equity rate" (See Bates Page 0193) being used interchangeably? If not, please define each and explain the differences.

Response:
Regarding Bates 00193 the terms are meant to reflect the target IRR to the calculated IRR.

Regarding Bates 000253, a capitalization rate is the relationship between income and value. The equity rate refers to the equity dividend rate in the band of investment. It is a pre-tax cash flow divided by the initial equity investment that is also referred to the cash on cash rate.

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 15-464

Date Request Received: 08/11/2017 **Date of Response: 08/25/2017**
Request No. OCA 2-016 **Page 1 of 1**
Request from: Office of Consumer Advocate

Witness: Robert P. LaPorte

Request:
Reference LaPorte Attachment, Bates Page 0187. In the table "Updated Corridor Summary," Colliers cites original and updated corridor valuations of $11,076,163 and $11,360,038 respectively. Are these corridor valuations in any way influenced, directly or indirectly, by the economics of the NPT project including, but not limited to, its revenues, expenses, capacity, and/or cash flow from operations?

Response:
No. The market value of the land to be leased is the driving factor in the corridor valuation.

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 15-464

Date Request Received: 08/11/2017 **Date of Response: 08/25/2017**
Request No. OCA 2-019 **Page 1 of 1**
Request from: Office of Consumer Advocate

Witness: Eric H. Chung, Lisa M. Cooper

Request:
Reference Cooper-Chung Testimony, Bates Page 1140. The testimony states "Our understanding is that the transaction is a long term lease of property to NPT by PSNH for which NPT will pay [a 40 year rent stream]."

a. What is PSNH's estimated after tax return on the corridor asset based on lease revenues contained in rows 1 to 40 of APPENDIX E – ANNUAL RENT SCHEDULE – 40 YEAR TERM at Bates Page 0193? Show all calculation details and explain.
b. What is the projected Internal Rate of Return on the NPT project, once fully constructed, up and running, and operating at forecasted capacity? Please show all calculation details and explain all assumptions.

Response:
a. Please see pages 1 through 3 of Attachment OCA 2-019, which provide the net after-tax lease rental income and rate of return associated with the Distribution, Pool Transmission Facility (PTF) and non-PTF assets, respectively. Attachment OCA 2-019 excludes the lease rental income associated with non-utility plant.

b. Eversource objects to this data request on the grounds that it requests data or information which is not relevant to the issues in this docket concerning the approval of the subject Lease Agreement. Moreover, Eversource objects on the grounds that the information sought pertains to matters entirely within the knowledge or information of the Lessee, Northern Pass Transmission LLC.

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 15-464

Date Request Received: 07/24/2017 Date of Response: 07/31/2017
Request No. TS 1-005 Page 1 of 1
Request from: New Hampshire Public Utilities Commission Staff

Witness: Robert P. LaPorte

Request:
Referring to OCA 1-013(c), please compute the Capitalization Rate using the less leveraged structures described in the question (50/50 and 25/75).

Response:
For the 50/50 split the computed capitalization rate would be 8.60%, for the 25/75 mortgage/equity split the computed capitalization rate would be 10.30% under the assumption that the mortgage and equity rates remain the same. However, based on all the information on Bates pages 253-259 in Volume I of our appraisal, our opinion remains that 7.0% is the appropriate market capitalization rate.

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 15-464

Date Request Received: 08/11/2017 **Date of Response: 09/05/2017**
Request No. OCA 2-001 **Page 1 of 3**
Request from: Office of Consumer Advocate

Witness: Robert P. LaPorte

Request:
Reference LaPorte Attachment, Bates Pages 0186-0187. Please provide an updated version of the tables labeled "Northern Segment Average Sale Price Statistics" and "Southern Segment Average Sale Price Statistics" which includes the 2016 and 2017 values for each municipality.

Response:
Original Response:

Eversource objects to this data request on the grounds that it requests data or information which is not relevant to the issues in this docket concerning the approval of the subject Lease Agreement. Moreover, Eversource object on the grounds that performing the requested analysis would be unduly burdensome.

Updated Response:

Notwithstanding Eversource's objection, as a result of the parties' good-faith effort to resolve the discovery dispute as required by Puc Rule 203.09(i)(4), Eversource provides the following response:

The NPT corridor value of $11,076,163 was our market value opinion as of November 14, 2014. It was based on our research and analysis of land sales that occurred in the 19 communities that comprised the subject of our Northern Pass Transmission Project Appraisal. These land sales occurred prior to the November 2014 appraisal. In 2015, we were then requested to update the market value and market rent to July 30, 2015. This 8 month update was completed by researching and calculating the change in the average sale price between those two periods based on data published by The Warren Group and by the Northern New England Real Estate Network (NNERENMLS) for those same communities. The updated corridor market value was $11,360,038 and the market rent schedules were updated as well.

We have now been requested by OCA to provide an updated version of the tables on Bates Pages 0186-0187. Our response is limited to a macro review of market conditions that have now have transpired during the last two years. To update our appraisal would require a complete survey and analysis of relevant land sales for each of the 19 communities where the subject corridor is located.

This response is based on an overview of sale data reported by The Warren Group's "RE Records Search, New England's largest and most complete database. They report on all real estate sales in each community. Based on this data the average change in real estate prices for the seven Northern

communities from the end of July of 2015 to August 4 of 2017 varied significantly because of the limited number of sales that transacted during this period. We concluded that this was not reliable for the northern segment because of the limited number of sales in the smaller towns such as Dummer and Stark. The change in the average sale price for the other five communities comprising the northern segment averages 2.3% for the two years with a range of 26.4% to -15.6%. The average change for the twelve southern communities from the end of July of 2015 to August 4 of 2017 is 5.5% per year. It is noted that these sales include land, single family, multi-family, commercial and industrial real estate sales.

Summaries of that data for the Northern and Southern Segments is provided on the next page:

Southern Segment Average Sale Price Statistics

	Warren 2014 #	Warren 2015#	Warren 2017#	Warren 2014	Warren 2015	Warren 2017	change **2015-2017**
Ashland	67	29	454	$145,341	$124,998	$173,407	38.7%
Bridgewater	35	20	23	$304,708	$252,514	$177,030	-29.9%
Bristol	88	52	84	$144,668	$175,427	$162,102	-7.6%
New Hampton	49	27	39	$147,346	$175,976	$210,664	19.7%
Hill	18	18	24	$96,394	$101,344	$105,300	3.9%
Franklin	173	102	128	$120,782	$130,153	$149,075	14.5%
Northfield	75	60	81	$138,600	$141,001	$156,448	11.0%
Canterbury	52	24	51	$194,763	$163,633	$219,530	34.2%
Concord	653	336	542	$229,656	$234,072	$220,613	-5.8%
Pembroke	112	82	98	$180,833	$201,462	$198,487	-1.5%
Allenstown	85	61	90	$130,767	$113,780	$156,709	37.7%
Deerfield	96	59	77	$202,883	$226,601	$263,920	16.5%
average							11.0%
						per year	5.5%
Sum of averages				$ 2,036,741	$2,040,961	$2,193,285	7.5%

Northern Segment Average Sale Price Statistics

	Warren 2014 #	Warren 2015#	Warren 2017#	Warren 2014	Warren 2015	Warren 2017	change **2015-2017**
Dummer	10	2	5	$65,290	$20,933	$ 151,105	621.9%
Stark	23	3	11	$59,968	$28,810	$ 92,315	220.4%
Northumberland	50	32	31	$38,722	$72,604	$ 68,282	-6.0%
Lancaster	76	45	55	$97,438	$123,842	$ 104,520	-15.6%
Dalton	29	16	16	$67,903	$60,877	$ 76,967	26.4%
Whitefield	69	28	46	$103,557	$114,748	$ 103,052	-10.2%
Bethlehem	64	63	68	$94,512	$113,384	$ 132,361	16.7%
average							122.0%
average excluding Dummer % Stark							2.3%
Sum of averages				$527,390	$535,198	$728,602	36.1%

We also reviewed sale pricing published by New Hampshire Board of Realtors. They do not cover towns individually but rather by county. Their survey is limited to single family homes and excludes land.
The following is the results of their reporting of single family home prices from 2014 to 2016. Their annual report for 2017 will be available in early 2018.

Coos County (Dummer Stark Northumberland Lancaster Dalton and Whitefield)

Year	Units sold	% change	Median price	% change
2015	422	+15.9	$90,000	+11.1
2016	453	+7.3	$87,250	-3.1

Grafton County (Bethleham, Bridgewater, Ashland,and Bristol)

Year	Units sold	% change	Median price	% change
2014	896	-5.3	$178,500	-0.3
2015	1,022	+14.1	$188,500	+5.6
2016	1,105	+8.1	$191,250	+1.5

Belknap County (only New Hampton)

Year	Units sold	% change	Median price	% change
2014	850	-5.8	$200,000	+8.1
2015	959	+12.8	$214,450	+7.2
2016	1,140	+18.9	$219,950	+2.6

Merrimack County (Hill, Franklin, Northfield, Canterbury, Concord,Pembrke,Allenstown)

Year	Units sold	% change	Median price	% change
2014	1,581	+0.5	$212,500	+8.1
2015	1,788	+13.1	$213,000	-0.2
2016	1,911	+6.9	$225,000	+5.6

Rockingham County (only Deerfield)

Year	Units sold	% change	Median price	% change
2014	3,466	+0.1	$289,900	+5.4
2015	3,936	+13.6	$310,000	+6.9
2016	4,044	+2.7	$328,000	+5.8

The change in home prices illustrates an increase from north to south.
While it is acknowledged that sale prices have increased, the degree of price change in the land market is not known.

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 15-464

Date Request Received: 06/19/2017 **Date of Response: 06/29/2017**
Request No. OCA 1-018 **Page 1 of 1**
Request from: Office of Consumer Advocate

Witness: Eric H. Chung, Lisa M. Cooper

Request:
Reference Cooper-Chung Testimony, Bates Pages 1136-1143. What is the estimated market value of the completed transmission project proposed to be built by NPT?

Response:
Eversource objects to this data request on the grounds that it requests data or information which is not relevant to the issues in this docket concerning the approval of the subject Lease Agreement.

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 15-464

Date Request Received: 08/11/2017 **Date of Response: 08/25/2017**
Request No. OCA 2-015 **Page 1 of 1**
Request from: Office of Consumer Advocate

Witness: Eric H. Chung, Lisa M. Cooper

Request:
Reference OCA 1-018, which asks "What is the estimated market value of the completed transmission project proposed to be built by NPT?" Does "Figure 2: Estimated Northern Pass Utility Infrastructure Value by Community" at page 6 of the Company's Supplemental Response to OCA 1-018 provide the information requested in OCA 1-018?

Response:
Yes. Please refer to page 15 of 19 of the document referenced in our supplemental response to Q-OCA-1-018, which states:

"The taxable value of the Project over time depends on the fair market value of the investment over time, which is not known. Northern Pass property tax payments over time, however, are an important factor to consider for understanding local community benefits. In order to provide a lower bound estimate of Northern Pass property tax payments over time, a simplifying assumption is made that the fair market value is equal to the total new costs for the project in the first full year of operation, and then is straight-line depreciated at a rate of 2.5 percent per year for the first 20 years of operation."

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 15-464

Date Request Received: 06/19/2017 **Date of Response: 07/07/2017**
Request No. OCA 1-012 **Page 1 of 1**
Request from: Office of Consumer Advocate

Witness: Robert P. LaPorte

Request:
Reference Laporte Testimony Attachment, Bates Page 0259. The section entitled Band of Investment technique states "most properties are purchased with debt and equity capital."

a. Are the corridor properties in this transaction being purchased?
b. If the answer to (a) is no, what is the relevance of Band of Investment Technique in formulating a valuation and market rent payment?

Response:
a. No. Please refer to the market value definition on Bates page 215.

b. Since the objective of the appraisal is in part to provide an opinion of market rent, the band of investment analysis was one of two techniques used to solve for (RL) based on the value of the corridor. As expressed in our analysis, market rent (IL) can be calculated as: (Income to the Land (IL) = Rate to the land (RL) * Corridor Value). While neither the entire corridor nor the subject sub corridor will be sold, our market rent calculation is based on the premise that it can be sold as a ground lease investment property to a third party in a transaction similar to other ground lease properties. Thus the band of investment is one technique to solve for (RL). However, this assumes that the reversionary interest at the termination of the ground lease would revert to the ground lessor.