Ronald D. Willoughby, PE

Position:	**Executive Consultant**
Years' Experience:	45+
Education:	Honorary Professional Degree of EE – University of Missouri-Rolla (MO Univ. of Science & Tech)(MS&T) Post Graduate Studies – Carnegie-Mellon Univ (CMU) MSEE Power Engineering – Carnegie-Mellon Univ. BSEE – University of Missouri-Rolla (UMR) Professional Engineer (PE) License – Pennsylvania

Key Qualifications:

Distribution Grid Modernization Planning: Systematic/incremental addition of smart grid devices; with technology, performance, and cost central to the planning process.

Renewables Integration and Impact on Utility Grid: Power system analysis/operation, architecture, configurations, distributed generation strategies, market analysis, portfolio analysis, wind power and PV integration.

Conservation Voltage Reduction (CVR): Using smart grid data points and controllable VAR sources to regulate distribution voltages in near real time to reduce demand, lower peaks (kW), and save energy (kWh).

Transmission & Distribution Planning: Power flows; reliability analysis; transient & long-term stability; load shedding; reconfiguration schemes; contingency analysis; root cause analysis; distributed generation; energy storage strategies; protection/coordination; systematic replacement/upgrade strategies; and special protection systems (SPS).

Advanced Protection, Automation & Control: Sensor, communication, sectionalizing, controllable VAR sources, voltage control, expert systems, demand, and energy reduction application strategies.

Distribution Substation Design and Specifications Review: Modular Integrated Transportable Substation (MITS) application, design, specification, and implementation; renewables integration; volt/VAR control; substation upgrades; and distribution automation/protection strategies.

Patents & Publications

Earned U.S. Software Patent 6549880 for *Improving Reliability of Electrical Distribution Networks* (2003).

More than 60 publications relating to electric power systems analysis and operation.

Project Types

Distribution Grid Modernization Planning: Systematic/incremental addition of smart grid devices; with technology, performance, and cost central to the planning process.

Conservation Voltage Reduction (CVR): Using smart grid data points and controllable VAR sources to regulate distribution voltages in near real time to reduce demand, lower peaks (kW), and save energy (kWh).

Renewables Integration: Main substation, collector systems, protection and control.

Power System Energy Use: Technical and non-technical loss evaluation and improvement measures; with specific expertise in island power systems.

Power System Automation: Application of sensor/communication packages, sectionalizing equipment, and SCADA systems to achieve performance targets.

Power System Reliability: Preventive actions and sectionalizing strategies to achieve reliability performance targets.

Power System Protection: Protection/coordination; systematic replacement/upgrade strategies.

Root Cause Analysis (RCA): For unexplained electric power system events.

Knowledge Management: Use cases for technical procedures associated with power system analysis/operation, expert systems, architecture, and configurations.

Project Management: Transmission analysis, distribution analysis, system protection, and reliability improvement.

Training: Power system design, reliability, protection, stability, and operation.

Representative Project Experience

Conservation Voltage Reduction (CVR)

- Project Manager and Technical Lead for Commonwealth Edison Company (ComEd) feasibility study to quantify energy and demand savings using distribution Voltage Optimization techniques. Objectives: 1) Minimize cost by initiating feeder upgrades to achieve minimum performance thresholds. 2) Maximize energy savings by optimizing performance while staying within Total Resource Cost (TRC) constraints.
- Co-Instructor of CVR workshop customized to meet specific ComEd engineering and energy efficiency department needs.
- Co-founder of a CVR Industry Consortium to guide CVR research, work with industry groups, develop policy recommendations, promote implementation strategies, and document the results.
- Technical lead for project commissioned by DOE to conduct a comprehensive study across the USA on CVR, including deployment strategies, costs, benefits, barriers, and potential solutions, through a broad market outreach effort.

Advanced Protection, Automation, & Control for Transmission & Distribution

- Co-Chaired (with the Director of R&D at We-Energies) Distribution Vision 2010 LLC (DV2010), a consortium of Investor Owned Utility (IOU) companies. Mission: To create and execute a roadmap of equipment and service requirements important to cost-effectively operating a reliable electric distribution system; 2002-2006. DV2010 was accountable to CEOs and CFOs of member utilities.
- Led EPC and turnkey solutions in support of electric utility companies for electrical distribution automation, medium voltage modular substations (distribution centers), and wind farm electrical distribution systems (from the base of the turbine towers through interconnection to the utility grid); 1985-1988.
- Invited by the Director of Power & Energy Initiative at the University of Pittsburgh to be an Instructor for a graduate course on Smart Grid Technologies & Applications. Subject: Substation Automation and Protective Relaying; on-going.
- Participated in U.S./Canada Power Outage Task Force led by the Department of Energy (DOE), Natural Resources Canada, and the North American Electric Reliability Council (NERC) created to study the blackout of August 14, 2003, the largest electrical outage event in U.S. history.
- Led comprehensive Root Cause Analysis (RCA) for PJM executive management in response to a July 1999 low voltage condition stemming from record peak loading conditions on the bulk transmission system. Proactive corrective measures prevented future occurrences.

Renewables Integration and Impact on Transmission & Distribution Systems

- Invited by Prime Minister of Curacao to represent USA in 1st Annual Durable Energy Conference in Curacao to address renewables integration issues for the transmission and distribution system; March 2012.
- Invited by CEOs of Wind-2-Power-Systems (W2PS) and Hudson Energy to represent USA for conference in Madrid to cover PV integration, grid integration, energy storage, and DC infrastructure issues; February 2012.
- Invited by CARILEC to chair two sessions on Transforming the Electricity Grid at the Renewable Energy Forum, St Thomas, U.S. Virgin Islands; September 2011. CARILEC represents CEOs, COOs, and CFOs for 33 island utilities in the Caribbean.

Transmission & Distribution Planning

- Led distribution grid modernization planning efforts, focused on systematic and incremental addition of smart grid devices, with technology, performance, and cost central to the planning process
- Led EPC and turnkey solutions for electric distribution automation, medium voltage modular substations (distribution centers), and wind farm distribution systems (from base of turbine towers through interconnection to utility grid). Accountable for success of these focused areas when measured against sales and margin goals, internal and

external budget constraints, and overall customer satisfaction. Routinely augmented internal direct staff with external resources according to project needs. Matrix managed project teams to effectively utilize project resources.

- Co-founder of industry-wide consortium focused on strategic, business, regulatory, and technical issues associated with Conservation Voltage Reduction/Regulation (CVR) at investor-owned utilities, electric cooperatives, and municipals.
- Managed commissioning and public relations for comprehensive distribution line installation in the city of Smolensk, Russia. Project was collaborative effort between U.S. Trade & Development Agency (TDA) and Cooper Power Systems (CPS); 2002-2004.
- Developed distributed CVR measures to conserve energy and reduce overall losses without compromising end-user reliability or power quality.
- Developed emergency generation integration strategies for major industrial complexes in the USA.
- Conducted comprehensive seminar on electric power systems for the Ministry of Water and Power in Peking, China; 1984.
- Performed international power systems studies on power flow, transient stability, shunt compensation, load shedding, motor starting, loss formula development, short circuit, and protective device coordination; 1974-2000. Interfaced with Engineering Planning Managers.
- Led projects sponsored by the Pacific Power Association (PPA) for power system energy analysis and loss reduction on 20 islands in the South Pacific, 10 with U.S.-style power systems, and 10 with European-style power systems. Interfaced directly with CEOs and PPA throughout study.
- Taught Westinghouse Advanced School on Power System Stability; 1980-1988.

Professional Development Activities

NERC Compliance; IEC 61850; DMVP (DMEDI) Process Improvement; Professional Development Seminars on Management (Management Grid, Management Techniques, Team Building); Interpersonal Skills; Time Management; Managing the Software Project; Sales Techniques; SPIN Sales Training; Pricing Strategies; Finances; Technical Writing; Safety; Problem Solving & Decision Making; IEEE Seminars on Relay Coordination and Reactive Power Control; Root Cause Analysis; Reliability Analysis; Intellectual Property; Environmental Compliance; Corporate Ethics; Toastmasters International.

Company Affiliations

Willoughby Consulting, Raleigh, NC (2012 to Present)

Executive Consultant, Electric Power Systems Planning & Operation - Owner

Modular distribution substation application, specification, and implementation. Quantifiable Conservation Voltage Reduction (CVR) assessments for energy efficiency energy savings (kWh) and peak power reduction (kW); CVR application strategies. Emergency backup

power supply needs assessment and solution strategies for large industrial/commercial facilities. Portfolio analysis, go-to-market strategies, and operations support related to electric power systems. Specific service areas include transmission and distribution planning, renewables integration strategies, energy efficiency measures, system protection strategies, distribution automation schemes, data management, and business plan development.

River Consulting Group (RCG), Clayton, GA (2018 to Present)
Executive Consultant - Contract

Advisory services related to distribution grid modernization planning efforts involving systematic and incremental addition of smart grid devices, with technology, performance, and cost central to process.

ABB, Inc. (ABB), Raleigh, NC (2016 to 2017)
Executive Consultant - Contract

Advisory services related to distribution grid modernization planning efforts involving systematic and incremental addition of smart grid devices, with technology, performance, and cost central to process.

Advanced Microgrid Solutions (AMS), San Francisco, CA (2015 to 2017)
Executive Consultant - Contract

Advisory services regarding business strategy, competitive intelligence, and energy services pricing strategies related to the company's business development efforts.

Applied Energy Group (AEG), New Brunswick, NJ (2012 to 2015)
Principal, Executive Consultant - Contract

Energy efficiency (savings) analysis methods, project procurement, and project execution. Innovative applications of existing technologies to advance the art. Industry-wide investigations. Direct responsibility for project teams, including subcontractors.

Dell Innovation Services, Peoria, IL (2012 to 2014)
Vice President, Electricity Transmission & Distribution - Contract

Design and apply substations (including modular) for emergency power supply. Develop electrical site one-line diagrams and associated loading profiles. Conduct power demand audits.

KEMA, Raleigh, NC (2006 to 2012)
Vice President, Electricity Transmission & Distribution

Strategic leadership of the U.S. technical T&D practice in North America, focusing on client issues related to electric power system T&D planning, asset management, protection and reliability, advanced technology applications, and future power systems. Direct responsibility for team of 30 professionals.

Cooper Power Systems, Franksville, WI (1989 to 2006)
Director, Industrial Development & Technical Services Marketing; Manager, Systems Integration Solutions; Director, Thomas A. Edison Technical Center; Manager, Systems Engineering Group

Technical solution development for electrical distribution automation, substations, distribution operating centers, and wind farm integration. Accountable for sales, margins, budget, and customer objectives. Directed project teams to matrix manage overall resources (which included marketing, sales, and engineering staffs) to promote services, identify

opportunities, and secure business. Participated in strategic alliances and acquisitions. Managed high power laboratory (500 MVA short circuit generator), high voltage laboratory (2 million volts), and full materials laboratory, with direct responsibility for a team of 110 professionals. Managed group responsible for Modular Integrated Transportable Substation (MITS) application, design, specifications, implementation, and support (69 kV and below) (10 MVA and below).

Westinghouse Advanced Systems Technology, Pittsburgh, PA (1974 to 1988)
Manager, Transmission Planning Section; Manager, T&D Software Services

Responsible for a staff of 8 involved in the application of technical transmission and distribution software, including marketing and customer service.

Black & Veatch Consulting Engineers, Kansas City, MO (1971 to 1974)
Coop student while with the University of Missouri - Rolla

Professional Memberships

- IEEE – Life Senior Member
- IEEE Power Engineering Society – Senior Member
- IEEE Industrial Applications Society – Senior Member
- Phi Kappa Phi – Member
- Eta Kappa Nu – Member
- Tau Beta Pi – Member
- Kappa Kappa Psi – Member
- Wake County NC – Precinct Election Official (2017-2019)

Professional Recognition

2016 Achieved **Life Member** status for the Institute of Electrical and Electronics Engineers (**IEEE**).

2012-14 Invited **Instructor** for **University of Pittsburgh** graduate course on *Smart Grid Technologies & Applications*. Subject: *Substation Automation and Protective Relaying*.

2013 Co-Founder of an industry-wide ***CVR Consortium*** focused on increasing energy savings by resolving strategic, business, and technical issues preventing more wide-spread deployment by electric utility companies.

2012 Earned ***Order of the May*** honors recognition from Carnegie-Mellon University for more than 10 years of continous and consistent support. Citation includes these words: “This special order honors those who embody all the best characteristics for which the society was originally founded in 1947.”

2011 Invited **Chairman**, 2 Sessions, *Transforming the Electricity Grid*, **Carilec Renewable Energy Forum**, September 20-21, St. Thomas, U.S. Virgin Islands.

2003 Awarded ***Honorary Professional Degree of Electrical Engineering***, Univ of MO-Rolla (UMR), based on "outstanding professional and personal achievements"

2003 Elected **President**, *Academy of Electrical & Computer Engineers*, UMR

2001 Elected VP, *Academy of Electrical & Computer Engineers*, University of Missouri-Rolla

2001 Co-Chair, Steering Committee to develop **Distribution Vision 2010 LLC (DV2010)**, consortium of Investor Owned Utility (IOU) companies

2001 Appointed **Chairman**, Technical Paper Committee, USA National Committee, **CIRED**

2000 Appointed to ***Industry Advisory Council***, Rensselaer Polytechnic Institute (RPI), NY

1998 Appointed to ***Industrial Liason Council (ILC)*** for the College of Engineering and Applied Science, University of Wisconsin-Milwaukee

1997 Elected to ***Academy of Electrical & Computer Engineers***, University of Missouri-Rolla for "outstanding contributions to the profession of electrical engineering and for leadership in the community and profession." Requires minimum 20 years experience to qualify.

1991 Selected for **USA Trade Mission** on Electric Power to East Germany. Represented USA distribution equipment technologies. [E & W Berlin concrete wall fell Nov 1989]

1989 Appointed to ***Industry Advisory Council***, University of Missouri-Rolla (UMR).

1985 *Westinghouse* ***Engineering Achievement Award*** for "high level technical contribution to the development and implementation of profitable engineering courses in the Electric Utility and Industrial markets."

1985 ***Senior Member*** status for Institute of Electrical & Electronics Engineers (**IEEE**).

1984 Elected *Chairman* of the only **Quality Circle** in operation at Westinghouse Advanced Systems Technology (AST)

1982 Appointed to first ***Engineering Advisory Council*** for Westinghouse AST

1978 Earned ***PROFESSIONAL ENGINEER (PE) License*** from the Commonwealth of Pennsylvania

1972 Received *Outstanding Bandsman* award from Kappa Kappa Psi band fraternity

1969 **Valedictorian** and **Student Council President**, Grandview Senior High School

Publications

Ronald Dean Willoughby, PE

Willoughby, Ronald D, Bob Grant, and George Fandos. "Unbiased 360-Degree DER Evaluations and Assistance," EnergyCentral - Utility Professionals Group, April 20, 2020.

Willoughby, Ronald D. "Why Do It?," *EnergyPulse* from Energy Central – Intelligent Utility, March 21, 2018.

Willoughby, R., S. K. Gill, E, Zhang, J. Silvers. "Distributed Energy Resources Supporting Power Grid Reliability," CIGRE US National Committee, 2016 Grid of the Future Symposium, November 2016.

Willoughby, Ronald D. "Grid Modernization is Like Remodeling a House," Energy Central - Electric Power Systems Planning & Operation, July 20, 2016.

Willoughby, Ronald D. "The Power of Incrementalism," *EnergyPulse* from Energy Central - Communications & Security, February 10, 2016.

Willoughby, Ronald D. "Aging Workforce Presents Knowledge Management Opportunities," *EnergyPulse* from Energy Central - Human Resources, November 13, 2015.

Willoughby, Ronald D. "SEPB CVR Proposal Response Review," Report for AEG for TVA on behalf of SEPB, PO 916082, June 8, 2015.

Willoughby, Ronald D. "Distribution Automation and Conservation Voltage Reduction," *EnergyPulse* from Energy Central - Grid Operations; April 17, 2015.

Willoughby, Ronald D. "CVR Fundamentals," White Paper, January 5, 2015.

Willoughby, Ronald D., et al. "Final Report - Voltage Optimization (VO) Feasibility Study," AEG for ComEd VO Study, Contract No. 01146430, January 6, 2015.

Willoughby, Ronald D. "Order of the 9's," *EnergyPulse* from Energy Central - Grid Operations, June 2, 2014.

Willoughby, Ronald D. "Analysis Paralysis," *EnergyPulse* from Energy Central - Business Corporate, January 16, 2014.

Willoughby, Ronald D. "CVR and the Lost Revenue Conundrum," *EnergyPulse* from Energy Central, August 9, 2013.

Willoughby, Ronald D. "Time to Take a Second Look at Conservation Voltage Regulation?" *Intelligent Utility Update*, June 4, 2013.

Willoughby, Ron, Kellogg Warner. "Voltage Management: A Hidden Energy Efficiency Resource," GTM Research *Energy Efficiency Newsletter*, May 7, 2013.

Willoughby, Ron, Kellogg Warner. "Conservation Voltage Regulation: An Energy Efficiency Resource," IEEE *Smart Grid Newsletter*, April 10, 2013.

Willoughby, Ronald D. "Thinking Through Grid Modernization: It's a Chinese Puzzle – Moving Each Piece Moves Another," article written by Phil Carson of *Intelligent Utility Daily* after an exclusive interview with Mr. Willoughby, June 17, 2012.

Willoughby, Ronald D. "Power System Automation Drives Need for Data Acquisition," *Distributed Energy* Magazine, April 2012.

Willoughby, Ronald D. and Juan Gers. "IEC 61850 Primer," DNV KEMA *TECH Notes*, April 2012.

Willoughby, Ronald D. "Power System Automation Drives the Need for Smart Grid," DNV KEMA *Sherpa* Web Site, December 1, 2011.

Willoughby, Ronald D. "System Automation Drives Need for Data Acquisition," *Electric Light & Power* Magazine, November 2011.

Willoughby, Ronald D. "System Automation Drives Need for Data Acquisition," *PowerGrid International* Magazine, September 2011, pp 52-56.

Willoughby, Ronald D. "The 'Next Big Thing,'" article written by Phil Carson of *Intelligent Utility Daily* after an exclusive interview with Mr. Willoughby, April 21, 2010.

Willoughby, R. D., S. French Smith, S. Varadan. "A Knowledge Framework for Sustaining Business Growth and Success," Panel Session Submission 2010TD0574, IEEE T&D World Conference & Exposition, April 2010, New Orleans.

Willoughby, R. D. (Contributing Expert). *Utility of the Future*, Volume 2, *The Promise of Energy Storage*, KEMA, December 2009.

Willoughby, R. D. "The Evolving Convergence of Distribution Automation and Advanced Metering Infrastructure," KEMA Automation Insight, June 2007.

Willoughby, R. D. and L. A. Kojovic. "Integration of Distributed Generation In A Typical USA Distribution System," CIRED 2001, Amsterdam Netherlands, June 2001.

Willoughby, R. D. "Order of the 9's," Cooper Power Systems *SETUP* Newsletter, Summer 2000 Edition.

Willoughby, R. D., P. Avery, et al. "Economic Solutions To Power Quality and Reliability Problems," American Power Conference *Proceedings*, Chicago, IL, April 10-12, 2000.

Willoughby, R. D. and L. A. Kojovic. "Digital Models Simulate Physical Test Facilities," *IEEE Computer Applications in Power* Magazine, April 1995.

Willoughby, R. D., C. A. McCarthy, et al. "Power Quality and Reliability Services," Electric Power '99 Conference *Proceedings*, Baltimore MD, April 1999.

Willoughby, R. D., C. Gilker, and E. Strauss. "Education Highway for the Practicing Engineer: What Next in the Age of Deregulation?" Systems Engineering Group Bulletin SE9901, February 1999.

Willoughby, R. D. and S. R. Mendis. "Harmonic Filters Provide The Key To Plant Reliability," PPE Magazine, April 1996.

Willoughby, R. D. and L. A. Kojovic. "Computer Methods for Simulations of Power Lab Tests & Electrical Apparatus Operations in Power Systems," TESLA II Millennium, Belgrade, Yugoslavia, October 1996.

Willoughby, R. D., C. Gilker, et al. "Training for TODAY'S Practicing Electrical Distribution Engineer," Systems Engineering Group Bulletin SE9402, Cooper Power Systems, August 1994.

Willoughby, R. D. and K. Argiropoulos. "Hybrid Surge Arrester Technology," US Technology for the Production, Transmission, & Distribution of Electric Power Seminar, Berlin, Germany, October 1991.

Willoughby, R. D. and K. Argiropoulos. "Overcurrent Protection Devices for Overhead Distribution Systems," US Technology for the Production, Transmission, & Distribution of Electric Power Seminar, Berlin, Germany, October 1991.

Willoughby, R. D. and K. Argiropoulos. "Voltage Regulation Equipment for Overhead Distribution Systems," US Technology for the Production, Transmission, & Distribution of Electric Power Seminar, Berlin, Germany, October 1991.

Willoughby, R. D. and S. R. Mendis. "Power Quality Problems in Electric Power Systems," US Technology for the Production, Transmission, & Distribution of Electric Power Seminar, Berlin, Germany, October 1991.

Willoughby, R. D., et al. "Electrical Studies for an industrial Gas Turbine Co-Generation Facility," IEEE Industrial Applications Society (IAS) *Transactions*, July/August 1989.

Willoughby, R. D., R. W. Johnson, and R. A. Whiteside. "Computer-Aided Protective Device Coordination: Advantages," Congress on Protective Systsems for Electrical Installation, Puerto la Cruz, VZ, July 29-31, 1987.

Willoughby, R. D. , et al. "A Key to Plant Reliability: System Studies," Pakistan Electrical Conference, February 1987.

Willoughby, R. D., and S. Rubino. "Power Systems Studies can P4redict and Resolve Harmonic Resonance Problems in Industrial Planrs," IEEE Petroleum and Chemical (PCIC) *Conference Record*, September 1985.

Willoughby, R. D., J. A. Juves, and A. Batenburg. "Utility Survey of Methods for Minimizing the Number and Severity of System Separations," *Final Report*, Electric Power Research Institute, EPRI EL-3437, Project 1952-1, March 1984.

Willoughby, R. D. "Limitations on Local Shunt Compensation Studied with WESTCAT™," the Westinghouse *AST/Group News*, Pittsburgh, Pennsylvania, Winter 1983/84.

Willoughby, R. D. "New Program for Modelling Induction Motors," the Westinghouse *AST/Group News*, Pittsburgh, Pennsylvania, Summer 1983.

Willoughby, R. D. and J. A. Juves. "Computer Software for the Analysis of Industrial Power Systems," Westinghouse Industrial Applications *Workshop Proceedings*, Philadelphia, Pennsylvania, April 19-20, 1983.

Willoughby, R. D., J. A. Juves and S. S. Waters. "A Streamlined Procedure fro Obtaining Regulatory Approval for New Transmission Lines," *Final Report*, Electric Power Research Institute, EPRI EL-1404, Contract TPS-733, December 1982.

Willoughby, R. D., R. W. Powell, and T. E. Szabo. "The Effects of Shunt Compensation on Local Generation Requirements," Fourth (4th) Conference on Electric Power Supply Industry *Proceedings*, Bangkok, Thailand, 1982.

Willoughby, R. D. and S. S. Waters. "Modeling Induction Motors for System Studies," IEEE Industrial Applications Society (IAS) *Transactions*, San Francisco, California, 1982.

Willoughby, R. D. and P. M. Myers. "Special Industrial System Studies to Insure Plant Reliability," IEEE Petroleum and Chemical (PCIC) *Conference Record*, St. Louis, Missouri, 1982.

Willoughby, R. D. and J. A. Juves. "Justification and Approval of New Electric Transmission Lines: A Procedure," *Workshop Proceedings*, Electric Power Research Institute, EPRI EL-2190, Contract WS 79-230, December 1981, Section 1.

Willoughby, R. D. and S. S. Waters. "Procedure for Conducting a Transient Stability Study," IEEE Midwest Power Symposium *Conference Record*, University of Illinois, October 1981.

Willoughby, R. D. and E. R. Taylor, Jr.. "Practical Application Limit for Shunt Compensation Before Generation Addition," Pennsylvania Electric Association (PEA) Biannual System Planning Committee Meeting *Record*, Hershey, Pennsylvania, September 1981.

Willoughby, R. D., R. S. Hahn, S. Dasgupta, and E. M. Baytch. "Maximum Frequency Decay Rate for Reactor Coolant Pump Motors," IEEE *Transactions* on Nuclear Science, Vol NS-26, No. 1, February 1979, pp. 863-870.

Willoughby, R. D. and R. W. Johnson. "Stability Study Commentary and Interpretation of Computer Printout for Sonatrach LNG Plant Electrical Power System," *Final Report*, Report No. AST-75-1000-08, Westinghouse Advanced Systems Technology, Pittsburgh, Pennsylvania, June 1975.

Willoughby, R. D. and J. W. Skooglund. "Transient Stability Study for Central Nuclear de Almaraz," *Final Report*, Report No. AST-75-1023, Westinghouse Advanced Systems Technology, Pittsburgh, Pennsylvania, May 1975.

Willoughby, R. D. and R. W. Johnson. "Load Flow Study Commentary and Interpretation of Computer Printout for Sonotrach LNG Plant Electrical Power System," *Final Report*, Report No. AST-75-1000-06, Westinghouse Advanced Systems Technology, Pittsburgh, Pennsylvania, April 1975.

Willoughby, R. D. and R. W. Johnson. "Protective Device Coordination Study Commentary and Interpretation of Computer Printout for Sonotrach LNG Plant Electrical Power System," *Final Report*, Report No. AST-75-1000-04, Westinghouse Advanced Systems Technology, Pittsburgh, Pennsylvania, March 1975.

Willoughby, R. D. and R. W. Johnson. "Short Circuit Study Commentary and Interpretation of Computer Printout for Sonotrach LNG Plant Electrical Power System," *Final Report*, Report No. AST-75-1000-02, Westinghouse Advanced Systems Technology, Pittsburgh, Pennsylvania, February 1975.

Joseph J. DeVirgilio, Jr. Owner, Suncoast Management Consultants, LLC

Education:

B.E./1973/Electrical Engineering/Stevens Institute of Technology, Hoboken, NJ

M.E./1981/ Electric Power Engineering/RPI, Troy, NY

Professional Experience:

2013 – Present	Sarasota Memorial Healthcare System: Board member, former Chairman
2011 - Present	Suncoast Management Consultants, LLC: Owner
2010	United Way of Dutchess County: CEO
1973 - 2010	CH ENERGY GROUP, INC. CENTRAL HUDSON GAS & ELECTRIC CORPORATION CENTRAL HUDSON ENTERPRISES CORPORATION (CHEC) 284 South Avenue, Poughkeepsie, NY 12601
1/05 -12/10	Executive Vice President - Corporate Services and Administration Senior Corporate Officer and member of the Executive Team of CH Energy Group, Inc. Director of Central Hudson Gas & Electric Corp ("Central Hudson") and Central Hudson Enterprises Corp ("CHEC") Executive Responsibility for Griffith Energy Services, Inc., a wholly-owned fuel oil distribution subsidiary. Executive responsible for establishing and executing corporate policy and objectives and associated implementation of the related processes for the following areas of responsibility for Central Hudson: Information Technology; Corporate Communications, Media Relations, Governmental Affairs, and Economic Development; Human Resources Purchasing & Stores; Fleet Management; Office Services; Facility Operation & Maintenance; and Corporate Quality and Process Re-engineering. Corporate Executive Committee membership: Chairperson: I/T Steering Committee. Member of the Capital Resource Allocation Committee.
03/05 -12/10	Director, Central Hudson Gas & Electric Corp

03/02 -12/10	Director and Executive Vice President – CHEC, Griffith Energy Services and SCASCO
11/98 -12/24	Senior Vice President - Corporate Services and Administration Corporate Executive Committee membership: Chairperson: I/T Steering Committee and the Retirement Income, 401K, and VEBA Plans Administrative Committees. Member of the Capital Resource Committee.
5/88 -11/98	Vice President -- Human Resources and Administration
4/86 - 5/88	Assistant Vice President – Gas & Electric Customer Services & T&D Operation
3/84 - 4/86	Manager – Corporate Services & I/T
3/82 - 3/84	Manager – Gas & Electric Customer Services Field and Call Center Operation
3/79 - 3/82	District Superintendent – Catskill Gas & Electric T&D Operation
6/73 - 3/79	Engineering Assignments – Gas and Electric Field Engineering, Gas Meter Engineer, and Gas Testing facility supervisor

Professional Affiliations:

3/80 – 12/11	Professional Engineer, New York State, License No. 057637
1994 - 2000	Marketing Executives Conference -- member 1994; Executive Committee 1995; Program Chairperson 1997.
1993 -2004	Council of Industry of Southeastern New York -- Board of Directors.
1988 -1999	New York State Regional Utility Group -- Central Hudson's Representative
1982-1998	American Gas Association (AGA) -- Central Hudson Gas & Electric's Representative; Customer Services Committee (1982-1988); Human Resources Committee (1988 to 1998).

PURCHASE AND SALE AGREEMENT

This Agreement is dated this ___ day of December, 2017 (the "Effective Date"), between Rock Acquisition, LLC, a New Hampshire limited liability company, having an address of 2352 Main St., Suite 201, Concord, MA 01742 (the "Seller"), and Liberty Utilities (Granite State Electric) Corp., a New Hampshire corporation having a mailing address of 15 Buttrick Road, Londonderry, NH 03053 (the "Buyer").

Reference is made to the following facts:

A. Seller owns approximately 120 acres of land on Route 28 in Salem, New Hampshire, being developed as a retail and residential mixed-use project under the name of "Tuscan Village" (the "Tuscan Village Project").

B. Buyer desires to purchase approximately 1.4 acres of land (the "Real Estate"), which is part of the Tuscan Village Project, as shown on the plan attached hereto as Exhibit A, together with an easement over Tuscan Village Project for the right to access the Real Estate. The Real Estate, together with (i) all rights, privileges and easements appurtenant to the Real Estate and owned by Seller; and (ll) all improvements, on or within the Real Estate shall be collectively referred to herein as the "Property".

C. Buyer intends to seek subdivision approval from the Town of Salem to subdivide the Real Estate from the remainder of the Tuscan Village Project, to purchase the Property from Seller, and to construct an electrical substation thereon (the "Substation"), subject to the terms and conditions herein.

NOW, THEREFORE, for and in consideration of good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Seller agrees to sell and Buyer agrees to buy the Property for the sum and upon the terms and conditions as follows:

1. Sale and Purchase. Seller shall sell and Buyer shall purchase, in fee simple absolute and subject to the terms and conditions herein, the Property.

2. Purchase Price. The purchase price (the "Purchase Price") for the Property shall be One Million Five Hundred Thousand and 00/100 Dollars ($1,500,000.00) ("Purchase Price"), payable as follows:

(a) Buyer has paid a deposit of One Hundred Fifty Thousand Dollars ($150,000.00) (the "Deposit"). The Deposit shall be held in escrow by Hinckley, Allen & Snyder LLP (the "Escrow Agent") in an interest-bearing account and shall be applied or disbursed in accordance with the terms of this Agreement.

(b) Subject to the adjustments and prorations provided elsewhere in this Agreement, the balance of One Million Three Hundred Fifty Thousand 00/100 Dollars ($1,350,000.00) shall be paid by the Buyer to the Seller on the date of the closing of this sale (the "Closing") in immediately available funds by certified check or federal wire transfer.

3. Time of Closing. The parties agree to close on the date which is thirty (30) days after the expiration of the Permit Period, unless otherwise mutually agreed upon by the parties. The Closing shall occur at the offices of Seller's counsel in New Hampshire, or at such other place mutually agreed upon by the parties, at a time mutually convenient to the parties.

4. Warranties and Representations.

(a) Seller represents to the Buyer that: (i) Seller has marketable and insurable title to the Property; (ii) Seller is not a "foreign person" within the meaning of Section 1455, et. seq. of the Internal Revenue Code of 1986 as amended, or any regulations promulgated thereunder; (iii) Seller has the power and authority to enter into and perform its obligations under this Agreement and the execution, delivery and performance of this Agreement have been duly authorized by all necessary limited liability company actions, and (iv) there is no suit, action (legal or administrative), arbitration or other proceeding or any nature pending or to the best of Seller's knowledge, threatened against the Property, or against the Seller and relating to the Property.

(b) Buyer represents to the Seller that (i) the Buyer has the power and authority to enter into and perform its obligations under this Agreement; and (ii) the execution, delivery and performance of this Agreement have been duly authorized by all necessary actions.

5. Condition of Property. Buyer understands and agrees that, other than with respect to Seller's obligations hereunder to be satisfied prior to Closing, and Seller's post-closing construction obligations pursuant to Paragraph 20(b) hereof, Seller has not made and does not make any representations or warranties as to the physical condition, title, or any other matter or thing affecting or relating to the Property and Buyer hereby expressly acknowledges that no such representations or warranties have been made or are implied. Buyer agrees to take the Property "AS IS, WHERE IS" on the Closing Date with all faults in its then physical condition and Seller expressly disclaims any representations or warranties of title, merchantability, usage or fitness for any particular purpose.

6. Title and Deed. At the Closing, Seller shall convey to Buyer or its nominee by Warranty Deed (the "Deed") fee simple good and clear record, marketable and insurable title to the Property, free of all liens, agreements, leases, restrictions, parties in possession, mortgages and encumbrances except: (i) provisions of building and zoning laws in effect on the Closing Date; (ii) real property taxes for the then current year which are not yet due and payable on the Closing Date; (iii) any matters of record existing as of the date of this Agreement provided that the same do not materially interfere with the use

of the Property for the Substation in the reasonable discretion of Buyer (collectively, the "Permitted Exceptions").

Notwithstanding the foregoing, unless Buyer notifies Seller in writing prior to the expiration of Buyer's "Due Diligence Period" (defined in Section 7, below) of any respect in which title to the Property does not conform with the requirements of this Agreement, then Buyer shall be treated as having waived any right thereafter to assert that title to the Property is not of the quality required hereby, but such waiver shall apply only with respect to defects existing as of the date of the expiration of Buyer's Inspection Period.

If Buyer notifies Seller in writing as aforesaid of any manner in which Seller's title does not conform with the requirements of this Agreement (the "Buyer's Title Objections"), then Seller shall notify Buyer within five (5) business days thereafter, whether Seller will attempt to cure such Title Objections. Seller's failure to give notice within said five (5) business day period shall be deemed an election not to cure said Title Objections. If Seller elects to cure said Title Objections as aforesaid, Seller shall, for a period of time (not to exceed 30 days), to use diligent and good faith efforts to remove and remedy same. If, at the expiration of such thirty (30) day period, Seller despite such diligent and good faith efforts shall have failed to remove and remedy same, then, at Buyer's option, the Deposit shall be forthwith returned to Buyer, this Agreement shall become null and void, and the parties hereto shall have no further rights and obligations hereunder. Notwithstanding the foregoing, Seller shall be obligated to remove, at Seller's sole cost and expense (i) any mortgage affecting the Real Estate; (ii) any monetary lien affecting the Real Estate; and (iii) any real estate taxes or assessments affecting the Real Estate (collectively the "Monetary Liens"), provided that Seller shall be entitled to use the sale proceeds to remove the Monetary Liens.

7. Due Diligence/Investigations.

(a) For a period commencing on the Effective Date and expiring at 5:00 p.m. Eastern Standard Time forty five (45) days thereafter ("the Due Diligence Period"), Buyer shall have the right to perform its due diligence review, in such a manner as Buyer determines, of the condition of the Property, including without limitation, title, environmental condition, planning and zoning laws, and physical characteristics relating to the Property, at Buyer's sole expense, to determine the suitability of the Property for the Substation. If Buyer determines during such time, within its reasonable discretion, that the condition of the Property or any other matter related to the Property or Buyer's intended use thereof is not acceptable, then Buyer shall have the right to terminate this Agreement, by giving written notice of termination to Seller, upon which (i) the Buyer shall deliver to Seller all other reports, engineering data, plans, studies and other similar materials related to the Property prepared for or generated by Buyer in connection with its due diligence review of the Property; (ii) the Deposit shall be refunded to the Buyer; (iii) this Agreement shall become null and void; and (iv) the parties shall have no further rights or obligations hereunder. If this Agreement is not terminated as aforesaid, the Deposit shall become nonrefundable, except in the event Buyer does not obtain the Permits as set forth in Section 8.

(b) During the Due Diligence Period, Seller shall provide Buyer or its authorized representatives reasonable access to the Property, as Buyer may from time to time reasonably request to conduct, at Buyer's sole expense, all such reviews, studies, tests and the like which are reasonably appropriate in connection with the inspections authorized by Subsection (a) above. Seller agrees to reasonably cooperate with Buyer in its due diligence and, within five (5) business days after the Effective Date, will provide to Buyer copies of all reports, permits, approvals and other information and materials related to the condition of the Property, including but not limited to, site assessments, environmental assessments, surveys, existing or draft subdivision or site plans, soil studies and all other data pertaining to the physical condition or physical nature of the Property, to the extent such materials are in Seller's possession (the "Seller's Due Diligence Materials"). Seller's Due Diligence Materials will be provided by Seller without representation or warranty as to accuracy or completeness. If Seller's Due Diligence Materials are not timely delivered to Buyer within this five (5) business day deadline, the Due Diligence Period shall be extended one (1) day for each day such materials are delivered late.

(c) Buyer shall be responsible for ensuring that any part of Property affected by such investigation is restored to as near as possible its original condition. Buyer's investigation shall be conducted in a manner so as to minimize interference or disruption of any on-going business activities at the Property and on the Tuscan Village Project. Furthermore, Buyer shall also notify Seller at least two (2) days in advance of any proposed investigations requiring entry upon the Property. Seller may impose such reasonable requirements on Buyer as it may reasonably elect in order to assure that the Property is not damaged. As a condition to allowing Buyer or any of its representatives access to the Property, Buyer or its representatives shall provide Seller with evidence of comprehensive general liability insurance in an amount not less than Two Million Dollars ($2,000,000.00) naming Seller as an additional insured on such policy. Without limiting the foregoing, Buyer hereby agrees to indemnify, defend and hold Seller harmless from and against any and all claims, suits, obligations, liabilities, damages, costs and expenses (including without limitation reasonable attorney's fees) for physical injury to the Property or for injury to persons or property arising out of any of the provisions of this Section 7 or any acts or omissions of Buyer or any of its representatives in performing Buyer's due diligence review hereunder. This Section 7(c) shall survive the expiration or termination of this Agreement.

(d) Hazardous Materials, Environmental Laws. Buyer's inspection during the Due Diligence Period shall include, but shall not be limited to, investigations of the physical condition thereof and to determine the status of the Property with respect to geotechnical matters and Hazardous Materials (as hereinafter defined) and compliance with applicable Environmental Laws (hereinafter defined). Notwithstanding anything to the contrary contained herein, Buyer's right to conduct such inspections and tests shall not include the right to conduct any invasive environmental testing, and neither Buyer nor any of its agents, consultants or contractors shall perform any borings, well drilling, cut samples or similar procedures without the prior written approval of Seller. "Hazardous Materials" means asbestos, urea formaldehyde,

polychlorinated biphenyls, nuclear fuel or materials, radioactive materials, explosives, known carcinogens, petroleum products and by products (including crude oil or any fraction thereof), and any pollutant, contaminant, chemical, material or substance defined as hazardous or as a pollutant or a contaminant in, or the use, manufacture, generation, storage, treatment, transportation, release or disposal of which is regulated by, any Environmental Law. "Environmental Law" means any federal, state, county, municipal, local or other statute, ordinance or regulation that relates to or deals with the protection of the environment or wildlife and/or human health and safety, including all regulations promulgated by a regulatory body pursuant to any such statute, ordinance, or regulation, including the Comprehensive Environmental Response and Liability Act of 1980, as amended, 42 U.S.C. Section 9601 et seq., the Resource Conservation and Recovery Act, as amended, 42 U.S.C. Section 6901, et seq., the Federal Water Pollution Control Act, as amended, 33 U.S.C. Section 1251 et seq., the Clean Air Act, as amended, 42 U.S.C. Section 7401 et seq. and any applicable local law or the laws of the State of New Hampshire and any regulations promulgated thereunder (collectively, the "Environmental Laws").

8. Approvals. The Buyer shall have a period of one hundred twenty (120) days after the expiration of the Due Diligence Period (the "Permit Period") to obtain, at Buyer's sole cost and expense, all necessary final and unappealable governmental licenses, permits, and approvals to construct the Substation on the Property (the "Permits"). Buyer shall be responsible to obtain any and all necessary permits and approvals, including subdivision approval, at Buyer's sole cost and expense, except that if such permits and approvals are conditioned upon construction or installation of improvements as part of Seller's Tuscan Village Project, the cost of such improvements shall be Seller's responsibility, as further set forth in Section 20(c). Buyer shall use diligent and good faith efforts to obtain all required Permits. Seller agrees to cooperate with Buyer in seeking said Permits, provided that Seller shall not be required to incur any costs or expenses in connection therewith. Seller hereby authorizes Buyer during the term of this Agreement to apply for and sign applications for any Permits and shall execute the authorization letter attached hereto as Exhibit B simultaneously with the execution of this Agreement.

In the event the Buyer, despite its diligent and good faith efforts, is not able to secure the Permits within the Permit Period, with all appeal periods expired with no appeals filed or with any appeals dismissed or determined with finality in favor of Buyer, either party may, if it so elects, terminate this Agreement, upon which the Deposit shall be refunded to Buyer.

9. Condemnation. If, prior to the Closing, all or any part of the Property shall be condemned by governmental or other lawful authority such that, in Buyer's reasonable judgment, its contemplated use of the Property is materially, adversely affected, Buyer shall have the option of (a) completing the purchase in accordance with the terms of this Agreement, in which event all condemnation proceeds or claims thereof relating to the Property, if any, shall be assigned to Buyer or (b) canceling this Agreement, in which event any Deposit paid by Buyer shall be forthwith returned to Buyer and this Agreement shall be terminated with neither party having any rights or obligations hereunder.

10. Taxes and Assessments. Real property taxes, water and sewer charges, utility costs, if any, shall be prorated and adjusted on a per diem basis as of the date of Closing using the most recently available assessment, invoice, meter reading or billing. Taxes due and payable for all prior years shall be paid, by Seller, on or before the Closing. If the Closing shall occur before the tax rate is fixed for the then-current year, the apportionment of taxes shall be upon the basis of the tax rate for the preceding year applied to the latest assessed valuation, with the proration to be adjusted between the parties based on actual taxes for the year in which Closing occurs at the time such actual taxes are determined. If as of the date of Closing no separate assessment has been assigned to the Property then, for purposes of prorating, the assessed value for the Property will be that percentage of the overall assessment of the land valuation component of the property from which the Property has been subdivided as the acreage of the Property bears to the total acreage of the unsubdivided property prior to subdivision.

11. Transfer Tax. The expense and cost of all state and local documentary, revenue stamps, or other transfer taxes, if any, relating to the sale of the Property shall be divided evenly between the parties on the date of Closing consistent with New Hampshire conveyancing practice. Both parties agree to execute any tax returns required to be filed in connection with any such taxes.

12. Default by Buyer. If the Buyer shall fail to close the transaction contemplated hereby, or shall default in any other obligation of Buyer hereunder for a period of more than ten (10) days after written notice of such default by Seller, the Deposit made hereunder shall be paid by the Escrow Agent to the Seller as liquidated damages as Seller's sole remedy, either in equity or law. The parties acknowledge that such liquidated damages are a fair and reasonable measure of Seller's potential damages from Buyer's failure to fulfill Buyer's agreements herein, and that such liquidated damages do not and will not constitute a penalty. The parties acknowledge and agree that Seller has no adequate measure of damages in the event of Buyer's breach of or default under this Agreement because it is impossible to compute exactly the damages or losses which would accrue to Seller in such event. Therefore, the parties have taken these facts into account in setting the amount of the deposits made hereunder, and hereby agree that: (i) such Deposit is a reasonable forecast and approximation of such actual damages and losses which would accrue to Seller in the event of Buyer's default hereunder, and which could result from Seller's inability to resell the Property for the same agreed purchase price due to any number of presently undeterminable factors, including, but not by way of limitation, compensation to Seller for removing the Property from the market and reimbursement for costs and expenses (including attorney's fees) incurred by Seller; and (ii) the Deposit represents a reasonable amount for such damages and losses and not a penalty against the Buyer. In such an event this Agreement shall become null and void and the parties shall have no further rights or obligations hereunder.

13. Default by Seller. If, Seller shall default in the performance of any of its obligations hereunder, Buyer shall, have the right either (i) to terminate this Agreement without further liability hereunder, in which event the Deposit shall be forthwith returned to

Buyer and the parties shall have no further rights of obligations hereunder or (ii) to pursue a suit for specific performance.

14. Brokerage Fees. Seller and Buyer represent and warrant to each other that no brokerage fees or real estate commissions are or shall be due or owing in connection with this transaction or in any way with respect to the Property. Seller agrees to defend, indemnify, and hold Buyer harmless from any claims, costs, judgments, or liabilities of any kind advanced by persons claiming real estate brokerage fees through Seller. Buyer agrees to defend, indemnify and hold Seller harmless from any claims, costs, judgments, or liabilities of any kind advanced by persons claiming real estate brokerage fees through Buyer. The indemnities set forth in this Paragraph 14 shall survive Closing

15. Conditions Precedent to Buyer's Obligation to Purchase the Real Estate. The obligation of the Buyer to purchase the Property under this Agreement is expressly conditional and contingent upon all of the following:

(a) receipt of marketable and insurable title to and possession of the Property simultaneously with the Closing in the condition required by this Agreement, subject to the Permitted Exceptions;

(b) all of Seller's warranties and representations set forth in Paragraph 4 hereof being true as of the Closing, and Seller shall have fully satisfied all covenants hereunder required to be satisfied before the Closing;

(c) no eminent domain proceeding pending against the Property or any portion thereof;

(d) there being no material adverse change in the condition of the Property from its condition as of the date of the expiration of the Due Diligence Period; and

(e) receipt or waiver of the Permits.

These conditions and Seller obligations are for the benefit of Buyer and any one or more of such conditions or obligations (collectively, the "Buyer Conditions Precedent to Closing") may be waived by Buyer in its sole discretion. If any one of the Buyer Conditions Precedent to Closing are not met, Buyer may terminate this Agreement by giving written notice to Seller and receive a refund of the Deposit.

16. Conditions Precedent to Seller's Obligation to Sell the Property. The obligation of the Seller to sell the Property under this Agreement is expressly conditional and contingent upon receipt of the full Purchase Price from the Buyer for the Property at the Closing.

17. Notices. All notices and other communications required or permitted to be given hereunder shall be in writing and shall be (i) mailed by certified or registered mail,

postage prepaid, or (ii) sent overnight mail by a recognized national delivery service, or (iii) faxed or emailed (with confirming hard copy mailed by first class mail) addressed as follows or to such other addresses as the parties may designate in writing from time to time:

If to Seller:	Rock Acquisition, LLC 2352 Main St., Suite 201 Concord, MA 01742 Tel: (603) 912-5467 Email: tbean@tuscanbrands.com
With a copy to:	Hinckley, Allen & Snyder LLP 650 Elm St., Suite 500 Manchester, NH 03101 Attn: John H. Sokul, Jr. Tel: (603) 225-4334 Email: jsokul@hinckleyallen.com
If to Buyer:	Liberty Utilities 15 Buttrick Road Londonderry, NH 03053 Attn: Jill Fitzpatrick Tel: (603) 216-952-2999 Email: Jill.Fitzpatrick@libertyutilities.com
With a copy to:	Liberty Utilities 15 Buttrick Road Londonderry, NH 03053 Attn: Michael J. Sheehan Tel: (603) 216-335 Email: Michael.Sheehan@libertyutilities.com

18. Closing Costs. Notwithstanding anything to the contrary contained herein, the Closing costs shall be paid as follows:

By Buyer:

(a) title examination and title insurance premium
(b) one-half of the State real estate transfer tax
(c) recording fees
(d) its own legal fees

By Seller:

(a) cost of preparing the Deed
(b) one-half of the State real estate transfer tax

(c) cost of obtaining and recording all title clearing documents, if any
(d) its own legal fees

19. Documents to be Delivered at Closing. At the Closing, the Seller and Buyer shall execute, acknowledge and deliver all documents required to effectuate the transaction contemplated by this Agreement.

20. Construction Obligations. The following special obligations shall apply to the transaction and shall survive the Closing:

(a) Buyer shall construct, at Buyer's sole cost and expense, the Substation which will provide adequate electrical service to the Tuscan Village Project as generally shown on the conceptual master plan, a copy of which is attached hereto as Exhibit C, and according to the service requirements timetable attached hereto as Exhibit D. Buyer represents and warrants that the electrical system supplying electricity to the Tuscan Village Project, including the Substation, will be sufficient to serve the Seller's proposed development as and when needed per Exhibit D.

(b) Within thirty days following execution of this Agreement, Seller shall provide, at Seller's sole cost and expense, gravel, unpaved (but reasonable) access to the Real Estate in the general location shown on Exhibit E. The access will be paved by Seller following the Closing as and when Seller's Tuscan Village project is fully built out.

(c) Seller shall reserve in the deed to Buyer a slope/grading easement in the area labeled "Proposed 15' 0" grading easement" on Exhibit F. Seller shall be responsible, at its sole cost and expense, for any grading and related improvements within the slope/grading easement. Buyer shall be responsible, at its sole cost and expense, to construct a screening fence around the substation and for all other improvements on the Property.

21. Time of Essence. Time is expressly declared to be of the essence of this Agreement.

22. Headings. The headings to the Sections hereof have been inserted for convenience of reference only and shall in no way modify or restrict any provisions hereof or be used to construe any such provisions.

23. Modifications. The terms of this Agreement may not be amended, waived or terminated orally, but only by an instrument in writing signed by both Seller and Buyer.

24. Successors. This Agreement may not be assigned by the Buyer without Seller's prior written consent, which shall not be unreasonably withheld.

25. Deposit and Escrow Funds.

(a) The Deposits made hereunder shall be held in escrow by Hinckley, Allen & Snyder LLP as escrow agent, subject to the terms of this Agreement and shall be duly accounted for at the Closing. The Deposit shall be held in a federally insured, interest-bearing, money market escrow account. In the event that Buyer or Seller sends notice to Escrow Agent certifying to Escrow Agent that it is entitled to receive the Deposit pursuant to the terms of this Agreement (other than at the Closing), Escrow Agent shall forward a copy of such certification to the other party (pursuant to the notice provisions of Paragraph 17 hereof). If Escrow Agent does not receive an objection from such party to such certification within fifteen (15) days after the date of such notice, Escrow Agent may disburse all such amounts to the certifying party. If Escrow Agent receives an objection or receives conflicting demands, Escrow Agent shall have the right to do either of the following: (i) interplead the Deposit into a court of competent jurisdiction in Hillsborough County, New Hampshire (the cost of doing so, up to a maximum of $1,000, to be deducted from the Deposit) and the parties shall thereafter be free to pursue their rights at law or in equity with respect to the disbursement of the Deposit and the Escrow Agent shall be fully released and discharged from its duties and obligations under this Agreement; or (ii) resign and transfer the Deposit to a replacement escrow agent reasonably satisfactory to Buyer and Seller. Upon the transfer of Deposit to such replacement escrow agent, the Escrow Agent shall thereupon be fully released and discharged from all obligations to further perform any and all duties or obligations imposed upon it by this Agreement.

(b) The Escrow Agent shall incur no liability hereunder whatsoever, except in the event of its willful misconduct or gross negligence. The other parties hereto, jointly and severally, agree to defend and indemnify the Escrow Agent against all reasonable costs, obligations and liabilities suffered by it for which it may be claimed to be liable hereunder, except for that occasioned by its willful misconduct or gross negligence. The indemnity provided in the preceding sentence shall survive any termination of this Agreement. The fees of the Escrow Agent and costs incurred by it in performing its duties hereunder shall be shared equally by the parties.

(c) The Buyer acknowledges and understands that the Escrow Agent is Seller's attorney in this transaction. In the event of any dispute between the Buyer and the Seller arising out of this Agreement, the Buyer agrees that the Escrow Agent may represent the Seller in connection with that dispute provided that Escrow Agent also proceeds in accordance with (i) or (ii) of Paragraph (a), above. The Buyer agrees that in the event of any such dispute and provided that the Escrow Agent proceeds in accordance with (i) or (ii) of Paragraph (a) above, it will not object to the Escrow Agent's representation of the Seller in such dispute because of any potential or actual conflict of interest arising due to the Escrow Agent's role as Escrow Agent under the terms of this Agreement.

26. Counterparts. The Agreement may be signed by the parties in counterparts.

27. Cooperation. The parties agree to cooperate with each other in good faith

and in all reasonable respects to cause the transactions contemplated by this Agreement to be consummated in accordance with the terms of this Agreement and in allowing each party to fulfill its obligations and covenants contained in this Agreement, including, without limitation, each parties' permitting and construction activities.

28. Entire Agreement. This Agreement contains the entire agreement between Seller and Buyer, and there are no other terms, conditions, undertakings, promises, statements, or representations, express or implied, concerning the sale and other undertakings contemplated by this Agreement.

29. Title Standards. With respect to the conveyance of the property contemplated by this Agreement, any title matter which is the subject of a title standard of the New Hampshire Bar Association Title Examination Standards at the time for delivery of the deed shall be governed by said title standard to the extent applicable and not inconsistent with any provision of this Agreement.

30. Drafting Party. Buyer and Seller acknowledge that each of them and their counsel have had an opportunity to review this Agreement and that this Agreement will not be construed against either party merely because its counsel has prepared it.

31. Force Majeure. Notwithstanding anything to the contrary contained in this Agreement the parties' respective construction obligations shall be extended by one day for each day that completion is delayed due to wars, acts of God, fire, insurrection, and riots, winter conditions or strikes that prevent normal progress of construction, provided that written notice of such delay is delivered to the other party within fifteen days after the delay.

[Signature blocks on next page]

IN WITNESS WHEREOF, the parties have executed this Agreement in duplicate as of the day and year first above written.

SELLER: ROCK ACQUISTION, LLC

By: _____
Name: Joseph P. Fara
Its: managing member

BUYER: LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP.

By: _____
Name: Susan L. Fleck
Its: President

ESCROW AGENT: HINCKLEY, ALLEN & SNYDER LLP

By _____
Name: John H. Sokul
Its: Partner

EXHIBIT B – Authorization Letter

To Whom It May Concern:

Rock Acquisition, LLC (the "Owner") is the owner of the property located at 71 Rockingham Park Blvd., Salem, New Hampshire (the "Property"). The Owner hereby authorizes Liberty Utilities and/or its agents to execute, submit and prosecute applications and any applicable materials to the Town of Salem boards, commissions, agencies and the like (including, without limitation, zoning boards, planning boards and the Selectmen) on behalf of the Owner, for the purpose of obtaining municipal permits and approvals for the construction of an electrical substation on the Property.

Rock Acquisition, LLC

By: _____

Name: Joseph P. Fara

Title: Managing Member

Duly authorized

IN WITNESS WHEREOF, the parties have executed this Agreement in duplicate as of the day and year first above written.

SELLER: ROCK ACQUISTION, LLC

By: _____
Name:
Its:

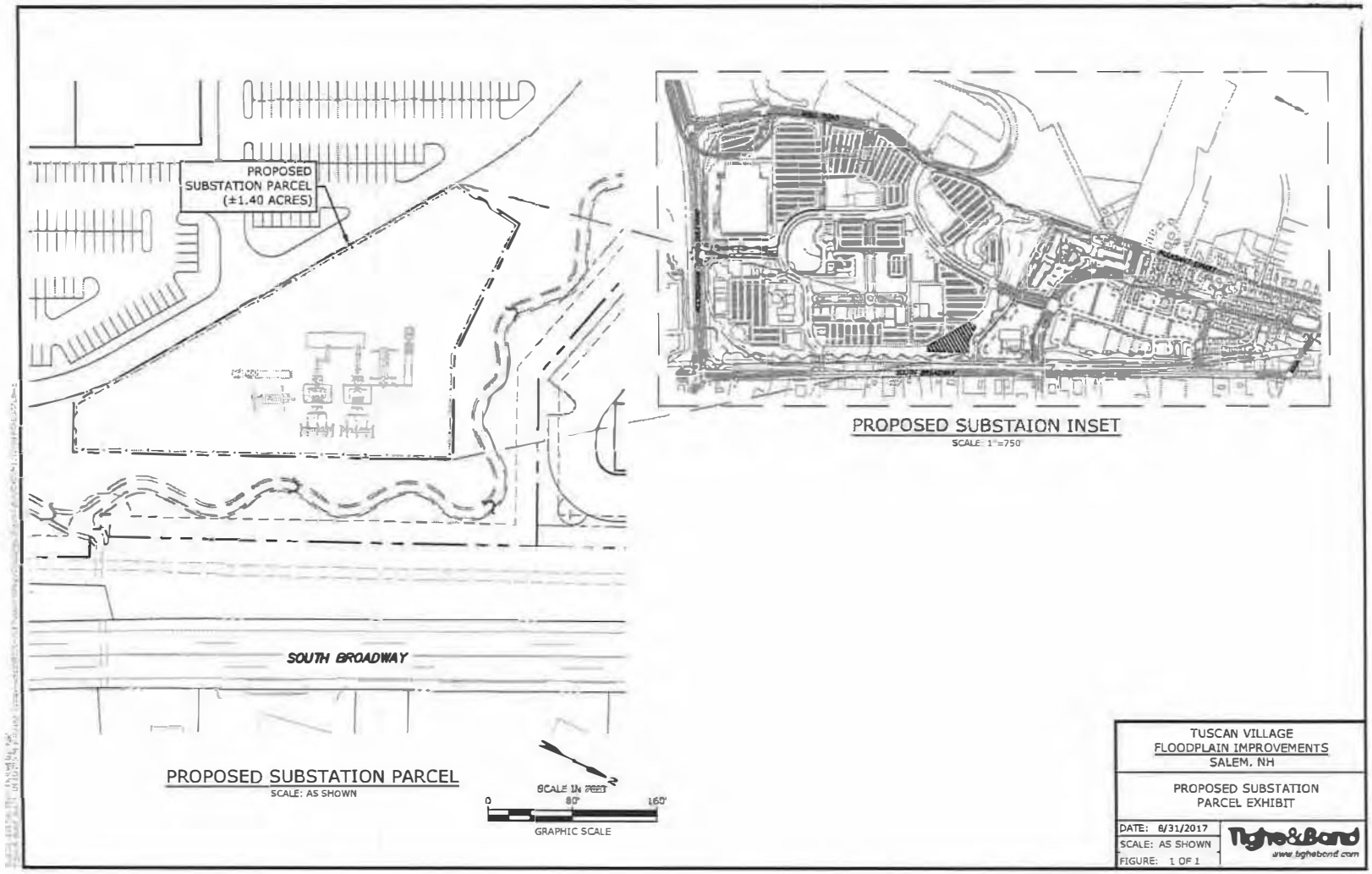
BUYER: LIBERTY UTILITIES (GRANITE STATE ELECTRIC) P.

By: _____
Name: Susan L. Fleck
Its; President

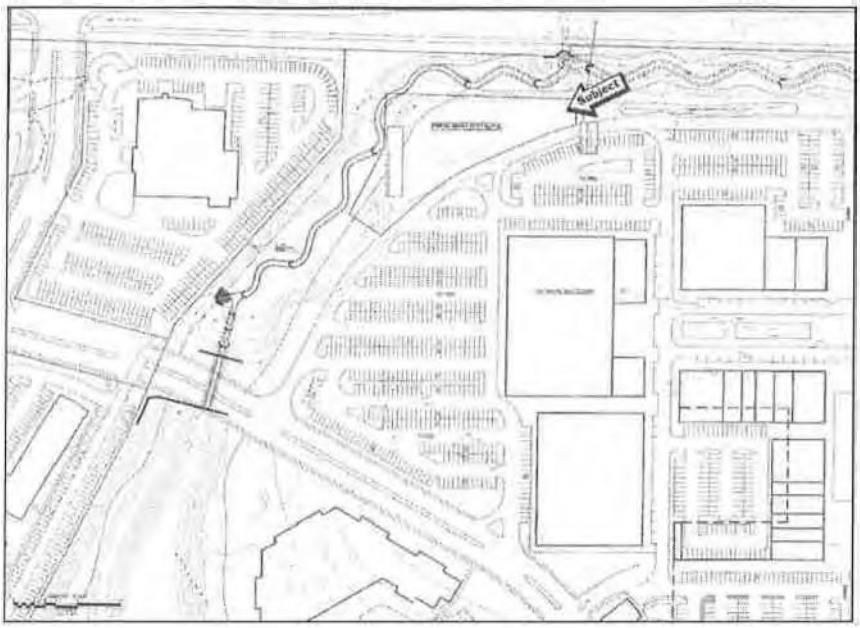
ESCROW AGENT: HINCKLEY, ALLEN & SNYDER LLP

By _____
Name: John H. Sokul
Its: Partner

EXHIBIT A – Plan Showing Real Estate


PROPOSED SUBSTATION PARCEL (±1.40 ACRES)
SOUTH BROADWAY
PROPOSED SUBSTATION PARCEL
SCALE: AS SHOWN
SCALE IN FEET
0
80'
160'
GRAPHIC SCALE
PROPOSED SUBSTAION INSET
SCALE: 1"=750'
TUSCAN VILLAGE
FLOODPLAIN IMPROVEMENTS
SALEM, NH
PROPOSED SUBSTATION PARCEL EXHIBIT
DATE: 6/31/2017
SCALE: AS SHOWN
FIGURE: 1 OF 1
Tighe&Bond
www.tighebond.com

REAL ESTATE APPRAISAL REPORT



1.23± ACRES TUSCAN VILLAGE
SALEM, NEW HAMPSHIRE

OWNED BY
ROCK ACQUISITION, LLC

CAA FILE NO. 60.0491

PREPARED FOR
ATTORNEY MICHAEL SHEEHAN
SENIOR COUNCIL
LIBERTY UTILITIES

AS OF
JULY 13, 2017

Crafts Appraisal Associates, Ltd.
4 Bell Hill Road • Bedford, NH 03110 • 603 472-2444 • fax 603 472-9856 •
Email admin@craftsappraisal.com

Crafts Appraisal Associates, Ltd.
Real Estate Appraisals

July 27, 2017

Attorney Michael Sheehan
Senior Council
Liberty Utilities
15 Buttrick Road
Londonderry, NH 03053

Re: **REAL ESTATE APPRAISAL REPORT OF**
1.23± ACRE PARCEL
TUSCAN VILLAGE
SALEM, NEW HAMPSHIRE
OWNED BY ROCK ACQUISITION, LLC
CAA PROJECT FILE NUMBER 60.0491

Dear Attorney Sheehan,

I have inspected the above-captioned property in order to report my opinion of the Market Value of the fee simple estate as of July 13, 2017. The subject of this report consists of a hypothetical 1.23± acres that will be dedicated to Liberty Utilities' installation of a substation to service the larger Tuscan Village Development on the former Rockingham Park. Exhibits provided by Liberty Utilities indicate this parcel to be on the eastern portion of the larger site near North Broadway. It shows it being on the perimeter of a parking area that will service a commercial portion of the development that is yet to be developed.

The purpose of this appraisal is to assist the intended user, Attorney Michael Sheehan and other involved in the loan decision process at Liberty Utilities in establishing a market value of the fee simple estate on which to make future financial decisions.

This appraisal report was prepared for the exclusive use of Liberty Utilities. This report is not intended for any other use. Any use of this appraisal by any other person or entity, or any reliance or decisions based on this appraisal, are the sole risk of the third party. Crafts Appraisal Associates, Ltd. accepts no responsibility for damages suffered by any third party as a result of reliance on, decisions made, or actions taken based on this report.

The appraisal research and analysis are summarized in the following report. As such, it might not include full discussions of the data, reasoning, and analyses that were used in the appraisal process to develop the opinion of value. Supporting documentation concerning the data, reasoning, and analyses is retained in our files. The information contained in this report is specific to the needs of the client and for the intended use stated in this report.

I hereby certify that I have inspected the subject property, that I have considered all factors that were pertinent to the value estimate, and that I have not knowingly or intentionally omitted any important data. I further certify that I have no present or contemplated future interest in the property, and that my professional fee is not dependent upon the value estimate.

On the basis of my inspection, investigation, study and analysis, I am of the opinion that the subject's value is:

MARKET VALUE OF THE FEE SIMPLE ESTATE AS OF JULY 13, 2017..... $925,000

Respectfully submitted,

Donald E. Watson

Donald E. Watson
Certified General Appraiser
No. NHCG-191

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SUMMARY OF IMPORTANT FACTS & CONCLUSIONS

Owner of Record:	Rock Acquisition, LLC
Location:	Tuscan Village Development 71 Rockingham Park Boulevard Salem, New Hampshire
Map/Lot:	98/7887
Deed Reference:	Book 5763, Page 52, Rockingham County Registry of Deeds.
Land Area:	A hypothetical 1.23± acre parcel within the larger 120.64± acre parcel that comprises the former Rockingham Park slated to be developed in a mixed-use fashion known as Tuscan Village.
Improvements:	Vacant land
Zoning:	Commercial Industrial (CIC)
Flood Zone:	According to the National Flood Insurance Program Map for Rockingham County, Community Panel No. 33015C0563E, with an effective date of May 17, 2005, the subject appears to be in an area designated as Zone X, an area outside of any known flood zone. There are some flood zone areas associated with the larger parcel and the exact placement of the subject within that is not quite defined. However, based on exhibits provided it appears it is not in the flood zone.
Assessment:	There is no meaningful assessment for the subject as appraised here.
Highest & Best Use:	Commercial development
Intended Use/User:	The purpose of this appraisal is to assist the intended user, Attorney Michael Sheehan, Senior Council, and others

involved in decisions at Liberty Utilities to establish the market value to assist in making future financial decisions.

This appraisal report was prepared for the exclusive use of Liberty Utilities. This report is not intended for any other use. Any use of this appraisal by any other person or entity, or any reliance or decisions based on this appraisal, are the sole risk of the third party. Crafts Appraisal Associates, Ltd. accepts no responsibility for damages suffered by any third party as a result of reliance on, decisions made, or actions taken based on this report.

Extraordinary Assumptions:

No hazardous materials or conditions were observed during the property inspection, nor were any disclosed. This report has not been prepared in an environmental-risk capacity and should not be construed as such. This report assumes that the subject property is free and clear of hazardous materials. If this is found to be untrue, the value in this appraisal could be affected.

This appraisal is based upon the assumption that a 1.23± acre parcel as represented by the client will be subdivided from the larger parcel for use as a utility substation. This is to service the proposed developed which is assumed to be completed.

The above are considered to be an *Extraordinary Assumptions*. USPAP 2014-2015 Edition, defines extraordinary assumption as: *"an assumption directly related to a specific assignment as of the effective date of the assignment results, which, if found to be false, could alter the appraiser's opinions or conclusions."*

Hypothetical Condition:

This appraisal values a 1.23± acre parcel that has yet to exist but is assumed to have been subdivided from the larger parcel for the sake of this appraisal.

USPAP 2014-2015 Edition, defines *Hypothetical Condition* as: *"a condition directly related to a specific assignment, which is*

contrary to what is known by the appraiser to exist on the effective date of the assignment result, but is used for the purpose of analysis."

Estimated Exposure Time:	6-12 months
Valuations:	Sales Comparison Approach $925,000
Valuation Date:	July 13, 2017
Report Date:	July 27, 2017
Appraiser:	Donald E. Watson Certified General Appraiser No. NHCG-203

SCOPE OF WORK

INTRODUCTION

The purpose of this assignment is to estimate the Market Value of the fee simple estate of 1.23± acres proposed to be subdivided from a larger parcel to be developed and known as Tuscan Village in Salem, New Hampshire as of July 13, 2017. Inspected on July 13, 2017, the subject of this report consists of a hypothetical 1.23± acres that will be dedicated to Liberty Utilities' installation of a substation to service the larger Tuscan Village Development on the former Rockingham Park. Exhibits provided by Liberty Utilities indicate this parcel to be on the eastern portion of the larger site near North Broadway. It shows it being on the perimeter of a parking area that will service a commercial portion of the development that is yet to be developed.

The appraisal research and analysis are summarized in the following report. As such, it might not include full discussions of the data, reasoning, and analyses that were used in the appraisal process to develop the opinion of value. Supporting documentation concerning the data, reasoning, and analyses is retained in our files. The information contained in this report is specific to the needs of the client and for the intended use stated in this report.

In preparing this appraisal my work included the following:

- Personal inspection of the subject on July 13, 2017;
- Review of available information from the Town of Salem's assessor's office;
- Review of various exhibits provided by the client;
- Inspection of the subject neighborhood to establish uses and trends within the neighborhood;
- Discussions with real estate professionals including other appraisers, brokers, and property owners to compile a pool of data to assist in the valuation section of this report;
- Research of databases including Crafts Appraisal, Paragon, and the Warren Group.

More information on the Scope of Work, such as the type and extent of the data researched and analysis applied, is discussed in the valuation section(s) of the report.

DEFINITION OF MARKET VALUE

Market Value is the major focus of most real property appraisal assignments. Both economic and legal definitions of Market Value have been developed and refined. A current economic definition agreed upon by federal financial institutions in the United States of America is:

The most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeably, and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby:

1. *buyer and seller are typically motivated;*
2. *both parties are well informed or well advised, and acting in what they consider their own best interests;*
3. *a reasonable time is allowed for exposure in the open market;*
4. *payment is made in terms of cash in United States dollars or in terms of financial arrangements comparable thereto; and*
5. *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.*

This definition is from regulations published by federal regulatory agencies pursuant to Title XI of the Financial Institutions Reform, Recovery, and Enforcement Act (FIRREA) of 1989 between July 5, 1990, and August 24, 1990 by the Federal Reserve System (FRS), National Credit Union Administration (NCUA), Federal Deposit Insurance Corporation (FDIC), the Office of Thrift Supervision (OTS), and the Office of Comptroller of the Currency (OCC). This definition is also referenced in regulations jointly published by the OCC, OTS, FRS, and FDIC on June 7, 1994, and in the *Interagency Appraisal and Evaluation Guidelines*, dated December 10, 2010, Federal Register/Volume 75 No. 237, Page 77471.

PROPERTY RIGHTS APPRAISED

This report is concerned with the value of the subject's fee simple estate. The Dictionary of Real Estate Appraisal, Fifth Edition, defines fee simple estate as: *"The absolute ownership unencumbered by any other interest or estate, subject only to the limitations imposed by the governmental powers of taxation, eminent domain, police power, and escheat."*

EXTRAORDINARY ASSUMPTIONS

No hazardous materials or conditions were observed during the property inspection, nor were any disclosed. This report has not been prepared in an environmental-risk capacity and should not be construed as such. This report assumes that the subject property is free and clear of hazardous materials. If this is found to be untrue, the value in this appraisal could be affected.

This appraisal is based upon the assumption that a 1.23± acre parcel as represented by the client will be subdivided from the larger parcel for use as a utility substation. This is to service the proposed developed which is assumed to be completed.

HYPOTHETICAL CONDITION

This appraisal values a 1.23± acre parcel that has yet to exist but is assumed to have been subdivided from the larger parcel for the sake of this appraisal.

VALUATION METHODOLOGIES

In appraising real estate the following methods may be used:

- The Cost Approach, which adds the estimated value of the underlying land and the depreciated improvement cost to derive a value indication.
- The Sales Comparison Approach, which compares the subject to sales of similar properties to derive a value indication.
- The Income Approach, which has two potential methodologies; Direct Capitalization and Discounted Cash Flow Analysis. The first methodology uses capitalization techniques to convert anticipated benefits into an indication of value, while the second applies a discount rate to a set of projected income streams and a reversion to determine value.
- The Development Procedure, which values undeveloped acreage by discounting the cost of development and the probable proceeds from the sale of developed sites. This method incorporates components from each of the other three approaches.

In appraising the subject, I used the Sales Comparison Approach, which is explained in the valuation section of this report. I did not utilize the Cost or Income Approaches given in this market they are utilized to value improved properties and since the subject, as described here, is vacant land they would not result in an appropriate value. For this reason the Cost and Income Approaches were not developed. The Development Procedure can sometimes be utilized in valuing vacant land but to do so requires engineering, approvals, etc. Since the subject does have these the Development Procedure would not be appropriate and was also not developed. The Sales Comparison Approach will result in a credible opinion of value for the subject property.

MUNICIPAL CONSIDERATIONS

INTRODUCTION

This section will address specific issues that impact the subject such as community and neighborhood considerations and trends.

MUNICIPAL DESCRIPTION

The subject is in Salem, which is in Rockingham County in the southern part of the state midway between Boston, MA and Concord, NH. The major highways servicing the local area are north/south state Route 28 and east/west Routes 97 and 111. Major links to the regions are provided by Interstates 93 and 495, running north/south and east/west, respectively. Salem is easily accessible via I-93, and is 30 miles north of Boston, 6 miles north of Lawrence, MA, 12 miles east of Nashua, NH and 19 miles southeast of Manchester, the state's largest city.

The population change for Salem totaled 19,643 over 55 years, the sixth largest numeric change was from 9,210 in 1960 to 28,853 in 2015. The largest decennial percent change was an increase of 119% between 1960 and 1970. The next largest percent increase, of 20%, occurred between 1970 and 1980. The 2015 Census estimate for Salem was 28,853 residents, which ranked 7th among New Hampshire's incorporated cities and towns.

The following chart demonstrates the community's growth over the past five decades as compared with that of Rockingham County.

YEAR	SALEM	ROCKINGHAM COUNTY
2015	28,853	299,006
2010	28,776	295,223
2000	28,219	278,748
1990	25,841	246,744
1980	24,124	190,345
1970	20,142	138,951

As of 2015 there are a total of 11,733 housing units in the community. Of that total 8,496 are single-family with 687 two to four units, 1,765 five or more units, and 523 mobile homes or other housing units.

The 2015 Census indicates that Salem's per capita income is $37,325 with a median household income of $79,755.

Salem's major employers are summarized below:

Northeast Rehabilitation Hospital.....300
J.C.Penney Co. 200
Reliable Security Guard 135
Salem Haven 120
Home Depot.....100

Salem's most distinguishing characteristic is its proximity both to the major highway system and the state of Massachusetts. Much of Salem's economy is affected both positively and negatively, by its location. The most recently published unemployment rates are as follows:

AREA	5/17	5/16
New Hampshire	2.7%	2.7%
Rockingham County	2.9%	2.9%
Salem-Town NH Portion Lawrence, Mass.-NH NECTA	3.6%	3.4%
Salem	3.6%	3.4%

Salem falls within the Lawrence, Massachusetts PMSA and has a higher unemployment rate compared with the remainder of the state of New Hampshire due to the Massachusetts influence. As such, this figure is a weak indicator of the true conditions in Salem, New Hampshire.

The retail sector has always been a bright spot for Salem. The lack of sales tax in New Hampshire, along with the easy access from Massachusetts, are a driving force of this retail activity. There are many retail businesses along North and South Broadway, aka Route 28, which have benefited from their proximity to Massachusetts. Over 300 retail businesses offer a wide variety of consumer merchandise.

Salem is governed by a five-member board with members elected for three-year terms and a full-time town manager. The selectmen and town warrants are voted on in the annual town meeting in March of each year. The community's planning and zoning functions are handled by a planning department, and are administered by a full-time

director and a five-person planning board, who implement the town's land use and zoning ordinances.

In summary, Salem has traditionally benefited from its location along the New Hampshire/Massachusetts border and its proximity to Route 93. Salem's population has grown over the last ten years, but at a rate slower than many of the surrounding communities. From an employment standpoint, almost a full 50% of the town's labor force works in Massachusetts, which currently contributes to a higher unemployment rate in the town, than in the state overall.

Historically, Salem has had a strong economic base, especially in the retail and industrial sectors. Again, this trend is partly due to the favorable tax structure in New Hampshire and the exceptional access via Interstate 93. The Mall at Rockingham Park, due to its size and location attracts new businesses, employees and shoppers.

The factors that have contributed to Salem's strength in the past are still present. Although the overall economies of both New Hampshire and Massachusetts have impacted the town, its non-manufacturing segment, including retailing, has remained strong.

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MARKET ANALYSIS

NEW HAMPSHIRE HEADING INTO 2017 WITH STRONG ECONOMY

New Hampshire is closing out 2016 with the nation's lowest unemployment rate, wages that are on the rise and strong real estate sales.

Combined, these factors show the state's economy is strong heading into 2017. The state's gross domestic product growth rate of 2.9 percent is among the highest in the nation, according to the most recently available federal data.

"Right now the state is in very good shape, probably the best shape it's been in economically in 10 years," said Russ Thibeault, president of Applied Economic Research in Laconia.

Still, there are challenges. Businesses say the low unemployment rate is making it hard to find skilled workers for open jobs. The state's modest in-migration also may make it hard for the state to sustain its growth.

"Without more people, the economy just can't grow anymore," said Steve Norton, executive director of the New Hampshire Center for Public Policy Studies.

UNEMPLOYMENT

New Hampshire's unemployment rate sat at 2.7 percent in November, tying with South Dakota for the lowest in the nation. That compares to 4.6 percent unemployment nationally.

A low unemployment rate increases competition for workers, which can in turn raise wages, Thibeult said. It also makes it easier for people seeking jobs to find one, because there is less competition.

On the flip side, New Hampshire businesses say it's hard to find skilled workers, particularly in fields such as advanced manufacturing. The state doesn't keep data on job vacancies, so it's hard to know how many positions are unfilled. But a lack of available workers could stop businesses from expanding.

"Almost anywhere you turn in the economy they are dealing with a shortage of skilled workers," said David Juvet, senior vice president of the Business and Industry Association.

HOUSING

New Hampshire's housing market is seeing an uptick in sales and home prices, according to recent data from the New Hampshire Association of Realtors.

November data show closed sales on single family homes went up 18.4 percent over the past year. The median sale prices for single family homes went up 5.9 percent, to $248,750, in the same period. Inventory of available homes has fallen quickly, making it more of a sellers' than a buyers' market.

Mortgage interest rates remain low but have finally started to rise, which adds uncertainty to the housing market heading into 2017, Thibeault said.

JOBS AND WAGES

Wages in New Hampshire also are climbing, offering another indicator of economic strength. On average, they're up 4 to 5 percent, according to data from the federal Bureau of Labor Statistics.

The median wage in New Hampshire is roughly $24 an hour, but that can vary sharply based on where someone lives. In the Lebanon-Hanover area, for example, the median wage hits almost $28 an hour. But over in Conway and Wolfeboro, an area dominated more by tourism and retail jobs, the median wage is closer to $19, according to a November report by the New Hampshire Department of Employment Security.

Roughly 734,000 workers were employed in New Hampshire as of November.

Leisure and hospitality jobs increased by 6 percent since last year, the highest increase, according to federal data.

Source: Kathleen Ronayne *Associated Press*

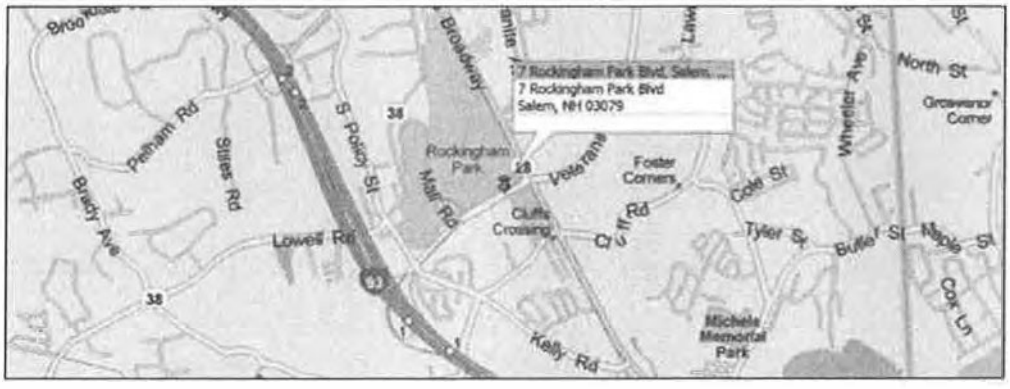
NEIGHBORHOOD DESCRIPTION

The subject is located on the west side of Route 28, South Broadway. It is sandwiched between Route 28 and Interstate 93. The neighborhood boundaries are roughly defined as Route 28, South Broadway, to the east, Route 97, Main Street, to the north, Interstate 93 to the west, and Rockingham Boulevard to the south.

The subject neighborhood has excellent access to the major highway system of the region by virtue of its proximity to Interstate 93. I-93 is the major north/south travel corridor running through central New Hampshire. Southerly it leads into Massachusetts and the greater Boston area. To the north it heads into the Manchester/Bedford market area and on into the White Mountains and Lake Regions of the state. The neighborhood has immediate access at either Exit 1, which is from Rockingham Park Boulevard or Exit 2 from Route 97, Main Street. Route 28 is a heavily traveled and commercially developed secondary state highway bisecting the community in a north/south direction. Prior to the construction of I-93, it fulfilled a similar role accessing the central portion of the state. It continues to be heavily traveled due to the retail development along the street.

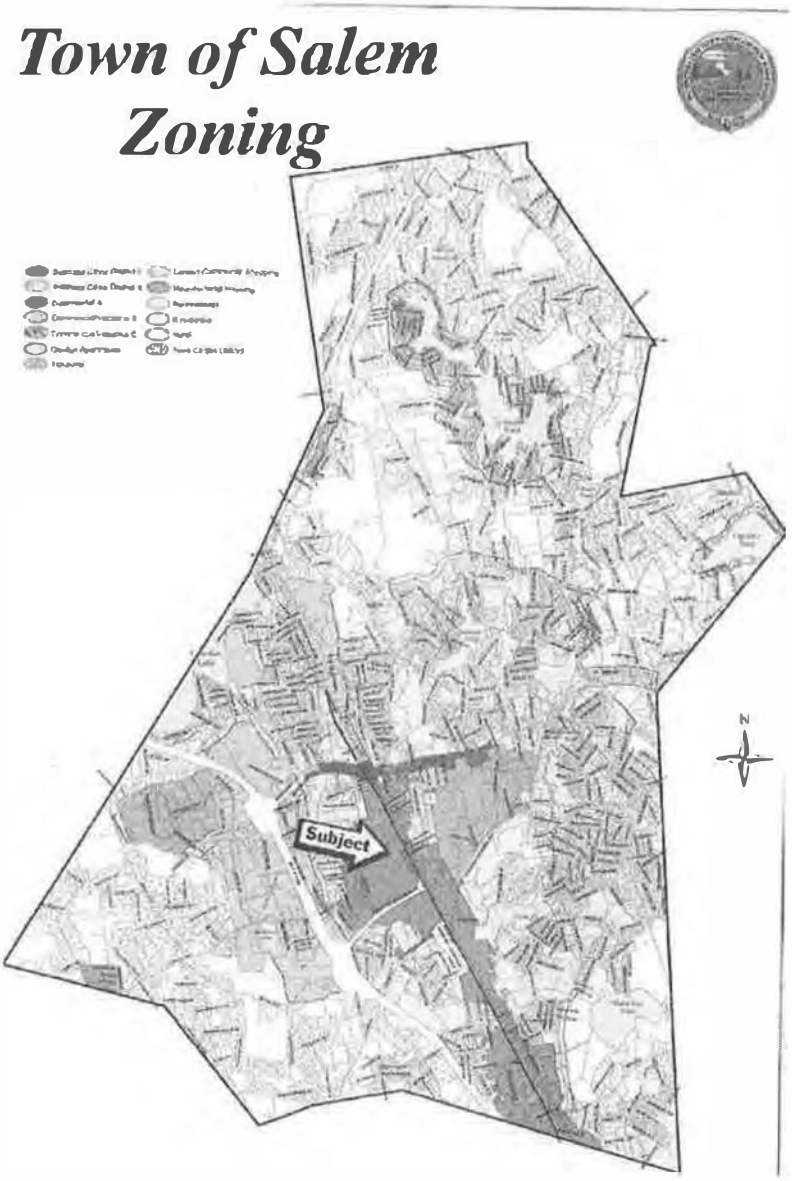
Route 28 is known as South Broadway from the intersection of Route 97, Main Street, to the north, southerly to the Massachusetts border. Due to the fact that Massachusetts has a sales tax, while New Hampshire does not, the locations in close proximity to the border have been heavily developed with commercial properties, more specifically retail. As a result South Broadway is one of the premier locations in the southern part of New Hampshire. Virtually all national retail franchises, including fast food restaurants, are located on this street. These are situated in freestanding buildings as well as anchored plazas. There are a number of automobile related uses on the street including dealerships.

In the subject's immediate area, in addition to the subject itself, the dominant feature is the Mall of Rockingham Park. This is a 1,000,000± SF Mall constructed during the early 90's. The streets in the western section of the subject's immediate neighborhood are primarily older retail.



ZONING

The subject is located in the Commercial A (CA) Zone. This zone permits a wide range of commercial uses with minimal dimensional requirements.



ASSESSMENT

The subject is a hypothetical 1.23± acre lot proposed to be subdivided from the larger 120± acre parcel and as such does not have an assessment as of the date of this appraisal.

SUBJECT PROPERTY DESCRIPTION

INTRODUCTION

This property description is more based on plans provided by the client on site inspection the specific property was difficult to locate within the larger parcel.

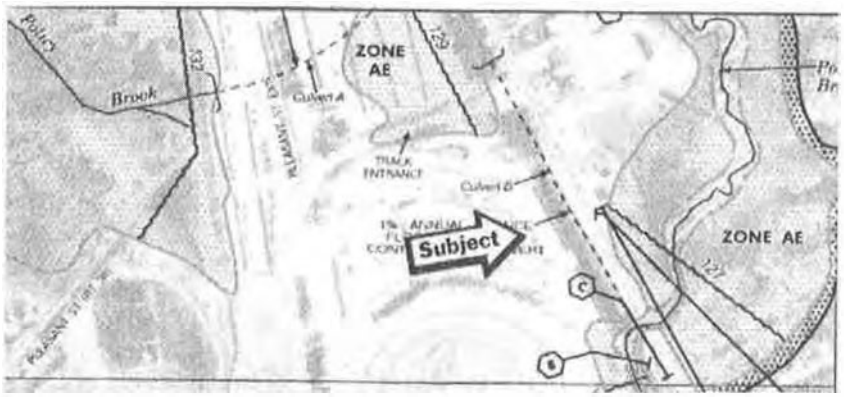
The following property description is presented for appraisal purposes only and is not intended to be exhaustive in nature.

SITE DESCRIPTION

The subject is an irregularly shaped parcel consisting of 1.23± acres. It is proposed to be located in the eastern portion of the larger parcel adjacent to what is proposed for a retail development closest to the area that is proposed for a cinema. The site has some topographic issues but it would more than likely be improved to generally level as part of the site preparation of the larger development. Its frontage and access would come from a to-be-built private road servicing the aforementioned retail development.

UTILITIES: The area is serviced by municipal water, sewer, electric, telephone, and natural gas.

FLOOD ZONE: According to the National Flood Insurance Program Map for Rockingham County, Community Panel No. 33015C0563E, with an effective date of May 17, 2005, the subject appears to be in an area designated as Zone X, an area outside of any known flood zone. There are some flood zone areas associated with the larger parcel and the exact placement of the subject within that is not quite defined. However, based on exhibits provided it appears it is not in the flood zone.



EASEMENTS: The appraiser is not aware of any easements or adverse conditions that would negatively impact the subject property.

HISTORY OF CONVEYANCE

According to the Rockingham County Registry of Deeds, there has not been a transfer of the subject as described here. The larger parcel transferred as follows:

SALE DATE	10/14/2016
SALE PRICE	$40,000,000
BOOK/PAGE	5763/52
GRANTOR	Rockingham Venture
GRANTEE	Rock Acquisition, LLC
COMMENTS	This was the sale of a larger parcel of what was known as Rockingham Racetrack. The purchaser in this transaction is proposing to develop it in a life style type center with a variety of uses including retail, hospitality, residential. The subject parcel which would be subdivided from this larger parcel would be to provide area for a utility substation by Liberty Utilities because of the increased demand to service the proposed development.

EXPOSURE TIME

Reasonable exposure time is one of a series of conditions in most market-value definitions. Exposure time is always presumed to proceed the effective date of the appraisal. USPAP, 2014-2015 Edition, defines exposure time as follows:

> *"The estimate length of time the property interest being appraised would have been offered on the market prior to the hypothetical consummation of a sale at market value on the effective date of the appraisal;"*

The subject represents a small parcel of what is a larger development. Given the exhibits provided to me it would make for a nice outparcel to the larger retail development which it abuts. As that development comes to fruition there would be good demand for this parcel. Therefore, I feel that the exposure would be dictated by the pace of development of the larger development. As that development moves forward I feel that the exposure would be a relatively short period of time however, as of the date of this appraisal there would be little demand for the parcel as it sits today. Therefore in summary, the exposure time associated with the subject is directly related to the development timeline of the larger development.

HIGHEST AND BEST USE

The Dictionary of Real Estate Appraisal, Fourth Edition, defines Highest and Best Use as:

"The reasonably probable and legal use of vacant land or an improved property, which is physically possible, appropriately supported, financially feasible, and that results in the highest value. The four criteria the highest and best use must meet are legal permissibility, physical possibility, financial feasibility, and maximum productivity."

The subject is a hypothetical 1.23± acre parcel that is irregular in shape and is located on the eastern side of the larger 120± acre parcel. It is directly adjacent to what is proposed to be a larger retail development. Its access would come from a road that would be developed along with that development.

The development which is to be known as Tuscan Village is a lifestyle center which will have a variety of uses including the adjacent retail development but will also have other components such as hospitality and residential. It is the site of the former Rockingham Racetrack. The area around the larger parcel is heavily developed in a commercial fashion. Directly adjacent to the larger parcel is the large Mall at Rockingham Park. The larger parcel is surrounded by heavily developed roads known as Rockingham Park Boulevard, South Broadway Street, and Main Street. Access is very good and my feeling is that the subject parcel would represent a good outparcel to be developed in concert with the larger retail parcel. Given its size it would most likely support a restaurant use although a small standalone retail use would also be appropriate.

SALES COMPARISON APPROACH

INTRODUCTION

The Sales Comparison Approach compares the subject to similar properties that have sold in the same market or in similar markets to derive an indication of its market value.

RESEARCH

I surveyed the subject's market area for information regarding sales and listings of properties similar to the subject. Research was conducted around the Southern and Seacoast part of the State for well located commercial parcels. Particular attention was paid to those in close proximity to larger commercial developments such as that of the subject. That research resulted in a relatively large pool of comparable sales from which the four that were considered to be the most comparable to the subject were chosen for analysis here. They consist of one each in the communities of Dover, Manchester, Hooksett, and Salem.

I gathered information regarding comparable properties from the Real Data Research Service, INNOVIA - the Northern New England Network MLS, CIBOR NH – the Commercial MLS, Crafts Appraisal Database, local and county municipal offices, brokers and appraisers. All of these sources are believed to be reliable. Parties familiar with the transactions confirmed the transactions whenever possible.

UNIT OF COMPARISON

In reviewing the comparable sales, it was necessary to determine a meaningful unit of comparison. A definite relationship was found to exist among the comparable sales in the form of sale price per acre. As such, I have determined that the sale price per acre is the most meaningful unit of comparison in analyzing the subject and the comparables.

SUMMARY OF COMPARABLE PROPERTIES

The comparables used in this approach are discussed briefly below. Please refer to the Comparable Sale Forms that follow this section for more information regarding these properties.

COMP 1: This represents the March 2017 sale of a four parcel property located at 817, 819, and 825 Central Ave and 3 Ridge Street in Dover, New Hampshire. The total size of the property was 1.14± acres and it sold for $950,000 or $673,759/acre. The parcel had 347.92±' of frontage on Central Ave and an additional 170±' of frontage on Ridge Street. The parcels were improved with a number of older residential or multi unit residential all of which were in below average condition and were felt to not add any contributory value to the sale. The buyer purchasing the property planned to develop it with a 15,000± SF owner-occupied retail center. This property is a corner parcel located in direct proximity to the Hannaford and Shaw's development and is considered to be a good to very good commercial location.

COMP 2: This represents the October 2014 sale of property located at 5 Driving Park Drive in Manchester, New Hampshire. This 2.58± acre parcel sold for $1,700,000 or $656,878/acre. The property was purchased by the owner of a furniture store who subsequently improved it with a 64,000± SF two story building. The property is located one parcel removed from South Willow Street at a signalized intersection. It has some visibility from South Willow Street and is adjacent to a large commercial development from which it has access through a number of the parking lots just east of South Willow Street as the City has prevailed on owners to make this available from one parcel to another to relieve some of the shopping traffic along South Willow Street.

COMP 3: This represents the April 2016 sale of property located at 1293 Hooksett Road, Hooksett, New Hampshire. This 1.05± acre parcel sold for $795,000 or $757,143/acre. The property is located at a signalized intersection in close proximity to a dense retail development. It represents a corner parcel with access from two roads and has subsequently been improved with a branch bank.

COMP 4: This represents the December 2015 sale of property located at 417 South Broadway in Salem, New Hampshire. This 4.898± acre parcel sold for $3,900,000. However, there was an existing building on the site which was going to be reused by the purchaser who is an abutting property owner, owning a car dealership across South Broadway from the subject. They intended to use it as a used car dealership. The depreciated contributory value of the building and the site improvements was $700,000 making the

effective price for the land $3,200,000 or $653,328/acre. Some of the total acreage was felt to be impacted by wetlands and would not support building however it may have been able to contribute to the density on the parcel.

SALE CONSIDERATIONS

In real estate transactions, property rights transferred, terms of sale (financing), conditions of sale (buyer/seller motivation), and expenses incurred immediately after purchase are factors that can influence sale price. In this analysis Comps 1, 2, and 3 involved fee simple estate, had conventional financing or were cash transactions, and appear to have been typically motivated, arm's length transactions. Since the Market Value of the subject's fee simple estate is being appraised here, and the other sale considerations are typical, adjustments have not been applied for these factors.

Comp 4 was sold to what would be considered an abutting property owner given that they had a car dealership directly across the street. They were going to use this parcel for expansion of the used car operation of that dealership. As such, I have adjusted it down by 10%.

MARKET CONDITIONS

Market conditions may change over time due to inflation, deflation, fluctuations in supply and demand, or other factors. As a result, the comparable sales may require adjustments to reflect changes in market conditions between the sale dates and the date of this report. In a market in which prices are increasing, these adjustments take the form of positive appreciation adjustments.

In considering changes in market conditions since the comparables sold, I consulted business publications for an overview of general economic conditions, industry-specific publications including the New England Real Estate Journal, The Appraisal Journal, and local brokers and appraisers familiar with the subject's market area.

The market for well located commercial properties has improved commensurate with the improvement in the overall commercial marketplace. While the broader recovery has been led by industrial and multi-family residential, commercial properties, as noted, have begun to improve. After an initial period of stabilization where vacancies and credit losses began to decrease the market is now to the point where landlords can write multi-year leases some with escalations. As the financial performance of these properties has

improved investors have become more interested in the property type and therefore improved commercial properties have shown appreciation.

It is felt that the demand for improved properties has improved the demand for well located commercial land and has also led to some appreciation in that market. As such, I have adjusted each of the comparables upward by 0.25% per month from January 2015 to the date of appraisal.

OTHER POTENTIAL ADJUSTMENTS

Relevant differences that may influence sale price can include size, location, and a variety of physical characteristics. In the case of the subject and the comparables it is felt that there are two areas that require formal adjustment. Those are location and physical features and are made as follows:

LOCATION: This appraisal assumes that the subject will be adjacent to a larger retail establishment and will benefit from the synergy of the overall development. As such, it is felt that it will be a very good commercial location within that commercial development however, it will not benefit necessarily from the broader traffic flow as if it was located along a main artery.

Comp 1 is located on Central Ave, which is Dover's primary commercial thoroughfare. It is an area that is heavily developed with commercial development. This parcel is located in direct proximity to two large grocery store anchored centers and is a corner location. As such, I feel this is a superior location and have adjusted it downward by 10%.

Comp 4, which is located directly on South Broadway in Salem, was felt to be in the same market as the subject, does benefit from a closer proximity to the Massachusetts boarder which drives much of the retail development in Salem and also is a heavily developed area. Therefore, I feel this comparable is superior from a locational standpoint of view and have adjusted it downward by 10%.

Comps 2 and 3 were felt to be similar. Comp 2 is located in Manchester and is one parcel removed from South Willow Street although it has access at a signalized intersection. It is in close proximity to other retail development at the northern end of South Willow Street where development has begun to

decline. Given its greater proximity to South Willow Street, some of which is offset by its location on South Willow Street, I feel that it is similar to the subject even though it does have some benefits from a visibility standpoint of view. Comp 3 was also felt to be similar. It was at a signalized intersection in proximity to some large development. The subject property upon completion will have a greater density in supportive type uses however I feel that is offset by the signalized intersection and therefore no adjustment has been made to this comparable.

PHYSICAL FEATURES: The subject property will be a flat site serviced by all municipal utilities upon completion of the larger development. Comps 1, 2, and 3 were all felt to be similar in that they were ready to develop sites and as such no adjustment has been made to those.

Comp 4, as noted, has a certain amount of wetlands on the larger parcel. The impact of those wetlands is such that perhaps they would not support building however it does have contributory value as far as density and parking. Therefore, I feel that it is inferior and have adjusted it upward by 20%.

VALUE CONCLUSION

The comparable properties and their adjustments are summarized in the table that follows this section. The analysis indicates the following adjusted per acre values:

Comp 1.....	$612,446
Comp 2.....	$707,786
Comp 3.....	$785,536
Comp 4.....	$677,517

The adjusted per acre values range from $612,446 to $785,536. Each of the sales provides a meaningful indication of value for the subject after adjustments. Of the four comparables Comp 4 was accorded the least weight. While it is the only comparable in Salem it was bought by an abutter and was also impacted by wetlands. While both of these things were adjusted for I feel for those reasons it is a slightly less reliable comparable and have accorded it the least weight.

The other three comparables were felt to be better indicators of value. Comp 2 which is the oldest comparable is similar in the fact that it is a parcel that derives much of

its value because of its proximity to other commercial development and is not located directly on the main artery. For that reason I feel that it should be given consideration.

Based on this investigation and analysis, as well as personal experience and judgment, I have formed the opinion that the subject warrants a value estimate of $750,000 per acre, as shown:

$750,000/acre x 1.23± acres = $922,500
ROUNDED TO $925,000

COMPARATIVE VALUE ANALYSIS CHART

FACTORS	SUBJECT	COMP 1	COMP 2	COMP 3	COMP 4
Location	71 Rockingham Park Boulevard Salem, NH	825 Central Ave Dover, NH	5 Driving Park Dr. Manchester, NH	1293 Hooksett Rd. Hooksett, NH	417 South Broadway Salem, NH
CAA Ref. No.	N/A	7991	7801	7892	7844
Sale price	N/A	$950,000	$1,700,000	$795,000	$3,200,000[1]
Sale date	N/A	3/17	10/14	4/16	12/15
Rights transferred	N/A	Fee simple	Fee simple	Fee simple	Fee simple
Financing	N/A	Cash to Seller	Conventional	Cash	Conventional
Motivation	N/A	Arm's length	Arm's length	Arm's length	Abutter -10%
Expenses immediately after purchase	–	–	–	–	–
Market Conditions	N/A	+1%	+7.75%	+3.75%	+4.75%
Adjusted price	N/A	$959,500	$1,831,750	$824,813	$3,016,800
No. of Acres	1.23± acre	1.41± acres	2.588±	1.05±	4.898±
Adjusted Price per Acre	N/A	$680,496	$707,786	$785,536	$615,925
Location	N/A	Superior -10%	Similar	Similar	Superior -10%
Physical Features	N/A	Similar	Similar	Similar	Inferior +20%
INDICATED VALUE/ACRE	**N/A**	**$612,446**	**$707,786**	**$785,536**	**$677,517**

[1] Effective Price

COMPARABLE LAND SALE 1

SALE DATA

Location:	817, 819, & 825 Central Ave and 3 Ridge Street, Dover, NH
Grantor:	Dean A. Fournier Charitable Trust 2005
Grantee:	Jeanette Gestapo, LLC
Sale Date:	3/1/2017
Sale Price:	$950,000
Sale Price Per Acre:	$673,759
Date Recorded:	3/22/2017
County/Deed Type:	Rockingham/Fiduciary
Book/Page:	4464/111
Rights Transferred:	Fee simple
Conditions of Sale:	Arm's length
Financing:	Cash to Seller
Confirmed By:	DEW
Date:	7/1/2017
Source:	Broker

PHYSICAL DESCRIPTION

Size:	1.41± acres
Frontage:	347.92±' on Central Ave/170±' on Ridge St.
Shape/Road Grade:	Slightly irregular/At grade
Topography:	Level

MUNICIPAL DATA

Water/Sewer/Gas:	Municipal/Municipal/Natural
Zoning:	Business - 3
Improvements/Land Use:	Older residential structures to be razed
Highest & Best Use:	Commecial development

REMARKS

These are four adjacent parcels of land that were purchased together for $950,000. The parcels were each improved with an older wood-frame residence or multi-unit residences that were in average to below average overall condition at the time of sale. They had no contributory value to the sale. The buyer purchased the property planning to develop it with a 15,000± SF owner-occupied retail building. This is located at a corner and less than one-quarter mile east of the Hannaford and Shaw's development.

7991

COMPARABLE LAND SALE 2

SALE DATA

Location:	5 Driving Park Drive, Manchester, NH
Grantor:	Five Driving Park, LLC
Grantee:	Leclerc Plaza, LLC
Sale Date:	10/1/2014
Sale Price:	$1,700,000
Sale Price Per Acre:	$656,878
Date Recorded:	10/30/2014
County/Deed Type:	Hillsborough/Warranty
Book/Page:	8704/509
Rights Transferred:	Fee simple
Conditions of Sale:	Arm's length
Financing:	Conventional
Confirmed By:	DEW
Date:	10/1/2014
Source:	Grantee & Documentation

PHYSICAL DESCRIPTION

Size:	2.588± acres
Frontage:	On Driving Park Drive
Shape/Road Grade:	Irregular/Generally at grade
Topography:	Level

MUNICIPAL DATA

Water/Sewer/Gas:	Municipal/Municipal/Natural
Zoning:	General Business (B-1)
Improvements/Land Use:	9,600± SF building to be razed
Highest & Best Use:	Commercial development

REMARKS

This property subsequent to the sale was improved with a 64,000± SF two story furniture sales building. In addition to its access from Driving Park Drive, which places it one parcel removed from South Willow Street, there is generally a pass through among these properties located on the west side of South Willow Street that allows free passage without having to access South Willow Street directly. This property is located below the grade of South Willow Street and behind a Wendy's restaurant, but does have some visibility from South Willow Street. The purchaser built a furniture store which is his third furniture store in the southern New Hampshire area.
7801

COMPARABLE LAND SALE 3

SALE DATA

Location:	1293 Hooksett Road, Hooksett, NH
Grantor:	John M. Kelly Revocable Trust of 1993
Grantee:	Merrimack County Savings Bank
Sale Date:	4/1/2016
Sale Price:	$795,000
Sale Price Per Acre:	$757,143
Date Recorded:	4/1/2016
County/Deed Type:	Merrimack/Warranty
Book/Page:	3510/1370
Rights Transferred:	Fee simple
Conditions of Sale:	Arm's length
Financing:	Cash
Confirmed By:	DEW
Date:	8/1/2016
Source:	Grantee/Public Records

PHYSICAL DESCRIPTION

Size:	1.05± acres
Frontage:	Hooksett Road
Shape/Road Grade:	Irregular/Slightly above grade
Topography:	Generally level

MUNICIPAL DATA

Water/Sewer/Gas:	Municipal/Municipal/Natural
Zoning:	Commercial
Improvements/Land Use:	Small auto service building to be razed
Highest & Best Use:	Commercial development

REMARKS

This parcel had a couple of older auto service buildings on it that were owned by a used car entity located across Hooksett Road from these. They never really utilized these properties and subsequently sold it to be developed with a branch bank for Merrimack County Savings Bank.

7892

COMPARABLE LAND SALE 4

SALE DATA

Location:	417 South Broadway, Salem, NH
Grantor:	State of New Hampshire
Grantee:	South Broadway Development, LLC
Sale Date:	12/24/2015
Sale Price:	$3,900,000
Sale Price Per Acre:	$1,387,000
Date Recorded:	12/30/2015
County/Deed Type:	Rockingham/Quitclaim
Book/Page:	5681/1714
Rights Transferred:	Fee simple
Conditions of Sale:	Abutter
Financing:	Conventional
Confirmed By:	AJC
Date:	5/1/2016
Source:	Public Records/Appraisal

PHYSICAL DESCRIPTION

Size:	4.898± ac (2.998± usable)
Frontage:	400±' on South Broadway
Shape/Road Grade:	Irregular/At grade
Topography:	Level

MUNICIPAL DATA

Water/Sewer/Gas:	Municipal/Municipal/Natural
Zoning:	Commercial/Industrial C
Improvements/Land Use:	See remarks
Highest & Best Use:	Commercial

REMARKS

Reportedly the improvement was constructed in 1965 as a state police barracks. Since the date of construction the building has been expanded and upgraded numerous times over the years. More recently it has been utilized as a liquor store. It is situated on a 4.89± acre lot. There are areas of wetlands. The property was purchased by Rockingham Toyota which is located directly across the street. The grantee intends on utilizing the site and the building for the sale of used cars. It is their intent to utilize the existing improvement in some manner. In order to estimate the contributory value of the building I utilized Marshall Valuation Service Section 13. This indicated a depreciated

value of the improvements of $630,000. To that I added $70,000 for contributory value of existing site improvements. This would indicate a price paid for the land of $3,200,000.

7844

CERTIFICATION

The Appraiser certifies and agrees that:

1. the statements of fact contained in this report are true and correct.

2. the reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions and are my personal, impartial, and unbiased professional analyses, opinions, and conclusions.

3. the Appraiser(s) have no present or prospective interest in the property that is the subject of this report and no personal interest with respect to the parties involved.

4. the Appraiser(s) have no bias with respect to the property that is the subject of this report or to the parties involved with this assignment.

5. the Appraiser(s) engagement in this assignment was not contingent upon developing or reporting predetermined results.

6. the Appraiser(s) compensation for completing this assignment is not contingent upon the development or reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value opinion, the attainment of a stipulated result, or the occurrence of a subsequent event directly related to the intended use of this appraisal.

7. the Appraiser(s) have made a personal inspection of the property that is the subject of this report.

8. no one provided significant real property appraisal assistance to the person(s) signing this certification.

9. the Appraiser(s) have not performed a previous appraisal of the subject property or provided any other service involving the subject property within the three years prior to this assignment.

10. the reported analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the Code of Professional Ethics and Standards of Professional Appraisal Practice of the Appraisal Institute and the Uniform Standards of Professional Appraisal Practice (USPAP).

11. the use of this report is subject to the requirements of the Appraisal Institute relating to review by its duly authorized representatives.

12. Crafts Appraisal Associates, Ltd. concentrates its practice in the appraisal of residential, commercial, industrial, special-purpose and development properties throughout New England. As such, the appraisers are competent to undertake this appraisal assignment, and copies of the qualifications of the appraisers who participated in preparing this appraisal are included in the Addendum of this report.

MARKET VALUE OF THE FEE SIMPLE ESTATE AS OF JULY 13, 2017..... $925,000

Donald E. Watson

Donald E. Watson
Certified General Appraiser
No. NHCG-191

STATEMENT OF LIMITING CONDITIONS

1. All facts and data set forth in this report are true and accurate to the best of the appraiser's knowledge and belief.

2. Sketches and maps included in the report are for the purpose of aiding the reader in visualizing the property and are not necessarily drawn to exact scale.

3. No land survey has been made by the appraiser and land dimensions given in the report are taken from available public records and the appraiser assumes no responsibility for the accuracy of such land dimensions.

4. No investigation of legal fee or title to the property has been made. No consideration has been given to liens or encumbrances against the property except as specifically stated in the report.

5. The appraiser assumes that there are no hidden or unapparent conditions of the property, subsoil or structures that would render the property more or less valuable. The appraiser assumes no responsibility for any engineering necessary to uncover such things.

6. Possession of this report, or a copy thereof does not carry with it the rights of publication, nor may it be used for any public purpose without the prior written consent of Crafts Appraisal Associates, Ltd.

7. The Americans with Disabilities Act (ADA) became effective January 26, 1992. The appraiser has not made a specific compliance survey and analysis of this property to determine whether or not it is in conformity with the various detailed requirements of the ADA. It is possible that a compliance survey of the property together with a detailed analysis of the requirements of the ADA could reveal that the property is not in compliance with one or more of the requirements of the act. If so, this fact could have a negative effect upon the value of the property. Since I have no direct evidence relating to this issue, I did not consider possible noncompliance with the requirements of the ADA in estimating the value of the property.

8. The party for whom this report was prepared may distribute copies of this report, in its entirety, to such third parties as may be selected by the party for whom this report was prepared; however, selected portions of this report shall not be given to third parties without prior written consent of the signatories of this report. Further, neither all nor any part of this report shall be disseminated to the general public by the use of advertising media, public relations media, news media, sales media or other media for public communication without the prior written consent of the signatories of this report.

9. This report is based on market conditions existing as of the date of the assignment and the appraiser's estimate of future market conditions. The appraiser is not responsible for unforeseeable events that alter market conditions subsequent to the effective date of the opinion.

10. The use of this report is subject to the requirements of the Appraisal Institute relating to the Code of Professional Ethics and the Uniform Standards of Professional Appraisal Practice.

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APPRAISER QUALIFICATIONS
DONALD E. WATSON
CERTIFIED GENERAL APPRAISER NO. NHCG-191

BACKGROUND SUMMARY

With over twenty-nine years in real estate and twenty-two years in the appraisal industry, I have served a wide variety of clients, including municipal and state governments, major universities, lending institutions, nonprofit organizations and investors. I have extensive experience with all property types ranging from unimproved land to subdivisions to improved commercial, industrial and residential properties including complexes and condominiums throughout New Hampshire. My appraisals have been widely used in eminent domain proceedings, estate-planning, financing, divorces, etc.

EDUCATION

NEW HAMPSHIRE COLLEGE, MANCHESTER, NH: Economic & Finance Program

OHIO STATE UNIVERSITY: A.S. Animal Science

HARVARD UNIVERSITY GRADUATE SCHOOL OF DESIGN:
Commercial Real Estate Development & Financing

SOCIETY OF REAL ESTATE APPRAISERS: Course 101, An Introduction to Appraising Real Property

APPRAISAL INSTITUTE:

- Course 1A-1, Real Estate Appraisal Principles
- Course 1A-2, Basic Valuation Procedures
- Course 1B-A, Capitalization Theory & Techniques, Part A
- Course 1B-B, Capitalization Theory & Techniques, Part B
- Course 2-1, Case Studies in Real Estate Valuation
- Course SPP, Standards of Professional Practice, Parts A & B
- Course 530, Advanced Sales Comparison & Cost Approaches
- Report Writing
- Over twenty (20) one and two day seminars

REALTORS' NATIONAL MARKETING INSTITUTE:

- Course CI - 101, Fundamentals of R.E. Investment & Taxation
- Course CI - 102, Fundamentals of Location & Market Analysis
- Course CI- 103, Advanced R.E. Taxation & Marketing Tools for Investment Real Estate

PROFESSIONAL DESIGNATIONS AND AFFILIATIONS

EXPERT WITNESS:	New Hampshire Land and Tax Court Federal Bankruptcy Court Federal District Court New Hampshire Superior Court
CERTIFIED GENERAL APPRAISER:	State of New Hampshire

PARTIAL LIST OF CLIENTS SERVED AND PROPERTIES APPRAISED BY CRAFTS APPRAISAL ASSOCIATES, LTD.

NATIONAL & LOCAL CORPORATIONS

Anagnost Companies
Anheuser Busch Company
Audley Construction Company
Autodesk, Inc.
B&M Railroad
Bentley Pharmaceutical
Brookstone Company
Burger King Corp.
Cabinet Press
Cendant Mobility
Circuit City Stores, Inc.
Cities Services, Inc.
CLD Consulting Engineers
Coca Cola Bottling Company
Coldwell Banker Relocation Corp.
Creative Capital Leasing
Crotched Mountain Properties
Dexter Shoes
Dunkin' Donuts
Eastpoint Properties
ECCO USA, Inc.
Executive Relocation
Freudenberg – North America
GMAC Relocation Services
Gulf Oil Corp.
H&R Block
Henry Hanger Company
Honey Dew Donuts
Howe, Riley & Howe, PC
Hubbard, LLC
Hunneman Real Estate
Infantine Insurance Corp.
Ingersol-Rand Co.
International Automotive Management
J.A. Wright & Company
John B. Sullivan Corp.
John G. Burk & Associates, CPA
JP Chemical Company, Inc.
LaCrosse Footwear, Inc.
Lahey Hitchcock Clinic
Landa & Altsher, PC
Long & Foster Relocation
Mast Road Grain & Lumber
McDonald's Corp.
Midas Muffler
Mobil Oil Corp.
National Gypsum Corp.
New England Circuits, Inc.
Northern Telecom
Old Dutch Mustard Company, Inc.
OSRM Sylvania
Patsy's
Peterbilt Corp.
Pizza Hut
Primacy Relocation
Prudential Relocation
Public Service Company of NH
Rite-Aid
St. Johnsbury Trucking Company, Inc.
Saint-Gobain Performance Plastics
STARS Relocation
State Street Development Corp.
Stewart Title Insurance Co.
Stoneyfield Farm Yogurt, Inc.
Tamposi Company
Texaco
Two Guys Smoke Shop
TransUnion Settlement Solution
Union Leader Corp.
UPS Commercial Underwriters
Velcro USA, Inc.
Verizon
Waterford Development
Weichert Relocation Services
Worldwide Relocation Management, Inc.

SPECIAL PURPOSE PROPERTIES & NONPROFIT ORGANIZATIONS

Abenaqui Country Club
American Red Cross
Assumption Greek Orthodox Church
Boston Minuteman Council
Boys & Girls Club of America
Bretton Woods Resort
Calvary Bible Church
Concord Indoor Tennis & Racquetball Club
Concord Lincoln-Mercury
Consumers Water Company
Dartmouth College
Ear Nose & Throat Physicians & Surgery PA
Easter Seals Society
Executive Health Club
Faith Christian Center
First Church of the Nazarene
Girl Scouts of Swift Water Council
Girl Scouts of Spar and Spindle Council
Good Shepherd School, Inc.
Green Meadow Golf Course, Inc.
Hampshire Hills Racquet & Health Club
Hickory Hill Golf Course, Inc.
Hillsboro Ford
International Brotherhood of Teamsters
Jack O'Lantern Resort

PARTIAL LIST OF CLIENTS SERVED continued

SPECIAL PURPOSE PROPERTIES & NON-PROFIT ORGANIZATIONS – CONTINUED

Manchester Children's Home
Manchester Community Health Center
Manchester Mental Health Center
Mount St. Mary's College
Mountain Club on Loon, The
New Hampshire Children's Aid Society
Portsmouth Regional Hospital
Rockefeller Estate
Serenity Place
Shriner's Hospitals for Children
Sky Meadow Development
Southern NH University
Summit at Four Seasons – Time Share
Talarico Automobile Dealerships
University of New Hampshire (UNH)
Visiting Nurses Association
Wentworth-Douglas Hospital
YMCA Camp Belknap

FEDERAL, STATE & LOCAL MUNICIPALITIES

City of Concord, NH
City of Berlin, NH
City of Dover, NH
City of Franklin, NH
City of Manchester, NH
City of Nashua, NH
Federal Aviation Administration
Greater Nashua Housing & Dev. Corp.
Keene Housing Authority
Laconia Airport Authority
Manchester Airport Authority
Manchester Highway Department
Manchester Housing Authority
Manchester Water Works
NH Housing Finance Authority
NH Dept. of Transportation
Salem Housing Authority
State of New Hampshire
State of Vermont
Town of Bedford, NH
Town of Brattleboro, VT
Town of Candia, NH
Town of Hampton, NH
Town of Hollis, NH
Town of Londonderry, NH
Town of Merrimack, NH
Town of Newmarket, NH
Town of North Andover, MA
Town of Pelham, NH
Town of Salem, NH
Town of Seabrook, NH
Town of Stratham, NH
U.S. Dept. of Transportation
U.S. Environmental Protection Agency
U.S. Postal Service
Veterans' Administration

CONSERVATION ORGANIZATIONS

Bedford Conservation Commission
Bedford Land Trust
Derry Conservation Commission
Derry Preservation Initiative
Dover Conservation Commission
Hollis Conservation Commission
Land Conservation Investment Program
Moose Mountain Regional Greenways
Mount Vernon Conservation Commission
Nature Conservancy
New Hampshire Audubon Society
North Hampton Forever
Society for the Protection of NH Forests
Stratham Conservation Commission
Temple Conservation Commission

LENDING & RELATED INSTITUTIONS

Bank of America
TD BankNorth
Beacon Federal
Berkshire Mortgage Finance
Berlin City Bank
Boston Federal Savings Bank
Cambridge Savings Bank
Centrix Bank & Trust Co.
Chittenden Bank
Citicorp Mortgage, Inc.
Community Bank & Trust Co.
Danversbank
Digital Federal Credit Union
E-Bid Mortgage
EastWest Mortgage
Eastern Bank
Enterprise Bank & Trust Co.
Federal Home Loan Mortgage Corp.
Federal National Mtg. Association
First Colebrook Bank
First Commercial Bank of Chicago
Flagship Bank
Ford Motor Credit Corp
GMAC Mortgage Corp.

PARTIAL LIST OF CLIENTS SERVED continued

Lending & Related Institutions - continued

H&R Block Mortgage Corp.
Haverhill Cooperative Bank
John Hancock Mutual Ins. Company
Laconia Savings Bank
Lake Sunapee Bank
Ledyard National Bank
Marco Community Bank
Mercantile Bank & Trust Co.
Merrimack County Savings Bank
Money Tree Mortgage
New England Federal Credit Union
Ocean National Bank
Passumptic Savings Bank
Salem Five Cents Savings Bank
St. Mary's Bank
Savings Bank of Walpole
Southern NH Bank & Trust Co.
Sovereign Bank
Telephone Credit Union of NH
Toyota Motor Credit Corp.
Traveler's Insurance Co.
Triangle Credit Union
Wachovia Mortgage
Western Federal Credit Union
Winchester Cooperative Bank

LEGAL REPRESENTATIVES

Abramson, Baillinson & O'Leary
Backus, Meyer &Solomon & Rood
Barradale, O'Connell, Newkirk & Dwyer, PA
Beaumont & Campbell, PA
Bernstein, Shur, Sawyer & Nelson, PA
Borofsky, Lewis & Amodeo-Vickery, PA
Bouchard Kleinman & Wright, PA
Boutin & Associates, PLLC
Boynton, Waldron, Doleac, Woodman & Scott, PA
Bradley, Burnett & Kinyon, PA
Bragdon, Berson, Davis & Klein
Cassassa & Ryan Attorneys at Law
Cleveland, Waters & Bass, PA
Cocheco Elder Law Associates
Cronin & Bisson, PC
Curtin Law Office
D'Amante, Couser, Steiner, Pellerin, PA
Devine, Millimet & Branch, PA
DiMento & Sullivan, PA
Duddy Law Offices
Finis E. Williams, III Law Firm
Greene & Perlow, PA
Hall, Morse, Anderson, Miller & Spinelli
Hamblett & Kerrigan
Hebert & Uchida, PLLC
Hodes, Buckley, McGrath & LeFevre, PA
Lotter & Bailin, PC
Mazerolle & Frasca, PA
McDonald & Kanyuk, PLLC
McLane, Graf, Raulerson & Middleton, PA
McNeil & Taylor, PA
Nadeau Law Offices
Orr & Reno, PA
Ransmeier & Spellman, P.C.
Riley & Fay, PLLC
Routhier, Donald Law Offices
Sarrouf, Tarricone & Flemming
Sheehan Phinney Bass & Green, PA
Stark, Rodney L., PA
Sullivan & Gregg, PA
Sulloway & Hollis, PA
Tardif, Shapiro & Cassidy, PA
Upton & Hatfield, LLP
Vittek Law Offices
Wadleigh, Starr & Peters, PLLC
Wiggin & Nourie, PA
Winer & Bennett, LLP
Wrigley, Weeks & Martin, PC

Liberty Utilities

Capital Project Business Case | 2020

NOTE: This form is required for planned Growth, Regulatory Supported, and Discretionary projects as well as combined blanket projects for Safety and Mandated with Growth, Regulatory Supported, and Discretionary Projects with a spend greater than $100,000 and all unplanned projects. All other Project types can utilize the Capital Expenditure Application Form.

Project Overview			
Project Name:	Rockingham Substation	**Date Prepared:**	2/1/2020
Project ID#:	8830-1964	**Cost Estimate:**	$400,000
Project Sponsor:	Charles Rodrigues	**Project Start Date:**	3/1/2020
Project Lead:	Anthony Strabone	**Project End Date:**	12/31/2020
Prepared By:	Joel Rivera	**Planned or Unplanned Projects:**	☒ Planned ☐Unplanned
Project Type (click appropriate boxes)**:**	☐ Safety ☐ Mandated ☐ Growth ☒ Regulatory Supported ☐ Discretionary		
Spending Rationale:	☐ Growth ☒ Improvement ☐ Replenishment		

Project Scope Statement

(Insert the scope of work, major deliverables, assumptions, and constraints)

The second phase of the Salem Area Study proposes the installation of two new 115kV supply lines, 115/13.2 kV - 33/44/55 MVA transformers, two 7.2 MVAR capacitor banks and 13.2kV metal clad switchgear. The new Rockingham Substation will be constructed at company owned land, neighboring the Tuscan Village Development. This substation will allow the retirement of the Salem Depot Substation given its issues with age and condition of the assets.

In 2020 it is planned to complete the design and procurement phase of the substation project. It will also include substation site work.

Background

(Insert description of current operational arrangement, and brief history of project & asset)

The town of Salem, NH will experience more than expected load growth in the upcoming years. This is due to commercial redevelopment, particularly in the Tuscan Village Development. This area consists of expansive residential developments, numerous retail plazas, office parks and Industrial/Commercial Parks. The new demand from the development is estimated at 17 MW. The loading of the system will increase to where various components (feeders, transformers and supply lines) will exceed certain planning and operating criteria. For a list of planning criteria violations expected to be exceeded with the upcoming load expansions see 2022 Planning Criteria Violations – Salem Area.pdf
See related projects Rockingham Transmission Supply and Rockingham Distribution Feeders.

Recommendation/Objective

(Insert the unique problem this project is looking to resolve)

The Salem Area Study was carried out to study options for the development of the power distribution system in the Salem, NH area. It determines the best engineering solution to mitigate overloads, address contingencies, and to upgrade/replace vintage assets in the system. In addition it determines the distribution requirements needed to supply the proposed Tuscan Village Development in the range of 17MW located at the former Rockingham Park Track.

This project will provide the required capacity to supply the upcoming customer expansions and will resolve all identified criteria violations for the town of Salem. It will also resolve all issues with asset condition at the Salem Depot Substation and make way for future investments in distribution automation and grid modernization.

This business case covers Phase 2 of the Salem Area Study which installs new Rockingham #21 Substation.

Alternatives/Options

(Describe all reasonably viable alternatives. Discuss the viability of each and provide reasons if rejected)

Liberty Utilities (WATER · GAS · ELECTRIC)

Capital Project Business Case

2020

This project is part of the Salem Area Study. For details on alternatives considered refer to Appendix A and Section 4 of the Salem Area Report.

Financial Assessment/Cost Estimates

(Double click embedded excel file to update; include contingency allowance in excel file)

Next Anticipated Test Year	**2021**	**Was this Capital Project included in the current year's Board Approved Budget?**	☒ Yes ☐ No

Regulatory Lag (Click appropriate box) ☐Less than 6 Months ☐6-12 Months ☒1 to 3 years ☐Greater than 3 years

Category	Total Already Approved	2020	2021	Beyond 2021	Total
Internal Labour (including labour and travel)	$ -	$ 25,000	$ -	$ -	$ 25,000
Materials (including consumables)	$ -	$ 250,000	$ -	$ -	$ 250,000
Equipment (rental equipment)	$ -	$ -	$ -	$ -	$ -
Contactor/Subcontractor (including consultants)	$ -	$ 125,000	$ -	$ -	$ 125,000
AFUDC ($)					
Total Project Costs ($)	**$ -**	**$ 400,000**	**$ -**	**$ -**	**$ 400,000**

Unlevered Internal Rate of Return: Click here to enter text.

Basis of Estimate: *This estimate is of investment grade. A project grade estimate for construction will be provided upon completion of detailed design.*

For materials, equipment, and construction requiring Engineering drawings please specify the percent complete:

Schedule

(List key milestone dates)

Key Milestone Description	Forecast Start Date	Forecast End Date
Detailed Design	6/1/2018	4/31/2020
Construction	6/30/2020	12/31/2020

Risk Assessment

(Please describe the risk of not completing the project)

Not completing this project could result in the Company not being able to supply new customer growth in the area and/or could result in distribution facilities operating above their design limits. The risk of equipment failure due to age and condition of the Salem Depot substation assets will increase if this project is delayed. The ability for the Company to restore load during emergencies and the ability to re-route power to perform routine maintenance will be compromised if this project is not completed or is delayed.

This project is needed to support the construction of the second 115kV line which is slated to begin in the fall of 2021. This project will enable reducing the loading on the 23kV supply system that will allow the necessary outages to construct the second 115kV line. As loading in the development continues to increase, delays on this project will further increase difficulties in obtaining planned outages to safely construct new facilities.

This project has a risk score of 50.

Liberty Utilities (WATER · GAS · ELECTRIC)

Capital Project Business Case | 2020

Trade Finance (Is there a possibility to apply trade finance products to this project? See Capital Planning for further clarification)
Unknown
Supporting Documentation (Reference drawings, condition assessment reports, vendor quotations, etc. Attach document or where possible include hyperlink to file located on shared server or SharePoint)
Please reference the following supporting documents: 2022 Planning Criteria Violations - Salem Area.pdf Salem Area Study Report.pdf 23kV Supply System Salem.pdf Rockingham Substation Project Schedule and One-Line.pdf

Approvals and Signatures [i]

Approved By:				
Role	**Approval Authority Limit**	**Name**	**Signature**	**Date**
Manager / Staff (requisitioner/buyer):	Up to $25,000	Anthony Strabone Manager, Electric Engineering		03/04/2020
Senior Manager: :	Up to $50,000			
Senior Director/Director:	Up to $250,000	Charles Rodrigues Director, Engineering		2/25/2020
Senior Vice President/ Vice President	Up to $500,000	Richard MacDonald Vice President, Operations		2/21/2020
State President:	Up to $500,000	Susan Fleck President, NH		2/26/2020
Regional President:	Up to $3,000,000			
Corporate - Sr VP Operations:	Up to $5,000,000			
Corporate - Exec Team Member (CEO, CFO, COO, Vice Chair):	Over $5,000,000			
Finance (East) – Vice President, Finance & Administration	All Requests	Peter Dawes VP, Finance & Administration		

[i] Approvals for work orders and purchase orders are subject to the limits set forth in the Approval Limits of Authority Policy owned and amended from time to time by the corporate procurement group.

Liberty Utilities
WATER GAS ELECTRIC

Capital Project Business Case | 2019

NOTE: This form is required for planned Growth, Regulatory Supported, and Discretionary projects as well as combined blanket projects for Safety and Mandated with Growth, Regulatory Supported, and Discretionary Projects with a spend greater than $100,000 and all unplanned projects. All other Project types can utilize the Capital Expenditure Application Form.

Project Overview			
Project Name:	Rockingham Substation	**Date Prepared:**	1/9/2019
Project ID#:	8830-1964	**Cost Estimate:**	$200,000
Project Sponsor:	Charles Rodrigues	**Project Start Date:**	1/1/2019
Project Lead:	Anthony Strabone	**Project End Date:**	12/31/2019
Prepared By:	Joel Rivera	**Planned or Unplanned Projects:**	☒ Planned ☐Unplanned
Project Type (click appropriate boxes):	☐ Safety ☐ Mandated ☐ Growth ☒ Regulatory Supported ☐ Discretionary		
Spending Rationale:	☐ Growth ☒ Improvement ☐ Replenishment		

Project Scope Statement

(Insert the scope of work, major deliverables, assumptions, and constraints)

The second phase of the Salem Area Study proposes the installation of two new 115/13.2 kV - 33/44/55 MVA transformers and eight 13.2kV feeders at the former Rockingham Race Track and the retirement of Salem Depot Substation.

In 2019 it is planned to design the installation of the 115kV line structures, 13.2kV metal clad switchgear and two 115/13.2kV transformers at the new substation site.

Background

(Insert description of current operational arrangement, and brief history of project & asset)

The town of Salem, NH will experience more than expected load growth in the upcoming years. This is due to commercial redevelopment. This area consists of expansive residential developments, numerous retail plazas, office parks and Industrial/Commercial Parks. The loading of the system has changed over the years to where various components are at or have exceeded certain planning and operating criteria. In addition, sub-transmission facilities in the area are approaching its design limits. The upcoming developments in the area result in an increase or worsening of components exceeding planning and operating criteria.

Recommendation/Objective

(Insert the unique problem this project is looking to resolve)

The Salem Area Study was carried out to study options for the development of the power distribution system in the Salem, NH area. It determines the best engineering solution to mitigate overloads, address contingencies, and to upgrade/replace vintage assets in the system. In addition it determines the distribution requirements needed to supply the proposed business park development in the range of 14MW – 17MW located at the former Rockingham Park Track.

The recommended plan accomplishes all system capacity and asset replacement requirements. Upon completion of the projects within the Salem Area Study, Baron Ave and Salem Depot substations will be retired. The plan will be achieved in three (3) phases. This business case is for Phase 2 of the Salem Area Study.

Alternatives/Options

(Describe all reasonably viable alternatives. Discuss the viability of each and provide reasons if rejected)

A total of twelve (12) plans were evaluated to address the existing and future system needs of the area. Six (6) of these plans were eliminated because of transmission costs and construction challenges due to site locations; refer to Appendix A under the Salem Area Report for a list of all Eliminated Plans. Five (5) Alternate plans were developed and weighed against the Recommended Plan. The Five (5) Alternate Plans are detailed in Section 7 and the Recommend Plan is detailed in Section 4 of the Salem Area Report.

Liberty Utilities (WATER · GAS · ELECTRIC)

Capital Project Business Case

2019

Financial Assessment/Cost Estimates

(Double click embedded excel file to update; include contingency allowance in excel file)

Next Anticipated Test Year	**2021**	**Was this Capital Project included in the current year's Board Approved Budget?**	☒ Yes ☐ No

Regulatory Lag (Click appropriate box) ☐Less than 6 Months ☐6-12 Months ☒1 to 3 years ☐Greater than 3 years

Category	Total Already Approved	2018	2019	Beyond 2019	Total
Internal Labour (including labour and travel)	$ -	$ -	$ 10,000	$ -	$ 10,000
Materials (including consumables)	$ -	$ -	$ -	$ -	$ -
Equipment (rental equipment)	$ -	$ -	$ -	$ -	$ -
Contactor/Subcontractor (including consultants)	$ -	$ -	$ 190,000	$ -	$ 190,000
AFUDC ($)					

Unlevered Internal Rate of Return: Click here to enter text.

Basis of Estimate: *This estimate is of investment grade for design activities on this project. A project grade estimate for construction will be provided upon completion of detailed design.*

For materials, equipment, and construction requiring Engineering drawings please specify the percent complete:

Schedule

(List key milestone dates)

Key Milestone Description	Forecast Start Date	Forecast End Date
Detailed Design	6/1/2018	12/31/2019

Risk Assessment

(Please describe the risk of not completing the project)

Not completing this project could result in the Company not being able to supply new customer growth in the area and/or could result in distribution facilities operating above their design limits.

Trade Finance

(Is there a possibility to apply trade finance products to this project? See Capital Planning for further clarification)

Unknown

Liberty Utilities
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Capital Project Business Case

2019

Supporting Documentation (Reference drawings, condition assessment reports, vendor quotations, etc. Attach document or where possible include hyperlink to file located on shared server or SharePoint)

Approvals and Signatures [i]

Approved By:				
Role	**Approval Authority Limit**	**Name**	**Signature**	**Date**
Manager / Staff (requisitioner/buyer):	Up to $25,000	Joel Rivera	JRR	3/5/19
Senior Manager: :	Up to $50,000			
Senior Director/Director:	Up to $250,000	Charles Rodrigues Director, Engineering	CaRodrigues	3/5/19
Senior Vice President/ Vice President	Up to $500,000			
State President:	Up to $500,000			
Regional President:	Up to $3,000,000			
Corporate - Sr VP Operations:	Up to $5,000,000			
Corporate - Exec Team Member (CEO, CFO, COO, Vice Chair):	Over $5,000,000			
Finance (East) – Vice President, Finance & Administration	All Requests	Peter Dawes VP, Finance & Administration	Peter Dawes	3/7/19

[i] Approvals for work orders and purchase orders are subject to the limits set forth in the Approval Limits of Authority Policy owned and amended from time to time by the corporate procurement group.

Liberty Utilities

Capital Project Expenditure Form | 2019

Project Name:	Rockingham Substation		
Financial Work Order (FWO):		**Project ID #:**	8830-1964
Requesting Region or Group:	Granite State Electric Co.	**Date of Request (MM/DD/YY):**	1/9/2019
Project Sponsor:	Charles Rodrigues	**Project Start Date:**	1/1/2019
Project Lead:	Anthony Strabone	**Project End Date:**	12/31/2019
Prepared by:	Joel Rivera	**Requested Capital ($)**	$200,000
Planned or Unplanned Projects:	☒ Planned ☐ Unplanned		
Project Type: (Click appropriate boxes)	☐ Safety ☐ Mandated ☐ Growth ☒ Regulatory Supported ☐ Discretionary		
Spending Rationale:	☐ Growth ☒ Improvement ☐ Replenishment		

Details of Request

Project description
The second phase of the Salem Area Study proposes the installation of two new 115/13.2 kV - 33/44/55 MVA transformers and eight 13.2kV feeders at the former Rockingham Race Track and the retirement of Salem Depot Substation. In 2019 it is planned to design the installation of the 115kV line structures, 13.2kV metal clad switchgear and two 115/13.2kV transformers at the new substation site.

Is this project growth or customer connection related? If "yes", list the specific locations and how expenditure aligns with customer expansion objectives.
Yes. This project supports and is aligned with the planned customer expansions at the Tuscan Village Park in Salem NH.

Please describe any permitting requirements, environmental impacts, or resulting performance obligations that may or may not result from this expenditure?
Permitting and/or Easement requirements will be undertaken during detailed design activities as applicable.

Will there be assets, greater than $5,000, currently in service removed as a result of this expenditure?
GUIDANCE: If yes, please detail the specific assets that will be removed: 1. *Original Cost of Plant to be removed (if known):* 2. *What is the replacement cost of the plant being removed (if original cost not known)?* 3. *Original Work Order of Plant to be removed (if known):* 4. *Is the Plant being removed reusable?* 5. *What is the year of original installation of the plant being removed*
No

What alternatives were evaluated and why were they rejected?
A total of twelve (12) plans were evaluated to address the existing and future system needs of the area. Six (6) of these plans were eliminated because of transmission costs and construction challenges due to site locations; refer to Appendix A under the Salem Area Report for a list of all Eliminated Plans. Five (5) Alternate plans were developed and weighed against the Recommended Plan. The Five (5) Alternate Plans are detailed in Section 7 and the Recommend Plan is detailed in Section 4 of the Salem Area Report.

Liberty Utilities

Capital Project Expenditure Form | 2019

What are the risks and consequences of not approving this expenditure?
Not completing this project could result in the Company not being able to supply new customer growth in the area and/or could result in distribution facilities operating above their design limits.

Please describe how Health, Safety and Security concerns and impacts as a result of this expenditure been addressed.
Health, Safety and Security will be addressed using Engineering designs/controls during the detailed design process if applicable.

Are there other pertinent details that may affect the decision making process?
No

Complete the Financial Summary table only if:

- **Project is less than $100,000; or**
- **Project category is *Mandated* or *Safety* (Business Case Form not required)**

Financial Summary

Next Anticipated Test Year		**Was this Capital Project included in the current year's Board Approved Budget?**	☐ Yes ☐ No
Regulatory Lag (Click appropriate box)	☐ Less than 6 months ☐6 – 12 months ☐1 – 3 years ☐Greater than three years		
Which regulatory constructs will be used for recovering this capital spend?			
Please Specify Basis of Estimate For materials, equipment, and construction requiring Engineering drawings please specify the percent complete: [i]	☐Fixed or Firm Price ☐Estimate – Internal ☐Estimate – External ☐Other (specify details) Click here to enter text.		

Category	Current Year	Future Years	Authorized Amount (to be filled in by Corporate)
Cost of Design & Engineering ($)			
Cost of Materials ($)			
Cost of Construction ($)			
External Costs ($)			
Internal Costs ($)			
Other ($)			
AFUDC ($)			
Total Project Costs ($)			

Liberty Utilities

Capital Project Expenditure Form | 2019

Approvals and Signatures [ii]

Approved By:				
Role	**Approval Limit**	**Name**	**Signature**	**Date**
Manager / Staff (requisitioner/buyer):	Up to $25,000	Joel Rivera	JRR	3/5/19
Senior Manager:	Up to $50,000			
Senior Director/Director:	Up to $250,000	Charles Rodrigues Director, Engineering	CRodrigues	3/5/19
Senior VP/VP:	Up to $500,000			
State President:	Up to $500,000			
Regional President:	Up to $3,000,000			
Corporate – Sr. VP Operations:	Up to $5,000,000			
Corporate - Exec Team Member (CEO, CFO, COO, Vice Chair):	Over $5,000,000			
Finance (East) – Vice President, Finance & Administration:	All Requests	Peter Dawes VP, Finance & Administration	Peter Dawes	3/7/19

[i] For Best Practices on estimating project contingencies please see the Capital Policy.

[ii] Approvals for work orders and purchase orders are subject to the limits set forth in the Approval Limits of Authority Policy owned and amended from time to time by the corporate procurement group.

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

DE 23-039

Distribution Service Rate Case

NH Department of Energy Data Requests - Set 6

Date Request Received: 8/31/23 | Date of Response: 9/15/23
Request No. DOE 6-19 | Respondent: Anthony Strabone

REQUEST:

Reference DOE 3-1, 2021 Capital Projects, Rockingham Substation, Change Order Form dated 4/05/2021.

a. Please provide an itemized breakdown with descriptions of the $4 million in additional expenditures for the project.

b. Given that the elevation grade change was due to Tuscan Development's error, why didn't Liberty hold Tuscan accountable for the extra project costs resulting from the error? Did Liberty ever approach Tuscan about this issue?

c. Given that the size and weight of the new transformers were known to Liberty prior to installation, why were the costs of the pilons not anticipated by Liberty during design and planning.

RESPONSE:

a. The original estimate of the substation project was based on costs for previously completed similar projects and not on bids based on preliminary designs. The table below depicts the breakdown of the $4 million in additional expenditures. Due to the Company providing revised drawings incorporating the change in elevation to the potential bidders during the competitive bid process, the Company is unable to determine the cost added to account for the change in the substation elevation. That is, the Company did not receive bids prior to the elevation change to enable the requested cost breakdown.

Docket No. DE 23-039 Request No. DOE 6-18

are incurred. However, when the training costs involved relate to facilities that are not conventional in nature, or are new to the service company's operations, these costs may be capitalized until the time that the facilities are ready for functional use. As stated in part (a) of this response, utilizing a distribution automation controller as part of the distribution automation scheme was the first implementation of this technology on the Company's system, and therefore, the Company capitalized the training costs in accordance with CFR § 367.83

c. Per the approved business case, the following estimated project cost breakdown is confirmed: $25,000 for internal labor, and $100,000 for subcontractor labor, resulting in a total project cost of $125,000.

   i. The estimated internal cost of $25,000 did not increase to $47,929.31. Per the project closeout form, the internal labor was $4,240.96. Burdens of $43,688.35 were applied to this project as a result of direct charges from both internal labor and contractor charges.

   ii. The contractor cost did not increase from $100,000 to $176,866. The $176,866 is due to a timing issue between the reversal of an accrual for an invoice in the amount of $88,433 and the actual invoice (in the same amount) being applied to the project. The double counting of this invoice resulted in the contractor costs being reported as $176,866. The total contractor costs, which include other external resources besides SEL, were $118,227.

   iii. As stated in part c.ii of this response, the total external contractor cost was $118,227. The amount from SEL, which includes labor costs to set up the automation system, program the devices, and provide troubleshooting support was $110,122. Contractor costs associated with the test and commissioning of the system were $6,380 and $1,725 was associated with traffic control.

   iv. Of the $110,122 from SEL, $4,160 was associated with training the Company's staff.

Liberty Utilities (WATER · GAS · ELECTRIC)

Capital Project Expenditure Form | 2020

Project Name:	Rockingham Substation		
Financial Work Order (FWO):		**Project ID #:**	8830-1964
Requesting Region or Group:	Granite State Electric Co.	**Date of Request (MM/DD/YY):**	1/10/2020
Project Sponsor:	Charles Rodrigues	**Project Start Date:**	1/1/2020
Project Lead:	Anthony Strabone	**Project End Date:**	12/31/2020
Prepared by:	Joel Rivera	**Requested Capital ($)**	$400,000
Planned or Unplanned Projects:	☒ Planned ☐Unplanned		
Project Type: (Click appropriate boxes)	☐ Safety ☐ Mandated ☐ Growth ☒ Regulatory Supported ☐ Discretionary		
Spending Rationale:	☐ Growth ☒ Improvement ☐ Replenishment		

Details of Request

Project description
The second phase of the Salem Area Study proposes the installation of two new 115/13.2 kV - 33/44/55 MVA transformers and eight 13.2kV feeders at the former Rockingham Race Track and the retirement of Salem Depot Substation. In 2020 it is planned to complete the design and procurement phase of the substation project. It will also include substation site work.

Is this project growth or customer connection related? If "yes", list the specific locations and how expenditure aligns with customer expansion objectives.
Yes. This project supports and is aligned with the planned customer expansions at the Tuscan Village Park in Salem NH.

Please describe any permitting requirements, environmental impacts, or resulting performance obligations that may or may not result from this expenditure?
Permitting and/or Easement requirements will be undertaken during detailed design activities as applicable.

Will there be assets, greater than $5,000, currently in service removed as a result of this expenditure?
GUIDANCE: If yes, please detail the specific assets that will be removed: 1. *Original Cost of Plant to be removed (if known):* 2. *What is the replacement cost of the plant being removed (if original cost not known)?* 3. *Original Work Order of Plant to be removed (if known):* 4. *Is the Plant being removed reusable?* 5. *What is the year of original installation of the plant being removed*
The scope of this project is to install a new 115kV – 13.2 kV Substation. There will be no equipment removed associated with this project. Therefore, this section does not apply.

What alternatives were evaluated and why were they rejected?
A total of twelve (12) plans were evaluated to address the existing and future system needs of the area. Six (6) of these plans were eliminated because of transmission costs and construction challenges due to site locations; refer to Appendix A under the Salem Area Report for a list of all Eliminated Plans. Five (5) Alternate plans were developed and weighed against the Recommended Plan. The Five (5) Alternate Plans are detailed in Section 7 and the Recommend Plan is detailed in Section 4 of the Salem Area Report.

Liberty Utilities WATER GAS ELECTRIC

Capital Project Expenditure Form | 2020

What are the risks and consequences of not approving this expenditure?
Not completing this project could result in the Company not being able to supply new customer growth in the area and/or could result in distribution facilities operating above their design limits.

Please describe how Health, Safety and Security concerns and impacts as a result of this expenditure been addressed.
Health, Safety and Security will be addressed using Engineering designs/controls during the detailed design process if applicable.

Are there other pertinent details that may affect the decision making process?
No

Complete the Financial Summary table only if:

- **Project is less than $100,000; or**
- **Project category is *Mandated* or *Safety* (Business Case Form not required)**

Financial Summary

Next Anticipated Test Year		**Was this Capital Project included in the current year's Board Approved Budget?**	☐ Yes ☐ No
Regulatory Lag (Click appropriate box)	☐ Less than 6 months ☐6 – 12 months ☐1 – 3 years ☐Greater than three years		
Which regulatory constructs will be used for recovering this capital spend?			
Please Specify Basis of Estimate For materials, equipment, and construction requiring Engineering drawings please specify the percent complete: [i]	☐Fixed or Firm Price ☐Estimate – Internal ☐Estimate – External ☐Other (specify details) Click here to enter text.		
Category	**Current Year**	**Future Years**	Authorized Amount (to be filled in by Corporate)
Cost of Design & Engineering ($)			
Cost of Materials ($)			
Cost of Construction ($)			
External Costs ($)			
Internal Costs ($)			
Other ($)			
AFUDC ($)			
Total Project Costs ($)	$400,000		

Liberty Utilities WATER GAS ELECTRIC

Capital Project Expenditure Form | 2020

Approvals and Signatures [ii]

Approved By:				
Role	**Approval Limit**	**Name**	**Signature**	**Date**
Manager / Staff (requisitioner/buyer):	Up to $25,000	Anthony Strabone Manager, Electric Engineering		03/09/2020
Senior Manager:	Up to $50,000			
Senior Director/Director:	Up to $250,000	Charles Rodrigues Director, Engineering		2/25/2020
Senior VP/VP:	Up to $500,000	Richard MacDonald Vice President, Operations		2/21/2020
State President:	Up to $500,000	SUSAN FLECK PRESIDENT		3/12/2020
Regional President:	Up to $3,000,000			
Corporate – Sr. VP Operations:	Up to $5,000,000			
Corporate - Exec Team Member (CEO, CFO, COO, Vice Chair):	Over $5,000,000			
Finance (East) – Vice President, Finance & Administration:	All Requests	Peter Dawes VP, Finance & Administration		

[i] For Best Practices on estimating project contingencies please see the Capital Policy.

[ii] Approvals for work orders and purchase orders are subject to the limits set forth in the Approval Limits of Authority Policy owned and amended from time to time by the corporate procurement group.

Project Overview			
Reason for Change: Reference 2019 Capital spend report. GSE capital portfolio reallocated mid-year.			
Project ID:	8830-1964	**Project Name:**	Rockingham Substation
Change Order Name:	Rockingham Substation 2019 #1	**Date Prepared:**	8/3/2023
Change Order #:	8830-1964 #1	**Financial Work Order (FWO):**[i]	
Project Sponsor:	Charles Rodrigues	**Revised Start Date:**	1/1/2019
Project Lead:	Anthony Strabone	**Revised End Date:**[ii]	12/31/2023
Prepared By:	Ryan Patnode	**Change Type**[iii]	X In Scope ☐ Out of Scope
Project Contingency Available?	☐ Yes ☐ No	If No is Selected, Please specify source of funds[iv]	

Financial Assessment/Cost Estimates
(Double click embedded excel file to update; include contingency allowance in excel file)

Category	Original Project Value	Previous Approved Charges	Current Change Order Amount	Total
Internal Labor				
Materials				
Equipment				
Contractor/Subcontractor				
Burdens/Overheads				
AFUDC				
Total Project Cost	**$200,000**		**$200,000**	**$400,000**

Updated Unlevered Internal Rate of Return:

Basis of Current Change Order Amount:

Reference 2019 Capital spend report. GSE capital portfolio reallocated mid-year.

Schedule Impacts
(As a result of the Change Order, where applicable, List the Impacts to schedule)

Baseline Schedule (BL)	New Forecast (NF)	Variance (BL – NF)

Approvals and Signatures[v]

Approved By:				
Role	**Approval Authority Limit**	**Name**	**Signature**	**Date**
Manager / Staff (requisitioner/buyer):	Up to $25,000			
Senior Manager: :	Up to $50,000			
Senior Director/Director:	Up to $250,000			
State President / Senior VP / VP:	Up to $500,000	Neil Proudman NH President		
Regional President:	Up to $3,000,000			
Corporate - Sr VP Operations:	Up to $5,000,000			
Corporate - Exec Team Member (CEO, CFO, COO, Vice Chair):	Over $5,000,000			

[i] The Financial Work Order Section captures the work order this change falls under when the job was initially set-up
[ii] The Revised project end date is dependent on changes in scope that may deviate the schedule from the original plan
[iii] The Change type for In scope or Out of scope changes fall within the following scenario:

- In Scope changes are deviations of scope from the original plan and approved budget that align to the original scope of the project but have revised pricing as a result of changes in pricing of labour, materials, and equipment
- Out of Scope changes are scope changes that were not originally planned for in the project baselines and approved budget. Examples of this type of change are related to changes in technology, missed deliverables, a change in the project design altering the scope of the project, etc.

iv In cases where the project no longer has contingency to cover project change orders, please specify any other sources of funds that would address the project variance (i.e. not executing another project, delaying scope of another project, etc)

[v] Approvals for work orders and purchase orders are subject to the limits set forth in the Approval Limits of Authority Policy owned and amended from time to time by the corporate procurement group.

Liberty Utilities
WATER | GAS | ELECTRIC

Change Order Form

2020

Project Overview			
Reason for Change: Budget Increase to fund project to accommodate work associated with Rockingham Substation			
Project ID:	8830-1964	**Project Name:**	Rockingham Substation
Change Order Name:	Budget Increase	**Date Prepared:**	07/27/2020
Change Order #:	8830-1964-01	**Financial Work Order (FWO):**[i]	Various
Project Sponsor:	Charles Rodrigues	**Revised Start Date:**	
Project Lead:	Anthony Strabone	**Revised End Date:**[ii]	12/31/2020
Prepared By:	Anthony Strabone	**Change Type**[iii]	x In Scope ☐ Out of Scope
Project Contingency Available?	☒ Yes ☐ No	**If No is Selected, Please specify source of funds**[iv]	2020 Capital Budget

Financial Assessment/Cost Estimates
(Double click embedded excel file to update; include contingency allowance in excel file)

Category	Original Project Value	Previous Approved Charges	Current Change Order Amount	Total
Internal Labor				
Materials				
Equipment				
Contractor/Subcontractor				
Burdens/Overheads				
AFUDC				
Total Project Cost	**$400,000**		**$150,000**	**$550,000**

Updated Unlevered Internal Rate of Return:

Basis of Current Change Order Amount: *Provide brief explanation on basis of the requested amount (i.e. revised contract amount, estimate based on revised engineering design, etc*)
Additional funding is requested to account for increase in costs associated with the Revised Salem Area Study as required per the NHPUC in Order Number 26,377.

Schedule Impacts
(As a result of the Change Order, where applicable, List the Impacts to schedule)

Baseline Schedule (BL)	New Forecast (NF)	Variance (BL – NF)
N/A	N/A	N/A

Liberty Utilities
WATER | GAS | ELECTRIC

Change Order Form

2020

Approvals and Signatures[v]

Approved By:				
Role	**Approval Authority Limit**	**Name**	**Signature**	**Date**
Manager / Staff (requisitioner/buyer):	Up to $25,000	Anthony Strabone Manager, Electric Engineering	Anthony Strabone	07/27/2020
Senior Manager: :	Up to $50,000			
Senior Director/Director:	Up to $250,000	Charles Rodrigues Director, Engineering		
State President / Senior VP / VP:	Up to $500,000	Richard MacDonald, VP Operations		
Regional President:	Up to $3,000,000	Susan Fleck President, NH		
Corporate - Sr VP Operations:	Up to $5,000,000			
Corporate - Exec Team Member (CEO, CFO, COO, Vice Chair):	Over $5,000,000			

[i] The Financial Work Order Section captures the work order this change falls under when the job was initially set-up
[ii] The Revised project end date is dependent on changes in scope that may deviate the schedule from the original plan
[iii] The Change type for In scope or Out of scope changes fall within the following scenario:

- In Scope changes are deviations of scope from the original plan and approved budget that align to the original scope of the project but have revised pricing as a result of changes in pricing of labour, materials, and equipment
- Out of Scope changes are scope changes that were not originally planned for in the project baselines and approved budget. Examples of this type of change are related to changes in technology, missed deliverables, a change in the project design altering the scope of the project, etc.

iv In cases where the project no longer has contingency to cover project change orders, please specify any other sources of funds that would address the project variance (i.e. not executing another project, delaying scope of another project, etc)

[v] Approvals for work orders and purchase orders are subject to the limits set forth in the Approval Limits of Authority Policy owned and amended from time to time by the corporate procurement group.

Liberty Utilities
WATER | GAS | ELECTRIC

Change Order Form

2020

Project Overview			
Reason for Change: Budget Increase to fund project to accommodate work associated with Rockingham Substation			
Project ID:	8830-1964	**Project Name:**	Rockingham Substation
Change Order Name:	Budget Increase	**Date Prepared:**	11/04/2020
Change Order #:	8830-1964-02	**Financial Work Order (FWO):**[i]	Various
Project Sponsor:	Charles Rodrigues	**Revised Start Date:**	
Project Lead:	Anthony Strabone	**Revised End Date:**[ii]	12/31/2020
Prepared By:	Anthony Strabone	**Change Type**[iii]	x In Scope ☐ Out of Scope
Project Contingency Available?	☒ Yes ☐ No	**If No is Selected, Please specify source of funds**[iv]	2020 Capital Budget

Financial Assessment/Cost Estimates
(Double click embedded excel file to update; include contingency allowance in excel file)

Category	Original Project Value	Previous Approved Charges	Current Change Order Amount	Total
Internal Labor				
Materials				
Equipment				
Contractor/Subcontractor				
Burdens/Overheads				
AFUDC				
Total Project Cost	**$400,000**	**$150,000**	**$350,000**	**$900,000**

Updated Unlevered Internal Rate of Return:

Basis of Current Change Order Amount:

Provide brief explanation on basis of the requested amount (i.e. revised contract amount, estimate based on revised engineering design, etc)

Previous change order amount was for additional funding to account for increase in costs associated with the Revised Salem Area Study as required per the NHPUC in Order Number 26,377. This change order amount of $350,000 was due to an intentional reallocation of funds from project 8830- 1944. Construction for project 8830-1944 was postponed and the remaining capital funds were transferred to this project for material procurement.

Schedule Impacts
(As a result of the Change Order, where applicable, List the Impacts to schedule)

Baseline Schedule (BL)	New Forecast (NF)	Variance (BL – NF)
N/A	N/A	N/A

Liberty Utilities WATER | GAS | ELECTRIC

Change Order Form

2020

Approvals and Signatures[v]

Approved By:				
Role	**Approval Authority Limit**	**Name**	**Signature**	**Date**
Manager / Staff (requisitioner/buyer):	Up to $25,000	Anthony Strabone Manager, Electric Engineering	Anthony Strabone	11/04/2020
Senior Manager: :	Up to $50,000			
Senior Director/Director:	Up to $250,000	Charles Rodrigues Director, Engineering	Charles Rodrigues Digitally signed by Charles Rodrigues Date: 2020.11.05 07:58:13 -05'00'	
State President / Senior VP / VP:	Up to $500,000	Richard MacDonald, VP Operations	Richard MacDonald Digitally signed by Richard MacDonald Date: 2020.11.18 17:18:45 -05'00'	
Regional President:	Up to $3,000,000	Susan Fleck President, NH		
Corporate - Sr VP Operations:	Up to $5,000,000			
Corporate - Exec Team Member (CEO, CFO, COO, Vice Chair):	Over $5,000,000			

[i] The Financial Work Order Section captures the work order this change falls under when the job was initially set-up
[ii] The Revised project end date is dependent on changes in scope that may deviate the schedule from the original plan
[iii] The Change type for In scope or Out of scope changes fall within the following scenario:

- In Scope changes are deviations of scope from the original plan and approved budget that align to the original scope of the project but have revised pricing as a result of changes in pricing of labour, materials, and equipment
- Out of Scope changes are scope changes that were not originally planned for in the project baselines and approved budget. Examples of this type of change are related to changes in technology, missed deliverables, a change in the project design altering the scope of the project, etc.

[iv] In cases where the project no longer has contingency to cover project change orders, please specify any other sources of funds that would address the project variance (i.e. not executing another project, delaying scope of another project, etc)

[v] Approvals for work orders and purchase orders are subject to the limits set forth in the Approval Limits of Authority Policy owned and amended from time to time by the corporate procurement group.

Liberty | Capital Project Business Case | 2022

NOTE: This form is required for planned Growth, Regulatory Supported, and Discretionary projects as well as combined blanket projects for Safety and Mandated with Growth, Regulatory Supported, and Discretionary Projects with a spend greater than $100,000 and all unplanned projects. All other Project types can utilize the Capital Expenditure Application Form.

Project Overview			
Project Name:	Rockingham Substation	**Date Prepared:**	01/03/2022
Project ID#:	8830-1964	**Cost Estimate:**	$500,000
Project Sponsor:	Christopher Steele	**Project Start Date:**	01/01/2022
Project Lead:	Melvin Emerson	**Project End Date:**	12/31/2022
Prepared By:	Melvin Emerson	**Planned or Unplanned Projects:**	☒ Planned ☐Unplanned
Project Type (click appropriate boxes)**:**	☐ Safety ☐ Mandated ☐ Growth ☒ Regulatory Supported ☐ Discretionary		
Spending Rationale:	☐ Growth ☒ Improvement ☐ Replenishment		

Project Scope Statement

(Insert the scope of work, major deliverables, assumptions, and constraints)

The second phase of the Salem Area Study proposes the installation of two new 115/13.2 kV - 33/44/55 MVA transformers and five 13.2kV feeders at the new Rockingham #21 Station and the retirement of Salem Depot #9 Substation.

In 2022 it is planned to paint the perimeter wall, install permanent gates, install animal protection, and perform civil work & landscaping.

Background

(Insert description of current operational arrangement, and brief history of project & asset)

The town of Salem, NH will experience more than expected load growth in the upcoming years. This is due to commercial redevelopment. This area consists of expansive residential developments, numerous retail plazas, office parks and Industrial/Commercial Parks. The loading of the system has changed over the years to where various components are at or have exceeded certain planning and operating criteria. In addition, sub-transmission facilities in the area are approaching its design limits. The upcoming developments in the area result in an increase or worsening of components exceeding planning and operating criteria. In addition the testing of several substation transformers in the town of Salem have shown signs of gassing and continued deterioration.

Recommendation/Objective

(Insert the unique problem this project is looking to resolve)

The Salem Area Study was carried out to study options for the development of the power distribution system in the Salem, NH area. It determines the best engineering solution to mitigate overloads, address contingencies, and to upgrade/replace vintage assets in the system. In addition it determines the distribution requirements needed to supply the proposed business park development in the range of 12MW – 18MW located at the Tuscan Village Development.

The recommended plan accomplishes all system capacity and asset replacement requirements. Upon completion of the projects within the Salem Area Study, Baron Ave and Salem Depot substations will be retired.

Alternatives/Options

(Describe all reasonably viable alternatives. Discuss the viability of each and provide reasons if rejected)

For details on alternatives considered, refer to the 2020 Salem Area Study.

Liberty | Capital Project Business Case | 2022

Financial Assessment/Cost Estimates
(Double click embedded excel file to update; include contingency allowance in excel file)

Next Anticipated Test Year	**2022**	**Was this Capital Project included in the current year's Board Approved Budget?**	☒ Yes ☐ No

Regulatory Lag (Click appropriate box) ☐Less than 6 Months ☐6-12 Months ☒1 to 3 years ☐Greater than 3 years

Category	Total Already Approved	2021	2022	Beyond 2022	Total
Internal Labour (including labour and travel)	$ -	$ -	$ -	$ -	$ -
Materials (including consumables)	$ -	$ -	$ 100,000	$ -	$ 100,000
Equipment (rental equipment)	$ -	$ -	$ -	$ -	$ -
Contactor/Subcontractor (including consultants)	$ -	$ -	$ 400,000	$ -	$ 400,000
AFUDC ($)					

Unlevered Internal Rate of Return: Click here to enter text.

Basis of Estimate: *This estimate is of investment grade for design activities on this project. A project grade estimate for construction will be provided upon completion of detailed design.*

For materials, equipment, and construction requiring Engineering drawings please specify the percent complete:

Schedule
(List key milestone dates)

Key Milestone Description	Forecast Start Date	Forecast End Date
Detailed Design	6/1/2018	12/31/2019
Construction	4/1/2022	12/31/2022

Risk Assessment
(Please describe the risk of not completing the project)

Not completing this project could result in the Company not being able to supply new customer growth in the area and/or could result in distribution facilities operating above their design limits.
Continued deterioration of substation assets increase the safety risk to company personnel and the public. Transformer testing has shown deterioration of the transformer insulation and failure could result in extended outages. There are no spare transformers available if a failure were to occur.

Trade Finance
(Is there a possibility to apply trade finance products to this project? See Capital Planning for further clarification)

Unknown

Supporting Documentation (Reference drawings, condition assessment reports, vendor quotations, etc. Attach document or where possible include hyperlink to file located on shared server or SharePoint)
Supporting Documentation can be found at W:\Engineering\Electric Engineering\Electric Planning Engineering

Approvals and Signatures [i]

Approved By:				
Role	**Approval Authority Limit**	**Name**	**Signature**	**Date**
Manager / Staff (requisitioner/buyer):	Up to $25,000	Melvin Emerson Capital Lead	Melvin Emerson	01/04/2022
Senior Manager: :	Up to $50,000	Anthony Strabone Sr Manager, Electric Engineering	Anthony Strabone	01/04/2022
Senior Director/Director:	Up to $250,000	Christopher Steele Sr. Director, Electric Operations		
Senior Vice President/ Vice President	Up to $500,000			
State President:	Up to $500,000	Neil Proudman President, NH		
Regional President:	Up to $3,000,000			
Corporate - Sr VP Operations:	Up to $5,000,000			
Corporate - Exec Team Member (CEO, CFO, COO, Vice Chair):	Over $5,000,000			
Finance (East) – Vice President, Finance & Administration	All Requests	Peter Dawes VP, Finance & Administration		

[i] Approvals for work orders and purchase orders are subject to the limits set forth in the Approval Limits of Authority Policy owned and amended from time to time by the corporate procurement group.

Liberty | Change Order Form | 2022

Project Overview			
Reason for Change:	Budget Increase to fund project to accommodate work associated with Rockingham Substation		
Project ID:	8830-1964	**Project Name:**	Rockingham Substation
Change Order Name:	8830-1964 Rockingham Substation	**Date Prepared:**	11/30/2022
Change Order #:	8830-1964-1	**Financial Work Order (FWO):**[i]	Various
Project Sponsor:	Anthony Strabone	**Revised Start Date:**	1/1/2022
Project Lead:	Melvin Emerson	**Revised End Date:**[ii]	12/31/2022
Prepared By:	Melvin Emerson	**Change Type**[iii]	x In Scope ☐ Out of Scope
Project Contingency Available?	☐ Yes ☒ No	**If No is Selected, Please specify source of funds**[iv]	8830-1958 Tuscan Village Line South $160K.

Financial Assessment/Cost Estimates
(Double click embedded excel file to update; include contingency allowance in excel file)

Category	Original Project Value	Previous Approved Charges	Current Change Order Amount	Total
Internal Labor				
Materials				
Equipment				
Contractor/Subcontractor				
Burdens/Overheads				
AFUDC				
Total Project Cost	**$500,000**		**$160,000**	**$660,000**

Updated Unlevered Internal Rate of Return:

Basis of Current Change Order Amount: *$160,000*

Over expenditure is being driven by costs associated with work identified needing to be addressed under the Rockingham Substation Capital Specific Project. The major project expenditures necessary to complete construction and make the substation ready for service include station commissioning, animal protection, wall staining, gates, paving, and labor to monitor and complete construction of the substation. The anticipated overspend of this project will be offset by underspend of other capital projects and therefore will not impact the overall 2022 GSE Capital Budget.

Schedule Impacts
(As a result of the Change Order, where applicable, List the Impacts to schedule)

Baseline Schedule (BL)	New Forecast (NF)	Variance (BL – NF)
N/A	N/A	N/A

Liberty | Change Order Form | 2022

Approvals and Signatures[v]

Approved By:				
Role	**Approval Authority Limit**	**Name**	**Signature**	**Date**
Manager / Staff (requisitioner/buyer):	Up to $25,000	Melvin Emerson Capital Lead	Melvin Emerson	5 June 2023
Senior Manager:	Up to $300,000	Kedrick Robinson Manager, Engineering Projects	Kedrick Robinson	6/5/23
Senior Director/Director:	Up to $500,000	Anthony Strabone Director, Engineering & Project Management	Anthony Strabone	06/05/2023
State President / Senior VP / VP:	Up to $2,000,000	Neil Proudman NH President		
Regional President:	Up to $3,000,000			
Corporate - Sr VP Operations:	Up to $3,500,000			
Corporate - Exec Team Member (CEO, CFO, COO, Vice Chair):	Over $7,500,000			

[i] The Financial Work Order Section captures the work order this change falls under when the job was initially set-up
[ii] The Revised project end date is dependent on changes in scope that may deviate the schedule from the original plan
[iii] The Change type for In scope or Out of scope changes fall within the following scenario:

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[iv] In cases where the project no longer has contingency to cover project change orders, please specify any other sources of funds that would address the project variance (i.e. not executing another project, delaying scope of another project, etc)

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Liberty | Capital Project Expenditure Form | 2022

Project Name:	Rockingham Substation		
Financial Work Order (FWO):		**Project ID #:**	8830-1964
Requesting Region or Group:	Granite State Electric Co.	**Date of Request (MM/DD/YY):**	12/23/2021
Project Sponsor:	Christopher Steele	**Project Start Date:**	01/01/2022
Project Lead:	Melvin Emerson	**Project End Date:**	12/31/2022
Prepared by:	Melvin Emerson	**Requested Capital ($)**	$500,000
Planned or Unplanned Projects:	☒ Planned ☐Unplanned		
Project Type: (Click appropriate boxes)	☐ Safety ☐ Mandated ☐ Growth ☒ Regulatory Supported ☐ Discretionary		
Spending Rationale:	☐ Growth ☒ Improvement ☐ Replenishment		

Details of Request Rockingham Substation

Project description
The second phase of the Salem Area Study proposes the installation of two new 115/13.2 kV - 33/44/55 MVA transformers and five 13.2kV feeders at the new Rockingham #21 Station and the retirement of Salem Depot #9 Substation. In 2022 it is planned to design the installation of the second set of 115kV line structures, and complete work at the new substation site.

`

Is this project growth or customer connection related? If "yes", list the specific locations and how expenditure aligns with customer expansion objectives.
Yes. This project supports and is aligned with the planned customer expansions at the Tuscan Village Park in Salem NH.

Please describe any permitting requirements, environmental impacts, or resulting performance obligations that may or may not result from this expenditure?
Permitting and/or Easement requirements will be undertaken during detailed design activities as applicable.

Will there be assets, greater than $5,000, currently in service removed as a result of this expenditure?
GUIDANCE: If yes, please detail the specific assets that will be removed: 1. *Original Cost of Plant to be removed (if known):* 2. *What is the replacement cost of the plant being removed (if original cost not known)?* 3. *Original Work Order of Plant to be removed (if known):* 4. *Is the Plant being removed reusable?* 5. *What is the year of original installation of the plant being removed*
No

What alternatives were evaluated and why were they rejected?
For details on alternatives considered, refer to the 2020 Salem Area Study.

What are the risks and consequences of not approving this expenditure?

Liberty | Capital Project Expenditure Form | 2022

Not completing this project could result in the Company not being able to supply new customer growth in the area and/or could result in distribution facilities operating above their design limits. Continued deterioration of substation assets increase the safety risk to company personnel and the public. Transformer testing has shown deterioration of the transformer insulation and failure could result in extended outages. There are no spare transformers available if a failure were to occur.

Please describe how Health, Safety and Security concerns and impacts as a result of this expenditure been addressed.
Health, Safety and Security will be addressed using Engineering designs/controls during the detailed design process if applicable.

Are there other pertinent details that may affect the decision making process?
No

Liberty | Capital Project Expenditure Form | 2022

Complete the Financial Summary table only if:

- **Project is less than $100,000; or**
- **Project category is *Mandated* or *Safety* (Business Case Form not required)**

Financial Summary

Next Anticipated Test Year	**2022**	**Was this Capital Project included in the current year's Board Approved Budget?**	☒ Yes ☐ No
Regulatory Lag (Click appropriate box)	☐ Less than 6 months ☐6 – 12 months ☒1 – 3 years ☐Greater than three years		
Which regulatory constructs will be used for recovering this capital spend?			
Please Specify Basis of Estimate For materials, equipment, and construction requiring Engineering drawings please specify the percent complete: [i]	☐Fixed or Firm Price ☒Estimate – Internal ☐Estimate – External ☐Other (specify details) Click here to enter text.		
Category	**Current Year**	**Future Years**	Authorized Amount (to be filled in by Corporate)
Cost of Design & Engineering ($)			
Cost of Materials ($)			
Cost of Construction ($)			
External Costs ($)			
Internal Costs ($)			
Other ($)			
AFUDC ($)			
Total Project Costs ($)	$500,000		

Liberty | Capital Project Expenditure Form | 2022

Approvals and Signatures [ii]

Approved By:				
Role	**Approval Limit**	**Name**	**Signature**	**Date**
Manager / Staff (requisitioner/buyer):	Up to $25,000	Melvin Emerson Capital Lead	Melvin Emerson	12/28/2021
Senior Manager:	Up to $50,000	Anthony Strabone Sr Manager, Electric Engineering	Anthony Strabone	12/28/2021
Senior Director/Director:	Up to $250,000	Christopher Steele Sr. Director, Electric Operations		
Senior VP/VP:	Up to $500,000			
State President:	Up to $500,000	Neil Proudman President, NH		
Regional President:	Up to $3,000,000			
Corporate – Sr. VP Operations:	Up to $5,000,000			
Corporate - Exec Team Member (CEO, CFO, COO, Vice Chair):	Over $5,000,000			
Finance (East) – Vice President, Finance & Administration:	All Requests	~~Peter Dawes~~ ~~VP, Finance & Administration~~		

[i] For Best Practices on estimating project contingencies please see the Capital Policy.

[ii] Approvals for work orders and purchase orders are subject to the limits set forth in the Approval Limits of Authority Policy owned and amended from time to time by the corporate procurement group

Liberty Utilities

Change Order Form

2021

Project Overview			
Reason for Change: Budget Increase to fund project to accommodate work associated with Rockingham Substation			
Project ID:	8830-1964	**Project Name:**	Rockingham Substation
Change Order Name:	Budget Increase	**Date Prepared:**	04/05/2021
Change Order #:	8830-1964-01	**Financial Work Order (FWO):**[i]	Various
Project Sponsor:	Charles Rodrigues	**Revised Start Date:**	
Project Lead:	Anthony Strabone	**Revised End Date:**[ii]	12/31/2021
Prepared By:	Anthony Strabone	**Change Type**[iii]	x In Scope ☐ Out of Scope
Project Contingency Available?	☒ Yes ☐ No	**If No is Selected, Please specify source of funds**[iv]	2020 Capital Budget

Financial Assessment/Cost Estimates
(Double click embedded excel file to update; include contingency allowance in excel file)

Category	Original Project Value	Previous Approved Charges	Current Change Order Amount	Total
Internal Labor				
Materials				
Equipment				
Contractor/Subcontractor				
Burdens/Overheads				
AFUDC				
Total Project Cost	**$7,000,000**		**$4,000,000**	**$11,000,000**

Updated Unlevered Internal Rate of Return:

Basis of Current Change Order Amount:

Provide brief explanation on basis of the requested amount (i.e. revised contract amount, estimate based on revised engineering design, etc)

The drivers associated with this change order are as follows:

1. Burden rates: In 2020 the burden rates used, which were provided by Finance, to determine the cost of this project were 32.76% for contractor and outside vendors and 8% for direct material charges. However, per an update from Finance, the 2021 burden rates are 43% and 22% for contractor/outside services and direct material charges respectfully. This results in an overall increase of approximately 24%.

2. Elevation grade change: In early March 2021, the Tuscan Development Team made Liberty aware that there were issues with the elevations on the Tuscan parcel around the substation property. Tuscan indicated that the elevations provided to Liberty in 2018, which were used to design the substation, were lower than what was actually being encountered in the field. Based on field measurements; multiple meetings and discussions with the Substation Design Team, the best and safest alternative was chosen which was to raise the substation property on average 2FT.

Liberty Utilities

Change Order Form

2021

3. Transformer Foundations: Based on the weight and size of the transformers, the soil, which is based on a geo-technical study, in the area of the transformers is not suitable to support these units. In order to prevent these foundations from settling over time, each foundation will require 10, 30FT grout filled steel piles

4. Increase in labor and material costs from 2020 to 2021.

Schedule Impacts (As a result of the Change Order, where applicable, List the Impacts to schedule)		
Baseline Schedule (BL)	**New Forecast (NF)**	**Variance (BL – NF)**
N/A	N/A	N/A

Approvals and Signatures

Approved By:				
Role	**Approval Authority Limit**	**Name**	**Signature**	**Date**
Manager / Staff (requisitioner/buyer):	Up to $25,000			
Senior Manager: :	Up to $50,000	Anthony Strabone Senior Manager, Electric Engineering	Anthony Strabone	05/17/2021
Senior Director/Director:	Up to $250,000	Charles Rodrigues Director, Engineering	Charles Rodrigues Digitally signed by Charles Rodrigues Date: 2021.05.17 13:52:34 -04'00'	
State President / Senior VP / VP:	Up to $500,000	Richard MacDonald, VP Operations	Richard MacDonald Digitally signed by Richard MacDonald Date: 2021.05.24 09:01:02 -04'00'	

Liberty Utilities

Change Order Form

2021

Regional President:	Up to $3,000,000	~~Susan Fleck President, NU~~		5/26/21
Corporate - Sr VP Operations:	Up to $5,000,000			
Corporate - Exec Team Member (CEO, CFO, COO, Vice Chair):	Over $5,000,000	COO		06/07/21

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Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

DE 23-039
Distribution Service Rate Case

Department of Energy Technical Session Data Requests - Set 2

Date Request Received: 11/3/23 | Date of Response: 11/20/23
Request No: DOE TS 2-40 | Respondent: Anthony Strabone

REQUEST:

Reference DOE 3-1, 2019 - 2022 Capital Projects, Rockingham Substation, Change Order dated April 5, 2021; DOE 6-19; and Docket DE 19-064, Exhibit 21, Attachment JED-3c at Bates 421.

a. Please describe the Company's efforts in 2017 related to searching and investigating potential sites for the Rockingham Substation. Please list all of the potential locations reviewed. Also, please provide any documentation or records, including any written analysis, that details Liberty's property search and why certain sites were not selected.

b. Please explain why re-utilizing Liberty's existing substations, Salem Depot and Baron Ave., were not viable options for the Rockingham Substation. Did the Company ever contact or explore the potential purchase of the former restaurant property adjacent to Salem Depot, and if so, what were the results of those discussions?

c. When and why did Liberty approach the developer of Tuscan Village about locating the Rockingham Substation within that development? What were the developer's conditions, if any, for locating the substation within Tuscan Village?

d. A commercial appraisal of the proposed Rockingham Substation site within Tuscan Village was performed in July 2017. The appraisal concluded the market value of the lot to be $925,000. Please describe the decision-making process undertaken by Liberty that provided justification for the Company to purchase the lot at a price of $1.5 million, representing a $575,000 premium over and above the market value.

e. The contractor responsible for building the paved road to Rockingham Substation initially (2018) provided Liberty with the wrong elevation grade causing Liberty to redesign and revise the elevation of the substation at substantial additional expense to the Company and ratepayers. Did Liberty ever consider holding the contractor liable for that error? If not, why not?

f. Liberty commissioned a geotechnical study of the soils at the Rockingham site which concluded that some of the underlying soils were unstable. Please provide a copy of the geotechnical report.

g. Liberty constructed a screening wall around the perimeter of the Rockingham Substation site to conceal it from view. Please provide the following information:

Docket No. DE 23-039 Request No. DOE TS 2-40

i. Type of wall, wall height, and construction material used.

ii. Total cost of the wall.

iii. Confirm that the construction of the wall was at the request of the Tuscan Village owner and the Town of Salem.

iv. Provide a copy of the decision of the Town of Salem Planning Board including findings of fact involving approval of the construction of Rockingham Substation and the screening wall.

v. Copies of any and all communications between Liberty, the owner of Tuscan Village, and the Salem Planning Board related to the requirement of a screening wall.

h. Confirm that the second transformer was finished, energized, and taking load in 2022.

RESPONSE:

a. In 2017, the Company evaluated the properties listed below for locating the Rockingham substation.

i. Salem Depot Substation- please see the Company's responses to part b below for why this property was not selected.

ii. Baron Ave Substation- please see the Company's responses to part b below for why this property was not selected.

iii. 1 Tuscan Blvd (current site of Rockingham Substation)

iv. 60 Pleasant Street. This site is located West of the Tuscan Development. It proposed challenges with respect to routing of the 115 kV Supply lines and distribution feeders. With respect to routing of the ten (10) distribution feeders proposed with Rockingham Substation, these ten distributions feeders would either exit the Pleasant Street site overhead on multiple pole lines or underground along public rights of ways (streets/roads) which would significantly increase costs. Another challenge was that, in order to reach this site, the 115 kV Supply lines would need to be extended from the ROW and routed either through the Tuscan development, and the property of the Rockingham Mall Hampshire or along local roads/street resulting in increased costs for the supply lines. For these reasons listed, this property was not selected.

v. Garabeddian Site- this site is located near the Salem Animal Rescue League and was the former site of the Salem Water Treatment Facility. This site was identified as containing contaminated soil which was recently treated by the Town of Salem. This site proposed challenges with respect to routing of the ten distribution feeders proposed with Rockingham Substation. These ten (10) distributions feeders would either exit the site overhead on multiple pole lines or underground along public right of ways which would increase costs. For these reasons listed, this property was not selected.

Docket No. DE 23-039 Request No. DOE TS 2-40

b. The Company did not contact or explore the potential purchase of the former restaurant property adjacent to Salem Depot because this restaurant was still in operation at the time the Company was evaluating potential sites for the new substation. The fire at the restaurant occurred in June 2018, which was after the Company completed its analysis of properties and around the same time the Company and Tuscan Development were finalizing the purchase and sales agreement for the current Rockingham Substation property.

   Salem Depot was not a viable option because the property where the existing substation was located was not of sufficient size to accommodate the new proposed substation. In order to utilize this property, the Company would have to purchase two adjacent residential properties and request the Town of Salem to discontinue the use of a local road near the Salem Depot property In addition to these issues, the Salem Depot property is located further North of the property where the Rockingham substation was constructed, which would require additional costs to extend the 115 KV Supply lines further North to the Salem Depot substation. Based on the property challenges and additional costs for the 115 kV line, the Company determined the Salem Depot property was not a viable option.

   Similar to Salem Depot, the Baron Avenue substation site was not a viable option because the existing property was not of sufficient size to accommodate the proposed substation. Property expansion at Baron Ave Substation was also a challenge due to existing wetlands in close proximity to the substation property. In addition to limited property expansion at Baron Ave, this site also presented challenges with respect to routing of the ten distribution feeders proposed with Rockingham Substation. These ten distributions feeders would either exit the Baron Ave site overhead on multiple pole lines through residential neighborhoods or underground along public right of ways which would significantly increase costs. Based on the property and distribution routing challenges, the Company determined the Baron Ave property was not a viable option.

c. As part of its efforts of identifying possible parcels for a new substation, the Company approached the developer of Tuscan Village in 2016 about locating the Rockingham Substation within that development. There only additional condition imposed by the developer for locating the substation within the development was screening.

d. Although the Company's commercial appraisal of the proposed Rockingham Substation site within Tuscan Village was less than the purchase price of $1.5 million, the arms' length negotiation between the Company and the developer resulted in the purchase price, -- and thus the actual market value -- of $1.5 million. The Company had determined this lot was clearly the best possible location for the new proposed substation in terms of overall cost and operational factors based on its evaluation of other locations in the area described above. There was no "premium" of $575,000 over market value. The true market value was what the Company paid because it resulted from an arms' length transaction between two sophisticated parties. Alternatively, the Company had determined that any "premium" was less than the increased construction costs that would have been associated with the other properties the Company considered.

Docket No. DE 23-039 Request No. DOE TS 2-40

e. The Company did not consider holding the contractor liable for the change in road elevation since Tuscan Development was only required to provide a paved road to the substation site and the elevation of the road was not identified as part of the agreement.

f. Refer to Attachment 23-039 DOE TS 2-40.f.

g. Please see the following responses:

   i. The wall is 15 feet high and is made of concrete.

   ii. Total cost of the wall is $653,608.

   iii. The original request of the Town of Salem was for a 15 FT high louvered metal fence option to provide substation screening. Upon review of cost and construction requirements of the metal fence option, the Company requested and received approval from the Salem Planning Board to use the lower cost option of a concrete wall to screen the substation instead of the metal fence.

   iv. Please see Attachment 23-039 DOE TS 2-40.g.iv for a copy of the approved substation drawings along with a letter from the Salem Planning Board approving the use of the concrete wall instead of the metal fence.

   v. Please see Attachment 23-039 DOE TS 2-40.g.v for additional correspondence related to the substation screening between the Company and the Town of Salem's consultant.

h. The second transformer was energized and taking load in 2023.

October 5, 2020
CHG Job No. 2016

PLM, Inc.
35 Main Street
Hopkinton, MA 01748
Attention: Kevin Soden

Subject: Geotechnical Engineering Investigation
Rockingham Substation
Salem, NH

Dear Mr. Soden:

Charles H. Gross, PE, LLC (CHG) is pleased to submit the findings and recommendations of our geotechnical engineering investigation conducted at the above-referenced property for the proposed site improvements at the above address.

Thank you for engaging our services for this project. If you have any questions, please do not hesitate to call.

Very truly yours,
Charles H. Gross, PE, LLC

Charles H. Gross, PE, M.ASCE
Manager

Attachments

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Figure 1 – Locus Plan
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1.0 GENERAL

1.1 Authorization

In accordance with your authorization we have undertaken and completed our subsurface investigation and prepared this Geotechnical Engineering Report. Refer to Figure 1 in this report for a locus plan.

1.2 Project Description

The project consists of constructing electrical equipment in the general area where test borings were drilled on September 4, 2020. PLM provided CHG with the boring locations shown on Figure 2.

Borings B-1, B-2 and B-3 are the locations for future caisson foundations that are anticipated to be 6'-0" in diameter. B-4 and B-5 are at proposed power transformers. Boring B-6 is at the 13.2 kV Switchgear assembly.

1.3 Purposes and Scope of the Investigation

The purposes of this investigation are to define and evaluate the subsurface conditions beneath the proposed construction and provide recommendations for the foundation and earthwork activities, including recommendations for allowable soil bearing capacity and seismic site profile classification. To accomplish these tasks, the following scope of services was performed:

- Performed a visual Site inspection by our Geotechnical Engineer;
- Engaged a boring contractor to drill 6 test borings;
- Monitored the test boring operations;
- Collected soil samples and measured groundwater levels in the field;
- Logged and classified soil samples; and
- Submitted this report of our findings, conclusions and recommendations.

2.0 SITE CONDITIONS

2.1 Surface Conditions

At the time of our investigation, the Site was relatively level and vacant.

2.2 Subsurface Conditions

As part of this investigation test borings were drilled under the supervision of Charles H. Gross, P.E. to explore the Site's subsurface conditions. Test boring locations are shown on Figure 2. Mr. Gross classified soil samples in the field based on visual and textural examination using the Unified Soil Classification System.

Soil X Corp of Leominster, MA drilled 6 test borings. The borings were drilled using rotary drill rigs. Standard Penetration Tests[1] (SPT) were performed at intervals noted on the boring logs. Soil samples were collected from the ground surface to the maximum depth explored, which was 32 ft below existing grade. Test boring logs are included in Appendix A.

Our knowledge of the subsurface conditions beneath the proposed construction area is based on the findings in the test borings. The following generalized subsurface strata were encountered starting from the ground surface:

- **Fill,** consisting of Silty Sand (SM[2]) and Gravelly Sand (SP-SM), was encountered at the ground surface. The Fill extended to a depth of 5 ft in the test borings. The Fill was very loose to dense with SPT N-values ranging from 10 to 38 blows; however, it was primarily medium dense.
- **Peat (PT)** , approximately 3 ft thick, was encountered directly beneath the Fill in test boring B-6. The Peat was very soft with an SPT N-value of 2 blows.
- **Native Granular Soils** were encountered directly beneath the Fill. The Native Granular Soils consisted of Silty Sand (SM), Sand (SP-SM), and Sandy Silt (ML) and extended to the maximum depths explored, which was 32 ft below existing

[1] SPT N-Value is the number of blows for the drill rigs automatic hammer required to advance the standard 1-3/8 inch I.D. by 2.0 inch O.D. split-spoon sampler the last 12 inches of an 18-inch sampling interval.

[2] Symbols used on the test boring logs are explained as follows:

SP-SM:	Poorly graded Sands with 5 to 12% ML or MH fines
SM:	Sands with greater than 12% ML or MH fines
Pt:	Organic soils with a distinctive organic texture and containing particles of leaves, grass, branches or other fibrous vegetative matter.
ML:	Inorganic nonplastic and slightly plastic Silts and medium plastic Clayey Silts
MH:	Inorganic slightly plastic Silts and medium plastic to very plastic Clayey Silts

grade. The soils were loose to very dense with SPT N-values ranging from 5 to greater than 59 blows.

2.3 Groundwater

The groundwater levels in the borings varied from approximately 8 to 10 ft below existing grade.

The groundwater level may be affected by local anomalous conditions as well as seasonal factors and thus, may not represent the level to be encountered in the future. Generally, groundwater levels are highest in the early spring and lowest in the late fall.

3.0 FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

3.1 General

The geotechnical concerns for the Site are the following:

- All foundation units be founded on similar bearing strata;
- Possible softening of the bearing strata due to construction operations and rainfall runoff;
- The suitability of on-Site materials for re-use as compacted fills; and

To avoid construction delays, we recommend preparing an as-built utility plan during the design phase of this project. The as-built utility plan will help the design team prepare foundation plans and specifications minimizing construction delays and potential utility damage.

3.2 Foundation Support

Geotechnical design parameters for soils in Section 2.2 include the following:

- Allowable bearing capacity of the medium dense Native Granular Soils = 3 ksf;
- Approximate unit weight of compacted Fill Soils = 120 pcf
- Approximate unit weight of Native Granular Soils = 120 pcf;
- Angle of internal friction of Native Granular Soils = 30 degrees;
- Coefficient of friction between Native Granular Soils and concrete = 0.4;
- Coefficient of friction between Processed Gravel Fill and concrete = 0.45;
- Coefficient of active earth pressure = 0.33;
- Coefficient of passive earth pressure = 3.0;
- Coefficient of earth pressure at rest = 0.5;
- Subgrade Modulus = 125 pci
- Equivalent fluid unit weight of the Native Granular Soils equal to 120 pcf to calculate passive pressures above water table;
- For design purposes of caissons, the upper 4 feet of soils should not be considered for skin friction values; and
- Hydrostatic uplift is not a concern for the proposed structures based on the depth groundwater was encountered.

6 ft dia. Caisson Foundations (B-1, B-2, & B-3)

CHG recommends that future caisson foundations be supported on the medium dense to dense Native Granular Soils. Considering the presence of wet sand, we recommend that the contractor be prepared to provide temporary casing to support the walls of the caisson shaft during drilling. The concrete should be cast-in-place directly against the Native Granular Soils.

We recommend the caissons be founded below the loose Native Granular Soils in boring B-1 & B-2 at 25 ft and B-3 at 30 ft below existing grade on the medium dense to dense sands. The net allowable bearing capacity of the medium dense Native Granular Soils is 3 ksf

For design purposes, total caisson settlements are estimated to be less than 1 inch and the differential settlement will be considerably less and should pose no significant structural problems.

Power Transforms & Switchgear Assembly (B-4, B-5, & B-6)

We do not recommend a shallow foundation scheme at these boring locations due to the presence of loose to medium dense soils consisting of the Fill, Peat, and Native Granular Soils mentioned in Section 2.2. In borings B-4, B-5, and B-6 these soils extended to a depth of approximately 20, 25, and 10 ft, respectively. The Fill is considered unsuitable for foundation support because there is no documentation provided indicating that it was placed in lifts, properly compacted, and tested. The organic Peat is unsuitable for foundation support because it is highly compressible.

CHG recommends considering a deep foundation system consisting of helical piles to support the proposed power transformers and switch gear assembly. We recommend engaging a Geotechnical Specialty Contractor for design and installation of the helical piles.

The helical piles are advanced into the ground using a rotary motor typically mounted to a backhoe or excavator. As the pile lead is advanced, additional extension sections are added as required. The lead section is advanced through the unsuitable soils into the underlying suitable medium dense Native Granular Soil bearing materials. The supported loads are transferred to the underlying suitable material via the pile shaft.

CHG recommends that the Geotechnical Specialty Contractor consider a grout-encased shaft style pile known as a Helical Pulldown Micro-pile (HPM). A helical pile with a grouted shaft provides an additional benefit as it introduces a friction component to the pile, which increases its overall capacity. The grouted portion of

the pile develops friction along the interface with the displaced soil surrounding it, which contributes to the pile capacity.

The HPM consists of a conventional helical pile that is encased in a shaft of neat cement grout. The pile extensions are fitted with plates that displace the surrounding soil as the pile is advanced. A reservoir is used at the surface to maintain a head of grout above the pile. As the HPM is advanced, the grout is drawn down with the pile forming a continuous shaft. The grouted shafts typically have diameters on the order of 4 to 6 inches.

For this project, it is anticipated that a properly configured helical pile (length up to 32 ft) with a continuous shaft installed into the underlying medium dense Native Granular Soils could develop an allowable (working load) capacity up to 5 to 10 tons. We recommend the Geotechnical Specialty Contractor perform a pile load test(s) verifying the achieved working load and submit the results to the Owner's representative prior to installing production piles. In addition, we recommend the Contractor submit documentation verifying the as-built design capacity and depth of embedment of each pile immediately after it is installed to the Owners representative on-site.

For design purposes, total helical pile settlements are estimated to be less than 1 inch and the differential settlement will be considerably less and should pose no significant structural problems.

3.3 Site Preparation

If encountered, all old foundations (i.e., concrete slabs, walls, and footings) and any old sewage disposal system are unsuitable for foundation support and must be removed and then backfilled with compacted Granular Fill, crushed stone or combination thereof, as specified in Section 3.7, up to design grade. It is also recommended that existing foundations be removed beneath proposed utilities, exterior slabs, and pavement.

3.4 Groundwater Control During Construction

Groundwater was encountered in the test borings and varied from 8 to 20 feet below existing grade. However, it should be anticipated that groundwater control might be required at this Site during the excavation and backfilling operations. Groundwater infiltration into the excavation may be substantial during periods of heavy or prolonged rainfall and in the springtime of the year. Trapped groundwater in the on-site soil layers may be encountered in the excavation. Groundwater control may be accomplished with the use of sumps, ditches and pumps.

In all excavations where groundwater is encountered, it is essential that the foundation-bearing surface be protected against softening due to traffic of workmen and equipment. We recommend that groundwater be lowered a minimum of 2 feet below the bottom of the proposed excavation and that all bearing surfaces be protected against disturbance by placing a minimum 6 inch thick layer of ¾ Inch Minus Crushed Stone Fill. The stone layer should be compacted by making at least 6 passes with a hand operated vibratory plate compactor under the observation of a Geotechnical Engineer.

Surface drainage should be directed away from the excavation during construction so that the bearing surface does not become softened by water flow or puddling. This can be accomplished with proper grading or construction of small dikes at the edge of the excavation. The Site should be graded so that surface water will not accumulate, as soils will soften and lose strength.

3.5 Stability of Excavations

The Contractor is responsible for construction site safety and should be aware that slope height, slope inclination and excavation depths should in no case exceed those specified in local, state or federal safety regulations (i.e., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926) Soil stockpiles should be maintained at least 5 feet from the edge of excavations. A trench shield would be an appropriate excavation support tool to use on this project.

Design of temporary and permanent cut slopes should be in accordance with pertinent OSHA and local safety regulations. Excavations deeper than 5 feet require bracing, shoring or flattening of slopes. Permanent excavations (those planned to be left open more than one month) should be no steeper than 2.5 horizontal to 1 vertical in the overlying soils.

3.6 Excavations and Preparation of Bearing Surfaces

The Site overburden soils can be excavated by hydraulic backhoe or other conventional earth moving equipment based on the conditions encountered in our subsurface investigations.

Unstable areas, which may appear during compaction, should be excavated and replaced with ¾ Inch Minus Crushed Stone Fill, compacted Processed Gravel Fill, and/or compacted Granular Fill. Refer to Section 3.7 for ¾ Inch Minus Crushed Stone Fill gradation recommendations. If more than a 6 inch thickness of crushed stone is required to reach bottom of footing grade, the crushed stone should be completely wrapped in Mirafi 140N filter fabric, or equivalent, to mitigate migration of the fine soils into the voids of the crushed stone. Migration of fines could result in significant settlement of foundations. The crushed stone should be compacted by making at least 6 passes with a hand operated vibratory compactor under the observation of a Geotechnical Engineer.

3.7 Backfill and Compaction

Gradation of Granular Fill – Backfill beneath footings, slabs, and adjacent to walls should consist of compacted Granular Fill. This fill should consist of well graded natural sand and gravel, free from plastic fines, organic matter and deleterious material and should have the following gradation:

Gradation of Granular Fill

U.S. Sieve Size & Number	Percent Passing Maximum	Percent Passing Minimum
2 inch	---	100
1 inch	100	60
No. 4	85	25
No. 20	60	10
No. 50	35	4
No. 200	10	3

Processed Gravel Fill – This fill should consist of well-graded processed gravel and sand, free from plastic fines, organic matter and deleterious material and should have the following gradation:

U.S. Sieve Size & Number	Percent Passing Maximum	Percent Passing Minimum
3/4 inch	---	100
No. 4	85	40
No. 200	10	0

¾ Inch Minus Crushed Stone Fill – We recommend the following gradation:

U.S. Sieve Size & Number	Percent Passing Maximum	Percent Passing Minimum
1 inch	---	100
3/4 inch	100	90
1/2 inch	50	10
3/8 inch	20	---
No. 4	5	---

Within the areas excavated for footings, walls, and other limited areas where large compaction equipment cannot work, we recommend that the fill be placed in loose lifts no more than 4 inches in thickness and be compacted with hand manipulated machines such as pneumatic compactors, vibratory plate compactors, etc. In open areas where a 10-ton vibratory roller can be used, we recommend that the loose lift thickness not exceed 12 inches. Fill should be compacted within 2 percent of the optimum moisture content to a minimum of 95% of the maximum dry density as determined by the test designated ASTM D1557.

In soil load bearing areas, prior to placing any structural concrete or fill, the excavated surfaces should be cleaned of all loose or disturbed material. The resulting subgrade should then be proof-rolled with at least 6 passes each way using a vibratory compactor to minimize settlements of in-situ material locally disturbed during the excavation operations. A Geotechnical Engineer prior to placement of concrete or compacted fill should inspect all bearing surfaces.

3.8 Seismic Design

With regard to seismic design, the Site should be considered a Site Class D in accordance with Table 1613.2 of the 2015 International Building Code.

It is our opinion that the native soils encountered in the subsurface explorations that are directly beneath the proposed construction, as well as the compacted fill materials, will have sufficient density to preclude liquefaction or excessive dynamic settlement during the postulated seismic event.

It is our opinion that the native soils encountered in the test borings that are directly beneath the proposed construction, as well as the compacted fill materials, will have sufficient density to preclude liquefaction or excessive dynamic settlement during the postulated seismic event.

3.9 Suitability of On-Site Material for Fill

Only the on-site Sands (SP-SM) described in Section 2.2 without any deleterious and/or organic matter are suitable for re-use as compacted fill up to within 12 inches of the bottom of footings.

We do not recommend using the on-Site Silty Sand (SM) beneath structures, footings, and slabs because:

- they are very sensitive to disturbance due to changes in water content and construction traffic;
- they are frost susceptible, which means proper placement of these materials during freezing weather (winter conditions) will be difficult to achieve;
- they poorly drain beneath proposed pavement sections; and
- they are very difficult to work with during rainy weather and it may be necessary to dry out the near surface soils after a rainstorm by mixing and drying.

4.0 LIMITATIONS

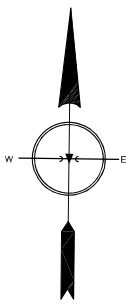
All the professional opinions presented in this report are based solely on the scope of work conducted and sources referred to in our report. The data presented by CHG in this report was collected and analyzed using generally accepted industry methods and practices at the time the report was generated. This report represents the conditions, locations, and materials that were observed at the time the fieldwork was conducted. No inferences regarding other conditions, locations, or materials, at a later time may be made based on the contents of the report. No other warranty, expressed or implied, is made.

This report was prepared for the sole use of our client. The use of this report by anyone other than our client or CHG is strictly prohibited without the express prior written consent of CHG. Portions of the report may not be used independently of the entire report.

The above recommendations and conclusions are based on our evaluation of the obtained data presented in the text. We would welcome the opportunity to monitor the pertinent phases of the foundation construction; thus, if differences are found between the field conditions described herein and those encountered during construction, we can modify our recommendations in a timely and professional manner.

ATTACHMENTS

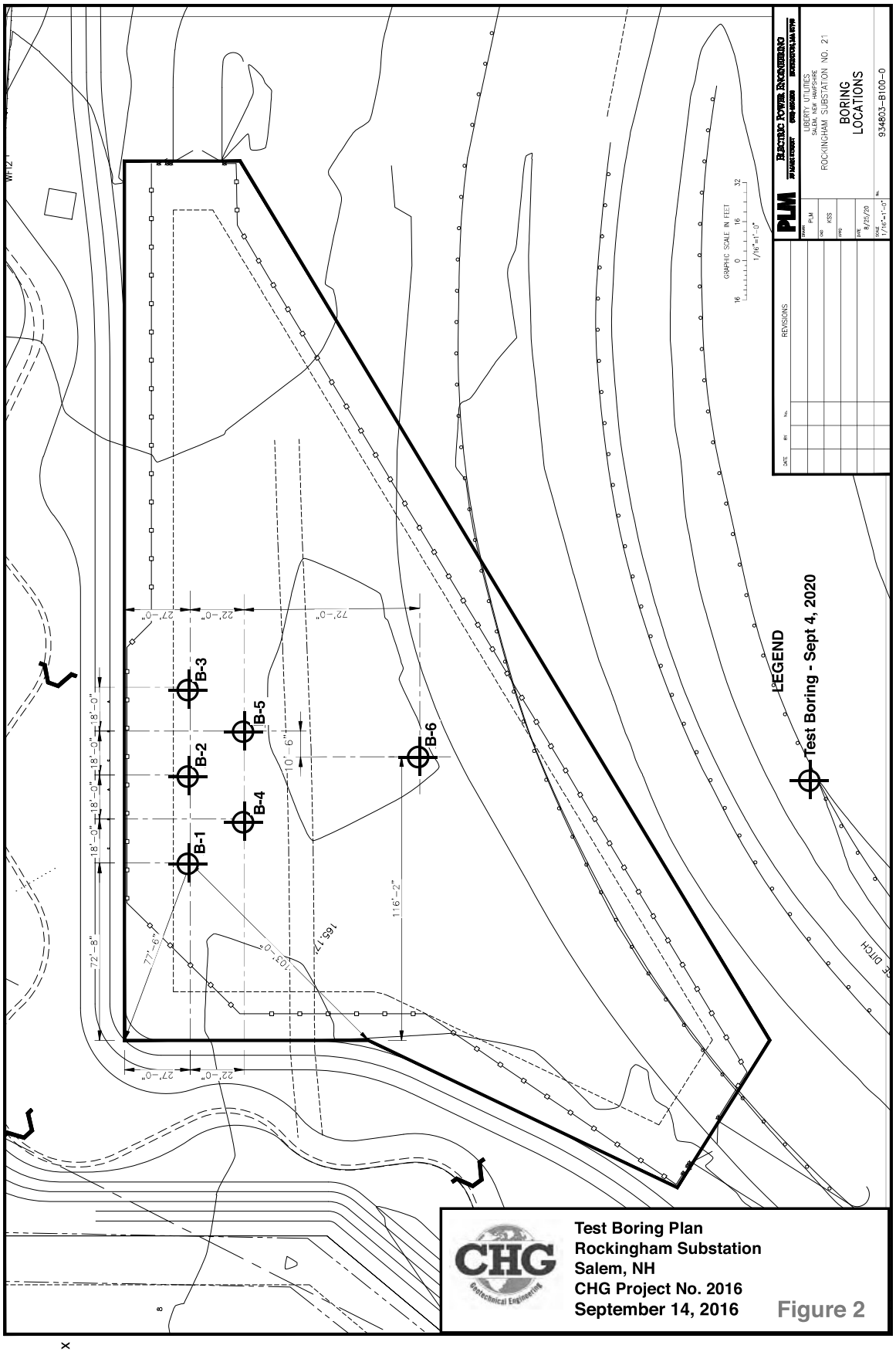
FIGURES



Locus Plan
Rockingham Substation
Salem, NH

Charles H. Gross, PE, LLC
23 Liberty Circle, Hanson, MA
Tel: 617-909-5180

Dr. By CHG	Scale: As Shown	Figure No. 1
Ck'd. By CHG	Date: 9/14/20	Project No. 2016


LEGEND
Test Boring - Sept 4, 2020
B-1
B-2
B-3
B-4
B-5
B-6
LIBERTY UTILITIES
SALEM, NEW HAMPSHIRE
ROCKINGHAM SUBSTATION NO. 21
BORING LOCATIONS
934803-B100-0
REVISIONS
GRAPHIC SCALE IN FEET
1/16"=1'-0"
Test Boring Plan
Rockingham Substation
Salem, NH
CHG Project No. 2016
September 14, 2016
Figure 2

APPENDIX A
TEST BORING LOGS

CHG Geotechnical Engineering	Project Name: **Rockingham Substation** Project Location: **Salem, New Hampshire** Project Number: **2016** Boring Contractor: **Soil X Corp**	Boring No. **B-1** Sheet 1 of 1 Location: See Figure 2 Approx. Elev.

Groundwater Observations				Casing	Sampler	Core	Date Start: 9/4/20
Date	Time	Depth	Type	Auger	Split Spoon		Date Finish: 9/4/20
9/4/20	Completion	10’	Size I.D.	4-¼”	1-3/8”		Driller: D. Ledger
			Hammer Wt.	Automatic Hammer			Inspector: C. Gross
			Hammer Fall				Rig Type: M0bile B-57

Depth	No.	Pen./Rec. (inches)	Sample Depth (feet)	Blows/6”	Sample Description
	S-1	24/22	0 - 2	7-15-14-10	**Fill: Silty Sand (SM):** c/f sand, 15-25% npf, light brown, dry.
	S-2	24/11	2 - 4	7-8-9-5	**Fill: Silty Sand (SM):** m/f sand, 12-20% npf, brown & dark brown, dry.
5’					5’
	S-3	24/23	5 - 7	8-10-14-16	**Sand (SP-SM):** fine sand, 5-12% npf, orange-brown, moist
	S-4	24/22	7 - 9	8-9-8-9	7’ **Silty Sand (SM):** fine sand, 12–20% npf, light brown, moist.
10’					9’
	S-5	24/19	10 - 12	2-4-5-6	**Sand (SP-SM):** fine sand, 5-12% npf, light brown, moist
					14’
15’	S-6	24/22	15 - 17	3-5-5-6	**Silty Sand (SM):** fine sand, 12–20% npf, brown, wet.
20’	S-7	24/12	20 - 22	2-3-3-4	**Silty Sand (SM):** fine sand, 12-20% npf, brown, wet.
					23’
25’	S-8	24/15	25 - 27	16-18-22-20	**Silty Sand (SM):** c/f sand, 5-12% fine gravel, 12-20% npf, gray-brown, wet
30’	S-9	24/20	30 - 32	12-14-19-14	**Silty Sand (SM):** c/f sand, 5-12% fine gravel, 20-30% npf, gray-brown, wet
					End of Boring @ 32’

Sample Types
S - split spoon
ST - shelby tube
AF - auger flight
RC - rock core
c/f means coarse to fine
m/f means medium to fine
npf means nonplastic fines

Notes:
1. Automatic hammer used for driving & split-spoon sampler

Granular Soils	
N-Value	Density
<4	very loose
5-10	loose
11-30	medium
31-50	dense
>50	very dense

Cohesive Soils	
N-Value	Consistency
<2	very soft
2-4	soft
5-8	medium
9-15	stiff
16-30	very stiff
>30	hard

CHG Geotechnical Engineering	Project Name: **Rockingham Substation** Project Location: **Salem, New Hampshire** Project Number: **2016** Boring Contractor: **Soil X Corp**	Boring No. **B-2** Sheet 1 of 1 Location: See Figure 2 Approx. Elev.

Groundwater Observations				Casing	Sampler	Core	
Date	Time	Depth	Type	Auger	Split Spoon		Date Start: 9/4/20
9/4/20	Completion	10’	Size I.D.	4-¼”	1-3/8”		Date Finish: 9/4/20
			Hammer Wt.	Automatic Hammer			Driller: D. Ledger
			Hammer Fall				Inspector: C. Gross
							Rig Type: M0bile B-57

Depth	No.	Pen./Rec. (inches)	Sample Depth (feet)	Blows/6”	Sample Description
	S-1	24/20	0 - 2	10-16-10-9	**Fill: Gravelly Sand (SP-SM):** c/f sand, 5-15% fine gravel, 5-12% npf, brown, dry.
	S-2	24/19	2 - 4	5-6-5-5	**Fill: Silty Sand (SM):** fine sand, 12-20% npf, light brown, dry.
5’					5’
	S-3	24/22	5 - 7	6-8-14-10	**Sand (SP-SM):** fine sand, 5-12% npf, orange-brown, dry
	S-4	24/17	7 - 9	10-14-16-10	**Sand (SP-SM):** fine sand, 5-12% npf, orange-brown, dry
					9’
10’	S-5	24/18	10 - 12	3-3-2-3	**Sand (SP-SM):** fine sand, 5-12% npf, light brown, wet
					14’
15’	S-6	24/20	15 - 17	4-7-7-7	**Silty Sand (SM):** fine sand, 12–20% npf, light brown, wet.
					19’
20’	S-7	24/12	20 - 22	2-3-3-4	**Silty Sand (SM):** fine sand, 12-20% npf, light brown, wet.
					24’
25’	S-8	24/19	25 - 27	8-7-10-12	**Silty Sand (SM):** c/f sand, 5-12% fine gravel, 15-25% npf, light brown, wet
					28’
30’	S-9	7/7	30 - 30.7	37-100/1”	**Gravelly Sand (SP-SM):** c/f sand, 10-15% fine gravel, 5-12% npf, gray-brown, wet
					End of Boring @ 30.7’

Sample Types
S - split spoon
ST - shelby tube
AF - auger flight
RC - rock core
c/f means coarse to fine
m/f means medium to fine
npf means nonplastic fines

Notes:
1. Automatic hammer used for driving & split-spoon sampler

Granular Soils	
N-Value	Density
<4	very loose
5-10	loose
11-30	medium
31-50	dense
>50	very dense

Cohesive Soils	
N-Value	Consistency
<2	very soft
2-4	soft
5-8	medium
9-15	stiff
16-30	very stiff
>30	hard

CHG Geotechnical Engineering	Project Name: **Rockingham Substation** Project Location: **Salem, New Hampshire** Project Number: **2016** Boring Contractor: **Soil X Corp**	Boring No. **B-3** Sheet 1 of 1 Location: See Figure 2 Approx. Elev.

Groundwater Observations				Casing	Sampler	Core	Date Start: 9/4/20
Date	Time	Depth	Type	Auger	Split Spoon		Date Finish: 9/4/20
9/4/20	Completion	10’	Size I.D.	4-¼”	1-3/8”		Driller: D. Ledger
			Hammer Wt.	Automatic Hammer			Inspector: C. Gross
			Hammer Fall				Rig Type: M0bile B-57

Depth	No.	Pen./Rec. (inches)	Sample Depth (feet)	Blows/6”	Sample Description
	S-1	24/20	0 - 2	10-15-8-7	**Grass overlying Fill: Gravelly Sand (SP-SM):** c/f sand, 5-15% fine gravel, 5-12% npf, brown, dry.
	S-2	24/2	2 - 4	8-8-10-8	**Fill: Silty Sand (SM):** fine sand, 12-20% npf, light brown, dry.
5’					5’
	S-3	24/18	5 - 7	5-8-8-9	**Sand (SP-SM):** fine sand, 5-12% npf, light brown, dry
	S-4	24/22	7 - 9	8-9-8-9	**Sand (SP-SM):** fine sand, 5-12% npf, light brown, moist
					9’
10’	S-5	24/20	10 - 12	4-4-5-5	**Sand (SP-SM):** fine sand, 5-12% npf, light brown, wet
					14’
15’	S-6	24/19	15 - 17	5-7-8-10	**Silty Sand (SM):** fine sand, 12–20% npf, light brown, wet.
20’	S-7	24/19	20 - 22	5-5-5-5	**Silty Sand (SM):** fine sand, 20-30% npf, light brown, wet.
					24’
25’	S-8	24/6	25 - 27	10-5-6-5	**Sand (SP-SM):** c/f sand, 5-10% fine gravel, 5-12% npf, brown, wet
					28’
30’	S-9	14/10	30 - 31.2	30-31-100/2”	**Silty Sand (SM):** c/f sand, 10-15% fine gravel, 15-25% npf, gray-brown, wet
					End of Boring @ 31.2’

Sample Types
S - split spoon
ST - shelby tube
AF - auger flight
RC - rock core
c/f means coarse to fine
m/f means medium to fine
npf means nonplastic fines

Notes:
1. Automatic hammer used for driving & split-spoon sampler

Granular Soils	
N-Value	Density
<4	very loose
5-10	loose
11-30	medium
31-50	dense
>50	very dense

Cohesive Soils	
N-Value	Consistency
<2	very soft
2-4	soft
5-8	medium
9-15	stiff
16-30	very stiff
>30	hard

CHG Geotechnical Engineering	Project Name: **Rockingham Substation** Project Location: **Salem, New Hampshire** Project Number: **2016** Boring Contractor: **Soil X Corp**	Boring No. **B-4** Sheet 1 of 1 Location: See Figure 2 Approx. Elev.

Groundwater Observations				Casing	Sampler	Core	
Date	Time	Depth	Type	Auger	Split Spoon		Date Start: 9/4/20
9/4/20	Completion	9’	Size I.D.	4-¼”	1-3/8”		Date Finish: 9/4/20
			Hammer Wt.	Automatic Hammer			Driller: P. Goodale
			Hammer Fall				Inspector: C. Gross
							Rig Type: CME-75 ATV

Depth	No.	Pen./Rec. (inches)	Sample Depth (feet)	Blows/6”	Sample Description
	S-1	24/21	0 - 2	8-12-15-10	**Fill: Silty Sand (SM):** c/f sand, 12-20% npf, light brown, dry.
	S-2	24/18	2 - 4	6-5-5-4	**Fill: Silty Sand (SM):** m/f sand, 12-20% npf, brown, dry.
5’					5’
	S-3	24/21	5 - 7	15-28-31-38	**Sand (SP-SM):** fine sand, 5-12% npf, light brown, moist
	S-4	24/18	7 - 9	18-22-19-24	**Sand (SP-SM):** fine sand, 5-12% npf, light brown, moist
					9’
10’	S-5	24/21	10 - 12	3-4-5-4	**Silty Sand (SM):** fine sand, 12–20% npf, brown, wet.
15’	S-6	24/21	15 - 17	5-5-6-7	**Silty Sand (SM):** fine sand, 12–20% npf, brown, wet.
					19’
20’	S-7	24/21	20 - 22	5-7-8-9	**Silty Sand (SM):** c/f sand, 5-12% fine gravel, 12-20% npf, gray-brown, wet.
25’	S-8	24/18	25 - 27	8-7-9-13	**Silty Sand (SM):** c/f sand, 5-12% fine gravel, 12-20% npf, gray-brown, wet
30’	S-9	24/12	30 - 31.2	9-12-100/2”	**Silty Sand (SM):** c/f sand, 5-12% fine gravel, 12-20% npf, gray-brown, wet
					End of Boring @ 31.2’

Sample Types
S - split spoon
ST - shelby tube
AF - auger flight
RC - rock core
c/f means coarse to fine
m/f means medium to fine
npf means nonplastic fines

Notes:
1. Automatic hammer used for driving & split-spoon sampler and casing.

Granular Soils

N-Value	Density
<4	very loose
5-10	loose
11-30	medium
31-50	dense
>50	very dense

Cohesive Soils

N-Value	Consistency
<2	very soft
2-4	soft
5-8	medium
9-15	stiff
16-30	very stiff
>30	hard

CHG Geotechnical Engineering	Project Name: **Rockingham Substation** Project Location: **Salem, New Hampshire** Project Number: **2016** Boring Contractor: **Soil X Corp**	Boring No. **B-5** Sheet 1 of 1 Location: See Figure 2 Approx. Elev.

Groundwater Observations				Casing	Sampler	Core	
Date	Time	Depth	Type	Auger	Split Spoon		Date Start: 9/4/20
9/4/20	Completion	9’	Size I.D.	4-¼”	1-3/8”		Date Finish: 9/4/20
			Hammer Wt.	Automatic Hammer			Driller: P. Goodale
			Hammer Fall				Inspector: C. Gross
							Rig Type: CME-75 ATV

Depth	No.	Pen./Rec. (inches)	Sample Depth (feet)	Blows/6”	Sample Description
	S-1	24/12	0 - 2	8-11-13-10	**Fill: Silty Sand (SM):** m/f sand, 12-20% npf, brown, moist.
	S-2	24/15	2 - 4	9-10-10-8	**Fill: Silty Sand (SM):** m/f sand, 5-15% fine gravel, 12-20% npf, brown, moist.
5’					5’
	S-3	24/15	5 - 7	3-5-4-5	**Sand (SP-SM):** fine sand, 5-12% npf, light brown, moist
	S-4	24/18	7 - 9	8-9-9-11	**Sand (SP-SM):** fine sand, 5-12% npf, light brown, moist
					9’
10’	S-5	24/21	10 - 12	3-4-5-4	**Silty Sand (SM):** fine sand, 12–20% npf, brown, wet.
15’	S-6	24/21	15 - 17	4-5-5-6	**Silty Sand (SM):** fine sand, 12–20% npf, brown, wet.
20’	S-7	24/18	20 - 22	4-5-5-4	**Silty Sand (SM):** fine sand, 12-20% npf, brown, wet.
					24’
25’	S-8	24/21	25 - 27	7-8-8-13	**Silty Sand (SM):** c/f sand, 5-12% fine gravel, 12-20% npf, gray, wet
30’	S-9	24/21	30 - 32	6-7-8-22	**Silty Sand (SM):** c/f sand, 5-12% fine gravel, 12-20% npf, gray, wet
					End of Boring @ 32’

Sample Types
S - split spoon
ST - shelby tube
AF - auger flight
RC - rock core
c/f means coarse to fine
m/f means medium to fine
npf means nonplastic fines

Notes:
1. Automatic hammer used for driving & split-spoon sampler

Granular Soils	
N-Value	Density
<4	very loose
5-10	loose
11-30	medium
31-50	dense
>50	very dense

Cohesive Soils	
N-Value	Consistency
<2	very soft
2-4	soft
5-8	medium
9-15	stiff
16-30	very stiff
>30	hard

CHG Geotechnical Engineering	Project Name: **Rockingham Substation** Project Location: **Salem, New Hampshire** Project Number: **2016** Boring Contractor: **Soil X Corp**	Boring No. **B-6** Sheet 1 of 1 Location: See Figure 2 Approx. Elev.

Groundwater Observations				Casing	Sampler	Core	
Date	Time	Depth	Type	Auger	Split Spoon		Date Start: 9/4/20
9/4/20	Completion	8’	Size I.D.	4-¼”	1-3/8”		Date Finish: 9/4/20
			Hammer Wt.	Automatic Hammer			Driller: P. Goodale
			Hammer Fall				Inspector: C. Gross
							Rig Type: CME-75 ATV

Depth	No.	Pen./Rec. (inches)	Sample Depth (feet)	Blows/6”	Sample Description
	S-1	24/9	0 - 2	6-7-9-5	**Fill: Silty Sand (SM):** c/f sand, 5-15% m/f gravel, 12-20% npf, black, moist.
	S-2	24/12	2 - 4	13-21-17-17	**Fill: Silty Sand (SM):** m/f sand, 5-15% fine gravel, 12-20% npf, black & light brown, moist. 5’
5’	S-3	24/18	5 - 7	1-1-1-2	**Peat (PT):** fibrous, black and brown, wet
	S-4	24/18	7 - 9	1-2-10-13	8’
10’	S-5	24/18	10 - 12	6-7-6-2	**Silty Sand (SM):** m/f fine sand, <5% fine gravel, 12–20% npf, brown, wet. 11.5’
					Sandy Silt (ML): slightly plastic, 20–30% very fine sand, gray-brown, wet. 13.5’
15’	S-6	24/18	15 - 17	6-6-7-11	**Silty Sand (SM):** c/f sand, 15–25% npf, brown, wet. 19’
20’	S-7	24/21	20 - 22	5-6-7-9	**Silty Sand (SM):** fine sand, 15-25% npf, brown, wet. 24’
25’	S-8	24/15	25 - 27	5-7-7-13	**Gravelly Sand:** c/f sand, 10-15 fine gravel, 5-12% npf, gray, wet
30’					**Auger Refusal @ 29’** **End of Boring @ 29’**

Sample Types
S - split spoon
ST - shelby tube
AF - auger flight
RC - rock core
c/f means coarse to fine
m/f means medium to fine
npf means nonplastic fines

Notes:
1. Automatic hammer used for driving & split-spoon sampler

Granular Soils	
N-Value	Density
<4	very loose
5-10	loose
11-30	medium
31-50	dense
>50	very dense

Cohesive Soils	
N-Value	Consistency
<2	very soft
2-4	soft
5-8	medium
9-15	stiff
16-30	very stiff
>30	hard

INDEX TO DRAWINGS

1. TITLE SHEET
2. EXISTING CONDITIONS PLAN
3. OVERVIEW PLAN
4. SITE PLAN
5. SITE SECTION
6. GRADING PLAN
7. STORMWATER MANAGEMENT PLAN
8. CONSTRUCTION DETAILS
   LANDSCAPE PLAN (BY OTHERS)

ABUTTERS

MAP/LOT #	NAME & ADDRESS	MAP/LOT #	NAME & ADDRESS
98/12502	DEMOULAS SUPER MARKETS, INC. 875 EAST STREET TEWKSBURY, MA 01876	116/11150	MAY DEPARTMENT STORES COMPANY PROPERTY TAX DEPARTMENT 7 WEST 7TH STREET CINCINNATI, OH 45202
98/12543	TUSCAN VILLAGE RESIDENTIAL HOLDINGS, LLC 150 PRESIDENTIAL WAY, SUITE 200 WOBURN, MA 01801	117/7885	STATE OF NEW HAMPSHIRE P.O. BOX 483 CONCORD, NH 03301
98/11084 116/7884 116/11167	ROCKSAL MALL LLC C/O SIMON PROPERTY GROUP P.O. BOX 6120 INDIANAPOLIS, IN 46207	117/7880	ROCKINGHAM 620, INC. C/O KIMCO REALTY CORPORATION 3333 NEW HYDE PARK ROAD #100 NEW HYDE PARK, NY 11042
107/11154 107/11153	SERITAGE SRC FINANCE LLC 3333 BEVERLY ROAD HOFFMAN ESTATES, IL 60179	99/12507	DILORENZO LFAYETTE LEDGEWOOD REAL ESTATE, LLC C/O ANTHONY DILORENZO, MANAGER 549 US HIGHWAY 1 BYPASS PORTSMOUTH, NH 03801
116/11152	JC PENNEY PROPERTIES INC. PROPERTY TAX OFFICE P.O. BOX 10001 DALLAS, TX 75301	151/12213	STATE OF NHDOT JOHN O'MORTON BUILDING ONE HAZEN DRIVE CONCORD, NH 03302

PERMITS & APPROVALS

TYPE	PERMIT NUMBER	APPROVED
NHDES ALTERATION OF TERRAIN	AOT-1463	7/26/2018

SALEM PLANNING BOARD

1) ON JUNE 12, 2018 THE SALEM PLANNING BOARD VOTED TO GRANT A CONDITIONAL USE PERMIT TO ALLOW AN ELECTRIC SUBSTATION ON MAP 99, LOT 12572, A USE NOT ALLOWED IN THE COMMERCIAL-INDUSTRIAL C DISTRICT.

2) ON JULY 25, 2018 THE SALEM PLANNING BOARD VOTED TO APPROVE THIS SITE PLAN SUBJECT TO THE FOLLOWING CONDITIONS:

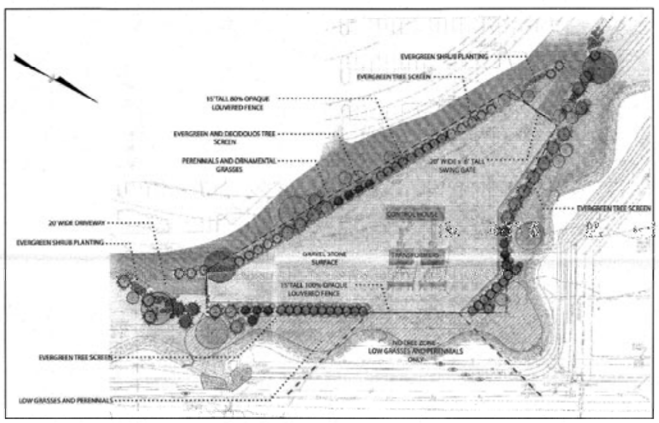
PRIOR TO BUILDING PERMIT:
1. NOTE CONDITIONAL USE PERMIT ON PLAN;
2. PAY FOR OUTSIDE INSPECTIONS PER DIRECTION OF ENGINEERING DIVISION;
3. SUBMIT STATE ALTERATION OF TERRAIN PERMIT;
4. SUBMIT RECORDED ACCESS EASEMENT;
5. ADD SHRUB PLANTINGS IN NO TREE ZONE;
6. ADD IRRIGATION SYSTEM;

PRIOR TO OCCUPANCY:
7. CONSTRUCT ALL SITE IMPROVEMENTS (INCLUDING SITE GRADING, UTILITIES, DRAINAGE, LANDSCAPING) IN ACCORDANCE WITH APPROVED PLAN;
8. PROVIDE CERTIFIED AS-BUILT PLAN;

OTHER:
9. ALL REPRESENTATIONS MADE BY APPLICANT OR AGENTS AND ALL NOTES ON PLANS ARE INCORPORATED AS PART OF APPROVAL.

PROPOSED ELECTRIC SUBSTATION
SALEM PROPERTY MAP 99 LOT 12572
64 SOUTH BROADWAY
SALEM, NEW HAMPSHIRE

LOCATION MAP
(NOT TO SCALE)



Prepared for:

LIBERTY UTILITIES CORP.
15 BUTTRICK ROAD
LONDONDERRY, NEW HAMPSHIRE 03053

NO.	DESCRIPTION	BY	DATE
5	UPDATE OWNER	DRJ	3/12/20
4	REVISE LANDSCAPE PLAN	DRJ	2/24/20
3	ADD PLANNING BOARD AND AOT APPROVAL	DRJ	2/5/20
2	REVISED SHEET 2, 5-8	DRJ	6/29/18
1	REVISED SHEET 8	NID	6/6/18

REVISIONS

TITLE SHEET

PREPARED FOR:
LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP.
15 BUTTRICK ROAD
LONDONDERRY, NEW HAMPSHIRE 03053
SALEM PROPERTY MAP 99 - LOT 12572
PROPERTY ADDRESS - 64 SOUTH BROADWAY

GPI Engineering Design Planning Construction Management
603.893.0720 GPINET.COM
Greenman-Pedersen, Inc.
44 Stiles Road
Suite One
Salem, NH 03079

SCALE: NONE
DATE: MAY 25, 2018

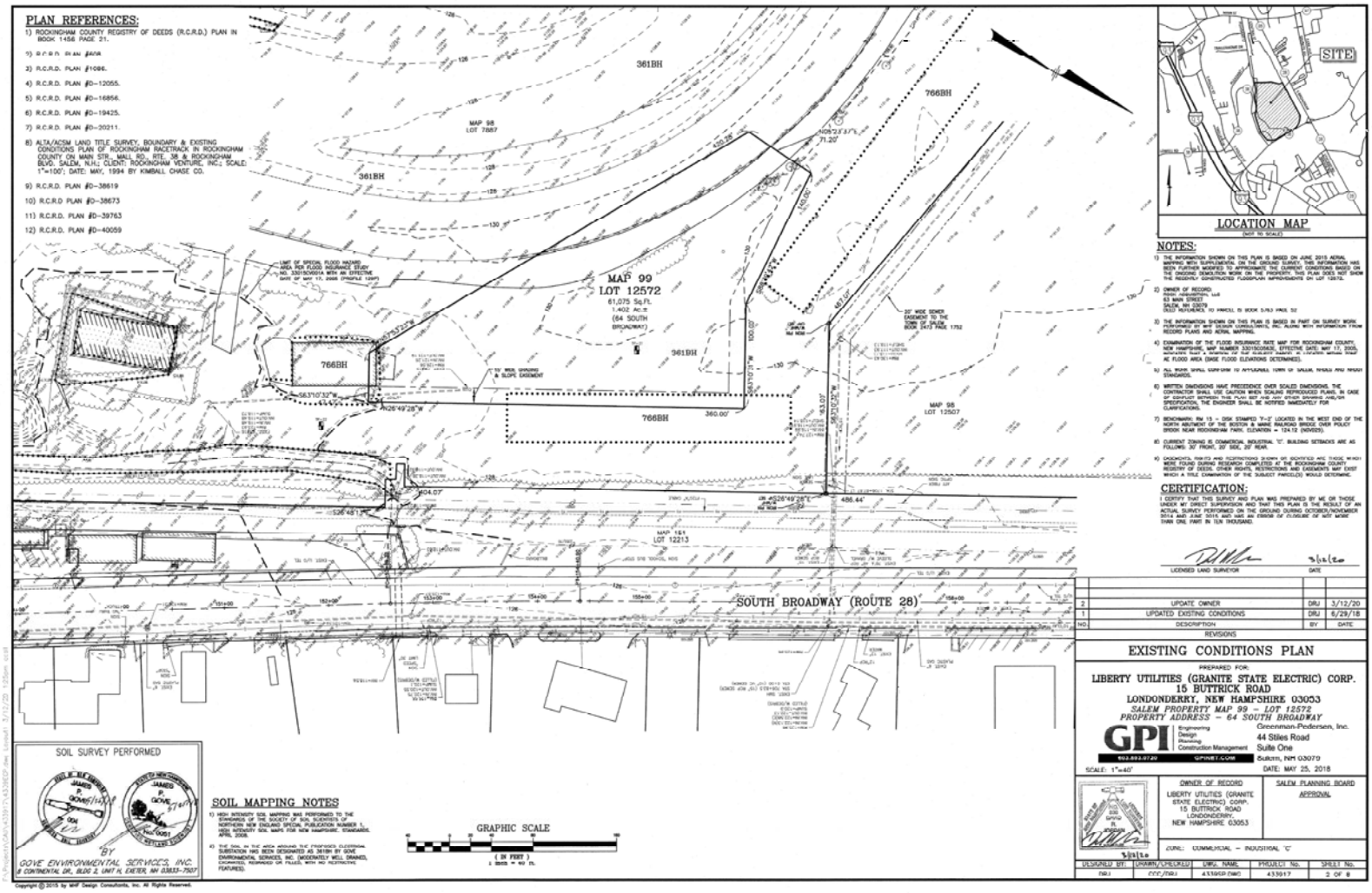
STATE OF NEW HAMPSHIRE DAVID R. JORDAN No. 7370
3/12/20

OWNER OF RECORD
LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP.
15 BUTTRICK ROAD
LONDONDERRY, NEW HAMPSHIRE 03053

SALEM PLANNING BOARD APPROVAL
Approved 7/24/18

ZONE: COMMERCIAL - INDUSTRIAL 'C'

DESIGNED BY:	DRAWN/CHECKED	DWG. NAME	PROJECT No.	SHEET No.
DRJ	CCC/DRJ	4339SP.DWG	433917	1 OF 8


PLAN REFERENCES:
1) ROCKINGHAM COUNTY REGISTRY OF DEEDS (R.C.R.D.) PLAN IN BOOK 1456 PAGE 21.
2) R.C.R.D. PLAN #1086.
3) R.C.R.D. PLAN #D-12055.
4) R.C.R.D. PLAN #D-16856.
5) R.C.R.D. PLAN #D-19425.
6) R.C.R.D. PLAN #D-20211.
7) ALTA/ACSM LAND TITLE SURVEY, BOUNDARY & EXISTING CONDITIONS PLAN OF ROCKINGHAM RACETRACK IN ROCKINGHAM COUNTY ON MAIN STR., MALL RD., RTE. 38 & ROCKINGHAM BLVD. SALEM, N.H.; CLIENT: ROCKINGHAM VENTURE, INC.; SCALE: 1"=100'; DATE: MAY, 1994 BY KIMBALL CHASE CO.
8) R.C.R.D. PLAN #D-38619
9) R.C.R.D PLAN #D-38675
10) R.C.R.D. PLAN #D-39763
11) R.C.R.D. PLAN #D-40059
MAP 99
LOT 12572
61,075 Sq.Ft.
1.402 Ac.±
(64 SOUTH BROADWAY)
MAP 98
LOT 7887
MAP 98
LOT 12507
MAP 151
LOT 12213
361BH
766BH
SOUTH BROADWAY (ROUTE 28)
SITE
LOCATION MAP
NOTES:
CERTIFICATION:
LICENSED LAND SURVEYOR
DATE
REVISIONS
2 UPDATE OWNER DRJ 3/12/20
1 UPDATED EXISTING CONDITIONS DRJ 6/29/18
NO. DESCRIPTION BY DATE
EXISTING CONDITIONS PLAN
PREPARED FOR:
LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP.
15 BUTTRICK ROAD
LONDONDERRY, NEW HAMPSHIRE 03053
SALEM PROPERTY MAP 99 – LOT 12572
PROPERTY ADDRESS – 64 SOUTH BROADWAY
Greenman-Pedersen, Inc.
44 Stiles Road
Suite One
Salem, NH 03079
SCALE: 1"=40'
DATE: MAY 25, 2018
OWNER OF RECORD
LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP.
15 BUTTRICK ROAD
LONDONDERRY, NEW HAMPSHIRE 03053
SALEM PLANNING BOARD
APPROVAL
ZONE: COMMERCIAL – INDUSTRIAL 'C'
DESIGNED BY: DRJ
DRAWN/CHECKED: CCC/DRJ
DWG. NAME: 433969-DWG
PROJECT No.: 433917
SHEET No.: 2 OF 8
SOIL SURVEY PERFORMED
JAMES P. GOVE
SOIL SCIENTIST
GOVE ENVIRONMENTAL SERVICES, INC.
8 CONTINENTAL DR., BLDG 2, UNIT H, EXETER, NH 03833-7507
SOIL MAPPING NOTES
1) HIGH INTENSITY SOIL MAPPING WAS PERFORMED TO THE STANDARDS OF THE SOCIETY OF SOIL SCIENTISTS OF NORTHERN NEW ENGLAND SPECIAL PUBLICATION NUMBER 1, HIGH INTENSITY SOIL MAPS FOR NEW HAMPSHIRE STANDARDS, APRIL 2006.
2) THE SOIL IN THE AREA AROUND THE PROPOSED ELECTRICAL SUBSTATION HAS BEEN DESIGNATED AS 361BH BY GOVE ENVIRONMENTAL SERVICES, INC. (MODERATELY WELL DRAINED, CHOWANSED, REDHOOKED OR FILLED, WITH NO RESTRICTIVE FEATURES).
GRAPHIC SCALE
(IN FEET)
1 INCH = 40 FT.
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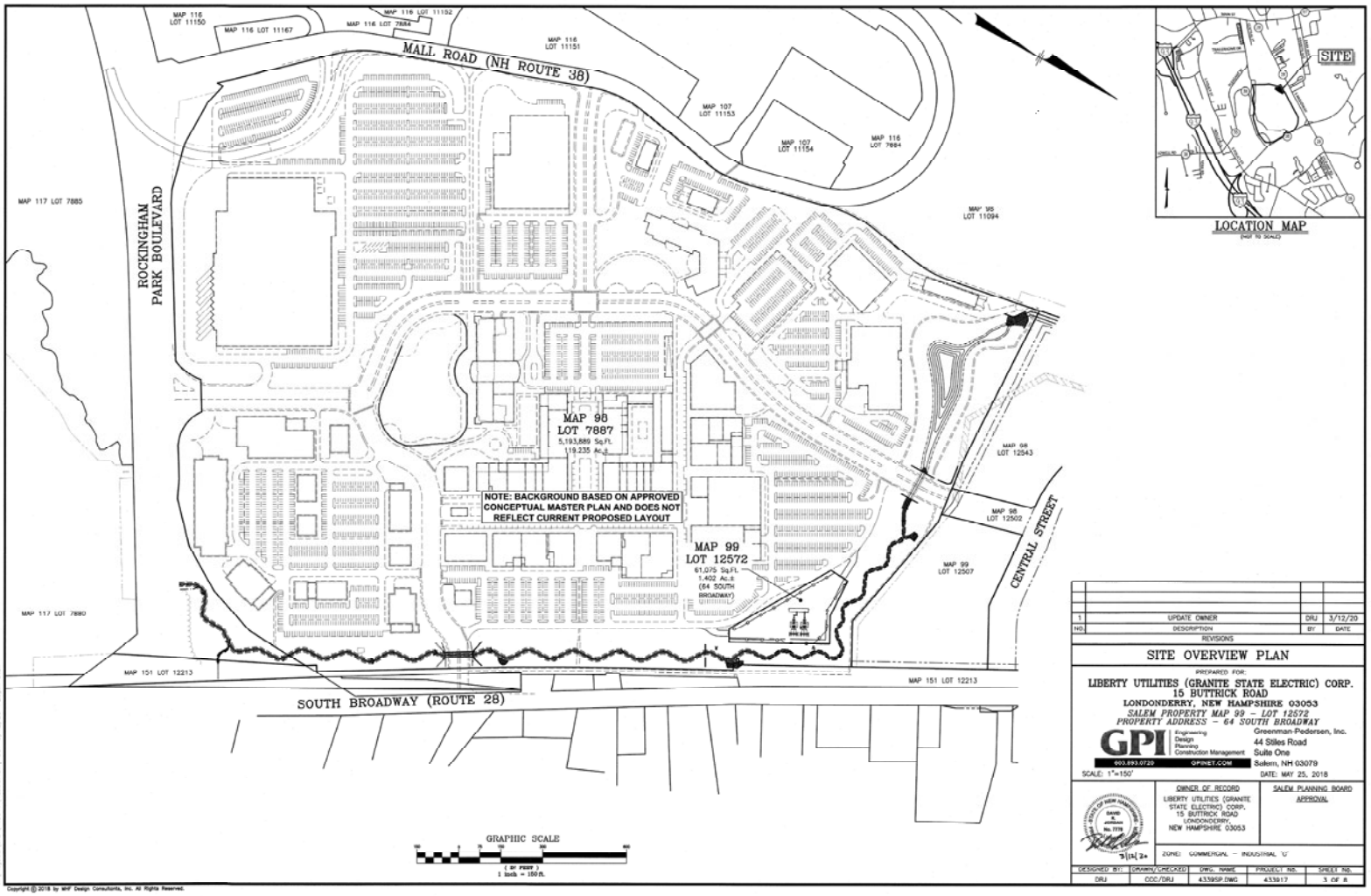


NO.	DESCRIPTION	BY	DATE
	REVISIONS		
1	UPDATE OWNER	DRJ	3/12/20

SITE OVERVIEW PLAN

PREPARED FOR:
LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP.
15 BUTTRICK ROAD
LONDONDERRY, NEW HAMPSHIRE 03053
SALEM PROPERTY MAP 99 – LOT 12572
PROPERTY ADDRESS – 64 SOUTH BROADWAY

GPI Engineering Design Planning Construction Management
603.893.0720 GPINET.COM
Greenman-Pedersen, Inc.
44 Stiles Road
Suite One
Salem, NH 03079

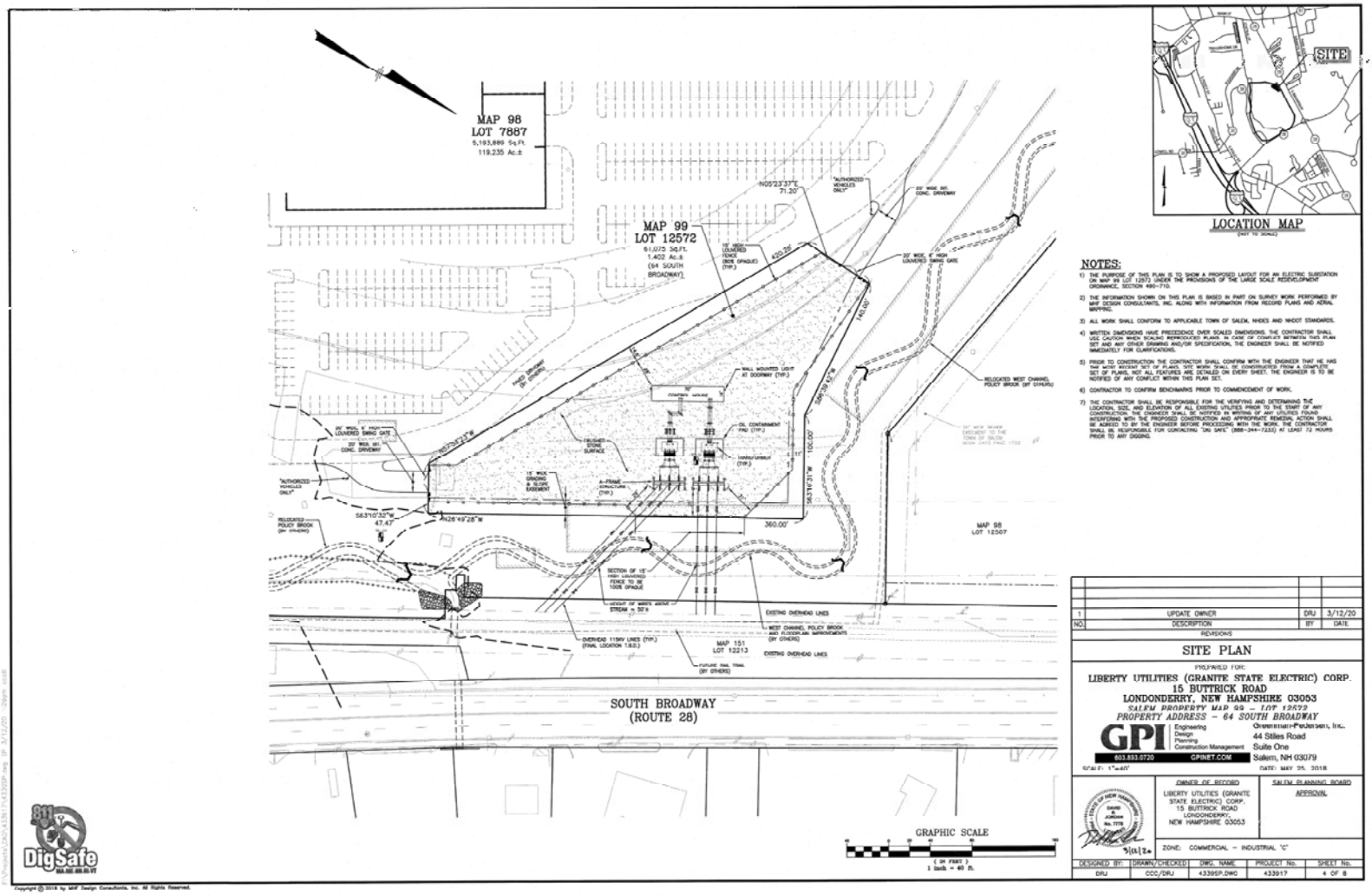
SCALE: 1"=150' DATE: MAY 25, 2018

OWNER OF RECORD
LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP.
15 BUTTRICK ROAD
LONDONDERRY
NEW HAMPSHIRE 03053

SALEM PLANNING BOARD APPROVAL

ZONE: COMMERCIAL – INDUSTRIAL 'C'

DESIGNED BY:	DRAWN/CHECKED	DWG. NAME	PROJECT NO.	SHEET NO.
DRJ	CDC/DRJ	4339SP.DWG	4339.17	3 OF 8



NOTES:

1) THE PURPOSE OF THIS PLAN IS TO SHOW A PROPOSED LAYOUT FOR AN ELECTRIC SUBSTATION ON MAP 99 LOT 12572 UNDER THE PROVISIONS OF THE LARGE SCALE REDEVELOPMENT ORDINANCE, SECTION 490-710.
2) THE INFORMATION SHOWN ON THIS PLAN IS BASED IN PART ON SURVEY WORK PERFORMED BY MHF DESIGN CONSULTANTS, INC. ALONG WITH INFORMATION FROM RECORD PLANS AND AERIAL MAPPING.
3) ALL WORK SHALL CONFORM TO APPLICABLE TOWN OF SALEM, NHDES AND NHDOT STANDARDS.
4) WRITTEN DIMENSIONS HAVE PRECEDENCE OVER SCALED DIMENSIONS. THE CONTRACTOR SHALL USE CAUTION WHEN SCALING REPRODUCED PLANS. IN CASE OF CONFLICT BETWEEN THIS PLAN SET AND ANY OTHER DRAWING AND/OR SPECIFICATION, THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY FOR CLARIFICATIONS.
5) PRIOR TO CONSTRUCTION THE CONTRACTOR SHALL CONFIRM WITH THE ENGINEER THAT HE HAS THE MOST RECENT SET OF PLANS. SITE WORK SHALL BE CONSTRUCTED FROM A COMPLETE SET OF PLANS, NOT ALL FEATURES ARE DETAILED ON EVERY SHEET. THE ENGINEER IS TO BE NOTIFIED OF ANY CONFLICT WITHIN THIS PLAN SET.
6) CONTRACTOR TO CONFIRM BENCHMARKS PRIOR TO COMMENCEMENT OF WORK.
7) THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE VERIFYING AND DETERMINING THE LOCATION, SIZE, AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO THE START OF ANY CONSTRUCTION. THE ENGINEER SHALL BE NOTIFIED IN WRITING OF ANY UTILITIES FOUND INTERFERING WITH THE PROPOSED CONSTRUCTION AND APPROPRIATE REMEDIAL ACTION SHALL BE AGREED TO BY THE ENGINEER BEFORE PROCEEDING WITH THE WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING "DIG SAFE" (888-344-7233) AT LEAST 72 HOURS PRIOR TO ANY DIGGING.

NO.	DESCRIPTION	BY	DATE
	REVISIONS		
1	UPDATE OWNER	DRJ	3/12/20

SITE PLAN

PREPARED FOR:
LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP.
15 BUTTRICK ROAD
LONDONDERRY, NEW HAMPSHIRE 03053
SALEM PROPERTY MAP 99 – LOT 12572
PROPERTY ADDRESS – 64 SOUTH BROADWAY

GPI
Engineering
Design
Planning
Construction Management
603.893.0720 GPINET.COM
Gorrman-Poirier, Inc.
44 Stiles Road
Suite One
Salem, NH 03079

SCALE: 1"=40' DATE: MAY 25, 2018

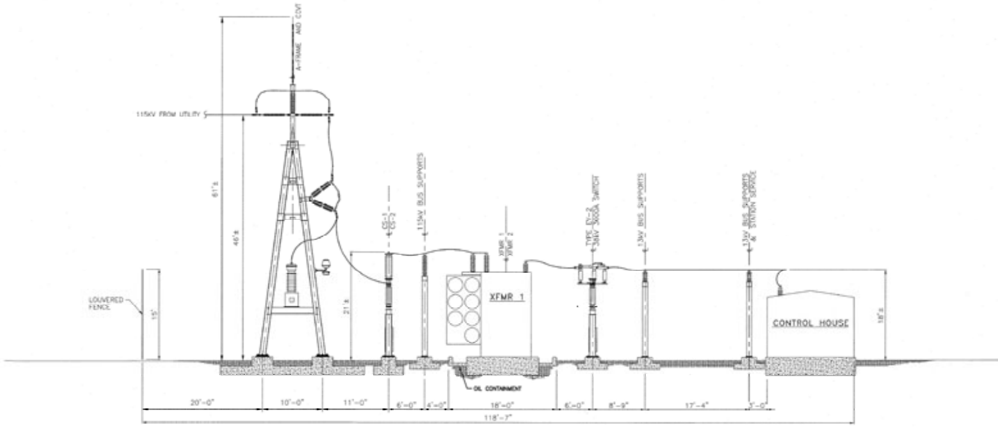
DAVID A. JOHNSON No. 7776 — 5/11/20

OWNER OF RECORD
LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP.
15 BUTTRICK ROAD
LONDONDERRY, NEW HAMPSHIRE 03053

SALEM PLANNING BOARD APPROVAL

ZONE: COMMERCIAL – INDUSTRIAL "C"

DESIGNED BY:	DRAWN/CHECKED	DWG. NAME	PROJECT No.	SHEET No.
DRJ	CCC/DRJ	43395P.DWG	43317	4 OF 8



SECTION A
SIDE ELEVATION
SK-17128-XX

NO.	DESCRIPTION	BY	DATE
2	UPDATE OWNER	DRJ	3/12/20
1	UPDATE DIMENSIONS	DRJ	6/29/18

REVISIONS

SITE SECTION

PREPARED FOR:
LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP.
15 BUTTRICK ROAD
LONDONDERRY, NEW HAMPSHIRE 03053
SALEM PROPERTY MAP 99 – LOT 12572
PROPERTY ADDRESS – 64 SOUTH BROADWAY

GPI Engineering Design Planning Construction Management
603.893.0720 GPINET.COM
Greenman-Pedersen, Inc.
44 Stiles Road
Suite One
Salem, NH 03079

NOT TO SCALE
DATE: MARCH 25, 2018

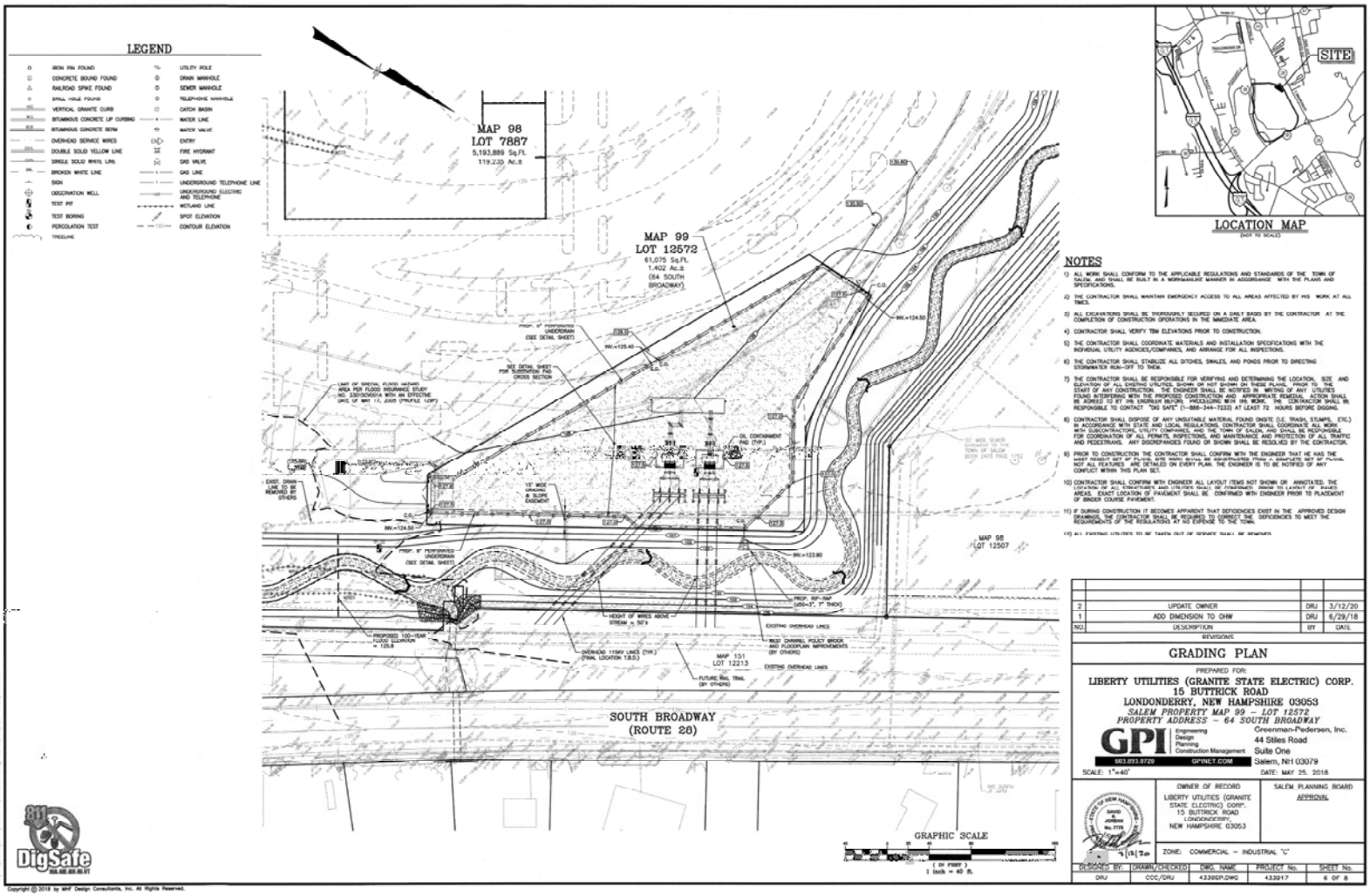
OWNER OF RECORD
LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP.
15 BUTTRICK ROAD
LONDONDERRY,
NEW HAMPSHIRE 03053

SALEM PLANNING BOARD APPROVAL

STATE OF NEW HAMPSHIRE DAVID R. JORDAN No. 7779
3/12/20

ZONE: COMMERCIAL – INDUSTRIAL "C"

DESIGNED BY:	DRAWN/CHECKED	DWG. NAME	PROJECT No.	SHEET No.
DRJ	CCC/DRJ	4339ELEV.DWG	433917	5 OF 8



NOTES

1) ALL WORK SHALL CONFORM TO THE APPLICABLE REGULATIONS AND STANDARDS OF THE TOWN OF SALEM, AND SHALL BE BUILT IN A WORKMANLIKE MANNER IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS.

2) THE CONTRACTOR SHALL MAINTAIN EMERGENCY ACCESS TO ALL AREAS AFFECTED BY HIS WORK AT ALL TIMES.

3) ALL EXCAVATIONS SHALL BE THOROUGHLY SECURED ON A DAILY BASIS BY THE CONTRACTOR AT THE COMPLETION OF CONSTRUCTION OPERATIONS IN THE IMMEDIATE AREA.

4) CONTRACTOR SHALL VERIFY TBM ELEVATIONS PRIOR TO CONSTRUCTION.

5) THE CONTRACTOR SHALL COORDINATE MATERIALS AND INSTALLATION SPECIFICATIONS WITH THE INDIVIDUAL UTILITY AGENCIES/COMPANIES, AND ARRANGE FOR ALL INSPECTIONS.

6) THE CONTRACTOR SHALL STABILIZE ALL DITCHES, SWALES, AND PONDS PRIOR TO DIRECTING STORMWATER RUN-OFF TO THEM.

7) THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AND DETERMINING THE LOCATION, SIZE AND ELEVATION OF ALL EXISTING UTILITIES, SHOWN OR NOT SHOWN ON THESE PLANS, PRIOR TO THE START OF ANY CONSTRUCTION. THE ENGINEER SHALL BE NOTIFIED IN WRITING OF ANY UTILITIES FOUND INTERFERING WITH THE PROPOSED CONSTRUCTION AND APPROPRIATE REMEDIAL ACTION SHALL BE AGREED TO BY DRI, UNDRUM MAINS. PRECEDING NEW DRI WORK. THE CONTRACTOR SHALL BE RESPONSIBLE TO CONTACT "DIG SAFE" (1-888-344-7233) AT LEAST 72 HOURS BEFORE DIGGING.

8) CONTRACTOR SHALL DISPOSE OF ANY UNSUITABLE MATERIAL FOUND ONSITE (I.E. TRASH, STUMPS, ETC.) IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. CONTRACTOR SHALL COORDINATE ALL WORK WITH SUBCONTRACTORS, UTILITY COMPANIES, AND THE TOWN OF SALEM, AND SHALL BE RESPONSIBLE FOR COORDINATION OF ALL PERMITS, INSPECTIONS, AND MAINTENANCE AND PROTECTION OF ALL TRAFFIC AND PEDESTRIANS. ANY DISCREPANCIES FOUND OR SHOWN SHALL BE RESOLVED BY THE CONTRACTOR.

9) PRIOR TO CONSTRUCTION THE CONTRACTOR SHALL CONFIRM WITH THE ENGINEER THAT HE HAS THE LATEST REVISION OF THE PLANS. THE CONTRACTOR SHALL REVIEW ALL SHEETS OF THE PLANS, AS NOT ALL FEATURES ARE DETAILED ON EVERY PLAN. THE ENGINEER IS TO BE NOTIFIED OF ANY CONFLICT WITHIN THIS PLAN SET.

10) CONTRACTOR SHALL CONFIRM WITH ENGINEER ALL LAYOUT ITEMS NOT SHOWN OR ANNOTATED. THE LOCATION OF ALL STRUCTURES AND UTILITIES SHALL BE CONFIRMED PRIOR TO LAYOUT OF PAVED AREAS. EXACT LOCATION OF PAVEMENT SHALL BE CONFIRMED WITH ENGINEER PRIOR TO PLACEMENT OF BINDER COURSE PAVEMENT.

11) IF DURING CONSTRUCTION IT BECOMES APPARENT THAT DEFICIENCIES EXIST IN THE APPROVED DESIGN DRAWINGS, THE CONTRACTOR SHALL BE REQUIRED TO CORRECT THE DEFICIENCIES TO MEET THE REQUIREMENTS OF THE REGULATIONS AT NO EXPENSE TO THE TOWN.

NO.	DESCRIPTION	BY	DATE
	REVISIONS:		
2	UPDATE OWNER	DRJ	3/12/20
1	ADD DIMENSION TO OHW	DRJ	6/29/18

GRADING PLAN

PREPARED FOR:
LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP.
15 BUTTRICK ROAD
LONDONDERRY, NEW HAMPSHIRE 03053
SALEM PROPERTY MAP 99 – LOT 12572
PROPERTY ADDRESS – 64 SOUTH BROADWAY

GPI Engineering Design Planning Construction Management
Greenmen-Pedersen, Inc.
44 Stiles Road
Suite One
Salem, NH 03079
603.893.0720 GPINET.COM

SCALE: 1"=40' DATE: MAY 25, 2018

OWNER OF RECORD
LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP.
15 BUTTRICK ROAD
LONDONDERRY,
NEW HAMPSHIRE 03053

SALEM PLANNING BOARD
APPROVAL

ZONE: COMMERCIAL – INDUSTRIAL "C"

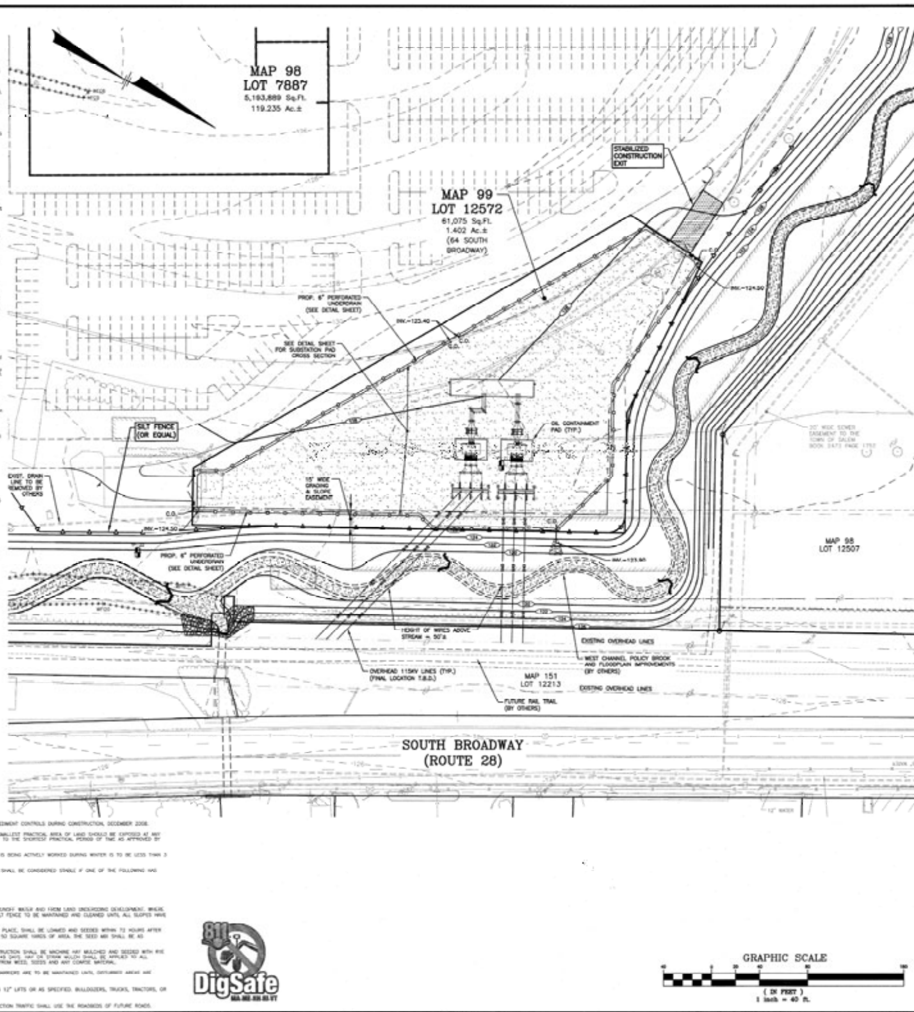
DESIGNED BY:	DRAWN/CHECKED	DWG. NAME	PROJECT No.	SHEET No.
DRJ	CCC/DRJ	4339GP.DWG	4339.17	6 OF 8

TEMPORARY EROSION CONTROL MEASURES:

WINTER STABILIZATION NOTES:

CONSTRUCTION SEQUENCE NOTES:

EROSION CONTROL NOTES:



LOCATION MAP
(NOT TO SCALE)

NOTES:

1) ALL SITE DRAINAGE PIPE SHALL BE CORRUGATED HIGH-DENSITY POLYETHYLENE PIPE WITH STANDARD JOINTS, DUAL-WALL, SMOOTH INTERIOR AS MANUFACTURED BY ADS, INC., OR APPROVED EQUAL, UNLESS OTHERWISE NOTED ON PLAN.

2) ELEVATIONS ARE BASED ON NGVD 1929 DATUM.

3) ALL PROPOSED ELEVATIONS AS SHOWN ARE BOTTOM OF CURB ELEVATIONS, UNLESS OTHERWISE NOTED.

4) ANY UTILITY FIELD ADJUSTMENTS SHALL BE APPROVED BY THE LOCAL AUTHORITIES AND THE DEVELOPER PRIOR TO INSTALLATION.

5) THE LOCATIONS OF UNDERGROUND UTILITIES ARE APPROXIMATE ONLY. THE CONTRACTOR IS TO VERIFY EXACT LOCATION PRIOR TO CONSTRUCTION. THE CONTRACTOR IS TO NOTIFY THE DESIGN ENGINEER OF ANY DISCREPANCIES. CONSTRUCTION SHALL COMMENCE BEGINNING AT THE LOWEST INVERT (POINT OF CONNECTION) AND PROGRESS UP GRADIENT. PROPOSED INTERFACE POINTS (CROSSINGS) WITH EXISTING UNDERGROUND INSTALLATIONS SHALL BE FIELD VERIFIED BY TEST PIT PRIOR TO COMMENCEMENT OF CONSTRUCTION.

6) ALL CONSTRUCTION SHALL CONFORM TO APPLICABLE TOWN, STATE AND FEDERAL STANDARDS.

7) THE CONTRACTOR SHALL CALL AND COORDINATE WITH DIG-SAFE (1-888-344-7233) PRIOR TO COMMENCING ANY EXCAVATION.

NO.	DESCRIPTION	BY	DATE
2	UPDATE OWNER	DRJ	3/12/20
1	ADD TEST PITS	DRJ	6/29/18

REVISIONS

STORMWATER MANAGEMENT PLAN

PREPARED FOR:
LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP.
15 BUTTRICK ROAD
LONDONDERRY, NEW HAMPSHIRE 03053
SALEM PROPERTY MAP 99 – LOT 12572
PROPERTY ADDRESS – 64 SOUTH BROADWAY

GPI Engineering Design Planning Construction Management
603.893.0720 GPINET.COM
Greenman-Pedersen, Inc.
44 Stiles Road
Suite One
Salem, NH 03079

SCALE: 1"=40'
DATE: MAY 25, 2018

OWNER OF RECORD
LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP.
15 BUTTRICK ROAD
LONDONDERRY,
NEW HAMPSHIRE 03053

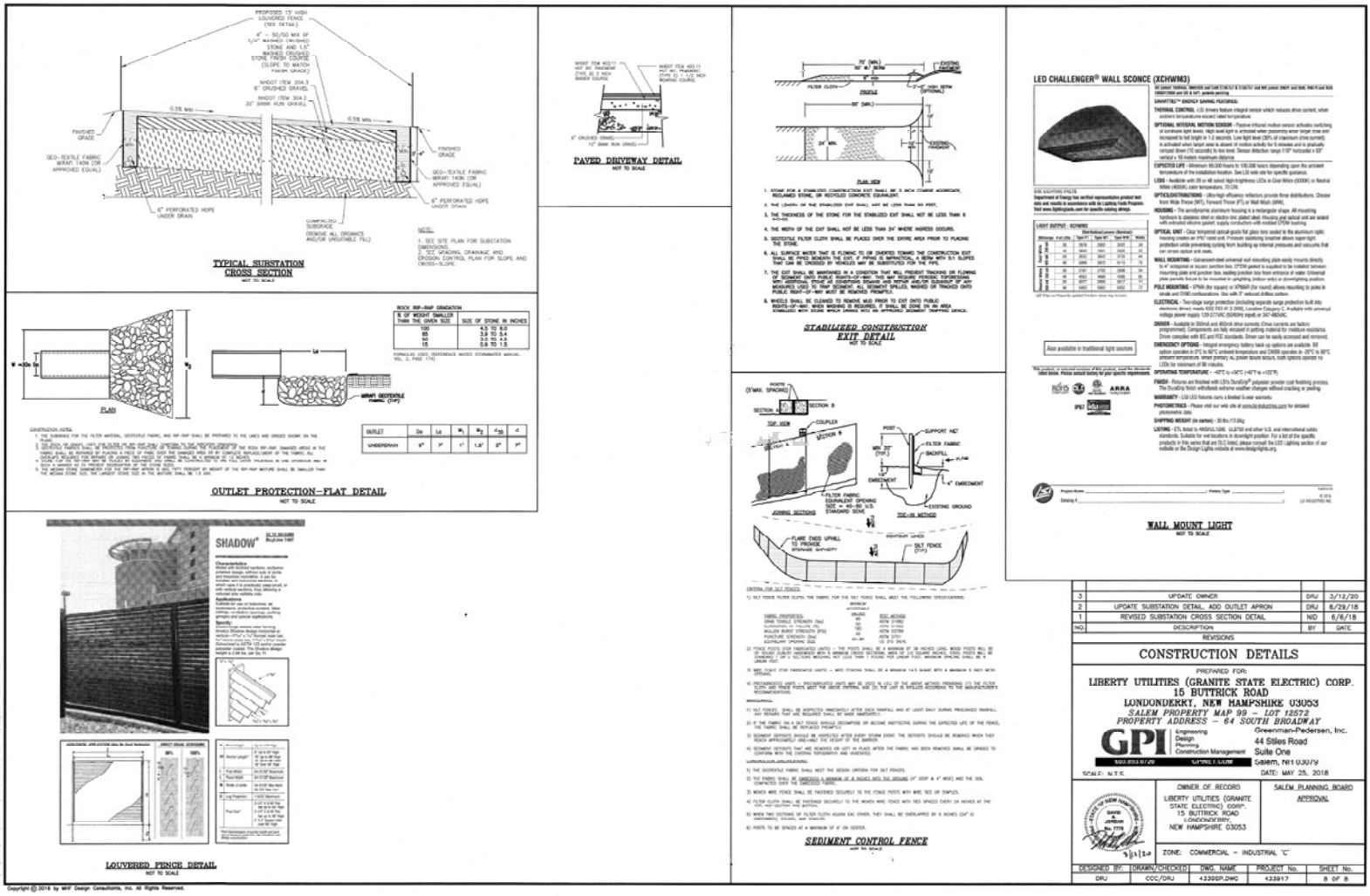
SALEM PLANNING BOARD APPROVAL

STATE OF NEW HAMPSHIRE — DAVID R. JORDAN No. 7776
3/12/20

ZONE: COMMERCIAL – INDUSTRIAL "C"

DESIGNED BY:	DRAWN/CHECKED	DWG. NAME	PROJECT No.	SHEET No.
DRJ	CCC/DRJ	4339SP.DWG	433917	7 OF 8

DigSafe



NO.	DESCRIPTION	BY	DATE
	REVISIONS		
3	UPDATE OWNER	DRJ	3/12/20
2	UPDATE SUBSTATION DETAIL, ADD OUTLET APRON	DRJ	6/29/18
1	REVISED SUBSTATION CROSS SECTION DETAIL	NID	6/6/18

CONSTRUCTION DETAILS

PREPARED FOR:
LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP.
15 BUTTRICK ROAD
LONDONDERRY, NEW HAMPSHIRE 03053
SALEM PROPERTY MAP 99 – LOT 12572
PROPERTY ADDRESS – 64 SOUTH BROADWAY

GPI — Engineering, Design, Planning, Construction Management
Greenman-Pedersen, Inc.
44 Stiles Road
Suite One
Salem, NH 03079
603.893.0720 GPINET.COM

SCALE: N.T.S. DATE: MAY 25, 2018

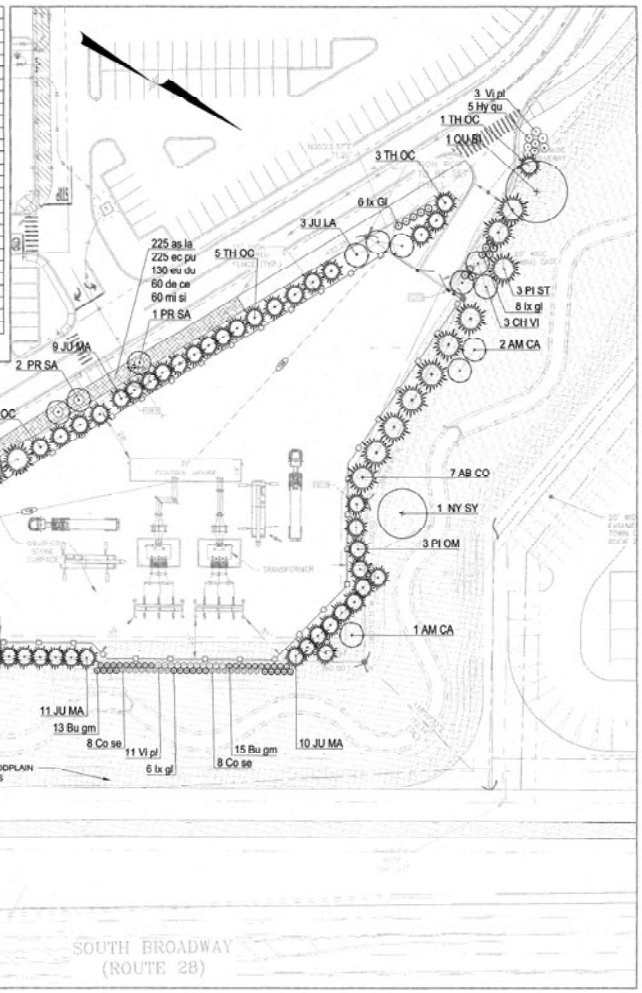
OWNER OF RECORD	SALEM PLANNING BOARD APPROVAL
LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP. 15 BUTTRICK ROAD LONDONDERRY, NEW HAMPSHIRE 03053	

ZONE: COMMERCIAL – INDUSTRIAL "C"

DESIGNED BY:	DRAWN/CHECKED	DWG. NAME	PROJECT No.	SHEET No.
DRJ	CCC/DRJ	4339SP.DWG	4339.17	8 OF 8

GENERAL LANDSCAPE PLANTING SCHEDULE

KEY	QNTY	BOTANICAL NAME	COMMON NAME	SIZE	COMMENTS
TREES					
AB CO	12	Abies concolor	White Fir	8'-10' Ht.	B&B; matched
AC FR	3	Acer x freemanii 'Autumn Blaze'	Freeman Maple	3"-3.5" Cal.	B&B; matched
AM CA	3	Amelanchier canadensis	Canadian Serviceberry	7'-8' Ht.	B&B; matched
CH VI	4	Chionanthus virginicus	Fringe Tree	6'-7' Ht.	B&B; matched
JU SM	3	Juniper virginiana - Small	Eastern Red Cedar	8'-10' Ht	B&B; matched
JU LA	9	Juniper virginiana - Large	Eastern Red Cedar	12'-14' Ht	B&B; matched
JU MA	30	Juniper virginiana 'Manhattan'	Manhatten Blue Eastern Red Cedar	12'-14' Ht	B&B; matched
NY SY	1	Nyssa sylvatica	Black Gum	2.5"-3" Cal.	B&B; matched
PI OM	7	Picea omorika ' Bruns'	Serbian Spruce	12'-14' Ht	B&B; matched
PI ST	6	Pinus strobus 'Fastigiata'	Columnar White Pine	12'-14' Ht	B&B; matched
PR SA	3	Prunus sargentii 'Columnaris'	Columnar Sargent Cherry	2.5"-3" Cal.	B&B; matched
QU BI	2	Quercus bicolor	Swamp White Oak	3"-3.5" Cal.	B&B; matched
TH OC	18	Thuja occidentalis 'Nigra'	Dark American Arborvitae	8'-10' Ht.	B&B; matched
SHRUBS					
Bu Gm	28	Buxus 'Green Mountain'	Green Mountain Boxwood	#7 Container	36" O.C, min size 30" Ht
Co Se	16	Cornus sericea 'Isanti'	Red Twig Dogwood	#7 Container	36" O.C, min size 30" Ht
Hy qu	12	Hydrangea quercifolia 'Pee Wee'	Oak-Leaf Hydrangea	#7 Container	36" O.C, min size 30" Ht
Ix gl	34	Ilex glabra 'Shamrock'	Shamrock Inkberry	#7 Container	30" O.C, min size 30" Ht
Vi pl	17	Viburnum plicatum f. tomentosum 'Shasta'	Summer Snowlake Viburnum	#10 Container	60" O.C, min size 36" Ht
PERENNIALS/ORNAMENTAL GRASSES					
as la	225	Aster laevis	Smooth Aster	#1 Container	18"O.C
ec pu	225	Echinacea pupurea	Purple Coneflower	#2 Container	18"O.C
eu du	1130	Eutrochium dubium 'Little Joe'	Little Joe Pye Weed	#2 Container	24"O.C
de ce	60	Deschampsia cespitosa 'Gold Tau'	Tufted Hair Grass	#2 Container	36"O.C
mi si	60	Miscanthus sinensis 'Gracillimus'	Maiden Grass	#3 Container	36"O.C



LEGEND

- SEEDED LAWN
- PERENNIALS / ORNAMENTAL GRASSES
- LIMIT OF WORK LINE
- EXISTING TREE TO REMAIN
- DECIDUOUS TREE
- CONIFEROUS TREE
- ORNAMENTAL TRFE
- SHRUBS

GENERAL NOTES

1. FOR PLANTING SCHEDULE SEE LANDSCAPE PLAN L-1.
2. ROADWAY AND UTILITIES LAYOUT ARE SHOWN FOR REFERENCE ONLY. REFER TO THE ROADWAY ENGINEERING DRAWINGS.
3. FOR ADJACENT PROPOSED DEVELOPMENTS REFER TO THE 'TUSCAN VILLAGE MASTER PLAN' AND RELEVANT DEVELOPMENT PLANS.
4. IRRIGATION FOR THE PLANTINGS AROUND THE SUBSTATION PERIMETER WILL BE PROVIDED BY THE TUSCAN VILLAGE IRRIGATION SYSTEM.

NO.	DESCRIPTION	BY	DATE
1	PLANTING REVISION	GS	2/24/2020

REVISIONS

LANDSCAPE PLAN L-2

PREPARED FOR:
LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP.
15 BUTTRICK ROAD
LONDONDERRY, NEW HAMPSHIRE 03053
SALEM PROPERTY MAP 99 - LOT 12572
PROPERTY ADDRESS - 64 SOUTH BROADWAY

HALVORSON DESIGN PARTNERSHIP
25 Kingston St, Boston MA 02111
T 617.536.5780 F 617.536.5804

SCALE: 1"=30' DATE: MAY 24, 2018

OWNER OF RECORD
ROCK ACQUISITION, LLC
63 MAIN STREET
SALEM, NEW HAMPSHIRE 03079
BOOK 5763 PAGE 52

SALEM PLANNING BOARD APPROVAL

ZONE: COMMERCIAL - INDUSTRIAL 'C'

DESIGNED BY:	DRAWN/CHECKED	DWG. NAME	PROJECT No.	SHEET No.
MAL	BL/MAL		433917	2 OF 3

April 2, 2021

TO: Ross Moldoff, Salem Planning Director

RE: Liberty Utilities Rockingham Substation Fence

Dear Mr. Moldoff,

As a follow up to our discussion on Monday, March 29th, 2021, I am submitting this letter to request approval from both you and the members of the Planning Board to use a different type of screening around our Rockingham Substation than originally proposed. Our current option is the Shadow Fence (see attachment A-1). It has been recently brought to our attention that this type of fence needs to have an independent engineering review to determine proper below grade support and may require a foundation wall with a poured footing. Unfortunately, this was not known to Liberty when this fence was proposed to use three years ago, as we believed this fence could be installed similar to a 'traditional' (post holes backfilled with concrete) fence installation. To complete the task of an engineering review; procurement; and installation of fence, Liberty is estimating a timeframe of one year. Unfortunately, postponing the construction for one year is not feasible as the substation needs to be completed this year so that Liberty can continue to provide safe, reliable electric service to the Town of Salem.

Liberty would like to propose the use of pre-cast concrete wall with a stone finish. Please see attachments A-2 (preferred style, color of stone to be darker than pictured) and A-3 as examples. The support for these walls are similar to a traditional fence and can be procured and installed in accordance with our current construction schedule. Liberty intends to maintain the 15 foot height of the wall and utilize gates similar to the Shadow Fence thus limiting the view inside the substation. One change Liberty is proposing, is to increase the height of the gates from 6 feet to 7 feet as this is more in line with industry standards.

Thank you for your time and consideration of this request. If you have any questions, please contact me at 603-327-9367 or at Anthony.strabone@libertyutilities.com.

Sincerely,

Anthony Strabone

Anthony Strabone

Liberty

Attachment A-1: Shadow Fence

Attachment A-2 (preferred) Concrete Wall; Stone finish with smooth posts

Attachment A-3: Concrete Wall; Stone finish with matching posts/columns

Town of Salem, New Hampshire
Community Development Department
Planning Division
33 Geremonty Drive, Salem, New Hampshire 03079
(603) 890-2080 - Fax (603) 898-1223

Ross A. Moldoff, AICP
Planning Director

April 15, 2021

Anthony Strabone
Liberty Utilities
9 Lowell Road
Salem, NH 03079

RE: Map 99, Lot 12572
64 S. Broadway – Substation Fence

Dear Anthony:

At their meeting on April 13, 2021, the Planning Board granted your request to use a different type of fence than originally proposed around the Liberty Utilities Tuscan Substation at 64 South Broadway, per your letter dated April 2, 2021.

Please contact me if you have any questions.

Sincerely,

Ross A. Moldoff
Planning Director

app.ltr.2021/S.Broadway-064/LibertyUtilities/substation fence

tjd&a | Terrence J. DeWan & Associates
Landscape Architects & Planners

June 11, 2018

TO: Ross Moldoff, Salem Planning Director
FR: Terry DeWan / TJD&A

RE: LIBERTY UTILITIES SUBSTATION PEER REVIEW
TUSCAN VILLAGE

The following comments are based upon information received by the Applicant, our knowledge of the site, review of Google Maps StreetView, and other data sources. The Applicant information includes:

- Proposed Electrical Substation Plan Set, prepared by MHF Design Consultants, dated May 25, 2018 (Sheets 1 through 8).
- STV Substation Site Plan, prepared by Halvorson Design Partnership, dated 5.24.18.
- Email Correspondence from David R. Jordan, MHF Design, dated June 7, 2018.

GENERAL

Key. The Illustrative Site Landscape Plan should have a Key that identifies the various elements on the Plan.

Scale. The various landscape plans should include a scale to help understand and check plant spacing.

Context. The substation is one component of the much larger plan for Tuscan Village. It would be very informative if the Landscape Plans showed more of the surrounding context, i.e., future roadways and walkways, future Rail Trail, proposed plantings, adjacent utility lines, etc.

Existing Vegetation. There is a significant line of vegetation that now separates the Tuscan Village site from Route 28. There is no indication as to whether any of these trees will be preserved as part of the construction of the substation.

Adjacent Parking Lot (not part of this application). While not part of this review, the Planning Board should pay special attention to the landscape treatment of the parking lot between the buildings on the east side of Market Place and the floodplain mitigation stream. Without a substantial amount of buffer plantings, this 645 car parking area (as seen from Route 28) will be a highly visible part of Tuscan Village.

SITE PLAN / FOOTPRINT

The current Site Plan for the substation includes a substantial amount of crushed stone surfacing around the electrical components and control house. The Tuscan Village Masterplan, dated 5.30.18, indicates that the substation has the potential to expand into this additional space. However, the current application, dated 5.25.18, does not indicate any potential expansion. In the 6.7.18 correspondence, David Jordan states 'There will be no future expansion…. The area inside the fence is needed as maneuvering space for large tractor-trailers in the event

transformer replacement is necessary and for the large utility trucks will lifts to access the overhead lines." The Planning Board should confirm that this is the current thinking regarding future expansion within the substation fencing.

VEGETATIVE SCREENING

The No Tree Zone facing Route 28 is to prohibit trees that could reach the safety zone around the electrical conductors. This is standard procedure in the design of utility lines and substations. However, there does not seem to be a reason why non-capable shrub species (i.e., would achieve a height of less than 15') should not be planted in this area. There are many native shrubs that should be considered for this location to maintain the continuity of the landscape screening. While it appears that shrubs in this location would be outside of the Liberty Utilities property, there are several other locations where this occurs.

In his June 6, 2018 memo, David Jordan addresses this issue by stating: "This area was kept clear of vegetation other than low grasses and perennials at the request of Liberty for the purpose of being able to access and maintain their overhead lines."

PLANTINGS

The Landscape Plan calls for low shrubs (Oak-leaf Hydrangea and Shamrock Inkberry) immediately adjacent to the southerly access gate. If this will be used during the winter months, the plantings should be moved further back from the edge of the access drive to account for snow storage that could harm the plantings.

The Manhattan Blue Juniper achieves a width of 5 to 10 feet. The Site Plan indicates that they will be spaced approximately 15' apart. If the intent is to provide a solid screen, the junipers should be planted closer together, or another tree selected that achieves a greater width at maturity.

The Manhattan Junipers adjacent to the southerly edge of the No Tree Zone appears to overlap with the possible location of the 115 kV conductors, as shown on Sheet 7 in the MHF Plan Set, which notes that the final location to be determined. This location should be verified and adjustments made to the planting plan if necessary.

Quantities should be added to the Planting Schedule.

The Common Name for Amelanchier should be changed on the Planting Schedule.

LOUVERED FENCE

The substation will be screened on most sides by a 15' tall louvered fence that provides 80% direct visual screening. Visit the company's website at: https://www.ametco.com/panel-types/shadow-80/ for illustration and photograph of recent installations.

In most instances this should provide an effective way to screen the lower electrical components from view, especially when used in combination with the proposed plantings. Where trees are not allowed (i.e., the No Tree Zone facing Route 28), the fencing will be 100% opaque, which eliminates the need for plantings.

What is missing is the color that will be applied to the fencing. In an earlier discussion with the Applicant's team, I believe that they agreed to a dark color, to be determined. The color should

relate to the color of other functional elements used in Tuscan Village (e.g., signposts or traffic signals) to maintain continuity.

MAINTENANCE

The majority of the plantings shown on the Halvorson drawings are within the Liberty Utilities' property. Will they be responsible for the maintenance once the plantings have been established and accepted?

The Landscape Plan indicates a large area of 'Low Grasses and Perennials' on the east side of the substation facing Route 28. It appears that most (but not all) of this area is outside the Liberty Utilities' property line. This type of landscape treatment can be labor-intensive for the first few years to get the plants established. Who will be responsible for maintaining this highly visible location?

Are there plans to irrigate any of the plantings surrounding the substation? If so, please provide the design and layout information.

SUBSTATION NOISE

The Applicant has noted that information on possible noise from the substation will be provided by Liberty Utilities. While noise is not an issue that we deal with, if there was the need for mitigation measures related to noise generated by the project (e.g., sound barriers), we should be aware of their physical design and comment accordingly.

Please contact me if you have any questions.

Terry DeWan FASLA
Terrence J. DeWan & Associates