RFP #23-65

City of Ann Arbor, MI – Geothermal Advisory Services

Ann Arbor, Michigan

December 13, 2023

Stantec

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Appendix A: Resumes

Stantec Consulting Services Inc.
1168 Oak Valley Drive, Suite 100, Ann Arbor, MI 48108

December 13, 2023

Missy Stults, PhD.
Sustainability and Innovations Director
City of Ann Arbor, Procurement Unit
301 E. Huron Street
Ann Arbor, MI 48104
MStults@a2gov.org

Reference: City of Ann Arbor, MI –Geothermal Advisory Services RFP #23-65

Dear Selection Committee,

The City of Ann Arbor (the "City") adopted A^{2}ZERO to achieve a just transition to community-wide carbon neutrality by 2030. We understand the City is seeking the support of a uniquely qualified firm to provide geothermal advisory services as an implementation strategy to transition to clean, safe, healthy, reliable, equitable, stably priced, and decarbonized heating for Ann Arbor homes and businesses.

As a team, we are proud that Stantec has worked on some of the most complicated and innovative energy transition and sustainability-focused heating projects. Our three-year strategic plan, launched this month, has Climate Solutions and Communities and Infrastructure of the Future as two of our core initiatives. The City's goals align directly with Stantec's strategic plan and will receive attention from our most senior executives.

Experience: We have gathered an international team of technical experts, hailing from the US, Canada, England, and the Netherlands, to augment our Michigan-based staff. This group has direct and current experience working with clients on geothermal and distributed heat sharing networks. For example, the work we completed for The Province of North-Brabant asked Stantec to develop local and regional primary heating network layouts, governance, locations of possible heat sources, cost estimates, and connections to end-consumers. The heating energy generation was a mix of geothermal, aquathermal, and residual heat. Our team also includes experts in environmental and economic justice, community engagement, and hydrogeology, which will be necessary to support the most vulnerable in our communities.

Efficiency: Stantec has the depth and breadth of internal resources to perform all aspects of the three primary tasks. Given the complex nature of this work and the multiple stakeholders, Stantec, as a single integrated firm, can bring efficiencies and flexibility, as well as simplifying communication and maximizing the exchange of ideas. Our team will be led by Jeff Schroeder, who is already working for the City on related services. There will be no ramp up period. We understand the City's need for rapid progress on the A^{2}ZERO strategies. Stantec's approach is structured to provide comprehensive and expeditious delivery.

This work will be needed throughout communities in the US, as it has already begun in earnest in other regions of the world. We commend Ann Arbor for leading through example and exploring the options for sustainable heating. If you have any questions or would like to discuss any aspect of this proposal, please feel to contact us.

Note that we acknowledge and have reviewed addendum 1.

Thank you for considering us to be your trusted partner on this important work.

Sincerely,

Jeff Schroeder
Senior Principal, Business Center Practice Leader
(613) 410-1337
jeff.schroeder@stantec.com

Curt Bjurlin
Vice President, Climate Solutions Leader, US
(608) 839-2033
curt.bjurlin@stantec.com

A. Professional Qualifications

1. Company Information

The scope of work will be performed by:

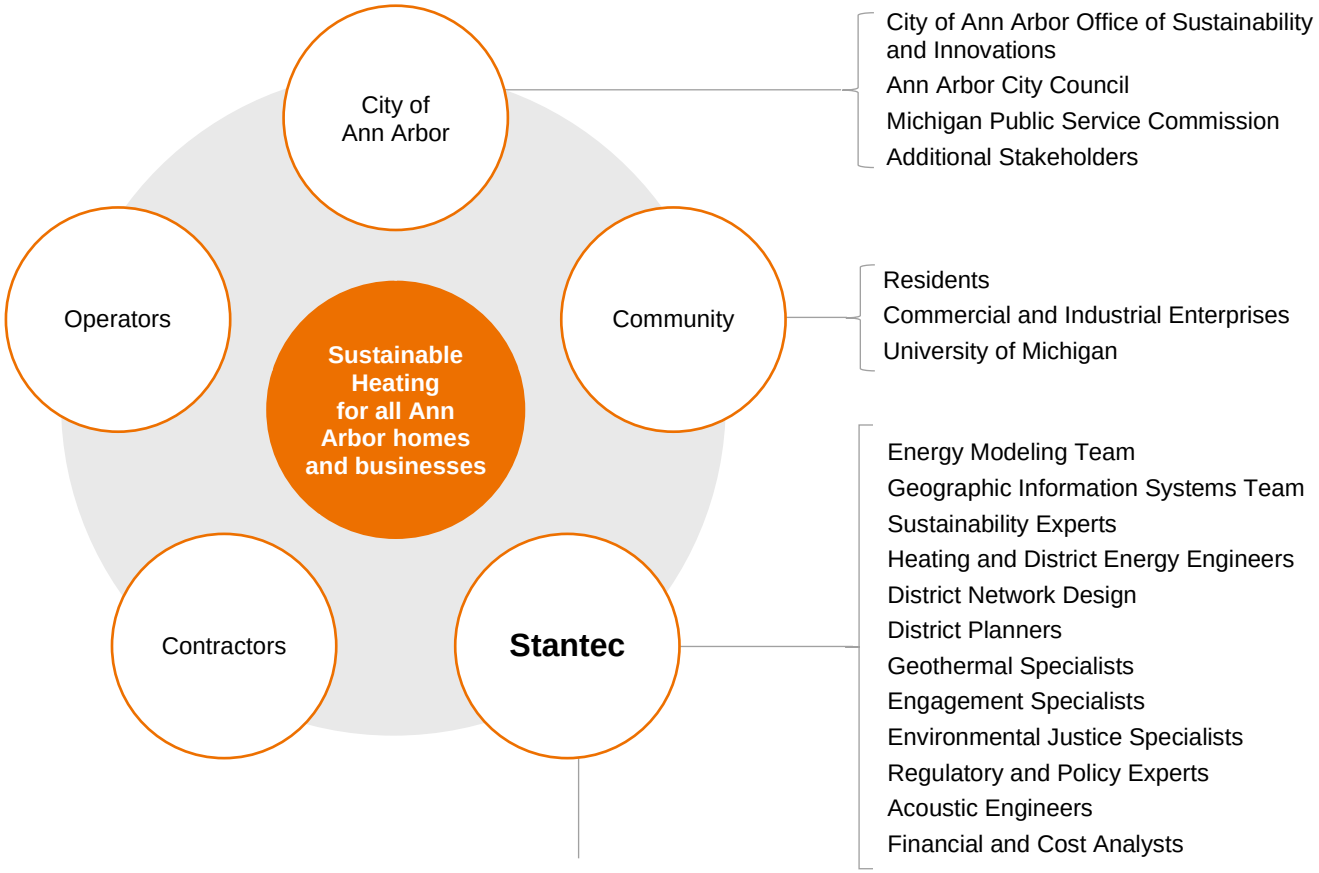
Company Name	Stantec Consulting Services Inc.
Branch Office	1168 Oak Valley Drive, Suite 100, Ann Arbor, MI 48108
Operation	Corporation
Licensed in the State of Michigan	Yes

2. Project Team

Stantec has developed a support team for the City's scope of work for Geothermal Advisory Services based on experience with similar scopes of work, expectations for strong stakeholder engagement, and diverse technical expertise.

The following pages include the organization structure of the team, bios, and required team member information.

*Resumes for Stantec's key personnel can be found in **Appendix A**.*



Project Manager
Jeff Schroeder
P.Eng., LEED AP BD+C
Representing Subtasks A, B, C

Executive Sponsor
Curt Bjurlin
Representing Subtasks A, B, C

Local Design Lead
Caz Zalewski
PE, LEED AP, CPD
Representing Subtasks A, B, C

SUBJECT MATTER EXPERTS

District Heating Technical Lead
Neil Bates
BEng (Hons)
Representing Subtask C

District Heating Specialist
Sean McInroy
P.Eng.
Representing Subtasks A, B, C

Engagement & Environmental Justice Lead
Amy Sackaroff
AICP
Representing Subtask C

Geothermal Specialist
Jim Bererton
P.Eng.
Representing Subtasks A, B, C

Geothermal Specialist Quality Reviewer
Brad Dawe
P.Eng., LEED AP
Representing Subtasks A, B, C

Funding & Grant Specialist
Mark Pascoe
P.E., LEED AP, ENV SP
Representing Subtask C

Financial & Business Planning
Richard van der Beek
MSc, MPhil, MSt, MBA, MBCS
Representing Subtasks A, B, C

Hydrogeologist
John Griggs
PhD, PG
Representing Subtasks A, B, C

Energy and Utilities Designer/Operator
Adrian Davison
P.Eng., C.Eng.
Representing Subtask C

Utility and Governance Liaison
Rogier Dieteren
B.Eng.
Representing Subtasks A, B, C

Technical QA
Susan Larson
P.E.
Representing Subtasks A, B, C

Subtask A: Geothermal Technical Advisor
Subtask B: General Owner's Agent on Geothermal Projects
Subtask C: Networked Geothermal Feasibility Study

Jeff Schroeder, P.Eng., LEED AP BD+C

Project Manager

Skills & Qualification

Jeff is a Senior Mechanical Engineer with 19 years of experience leading development of district energy systems, cold climate design, and sustainable buildings. Jeff is committed to providing exceptional service to his clients. He has worked on numerous campuses and complex buildings for commercial, institutional, and federal clients. Jeff's project experience includes Central Heating and Cooling Plants, hospitals, primary and secondary education, laboratories, corporate offices, and city protective services (fire and police).

As Project Manager, Jeff provides leadership on multi-disciplinary teams through all project phases – from initial project pursuit through programming and visioning, design, and project execution. A strategic thinker, Jeff works closely with the project team to draw out innovative and sustainable solutions. Jeff's role includes management of the design, staffing, and financial health of projects, and therefore has a holistic understanding of ongoing project success.

With Jeff's significant experience with district heating projects across North America, he will also support aspects of the technical scope, which will assist in relaying accurate updates on project schedule and technical findings to the City. Jeff has worked on the concepts, design and construction of heating and cooling systems that exceed current building practice standards, such as geoexchange, river water cooling, thermal storage, wastewater to energy (WET), ambient loops, biomass heating, thermal energy storage, heat pumps, and cascading hydronic systems.

Physical Location	Ottawa, Ontario, Canada
Subtask Experience	A, B, C
Project Management Experience & Skillsets	Yes

Curt Bjurlin

Executive Sponsor

Skills & Qualification

Curt leads Stantec's Climate Solutions business in the United States. An experienced practitioner in the energy sector, Curt is knowledgeable in the delivery of climate change adaptation and greenhouse gas mitigation strategies. Curt has spent much of the last 18 years developing renewable energy projects both as an owner/operator and as a consultant. For these projects, Curt has organized and participated in countless stakeholder engagement discussions. One area of technical expertise for Curt is leading Stantec's linear infrastructure routing and siting technical team, in which he has worked for most of the largest utilities in the United States. His routing skill set will be of critical use during the route evaluation phase of a district heating retrofit. As executive sponsor he has assembled the team in this response and will stay connected with the City to make sure the best of Stantec's technical experts are available.

Physical Location	Madison, Wisconsin
Subtask Experience	A, B, C
Project Management Experience & Skillsets	Yes

Caz Zalewski

Local Design Lead

Skills & Qualification

Caz has 25 of experience in engineering systems design. He is an expert in mechanical heating, ventilation and control systems. Caz has extensive experience working in the State of Michigan, as well as completing work in Ann Arbor and knowledge of Ann Arbor. As local design lead, Caz has dedicated his career to the design and support of municipal facilities and works closely with clients and the project teams to understand project goals and continues to provide his expertise throughout the project to maintain project development, coordination, schedule, and budget. During construction, he assists the team with system operation analysis of the mechanical, electrical and control systems. Caz will support the team adding local understanding and context into all aspects of the project including reviewing project deliverables.

Physical Location	Berkley, Michigan
Subtask Experience	A, B, C
Project Management Experience & Skillsets	Yes

Neil Bates, BEng (Hons), ACIBSE
District Heating Technical Lead

Skills & Qualification
As an experienced, mechanically focused building services engineer, Neil's recent experience across numerous decarbonization and district heat networks will bring design experience to this project. Neil has supported and led many projects across sectors, including defense, retail, commercial, education, and healthcare. Neil leads decarbonization and energy efficiency studies using innovative techniques such as network modelling to run simulations and investigate options. He is a driven individual who can work within a team as well as lead a design team to scope and budget.

Physical Location	Reading, United Kingdom
Subtask Experience	C
Project Management Experience & Skillsets	Yes

Amy Sackaroff, AICP
Engagement & Environmental Justice Lead

Skills & Qualification
Amy has more than 23 years of experience in developing sustainable solutions for complex infrastructure projects. She has managed the development of Environmental Impact Statements (EISs), Environmental Assessments (EAs), Categorical Exclusions (CEs), and associated technical studies pursuant to the National Environmental Policy Act, including Community Impact Assessments (CIAs) and Indirect and Cumulative Effects (ICE) Assessments. Through this work, she has gained a keen awareness of the planning, design, and construction challenges associated with developing transportation projects in the built environment. Amy also leads the development of Environmental Justice (EJ) engagement and impact analyses pursuant to Executive Order (EO) 12898 (Federal Actions to Address Environmental Justice to Minority and Low-Income Populations) and related EOs including EO 14008 (Tackling the Climate Crisis at Home and Abroad) which includes the Justice40 Initiative. She has conducted EJ analyses, equity analyses and other community studies in both urban and rural settings and understands how approach and potential impacts vary depending on a project's setting and context.

Physical Location	Raleigh, North Carolina
Subtask Experience	C
Project Management Experience & Skillsets	Yes

Mark Pascoe, P.E. LEED AP, ENV SP
Funding & Grant Specialist

Skills & Qualification
Mark is a Principal and Client Manager with 35 years of experience in site planning, design, and construction for a variety of public and private sector projects throughout the United States. These include brownfield sites, commercial and business developments, industrial and business parks, site condominiums, multi-family and single-family residential developments, municipal facilities–including water and wastewater, transportation systems – and educational and recreational facilities. Design elements include roads, streets and parking areas; non-motorized trails, sanitary and storm sewers; water mains; site drainage, grading, stormwater facilities and soil erosion control measures; site utilities, pump stations; subdivision and site condominium documents; and construction layout and observation. Mark is especially passionate in accessible and sustainable design solutions and has successfully prepared and administered numerous grant opportunities.

Physical Location	Ann Arbor, Michigan
Subtask Experience	C
Project Management Experience & Skillsets	Yes

Sean McInroy, P.Eng.
District Heating Specialist

Skills & Qualification
Sean has 14 years' experience that includes design, construction administration, project management, feasibility studies, and assessment/compatibility reports. Sean's specialization in district energy consists of: distribution piping systems (e.g., above and below-grade hot water, steam, chilled water, EN 13941 pre-insulated pipe systems); energy centers (i.e., heating/cooling plants), and energy transfer stations. His technical experience consists of hydraulic modelling, CAD modelling, pipe stress analysis (to ASME B31.1 and EN 13941), equipment/instrumentation sizing, and geothermal modelling.

Physical Location	Edmonton, Alberta, Canada
Subtask Experience	A, B, C
Project Management Experience & Skillsets	Yes

Jim Bererton, P.Eng.
Geothermal Specialist

Skills & Qualification
With 30 years of engineering practice, Mr. Bererton applies a rigorous and detailed approach to every project. His passion encompasses a wide range of sustainable technologies including geo-exchange, photovoltaics, PV/Thermal, heat pumps, borehole thermal energy storage (BTES), biomass, and high-performance building design. He excels at creating innovative and efficient hybrid solutions from proven technologies. His achievements include designing the second largest net-zero facility in North America and several campus-scale district energy systems. He has a solid background in solar thermal and seasonal storage applications from his involvement in the world-renowned Drake Landing Solar Community. He also contributes to the International Energy Agency and Canadian standards on geo-exchange, solar PV/Thermal, and energy storage designs. He conducts independent research on decarbonization technologies including PV/Thermal collectors, heat pumps, and thermal/electrical energy storage and strives to achieve zero carbon electrification with minimal grid impact.

Physical Location	Calgary, Alberta, Canada
Subtask Experience	A, B, C
Project Management Experience & Skillsets	Yes

Brad Dawe, P.Eng., LEED AP
Geothermal Specialist Quality Reviewer

Skills & Qualification
Brad brings nearly 20 years of experience in mechanical system design for buildings, including defense, public safety, healthcare, commercial, institutional, and industrial facilities. Throughout his career, Brad has played a major role in the design and delivery of several dozen small and large scale vertical closed loop geoexchange projects, for both new construction and retrofit projects. He has extensive experience as design lead and providing subject matter expertise to geoexchange system designs ranging from small light commercial projects to large institutional projects. Brad specializes in designing cost effective mechanical systems that meet project requirements for reliability, maintainability, security, sustainability, and indoor air quality. He has a sustainable design focus with involvement in dozens of LEED certified projects ranging from LEED Certified to Gold, many of which include high-performance geothermal systems.

Physical Location	St. John's, Newfoundland, Canada
Subtask Experience	A, B, C
Project Management Experience & Skillsets	Yes

Richard van der Beek, MSc, MPhil, MSt, MBA

Financial & Business Planning

Skills & Qualification
Richard is an experienced consultant working on the interface of science, business, and policy, with interests in finance, energy, supply chain, and the rural economy. He focuses on business cases and financial models for district heat networks, solar energy, and energy storage. Richard has advised various local governments on large-scale district heating projects, covering the political and administrative decision-making process, participation and involvement of the local community, analysis of available heat sources, technical and financial modelling of existing and proposed networks, and governance structures where governments actively participate in constructing and exploiting heat networks. He also advises on funding, such as (inter)national grants or equity and debt from national promotional banks and institutions, commercial banks, and the European Investment Bank. Recently he wrote grant applications for € 35,000,000 in district heating subsidies on behalf of two Dutch cities.

Physical Location	Sittard, The Netherlands
Subtask Experience	A, B, C
Project Management Experience & Skillsets	Yes

John Griggs, PhD, PG

Hydrogeologist

Skills & Qualification
John is a Principal Hydrogeologist and licensed professional geologist with 35 years of experience leading, designing, costing, and driving the execution of hydrogeological investigations, groundwater flow and solute transport modeling, environmental impact assessments, and permitting programs in accordance with federal, state, and local rules and regulations. He has managed portfolios of Phase I and Phase II Environmental Site Assessments and large, multi-faceted remediation projects that include addressing vapor intrusion concerns. Much of John's recent experience is as the hydrogeological lead for a portfolio of sites that require the identification of impacts to groundwater above regulatory levels and evaluating potential corrective measures, including using bench- and field pilot-scale testing.

Physical Location	Lombard, Illinois
Subtask Experience	A, B, C
Project Management Experience & Skillsets	Yes

Adrian Davison, P.Eng., C.Eng.

Energy and Utilities Designer/Operator

Skills & Qualification
Adrian is a commercially and operationally experienced energy and utilities professional engineer with over 30 years of experience in district energy, power generation, and energy efficiency for power generation utilities, industrial, and municipal clients. His experience extends to operating and optimizing district energy and industrial heat and power networks, creating, and executing biofuel supply chains, carbon strategies, and detailed designs of power facilities. Adrian's involvement in low and zero carbon heat and power generation projects spreads across North America and the United Kingdom. In addition, Adrian is a Six Sigma Blackbelt and is skilled at creating and executing original business strategies from concept through construction into commissioning for regulated power processes. He has been engaged in the design, construction, and operation of first-in-class systems and contracts, increasing viability and leading cross functional teams with P&L accountability. Notably, Adrian worked on the design and permitting of the 2012 London Olympic energy centers and has experience trading power and renewable credits and purchasing heat and power systems.

Physical Location	Calgary, Alberta, Canada
Subtask Experience	C
Project Management Experience & Skillsets	Yes

Rogier Dieteren, B. Eng.
Utility and Governance Liaison

Skills & Qualification
Rogier brings over 20 years of experience as an environmental and acoustic engineer, focusing on innovation and sustainability, predominantly in the public sector. Rogier works with political and administrative leaders in local governments to develop district heating projects and advises on facilitation or direct participation in heating utility companies. Additionally, he has designed projects tackling Energy Poverty for various cities in The Netherlands. Rogier had a fundamental role in setting up the sustainable heating utility company 'Groene Net' in The Netherlands. He not only founded the company, but also saw the project through the implementation and operations stages as development director. Currently he advises the City of Amersfoort and the Province of North-Brabant on the policy and governance aspects essential to a successful deployment of district heating, as well as source and network ownership models. Rogier is known for “taking his job home”, where he has installed an energy storage system, heat pumps, and over 100 solar panels.

Physical Location	Sittard, The Netherlands
Subtask Experience	A, B, C
Project Management Experience & Skillsets	Yes

Susan Larson, P.E.

Technical Quality Assurance

Skills & Qualification
Susan Larson, P.E., is an experienced leader with 38 years in the energy sector. Her roles has included Project Manager and Engineering Manager for numerous district energy heating and cooling system projects and utility-scale generation projects. Susan is a licensed mechanical engineer, managing project feasibility studies, regulatory filings, permitting, design, bid documents, construction, and commissioning. She has managed DES projects at the Hennepin County Energy Center serving the Hennepin County Medical Center, and the addition of the Pittsburgh PNC Ballpark to the Pittsburgh DES. Susan has led steam, hot water, and chilled water plant and distribution system projects at the Minneapolis Energy Center and satellite plants, including restoring the Foster House, an 1880s National Register of Historic Places building, to house a central cooling plant providing chilled water to the Minneapolis Federal Reserve. Susan’s recent experience includes regulatory filings for self-generation and utility scale solar and battery storage projects. She has extensive experience in commercial building HVAC systems and energy efficiency upgrades.

Physical Location	Minneapolis, Minnesota
Subtask Experience	A, B, C
Project Management Experience & Skillsets	Yes

3. Stantec History

Founded in 1954, Stantec unites 28,000 professionals in over 400 offices who provide professional consulting services. As a global design practice focused on creating better design at every scale, our philosophy is simple and holistic: Begin with the end in mind, from planning to design to construction to operations. Our proactive approach leads to greater participation from everyone touched by these projects. We routinely take ambitious ideas and concepts and turn them into iconic projects.

Stantec employs intelligent, creative, and dynamic people. Each of our team members comes from a different background and offers unique experience and expertise. Our work begins at the intersection of community, creativity, and client relationships—but it’s the combined strengths and experiences of our people that create the foundation of our business. From this foundation, we collaborate to best support our clients.

Stantec has been providing services for climate change planning, mitigation, and adaptation for decades. Our focus on Climate Solutions helps our clients see every project through a climate lens. We then help them act on their findings with expertise in net zero design, climate resiliency modeling, nature-based climate solutions, and more.

SERVICES AND QUALIFICATIONS
We provide services in five business operating units: Buildings, Energy & Resources, Environmental Services, Infrastructure, and Water. The team that has been assembled for this proposal is pulled from several of these businesses. This is one of the strengths of Stantec. We routinely work across disciplines, drawing on diverse expertise, all while sharing a core project management framework and philosophy. We have gathered an international team of technical experts, hailing from the US, Canada, England, and the Netherlands, to augment our Ann Arbor-based resources. This group has direct and current experience working with clients specifically on geoexchange, complex hydrogeological investigations, and distributed heat sharing networks.

CAPACITY OF STAFF PROJECTS

Stantec's size, organizational structure and processes allow us the capacity and efficiencies to handle simultaneous projects. Stantec has an advanced, forward-loading project tracking system through our Oracle Enterprise Knowledge System that forecasts workloads months in advance. Senior management reviews the tracking system to assess resourcing trends. Hiring and targeted training is carried out to meet our anticipated long-term requirements. Project schedules and intermediate-term resourcing needs are reviewed weekly. Project team meetings are carried out throughout the week as projects arise. Large portfolios of projects are set up with a dedicated project team that is supported by our local, regional, and global offices. Progress and short-term resourcing needs for projects in each region are identified immediately which roll into the short-, intermediate- and long-term planning meetings. Stantec staffs approximately 25% above project workloads to provide contingency for large projects with tight timelines. This allows that there are staff available to meet project demands.

Any unforeseen conditions or deficiencies are quickly dealt with by the Project Manager (PM) and Executive Sponsor through an analysis of the issue and proactive communication with the local, regional, national team as appropriate. Outcomes include how to best increase resources, temporarily transferring resources from other Stantec offices (at no additional cost to our clients) or working additional hours (at no additional cost to our clients). This collaborative approach, supported by our depth of resources across all regions, ensures that impacts to a specific project will not adversely affect others.

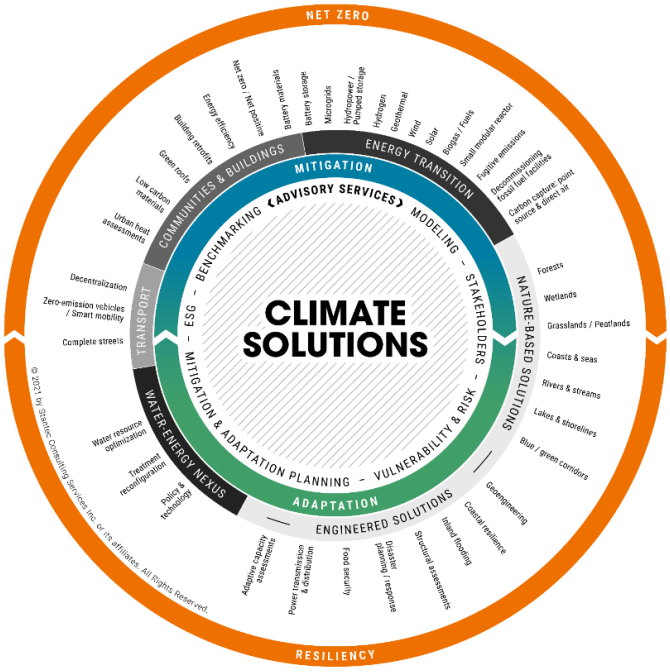
At Stantec, we firmly believe in maintaining the assigned resources throughout the life of a project. However, in the event a personnel replacement is required due to unforeseen circumstances, we will provide an equally, if not more, qualified and skilled resource for approval by the City and mobilize the replacement resource only after acceptance.

APPROACH TO CLIMATE SOLUTIONS

We recognize that to fulfill our promise to design with community in mind we need to consider climate change in our project work.

Stantec has assembled our climate services into what we call the Climate Solutions Wheel. Each of these areas represents an assemblage of services that we provide on a routine basis to our clients. By visiting the website below, you can further explore these services, see project examples, read blogs written by our experts, and generally learn more about our team. Our portfolio of work includes countless projects for which we've led sustainability efforts and/or collaborated with a partner to achieve certifications through design.

Learn more: https://www.stantec.com/en/markets/climate-solutions/explore-climate-solutions-wheel.



FIRM-SPECIFIC COMMITMENT TO SUSTAINABILITY

Our dedication to sustainability is mirrored in Stantec's corporate priorities. Stantec achieved carbon neutrality in 2022 and are working toward net-zero emissions. In recognition of our corporate sustainability efforts in 2023, Corporate Knights ranked Stantec number seven globally, and number one in the firm's industry peer group, placing the company among the top one percent in the world on sustainability performance.

The primary evaluation in the Corporate Knights ranking is a company's percentage of "clean" revenue. Stantec's high ranking reflects the progress we're making in supporting the United Nations Sustainable Development Goals (SDGs) through our project work.

We recognize our greatest potential for positive impact comes from the projects we deliver to clients.

1%	#1	Net Zero
RANKED AMONG TOP 1% IN THE WORLD ON SUSTAINABLE PERFORMANCE	**RANKED MOST SUSTAINABLE CORPORATION AMONG INDUSTRY PEERS**	**CARBON NEUTRAL FOR 2022 EMISSIONS, THEN NET ZERO**
2023 CORPORATE KNIGHTS GLOBAL 100	***2023 CORPORATE KNIGHTS GLOBAL 100***	***Our Operational Pledge***

STANTEC ANNUAL SUSTAINABILITY REPORTING

Stantec issues an annual Sustainability Report highlighting our contributions to and focus on sustainability for our key stakeholders. The report identifies and provides information about Stantec's material environmental, social, and governance (ESG) issues and achievements. The report is available on our website: https://www.stantec.com/en/about/sustainability/2022-sustainability-report.

4. Our Approach to Customer Service and Continous Improvement

At Stantec, operational excellence, quality, and cost efficiency for our clients are the cornerstones of our reputation. The best opportunity to provide value to our clients is through the technical advice we provide and through the efficient completion of our projects.

To support Ann Arbor for this project, we have identified Jeff Schroeder as Project Manager who has extensive experience leading large teams and complex projects as well as significant technical experience with District heating and Geothermal systems. Supporting Jeff, Curt Bjurlin will be the project executive sponsor. Curt and Jeff will check in regularly on how the project is going, but in addition, should the City have any issues or concerns they can reach out to both Jeff (primary point of contact) or Curt as required.

Within our continuous improvement program we measure performance of each project using Key Performance Indicators (KPIs), including quality, adherence to budget, and adherence to schedule. The Project Manager is responsible for the performance of the project. Real time KPIs are available to the Project Manager through information dashboards on Stantec's company-wide Enterprise Accounting System. The dashboards track budget spent compared to total project budget, project schedules, and several other KPIs related to the project.

Stantec has the following quality management and assurance programs in place:

- Company–wide ISO 9001:2008 Quality Management Registration
- Company-wide ISO 14001:2004 Environmental Management Registration
- Company–wide comprehensive Safety Management System
- A national client survey program
- National Service Teams and approved Senior Project Reviewers
- Documented quality reviews of all deliverables
- Quality audits internal to each office, from other offices and external to Stantec
- Preparation of Quality Management Plans
- Coordinated company-wide, regional and local staff training programs

Quality is planned, implemented, measured, reviewed, and modified on an ongoing basis for continuous improvement.

Upon completion of every project, the project team meets to debrief on the positive and negative aspects of the project, including:

a) Customer satisfaction
b) Cost Management Control (budget vs. actual)
c) Adherence to timelines
d) Other key performance indicators

By discussing performance upon project completion, the project team benefits from the lessons learned and are encouraged to continuously improve. KPI records of adherence to budget, schedule, and quality are retained by management and used to assess staff performance at annual performance reviews and interim quarterly staff reviews. Trends are tracked for all staff to determine training needs and to determine if additional management systems need to be put into place. Client satisfaction is discussed at the end of every project.

5. Project Team Experience

Stantec offers one of the most diversified and integrated Architectural, Environmental, and Engineering practices. We leverage this diversity to enhance our team's ability to deliver results in a collaborative, coordinated, and time-efficient manner. Our diversified global platform of professionals allows Stantec to quickly bring the necessary skillsets to the project as required.

We recognize that securing funding and leveraging tax credits and incentives is a critical component in helping the City affordably achieve these ambitious sustainability targets. Stantec has a North American Funding Program (NAFP) team comprised of more than 150 dedicated funding specialists in the US and Canada who work directly with our technical experts at various stages of project development to provide funding guidance. For 30+ years, Stantec has partnered with clients to successfully apply for grants and loans, **securing more than $6 billion in funding** for our clients' projects.

We provide the roles of key team members and their corresponding subtask experience in the following table:

Project Team Member	Roll on Project	Subtask A Experience	Subtask B Experience	Subtask C Experience
Jeff Schroeder	Project Manager	x	x	x
Curt Bjurlin	Exec. Sponsor	x	x	x
Caz Zalewski	Local Design Lead	x	x	x
Neil Bates	District Heating Technical Lead			x
Sean McInroy	District Heating Specialist	x	x	x
Jim Bererton	Geothermal Specialist	x	x	x
Brad Dawe	Geothermal Specialist	x	x	x
Richard van der Beek	Financial & Business Planning	x	x	x
John Griggs	Hydrogeologist	x	x	x
Adrian Davison	Energy and Utilities Designer/Operator			x
Rogier Dieteren	Utility and Governance Liaison	x	x	x
Amy Sackaroff	Engagement & Environmental Justice Lead			x
Mark Pascoe	Funding & Grant Expert			x
Susan Larson	Technical QA	x	x	x

B. Past Involvement with Similar Projects

STANTEC ANN ARBOR EXPERIENCE

- For more than 35 years, Stantec has partnered with the City of Ann Arbor on countless projects, including projects that have worked toward the City's commitment to achieve a just transition to community-wide carbon neutrality by the year 2030. Stantec has provided on-demand geothermal advisor services to the City of Ann Arbor to provide technical memos on geoexchange controls and geoexchange development beneath buildings.
- Stantec has provided architectural and engineering services for Ann Arbor Public Schools District (District) for the last four years. During that time, Stantec has supported architectural and engineering design and support services for over 1 million square feet of buildings for the District including the design of geothermal field systems. Our relationship began by supporting a series of air conditioning and lighting improvement projects across twelve buildings. Our scope of services expanded to include specific support during the pandemic for enhanced signage and mechanical and plumbing evaluation and support. During our partnership with the District we have supported an additional six projects including deferred maintenance, finish improvements, additional renovations, and commissioning activities. We are currently engaged in two additional capital projects associated with the 2019 bond campaign.
- Stantec was hired by the City for the Ann Arbor Hazard and Mitigation Plan and Climate Adaptation Plan. In addition to identifying cost, benefits, responsible entity, and timeline for the projects, we further enhanced the mitigation action plan by prioritizing mitigation actions using the following criteria: feasibility, equity (as tied to Ann Arbor Opportunity Index), climate resilience, public preference for project type, public perception of hazard of greatest concern, risk reduction, and cost.
- We performed an Ann Arbor Area Transportation Authority bus propulsion study, in which we completed emissions modelling to determine how greenhouse gases are reduced by a switch to zero emission bus technologies.
- We provided Ann Arbor Charter Township a water system reliability study. We started by utilizing the hydraulic network analysis (HNA) model to model the existing system and ended with a report that was submitted to the MDEQ.

STANTEC RELEVANT HYDROGEOLOGICAL EXPERIENCE

A unique aspect of this project is the presence of the 1,4 dioxane Gelman plume beneath many of the locations in which Ann Arbor would feasibly contemplate installing geoexchange systems to meet its sustainable heating goals. Stantec is one of the most experienced firms in characterizing and mitigating hydrogeological contaminant plumes. As evidenced by our current on-demand contract with the City of Ann Arbor, we have a team of deeply experienced hydrogeologists who have the professional expertise to navigate the complexities of contaminated groundwater plume management. Related to groundwater contamination is a concern for vapor intrusion into new or existing buildings. Below are several relevant projects Stantec has performed in Michigan that demonstrate our experience with investigating and mitigating concerns from environmental contamination for the natural and built environments.

MANUFACTURING SITE - HOWELL, MICHIGAN

Stantec has managed environmental investigation and remediation activities at an operating manufacturing facility in Howell, Michigan. A release from an underground storage tank (UST) associated with a former paint booth/cleaning area wash pit resulted in subsurface soil, groundwater, and soil vapor contamination due to chlorinated volatile organic compounds (VOCs). Stantec oversaw removal of the UST, and based on the results of a bench-scale pilot test, designed a solution to mitigate residual impacts to soil and groundwater. Based on post-implementation groundwater quality monitoring data, the mitigative measures resulted in a significant reduction of dissolved contaminant concentrations in the source area (up to 99% for some VOCs). Ongoing activities include monitoring on-site and off-site groundwater quality using an extensive network of monitoring wells and a volatilization to indoor air pathway investigation involving the periodic sampling of indoor air, sub-slab soil vapor points, and exterior soil vapor probes at the site.

FORMER DRY CLEANERS - LIVONIA, MICHIGAN

Stantec conducted response activities to investigate chlorinated VOC impacts to soil, groundwater, sub-slab soil gas, and shallow soil gas resulting from historic dry-cleaning operations at a former dry cleaners located within a strip mall. Investigation activities included the installation of soil borings, monitoring wells, sub-slab soil vapor points, and exterior soil vapor probes and the collection of soil, groundwater, and soil gas samples. Response activities included installation of a sub-slab soil vapor mitigation system, operation and maintenance of the system, collection of system data, and collection of effluent air discharge samples.

VI MITIGATION SYSTEM - SOUTHEASTERN MICHIGAN

Stantec was the engineering lead for the design of a vapor intrusion mitigation system to address chlorinated VOC impacts at a commercial building in southeastern Michigan. The design at the former dry cleaners required seven extraction points and a roof-mounted ventilation system capable of addressing a 5,500 square foot building.

FORMER MANUFACTURED GAS PLANT (MGP) – PORT HURON, MICHIGAN

Stantec conducted response activities to address environmental impacts to soil and groundwater associated with a former manufactured gas plant that was impacting an operating senior center. Investigation activities identified tar-like material in the subsurface adjacent to and below the senior center building. Response activities included the excavation of approximately 6,500 tons of subsurface materials and collection of approximately 50,000 gallons of impacted groundwater from a parking lot adjacent to the senior center building and from beneath the senior center building itself. Upon completion of the excavation and dewatering activities within the interior of the building, the excavation area was restored using poly sheeting, low permeable self-compacting cementitious flowable fill material, and a Liquid Boot vapor membrane to eliminate any potential future vapor intrusion issues.

FORMER MANUFACTURING FACILITY SOUTHWEST MICHIGAN

Historic use of degreasing solvents at a former manufacturing facility in Southwest Michigan resulted in trichloroethene (TCE) impacts to soil and groundwater. Stantec investigated and characterized the hydrogeology and nature and extent of TCE impacts at the site. Bench-scale testing completed by Stantec's treatability testing services group in Sylvania, Ohio was used to develop a site-specific solution using non-proprietary, low-cost, readily available materials to treat the contaminants. As the result of a successful pilot study, enhanced reductive dechlorination was selected as the remediation strategy to address the contaminated groundwater.

Degradation of TCE was observed across the treated area within 6 months after the full-scale application. The by-product from the degradation of TCE was observed to be successfully degrading to its final degradation product that is not of environmental concern. The remedy has resulted in over 95 percent of the contaminant mass-in-place to be degraded, and reductions of concentrations of TCE in groundwater continue to be observed.

A vapor intrusion mitigation system was designed and installed within approximately one fourth of a 100,000 square foot warehouse to address TCE in soil vapor. Pilot testing was performed to determine the design parameters for the mitigation system.

HIGHLIGHTED PROJECTS THAT SHOW PAST INVOLVEMENT IN SIMILAR WORK

Over the following pages, we've assembled a number of Stantec project profiles that are similar in size and/or other characteristics to the community-based district heating system scope requested in this RFP.

CLIENT REFERENCES

We have included references for all projects on the following pages. The three included in the table below are our preferred references.

	Reference 1	Reference 2	Reference 3
Firm/Agency Name	Ann Arbor Public Schools	Government of Canada (PSPC) – Energy Services Acquisition Program (ESAP)	Municipality of Amersfoort
Address	2555 South State Street Ann Arbor, MI 48104	Sir Charles Tupper Building, 2720 Riverside Drive, B400-10	Stadhuisplein 1, 3800 EA Amersfoort, The Netherlands
Telephone Number	Office: (734) 994-8118 Cell: (734) 548-4056	(613) 914-5843	+31 (033) 469 5111
Contact	Jason Bing, RA, LEED AP	Jason MacMudro	Mieke Coenen
Contact Title	Director, Capital Programs	Senior Project Manager	Projects Programme Manager

City of Amersfoort – Heating Feasibility Studies

Amersfoort, The Netherlands
2021 - ongoing

The city of Amersfoort is located in the middle of The Netherlands and has 160,000 inhabitants. Within Amersfoort, three private companies operate existing district heat networks. In light of a Bill currently being discussed in Parliament, which would enforce a minimum 50%+1 public ownership of heat networks, and the city's ambition to transition from individual gas-fired boilers to more sustainable solutions by 2030, Stantec has been asked to investigate how the City can facilitate or participate in the expansion of the heat network(s) in Amersfoort.

Stantec is performing availability and feasibility studies into potential sources (geothermal, aquathermal, biomass, residual heat, and heat from wastewater), modelling the network, and creating business cases to visualize impacts of various choices. In addition, our team is advising the City Council on governance choices available to them under the new law. Together with the City Council and one of the heat companies, Stantec has just submitted grant applications for national funding of two expansions of the network, to commence construction in 2024.

SIMILARITY TO ANN ARBOR PROJECT

For the City of Amersfoort, Stantec identified various ownership models for geothermal solutions, as well as the wider district heating network, ranging from fully publicly owned solutions to franchise models. Stantec is currently advising both the city's appointed administrators as well as the elected legislators on the policy and governance aspects key to a successful district heating deployment. Besides the governance track, Stantec's services on this project include a sources strategy track and a business case track. These show great similarity to C.3. Technoeconomic Study and elements of C.1. Pre-feasibility Screening Assessment and Model creation, including an analysis of potential heat sources as well as funding support analysis.

SUBTASK REFERENCE

A. Geothermal Technical Advisor
B. General Owner's Agent on Geothermal Projects
C. Networked Geothermal Feasibility Study

STANTEC TEAM MEMBERS

Rogier Dieteren, Richard van der Beek

CLIENT REFERENCE

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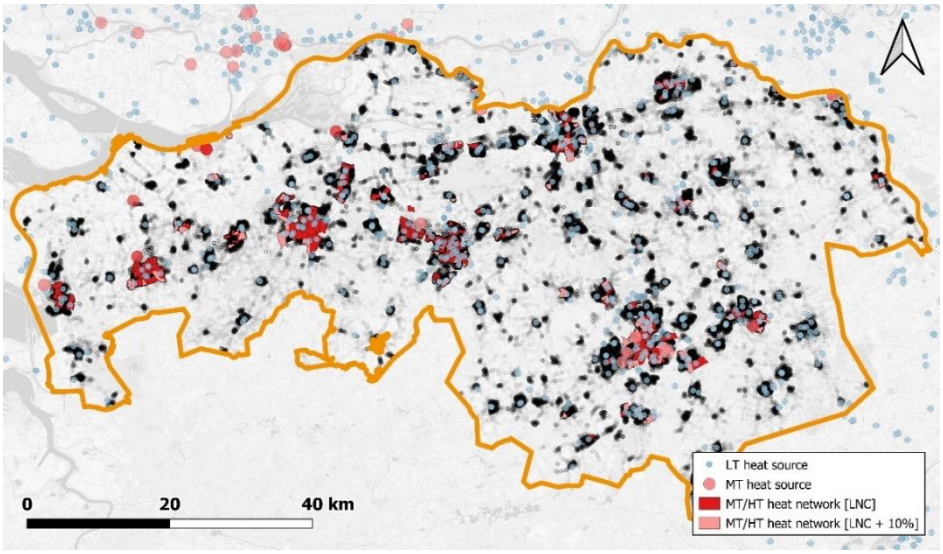
Province of North-Brabant –District Heating Feasibility

‘s-Hertogenbosch, The Netherlands
2023

The Province of North-Brabant is the third-largest in The Netherlands by population and second-largest by area. The heat transition is not new to the Province: in the western parts of the Province, the Amernet District Energy System currently supplies 2,085,160 MMBTU of heat to 51,000 households and 355 companies. Smaller networks exist in several other municipalities in the Province, and projects are currently in (pre-)development stages – some of which Stantec advises on.

In the Dutch political system, the energy and heat transitions have been delegated to local governments, but the Provinces are increasingly taking a more active role. In addition, legislation proposed in Parliament enforces new District Energy Systems to have a 50%+1 share public ownership, so all levels of (semi-)government, including the Provinces, now feel called upon to investigate what role they can perform in the heat transition. As such, The Province of North-Brabant asked Stantec to explore how the Provincial government can empower the development of local and regional District Energy Systems, how to organize this, and what the role of the Province and other public stakeholders within various governance structures could be.



Stantec interviewed policy officers in various municipalities, as well as representatives from stakeholders such as utility companies, grid operators, and public sector investment funds. We proposed several potential governance structures for a Provincial Heat Utility Company and supplied the Province with maps identifying existing DES (District Energy System), likely future district heating networks and locations of possible heat sources. Stantec also provided cost estimates covering heat sources, network distribution, and connections to end-consumers. These were provided as bandwidth estimates for three geographic scenario’s: 1) all neighborhoods, 2) all neighborhoods for which medium-to-high temperature district heating is the alternative with the lowest national costs, and 3) scenario 2 plus neighborhoods for which the national cost of medium-to-high temperature district heating is within 10% of the lowest national cost alternative. The heating energy generation was a mix of geothermal, aquathermal, and residual heat.

SIMILARITY TO ANN ARBOR PROJECT

The Province's questions cover governance and ownership models and policy and regulatory considerations – not just for geothermal but district heating in general. Some aspects will be taken up at the provincial level and some at the City-level instead. For instance, the Province could decide to establish a Provincial Heating Utility company which will then invest in City-level Heating Utility Companies. Stantec provided the Province with various governance models identifying how this could be enabled and how other (public sector) investors can be included, highlighting the benefits and drawbacks of each model. In addition, we identified the location of potential heat sources and a proposed primary network design and established cost estimates for different district heat options. As such, this project shows alignment with tasks A, B and C.

SUBTASK REFERENCE

A. Geothermal Technical Advisor
B. General Owner's Agent on Geothermal Projects
C. Networked Geothermal Feasibility Study

STANTEC TEAM MEMBERS

Richard van der Beek, Rogier Dieteren

CLIENT REFERENCE

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NCC LeBreton Flats - Community Energy Plan with District Energy

Ottawa, Ontario, Canada
March 2021 - March 2022

The NCC approved the Master Concept Plan for the redevelopment of LeBreton Flats (a brownfield and recently remediated 200 acre site) into a diverse and vibrant residential community supported by retail and employment opportunities and capitalizing on direct access to two light rail transit stations. Stantec was engaged to evaluate strategies for achieving a net-zero carbon community. These included various targets for energy efficiency (employing targets set by the City of Ottawa's High-Performa nce Development Standards), options for net-zero carbon district energy at the site including geothermal open and closed loop systems paired with ground source heat pumps, and the possibility of connecting to the nearby district energy systems.

The analysis includes detailed energy modelling of the proposed architype buildings, development of energy conservation measures (ECM's), as well as lifecycle costing and carbon analysis of multiple strategies to achieve a net-zero carbon community. The development was analyzed based on three stages of growth over a 30-year development timeline.

Comprehensive long-range forecasts of utility costs and emissions factors were employed to improve the accuracy of the analysis, and long-term weather forecasts were used to model the impacts of climate change on energy, emissions, and resiliency. The results of the analysis will be used to inform the policies that NCC will set for future development of the site over the next 30 years.

Stantec also supported the NCC in regards to potential ownership models for the District energy system, providing advise on the costs of energy, potential for funding, implementation options and project risk reviews.

SIMILARITY TO ANN ARBOR PROJECT

The scope completed for the NCC LeBreton Flats project closely resembles the scope for the City of Ann Arbor, showing alignment with tasks A, B and C. In particular full site modeling was completed to understand overall development energy requirements, ECM's were also incorporated into the models. Geothermal systems were reviewed and evaluated to determine potential energy generation potential. Well bore testing results were reviewed to understand the potential for geothermal. District heating and cooling network diagrams were completed to understand how the system would interact with the site. Cost estimates, life cycle costing and risk reviews were completed to support the business case for district energy. District energy ownership models were evaluated which considering pathways to implement construction.

SUBTASK REFERENCE

A. Geothermal Technical Advisor
B. General Owner's Agent on Geothermal Projects
C. Networked Geothermal Feasibility Study

STANTEC TEAM MEMBERS

Jeff Schroeder

CLIENT REFERENCE

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Canadian Federal Government – Ottawa – District Energy Modernization

Ottawa, Ontario and Gatineau, Quebec, Canada
2014 – Owners Engineering Scope Complete, Construction planned until 2026.

The $1.1 Billion Energy Services Acquisition Program (ESAP) district energy system modernization connects over 80 buildings (21 million sqft) in Ottawa, Ontario and Gatineau, Quebec. When fully built, this DES (District Energy System) will be one of the largest in North America and is expected to be carbon neutral by 2030. Stantec provided multidisciplinary engineering support, including project management, strategic financial advisory services, regulatory engagement, engineering, architecture, landscape, civil, geotechnical and geomatic surveys, and was further supported by specialized contractors. Stantec engaged with multiple stakeholders throughout the program, including client teams for smart buildings, energy services, utilities management, building operators, and users.

The main objective of the project is to modernize the DES as well as reduce greenhouse gas (GHG) emissions by moving away from steam and high temperature hot water to low temperature hot water, which allows for renewable thermal generation opportunities such as heat pumps (GSHP), geothermal, energy storage, and biomass generation. Three of the four energy centers are undergoing new construction, including the Modernized Gatineau Energy Centre that will be a fully zero-carbon supply energy source to both Quebec and Ontario customers. The Cliff Energy Centre, located beside the Supreme Court of Canada (see photo), is set to be a destination landmark. It is built to accommodate future energy generation capacity. It also supports public education and grants the public access to a large rooftop park and boardwalk with views onto the Ottawa river, where the building is built into the cliff face.

Stantec also supported connection to buildings that must accept new low temperature services and the installation of hydraulic separation and metering energy transfer stations. The impact to each building varies and guidelines were developed based on lessons learned to support consistency for building improvement goals.

Services provided include:

- Business case development and project risk analysis.
- Cost estimating and life-cycle cost options analysis.
- Evaluation of energy center modernization solutions including cogeneration, thermal storage, biomass, river water free cooling (geoexchange), system redundancy and similar energy and load management options.
- Feasibility and Schematic Designs, including detailed site surveys, assessment of high-pressure steam, condensate and chilled water distribution, seasonal peak calculations and testing, calibrated load calculations, systems options analysis, seismic evaluations, major equipment selections, system schematics, control diagrams, laser scanning paired with 3D modeling, and user group presentations.
- Development of technical and performance standards for district energy system modernization and conversion.
- Enhanced Detailed Design including development planning, renderings, cost estimating, phasing and implementation planning, and virtual 3D walkthroughs with facilities teams.

SIMILARITY TO ANN ARBOR PROJECT
We reviewed previous investigations and studies to understand nearly 100 years of existing infrastructure. Our scope included estimation of future building loads through energy modeling, and concept designs of piping networks and central equipment. The economics of options were evaluated with net present value and levelized cost of energy methods, allowing for direct comparison between options. A sensitivity analysis evaluated the impacts of uncertainty in the various model inputs, providing confidence in the results. Technical and performance standards for DES modernization were developed to support a consistent approach particularly in regard to connection of DES to buildings. Carbon emission savings were calculated to determine overall savings for the project.

SUBTASK REFERENCE
C. Networked Geothermal Feasibility Study

STANTEC TEAM MEMBERS
Jeff Schroeder

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City of Groningen – District Heating Expansion

Groningen, The Netherlands
2021 - ongoing

The capital of the north, Groningen is a university town with over 230,000 inhabitants, consisting of a moated mediaeval city center surrounded by a dense urban geography. The city is located just east of the Groningen gas field, one of the largest in the world. Until recently it was the base for natural gas production in The Netherlands.

Since 2021, Stantec has been advising the City Council and the local heat utility company (jointly owned by the City and the local water company) on expanding the existing district heating infrastructure to encompass all areas surrounding the city center. In the current phase, this involves the development of a business case and technical/financial model for connecting an additional 15,000 houses, the university hospital, university campuses, and new heat sources. Stantec is actively involved in securing funding for this project and participates in talks with funding bodies, public banks, and the European Investment Bank. Stantec has recently helped the City submit a grant application for € 22,000,000.

Geothermal energy is a politically sensitive topic and there is potential seismic risk in Groningen due to its gas mining history. Instead, the heat network will utilize solar thermal energy, residual heat from data centers and a sugar factory, and bio-fuel peak and back-up facilities. In the future, residual heat from the Eemsdelta Seaport will complement this.

SIMILARITY TO ANN ARBOR PROJECT

The work done for the Municipality of Groningen is similar to the technoeconomic study proposed in Subtask C.3. The business case and technical/financial model of the district heating includes setting investment estimates using quotes and nationally accepted characteristic values, as well as life cycle cost analysis, including operational costs, maintenance, business expenses, financing costs, and taxation. Lastly, Stantec similarly supported Groningen in assessing the various subsidies and grant schemes available for this project, nationally as well as internationally, and in applying for funding through the Ministry of Economic Affairs. The City of Groningen itself shows similarities to Ann Arbor: it is a university town which actively seeks to move away from natural gas at a rapid pace. Like in Ann Arbor, the University of Groningen, the Hanze University of Applied Sciences, and the University Hospital are anchor clients required for a district energy system deployment to succeed.

SUBTASK REFERENCE

C. Networked Geothermal Feasibility Study

STANTEC TEAM MEMBERS

Richard van der Beek, Rogier Dieteren

CLIENT REFERENCE

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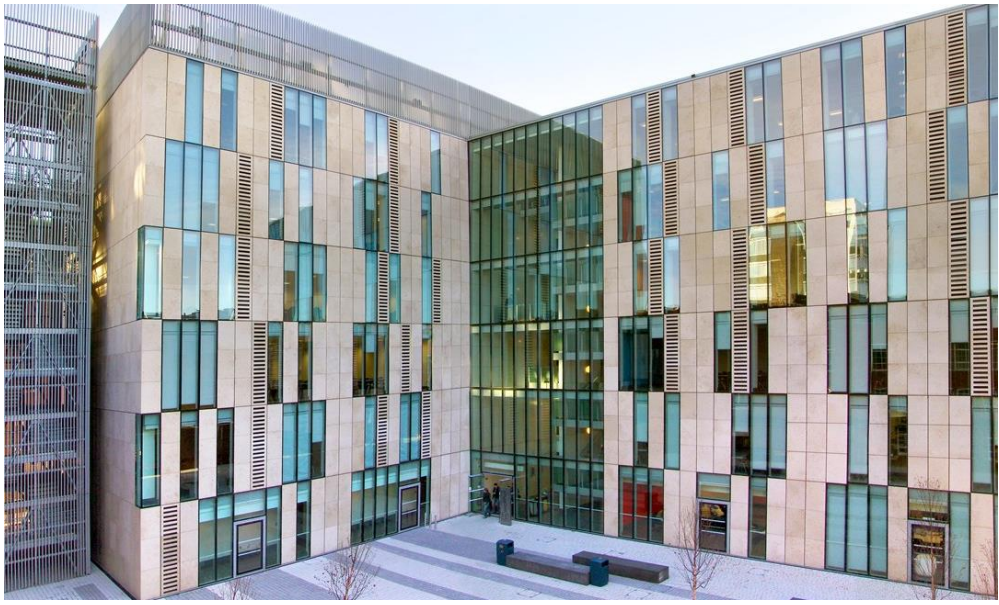
Telephone number: +31 05014015
Contact: Marco Attema
Contact Title: Strategic Advisor – Project Manager Energy Transition

Kingston University – Heat Decarbonization Plan

Kingston Upon Thames, London, England
2021 – ongoing



The Royal Borough of Kingston (RBK) has a population of roughly 170,000. A largely urban environment, it is home to Kingston University (the University), a highly recognized university that accommodates a wide range of facilities including Engineering and Life Science laboratory blocks.

Stantec has worked with the University to develop Decarbonization Strategies across four campuses providing the University with a series of projects and interventions to strategically phase out the University's reliance on fossil-fueled heating and hot water generation and support the delivery of a Net-Zero campus by 2038.

Stantec have subsequently been appointed to provide the University with specialist Mechanical, Electrical and Sustainability Consultancy to implement the recommendations of the Heat Decarbonization Plan across their main Penrhyn Road campus, including the construction of a new Energy Centre.

Key to the success of this system is the connection to the proposed District Heat Network. Our team has worked closely with RBK and their specialist consultant, to inform the design criteria and business case. The system will utilize heat recovery from a local foul water treatment works, combined with heat pumps, which will be a first in the UK. The project has required a top-down and bottom-up approach to future estate planning. An appreciation of the holistic influences on decarbonization strategies by the University team means that the road map will be integrated and deliverable – alongside the other drivers on a large-scale university campus.

SIMILARITY TO ANN ARBOR PROJECT
Similar to elements of the Ann Arbor project, this scheme involved the detailed energy demand assessment of non-residential buildings of varying occupancy patterns, use type and therefore energy profiles. Existing meter data was available for some elements, whilst others required modelling and simulation to determine the existing demand profiles. Scenarios were then investigated to ascertain potential energy improvement enhancements, including improving building fabric performance, removal of gas fired boilers and hot water heaters (and replacing with electric heat sources), and supplementary photovoltaic arrays to minimize operating cost implications.

The Decarbonisation Strategy concluded with a series of recommended interventions, potential timeline of projects, capital cost profiling and associated carbon emissions reduction profile stretching form 2023 through to 2035, in order to meet the clients Net Carbon Zero 2038 commitments.

The scheme has progressed from strategy stage to the initial design stages for a new Energy Center comprising Air Source and Water Source heat pumps, design due to complete Q2 2024.

SUBTASK REFERENCE
C. Networked Geothermal Feasibility Study

STANTEC TEAM MEMBERS
Neil Bates

CLIENT REFERENCE
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Telephone number: +44 78 245 29511
Contact: Will Begg
Contact Title: Energy Manager

Sacramento Municipal Utility District (SMUD)

Sacramento, California
July 2010 – June 2013

The Sacramento Municipal Utility District - East Campus - Operations Center (SMUD – EC-OC) includes 350,000 square feet of building space on a 51-acre site located southeast of downtown Sacramento, California. Structures include a six-story office building and several one to two story maintenance and operation buildings. The site was designed to achieve net zero energy and is LEED Platinum certified. The campus uses 35% less energy than a similar facility designed to code minimum standards, at a construction cost similar to “traditional” campuses.

CAMPUS SCALE ENERGY STRATEGIES
A central Utility plant (CUP) provides hot and chilled water for all buildings on this 51-acre campus. The CUP was designed as a hybrid system, combining a heat pump, heat recovery chillers, cooling towers, thermal energy storage tanks, and a horizontal geofield. This hybrid CUP was designed to provide superior energy performance compared to individual building distributed HVAC systems and allows for ease of maintenance and flexibility for expansion.

Campus-wide heating is accommodated by heat transfer from the cooling loop to the heating loop through two heat recovery water chillers (HRWC). When the instantaneous cooling load is insufficient to meet the demand, additional source energy is extracted from a horizontal ground field. When the ground field is drained of energy, or when the heat recovery chillers are less efficient, additional heat energy is extracted directly from the atmosphere through a high efficiency Air Source Heat Pump (ASHP). To optimize the utilization balance between HRWC and ASHP, the thermal energy storage tanks (TES) are charged with heat when the ambient temperature is warmer and then discharged during extreme cold conditions.

The site cooling is accommodated by the HRWCs, with heat rejection targeted first to the geoexchange field and second to the cooling towers. The cooling towers consist of two cells with independent fans and spray pump circuits. An elaborate control sequence minimizes the total cooling tower energy required to achieve a given heat rejection load.

Solar thermal collectors provide domestic hot water for all the buildings as well as a truck wash for fleet vehicles.

As a public utility, SMUD stipulated that no compressorized cooling would occur on site between 2-8 pm. This was a direct response to the desire to minimizing the impacts of constructing additional electric peaker plants.

Power for the Campus is provided by a 1.2 MW PV array, which forms the roof of the shade structures above the employee parking lot. Great care was taken in the placement of the arrays to provide maximum efficiency and avoid common problems. When rows of trackers are arranged in parallel, they often cast a shadow onto the next row. Due to the unique properties of PV modules in an array, this loss of energy is magnified: a 5% increase in shade results in a 30% reduction in power. To avoid this, the trackers can stop following the sun directly, slowly pointing horizontally to avoid shading. In addition to providing a renewable energy source the shade provided by the PV array is used in reducing the heat island effect of the employee parking to meet local shading coverage requirements.

SIMILARITY TO ANN ARBOR PROJECT
The approaches applied to the SMUD campus demonstrate a holistic approach to the development of the district energy system. Identification of existing localized resources allowed for a lower first cost. In the SMUD case, the horizontal geoexchange system was installed as the site was backfilled. Each site and district network will have unique resources and requirements. Application of a combination of technologies and solutions will maximize the local resources, overcome sites specific constraints, and deliver the lowest levelized cost of energy to the end consumers.

SUBTASK REFERENCE
A. Geothermal Technical Advisor
C. Networked Geothermal Feasibility Study

STANTEC TEAM MEMBERS
Jim Bererton

CLIENT REFERENCE
Firm/agency name: Sacramento Municipal Utility District
Address: Sacramento California
Telephone number: (916) 452-3211
Contact: Doug Norwood
Contact Title: Senior Mechanical Engineer

C. Proposed Work Plan

Project Management Methodology

Based on our past project experience we anticipate success in this project will be dependent not only on technical excellence but also project management.

PROJECT MANAGEMENT & CONTROL MEASURES

We have learned that the best solutions come from a design process that leverages the expertise of all project stakeholders. This requires a commitment to personal relationships and continuous communication. Jeff Schroeder will lead the delivery of this project. His organizational approach is comprehensive but flexible, built on experience and refinement. It starts "big-picture" to create a project framework and results in specific and actionable tasks with associated accountability. Just like our management approach, continuous communication through a defined organizational process allows for the stakeholder and design team to make quick decisions that align with the overall project goals.

A critical aspect of supporting the city will be to maintain an open line of communication. Jeff will regularly correspond with the city's representative to provide progress updates, discuss potential obstacles with meeting project milestones, provide a current assessment of the remaining budget, and obtain feedback on draft reports. Stantec will also include adequate time in the project schedule for the City to review draft reports/ drawings and provide feedback that will be incorporated into the final documents. Jeff will use Microsoft Project, Stantec's Resource Management Tool, and regular meetings to schedule and manage resources throughout the project.

Stantec has an ISO 9001-certified Project Management Framework (PM Framework, in Figure 1), which we apply to every project. The framework starts with the proposal stage, where we develop our proposal and work plan, and ends with the project closeout. Our workplan forms the basis of our schedule. It is expected this preliminary schedule will be discussed during the project kick-off phase in consultation with the NCC team. The efforts during the kick-off phase of the project will lay the foundation and provide the tools to enable overall project success.

STANTEC PROJECT MANAGEMENT FRAMEWORK	
0 POINT	Prepare a proposal that includes a preliminary Project Plan including scope, project budget, resources, deliverables, and schedule. Conduct and document an independent review of the final proposal as required by contract value and risk triggers
1 POINT	Obtain written instructions to proceed and execute an approved written contract. Obtain written subconsultant / subcontractor agreements (if applicable).
2 POINT	Prepare a Project Plan to an appropriate level of detail. Conduct and document reviews of the Project Plan as required by contract value and risk triggers.
3 POINT	Establish hard copy and/or electronic project record directories and file project records accordingly.
4 POINT	Complete a Health, Safety, Security & Environment (HSSE) risk management assessment and documentation for all projects involving field work.
5 POINT	Monitor the project financials on a regular basis. Follow best practices for managing project financials, including time charges, work in progress (WIP), accounts receivable (AR), and estimates to complete (ETC).
6 POINT	Obtain the client's written approval on scope of service changes in a timely manner. Conduct and document reviews of change orders as required by contract value.
7 POINT	Conduct and document a quality review of final deliverables prior to issue.
8 POINT	Conduct and document an independent review of all final deliverables prior to issue.
7 & 8 POINT	Quality versus Independent review.
9 POINT	Close off the project financials and close out the project files.

Figure 1

In conducting his work, Jeff will complete the following responsibilities:

- Provide a Health and Safety and an Environmental Protections Plan to endeavor that the project has a positive impact on people that are most affected by them.
- Perform all work to Industry Standards as well as any additional codes, standards or manuals identified or developed over the course of the contract, in compliance with our ISO 9001-registered PM Framework.
- Perform quality control working with Stantec's QA/QC team (independent senior technical team members).
- Manage schedule: effective work schedule compliance will be achieved through the implementation of a comprehensive planning and scheduling program that will be initiated at the project kick-off meeting.
- Control cost: all project effort and direct costs will be tracked and managed through the Stantec Oracle system using detailed Project Cost Dashboards and reports available on demand to Jeff. Jeff will review and will alert the city should there be any potential concerns foreseen through the specific Estimate to Completes and Cost Performance Indicators at each stage of the project.

The key responsibilities of Stantec's PM are client satisfaction, budget, schedule, and quality.

Schedule and Data/Material Delivery

Upon notice to proceed, Stantec will schedule a kickoff meeting with the City during which schedule, scope, and deliverables will be reviewed and updated. This meeting will lead to clear direction for the project. As the project proceeds, meetings will be held following draft milestone submissions to present and discuss our recommendations prior to completing the final version of each submission. Full review of the draft deliverables at an early stage in the project will bring significant value to meeting the City's goals of an implementable sustainable heating system. The draft project schedule provided in Figure 2 reflects how and when task will be completed or delivered to the City**.**

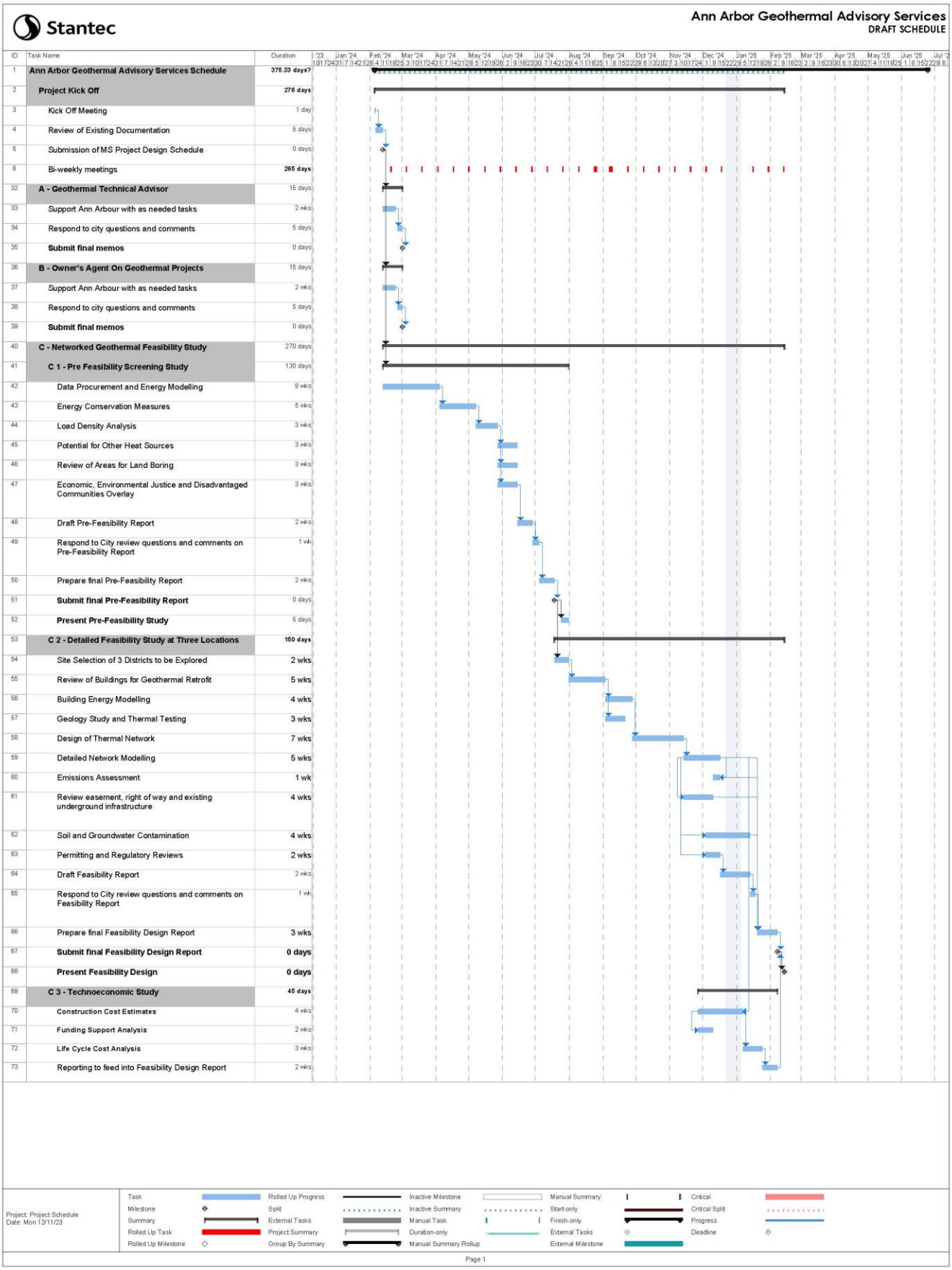

Stantec
Ann Arbor Geothermal Advisory Services
DRAFT SCHEDULE
ID
Task Name
Duration
1 Ann Arbor Geothermal Advisory Services Schedule 375.33 days?
2 Project Kick Off 276 days
3 Kick Off Meeting 1 day
4 Review of Existing Documentation 5 days
5 Submission of MS Project Design Schedule 0 days
6 Bi-weekly meetings 265 days
32 A - Geothermal Technical Advisor 15 days
33 Support Ann Arbour with as needed tasks 2 wks
34 Respond to city questions and comments 5 days
35 Submit final memos 0 days
36 B - Owner's Agent On Geothermal Projects 15 days
37 Support Ann Arbour with as needed tasks 2 wks
38 Respond to city questions and comments 5 days
39 Submit final memos 0 days
40 C - Networked Geothermal Feasibility Study 270 days
41 C 1 - Pre Feasibility Screening Study 130 days
42 Data Procurement and Energy Modelling 8 wks
43 Energy Conservation Measures 5 wks
44 Load Density Analysis 3 wks
45 Potential for Other Heat Sources 3 wks
46 Review of Areas for Land Boring 3 wks
47 Economic, Environmental Justice and Disadvantaged Communities Overlay 3 wks
48 Draft Pre-Feasibility Report 2 wks
49 Respond to City review questions and comments on Pre-Feasibility Report 1 wk
50 Prepare final Pre-Feasibility Report 2 wks
51 Submit final Pre-Feasibility Report 0 days
52 Present Pre-Feasibility Study 5 days
53 C 2 - Detailed Feasibility Study at Three Locations 150 days
54 Site Selection of 3 Districts to be Explored 2 wks
55 Review of Buildings for Geothermal Retrofit 5 wks
56 Building Energy Modelling 4 wks
57 Geology Study and Thermal Testing 3 wks
58 Design of Thermal Network 7 wks
59 Detailed Network Modelling 5 wks
60 Emissions Assessment 1 wk
61 Review easement, right of way and existing underground infrastructure 4 wks
62 Soil and Groundwater Contamination 4 wks
63 Permitting and Regulatory Reviews 2 wks
64 Draft Feasibility Report 2 wks
65 Respond to City review questions and comments on Feasibility Report 1 wk
66 Prepare final Feasibility Design Report 3 wks
67 Submit final Feasibility Design Report 0 days
68 Present Feasibility Design 0 days
69 C 3 - Technoeconomic Study 45 days
70 Construction Cost Estimates 4 wks
71 Funding Support Analysis 2 wks
72 Life Cycle Cost Analysis 3 wks
73 Reporting to feed into Feasibility Design Report 2 wks
Project: Project Schedule
Date: Mon 12/11/23
Task
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress
Split
External Tasks
Project Summary
Group By Summary
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Critical
Critical Split
Progress
Deadline
Page 1

Figure 2

Communication and Coordination

From our project managers' preliminary meeting to the successful delivery of the project, our project plan will minimize risk and sustain quality control. We propose bi-weekly check in meetings between Stantec's and the City's project managers, both of whom will act as conduits for either discipline staff (on the Stantec side) or stakeholders (on the City side). The two project managers will convene project meetings as required, each mobilizing staff from their respective organizations. Clear communication builds strong relationships—ones where we are all moving in the same direction to ensure a project's success. Minutes will be recorded and issued within 24 hours of each meeting so the City will remain well-informed. The work activities of the design team will be coordinated by the project manager. Each activity will be undertaken by an experienced individual who has the responsibility for accurately and correctly completing his or her component of the project.

Outreach and Engagement

Community engagement is required for a successful district energy project. Key stakeholders must be consulted at an early stage to inform project outcomes. For many inhabitants, it is important that they, as end-users, can play a role in the decisions that impact their user experience. Local regulators often place value on the influence of local inhabitants on policymaking, which gets more important when personal residences of citizens are being impacted.

The engagement formats will be defined throughout the project, led by our engagement and environmental justice specialist, Amy Sackaroff. Amy will tailor outreach and engagement activities to the needs of the stakeholder and will rely on the City's past successes in creating the A^{2}ZERO plan. Techniques may include information sessions, surveys, newsletters, or walk-in open office discussions. Depending on the specific situation, one option would be to deploy Stantec's Serious Games tools, such as the Climate Chase Game 2.0, to create awareness and inform stakeholders. The Serious Games tool has been used for similar activities in Stantec Dutch sustainable heating programs and has been translated for use in the United States. Stantec will work with the City of Ann Arbor to design an approach to public engagement that generates meaningful feedback in a format that respects the time stakeholders have already provided and the needs of the most vulnerable populations.

A discussion of community engagement would not be complete without addressing environmental justice (EJ). Stantec will conduct a desktop analysis to identify low-income, minority, and other vulnerable populations with the goal of identifying where more equitable and inclusive approaches can be used in communication strategies, outreach activities, and other engagement efforts. Stantec will review ongoing engagement strategies, as well as input provided to date by stakeholders and the public to develop recommendations on how the proposed project can infuse equity into the project development process. The desktop assessment will also identify notable community features such as schools, senior centers, and other community features to assess whether these locations could be viable locations to display project information and/or host public meetings.

Stantec and Ann Arbor Relationship

Stantec's Ann Arbor office was established in 1923 and has been working with the City of Ann Arbor for the last several decades (at least back to the 1950's). We are currently under contract with the Office of Sustainability and Innovations to provide on-demand geothermal advisor services. We also hold a Master Services Agreement with the City for the Water Treatment Plant, which includes plant and dam work. Finally, Stantec holds a Master Services Agreement for Construction inspection. Over the years, we have provided transportation, linear infrastructure, treatment plant, parks & recs, environmental services, and survey services.

The execution of this program will build upon those past successes. The City will have access to Jeff as the primary point of contact, and will use Curt as the secondary point of contact and to provide feedback on team performance. This two-contact approach will give the City the ability to suggest course correction as necessary.

Approach & Methodology

A. GEOTHERMAL TECHNICAL ADVISOR

Technical Leads: John Griggs, Jim Bererton, Sean McInroy
Timeline: on-demand

As the City's Geothermal Technical Advisor, Stantec will build upon our existing work for the City as on-demand geothermal advisor. To date, we have produced two technical memos covering topics associated with installing geoexchange systems under buildings and mitigating existing soil contaminant plumes. Upon notice to proceed for this contract, we would review these first memos with the City and discuss any improvements needed. In general, our approach to execution of advisory services entails confirming the scope of each task, the preferred mode of response, whether memorandums, technical reports, and/or presentations, the targeted audience, and the assigned qualified resource(s). Stantec will identify any additional information required from the City and agree on a due date for task deliverables. When requested by the City, Stantec will provide an hourly estimate for the specific task.

The Stantec team is familiar with a wide range of regulatory, environmental, and technical challenges associated with geoexchange. Having participated in the development of national and international standards and guidelines for geoexchange, the Stantec team is well equipped to navigate the City and the authority having jurisdiction (AHJ) to the safe and effective implementation of district scale geoexchange systems. Engagement between the subject matter experts, the City, and the AHJ allows for a collaborative definition of site-specific requirements while addressing environmental issues supporting a safe deployment for the public.

We have ample experience of various district heating governance and ownership models, ranging from the publicly owned, public-private partnership, and franchise models. Through our recent projects in The Netherlands we have also developed skills in adapting ownership models in an ever-changing legislative landscape and creating new governance structures based on conversations with stakeholders and potential public sector investors. As technical advisor we will explore what geothermal ownership model would be most suitable for Ann Arbor while also supporting development of a regulatory framework for district geothermal.

B. GENERAL OWNER'S AGENT ON GEOTHERMAL PROJECTS

Technical Lead: Neil Bates, Sean McInroy, Richard van der Beek, Rogier Dieteren
Timeline: on-demand

As the City's Owner's Agent, Stantec will assist the City in investigating specific geothermal expansion opportunities, challenges, and general growth trajectories, and specifically to provide on-demand support for identified tasks. The Stantec team is resourced and organized to address technical and economic questions, including key policy and governance aspects related to the design and future deployment of geothermal. These resources will be available to evaluate geothermal project plans and provide input regarding design, construction, and long-term maintenance. The process established in Section A. Geothermal Technical Advisor above will be utilized to manage timely and responsive deliverables to on-demand Owner's Agent questions and assignments.

Our history with the City and our depth of knowledge in horizontal underground infrastructure will support a review of regulatory and permitting considerations regarding proposed right-of-way (ROW) to accommodate existing and proposed public and utility infrastructure.

As Owner's Agent, we will be in the position to leverage our experience and scope with public engagement and outreach (described in the Outreach and Engagement section of this proposal) to effectively increase awareness of the heat transition and geothermal energy and to build support among the local population, as well as other stakeholders, for the creation of a district energy system.

The City of Ann Arbor will also be able to benefit from Stantec's experience in establishing frameworks to finance geothermal installations, such as setting appropriate rate structures, leveraging tax credits or incentives, cultivating partnerships, and applying for grants. For 30+ years, Stantec has partnered with clients to successfully apply for grants and loans. Mark Pascoe from Stantec's North American Funding Program (NAFP) team will work directly with our technical experts at various stages of project development to provide funding guidance as a critical component in helping the City of Ann Arbor to affordably achieve their ambitious sustainability targets. We have the experience and expertise to assess Inflation Reduction Act (IRA) funding, which is available in the form of competitive grants, loans, and technical assistance.

C. NETWORKED GEOTHERMAL FEASIBILITY STUDY

1. PRE-FEASIBILITY SCREENING ASSESSMENT AND MODEL CREATION

1.1 through 1.3 Collect Data, Data Cleaning, Correlation, Association, Stock-Level Building Energy Modeling, Model Calibration

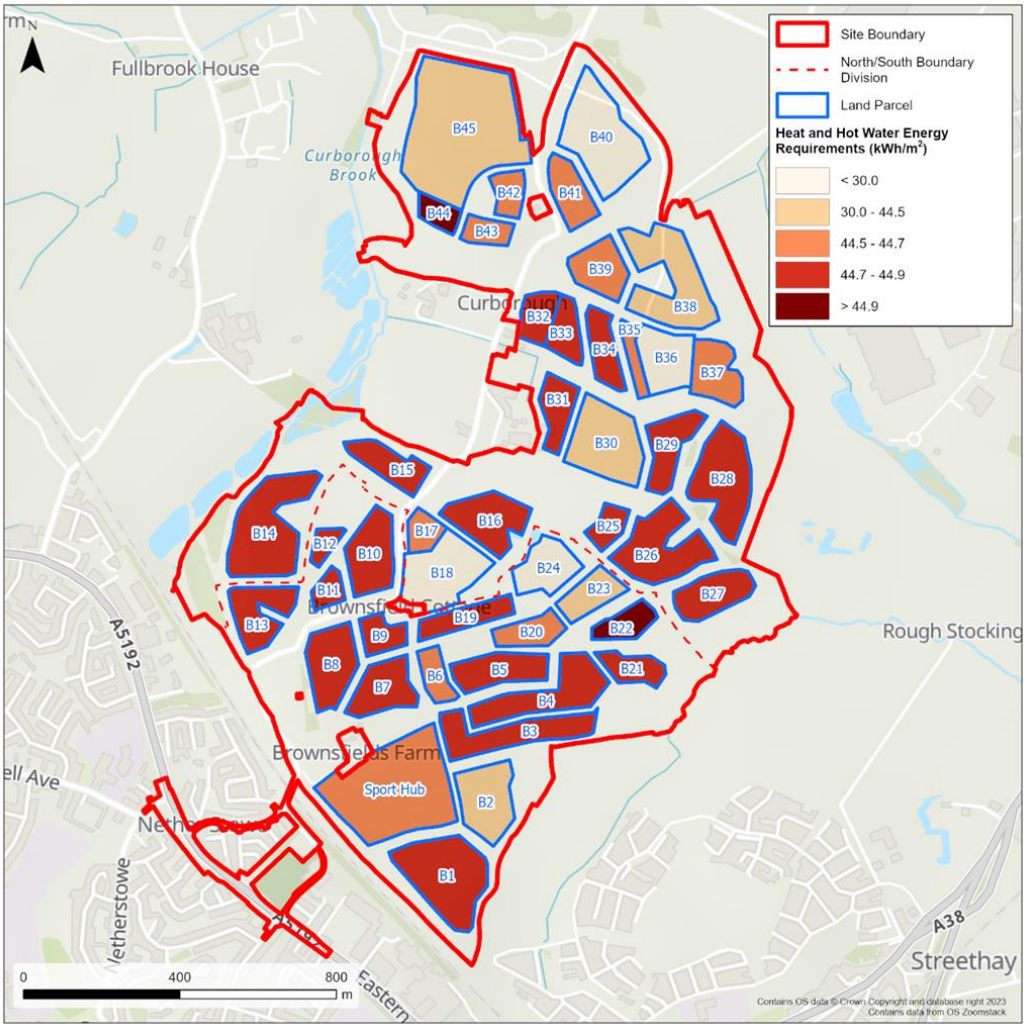
Technical Lead: Neil Bates
Timeline: 6-8 weeks.

Assessing the heat demand and its profile - both now and in the future - is key to developing a successful heat network. At Stantec we have created load data maps and screening evaluations for new developments as well as existing campuses.

For the city of Ann Arbor, we will create models to develop energy and thermal profiles for different building archetypes, initially utilizing open-source data. Energy estimates will be developed using Department of Energy (DOE) prototype building energy models (ComStock). The DOE maintains a refence database for commercial and residential building energy models intended for baseline assessment of building energy loads, comparison of different energy interventions, and evaluation of energy codes and standards. This approach relies on standard occupancy patterns, historical and future weather data, and industry recognized datasets. Based on the archetype models, we will then scale based on building area for like buildings to determine heat demand densities by neighborhood.

Depending on data availability, calibration of models using multi-year historical meter and weather data applying a linear regression fit could be completed to provide a more accurate load estimate.

Development of a screening tool to review district geothermal potential will utilize our Stantec geographic information systems (GIS) team to develop visualization of heat demand densities by neighborhood (see example below). Utilizing the above modeling we will overlay community scale information onto a map for decision making regarding district network routing.



1.4 Apply Energy Conservation, HVAC Upgrade Measures

Technical Lead: James Bererton, Jeff Schroeder
Timeline: 4-6 weeks

Stantec approaches energy conservation using the “Energy Hierarchy”:

- **“Be Lean” -** reduce demand through passive measures such as building fabric standards;
- **“Be Clean”** - utilize energy in an efficient manner, such as low energy lighting, efficient heating circulation or improved controls systems; and
- **“Be Green”** - utilize renewable energy sources.

Energy conservation measures (ECM’s) will be identified and reviewed based on the different building architypes and the age of the building. ECM’s will also be evaluated based on their ease of implementation and disruption to occupants.

Heat pump units at the building level is a likely choice when connecting to a geothermal district system. Stantec will explore multiple solutions to support the retrofit of heat pumps into the different building architypes within the city.

1.5 Perform Load Density Analysis

Technical Lead: Neil Bates,
Timeline: 2-4 weeks

Updates to the representative architype energy models will be completed based on the selected energy conservation measures. As the models are completed, GIS mapping will be employed to provide graphical analysis of the existing demands, similarities in demands, and how this may change in the future.

Identifying the heat demand densities graphically will inform the preferred locations of district heat, heat generation centers and inform options for routing heat network piping.

1.6 Identifying Other Heat Sources

Technical Lead: Caz Zalewski, Neil Bates, Jeff Schroeder, James Bererton
Timeline: 2-3 weeks for initial review

When developing large scale heat networks, a single source of heat is not preferable, due to financial, space, resiliency, and network pressures. As such, a “modular” or “nodal” approach to heat generation is often evaluated. Stantec will review other potential heat sources such as sewage heat recovery, data centers, industrial process heat, and Municipal Solid Waste (MSW) for use within the district heating system network. A high level “RAG” (Red, Amber, Green) assessment comparing heat sources across criteria such as relative construction, maintenance and operation costs, relative impact (carbon saving, versus heat output), space demand and maintainability will be completed to help in the overall evaluation of heat options. Preferred heat sources will be added to the GIS map developed in tasks 1.4/1.5 above.

As an additional service (not in scope), Stantec could analyze the electrical network to identify consumers with high potential for cooling demands (excess heat that can be harnessed).

1.7 Identify Green Spaces, Open Spaces, and Other Possible Land for Boring

Technical Lead: Caz Zalewski, Neil Bates, Sean McInroy, James Bererton
Timeline: 2-4 weeks

We will utilize GIS mapping, local knowledge and discussion with relevant stakeholders to identify potential locations of geoexchange boreholes. These may include the parking areas for Michigan Stadium or Briarwood Mall or open green spaces such as the University of Michigan Golf Course or Fuller Park or Buhr Field. Options such as these must be considered carefully to assess the likelihood for future development or damage to valuable land and/or ecosystems.

Open spaces and green spaces are not the only viable locations for geoexchange fields. Locating geoexchange fields beneath parking structures has recently become more viable with advances in coil tubing drill rigs in place of conventional drill pipe. These locations also avoid future development conflicts that are possible with open or green spaces. Stantec would welcome the discussion of this potential opportunity with the city.

Location viability will be evaluated against subsurface geological conditions (contaminant plumes), and formation thermal performance parameters.

1.8 Identify Economic and Environmental Justice, Disadvantaged Communities

Technical Lead: Amy Sackaroff
Timeline: 2-4 weeks to prepare overlay map – engagement ongoing throughout the project

Stantec will use a variety for resources to identify populations with environmental justice (EJ) concerns (i.e., low-income and minority populations) and other sensitive/vulnerable populations including children, seniors, and people with disabilities. We will review demographic data including race/ethnicity, income, education level, ability to speak English, age, health, homeownership, median home values, vehicle availability, internet access, and overall social vulnerability. Stantec will also review available zoning, land use plans, transportation plans, and aerial mapping. Additional data sources may include The City of Ann Arbor Residential Zoning Analysis completed in 2019, local/regional planning documents, and GIS data This analysis will also cross-reference screening tools including the USEPA’s EJScreen, the CEQ’s Climate and Economic Justice Screening Tool, and the Neighborhoods at Risk interactive tool by Headwaters Economics.

Stantec will utilize this data to create a GIS overlay of vulnerable populations that will be used with the maps produced in Section 1.5. We will verify draft results with City personnel and project stakeholders and revise as needed per comments.

Stantec will also develop a memorandum that summarizes the methodology used to create the EJ GIS overlay. The memorandum will describe areas for focused engagement of populations with EJ concern and note any specific demographic, economic, or cultural factors for each community. As a follow-on step to a potential district energy system (DES) governance model, Stantec will explore the applicability of the Michigan Energy Assistance Program to provide DES heating bill payment assistance to low-income residents.

1.9 and 1.10 Final Recommendations and Review with the City

Technical Lead: Jeff Schroeder, Neil Bates
Timeline: 2-4 weeks

The pre-feasibility district heat screening analysis will be concluded with a draft and final submission of a report and mapping tool. The report will include the study approach, findings, and recommendations.

Throughout the study we will liaise closely with the City, updating on current progress and findings and collating feedback from client meetings. As conclusions and recommendations are reached, a formal report will be prepared alongside a summary presentation that will be delivered to the city officials.

Outcomes of the study must consider the wider community. District heating is a relatively new approach to the typical United States citizens, which can worry potential customers, delay adoption, and impact the business project plan. The messaging behind system resilience, cost, and emergency procedures must therefore be carefully prepared to reassure stakeholders.

Stantec can participate as technical expert in stakeholder meetings with key groups as an out-of-scope service if this is desired. As part of this additional service, we can develop presentations and other collateral in addition to collating and responding to feedback.

2. DETAILED FEASIBILITY STUDY AT THREE LOCATIONS

2.1 Working with OSI and Public Services identify three geographic areas to perform a detailed analysis of geothermal feasibility

Technical Lead: Jeff Schroeder, Neil Bates
Timeline: 2-4 weeks

From the results obtained as part of task C.1: Networked Geothermal Feasibility Study, Stantec (in collaboration with OSI and Public Services) will review and identify three geographic areas of the City to perform a detailed district networked feasibility study. A heat map will be developed to illustrate the demand density vs. potential heat generation sites for the City. This heat map will be used to help identify the three geographic areas for study.

2.2 Assess potential for retrofit of building mechanical systems to district geothermal

Technical Lead: Jeff Schroeder, Neil Bates, James Berertон, Sean McInroy
Timeline: 5 weeks

Stantec has completed a significate number of district energy building retrofits to support both new and existing building connections across North America and Europe. Retrofits of existing buildings can be a challenge; however, we typically include the following key steps in our methodology when surveying and categorizing community-use buildings:

1. Space use – what are building operating hours and is the occupancy steady or sporadic?
2. Building age – is the building envelope well-insulated?
3. Type of mechanical system – is the system hydronic water, steam, electric, or air-side heating?
4. Equipment age– are the existing mechanical system components consistent with energy efficiency standards?
5. Controls – is there an existing control system (energy management system)?
6. Number of heat-generating systems – will additional utility metering be needed?

Each of these categories helps to develop an understanding opportunities and limitations. Building surveys at this stage will remain high-level, however further potential exists within the detailed design stage (not in scope) to target critical zones for retrofit within buildings that would reduce building connection retrofit costs. Studies[1] of buildings converted to geoexchange heating have demonstrated that buildings can be retrofitted at a lower capital cost by targeting critical zones. Applying this approach unlocks a larger fraction of the building stock for connection to a 5th generation (low temperature) heating network.

2.3 Detailed Building Energy Modeling

Technical Lead: Neil Bates,
Timeline: 4 weeks

Utilizing the building archetypes models from C1 pre-feasibility screening, energy conservation measures that have been agreed to will be applied to support lowering the overall district demand for the three geographic regions. We will then scale the model based on building area for similar buildings to determine heat demand densities for each geographic area.

2.4 Geology Study, Thermal Response Testing

Technical Lead: Geology Lead: John Griggs / Thermal Response Testing Lead: James Berertон
Timeline: Geology Study 3-4 weeks; Thermal Response Testing 12-14 weeks (see further information below)

Stantec will conduct a desktop review of the local geology based on published information that is readily available from public sources such as the United States Geological Survey and Michigan Geological Survey. In addition, Stantec will review available reports that have been prepared for studies conducted on the proposed project property and that provide geological information. The collected information will be evaluated to develop a conceptual site model of the geology of the property. Stantec will prepare a summary of the evaluation which will include limitations, if they exist, to the ability to characterize the geology within the proposed footprint or to the proposed depth of the geoexchange system.

After the geological studies determine the permissible depth for geoexchange fields, thermal response testing is necessary to characterize the thermal performance of the formation in the specific region to be developed. In addition to the recommended

[1] https://www.sciencedirect.com/science/article/pii/S0360544221032011

IGSHPA[2] best practices for thermal response testing, the flow rate and delta in temperature across the supply and return will be recorded. Using paired PT1000 RTD temperature sensors, the accuracy of the delta T is improved by a factor of ten. Specifying the accuracy for flow measurement further improves the thermal response test accuracy. Stantec will analyze the raw data through a parametric analysis of the thermal response properties. This yields a more accurate test result allowing for higher precision in the sizing of geoexchange fields. Thermal response testing requires between 6-12 weeks to bid the work and schedule the driller to perform the test and gather the data. It requires an additional 2 weeks to analyze the data. The test itself takes between 10-12 days to execute including drilling, cooldown of the borehole after drilling, and the 48h test period. Drilling costs would be based on the number of tests required. We have not included drilling costs within this scope as it may not be needed due to other tests already completed. A review of existing testing results will be completed early on so that planning of bore hole drilling could be completed within the timeline of this project.

2.5 Design Thermal Network

Technical Lead: Jeff Schroeder, Neil Bates, James Bererton, Sean McInroy
Timeline: 7 weeks

A detailed thermal energy model will be developed for each of the three locations to determine the overall network loads, optimal energy center sizes and locations, and optimal geoexchange field size and locations. Non-geoexchange heat sources and thermal energy storage systems will be integrated into the model where feasible. The integration to the district energy system will be reviewed based on the assessment results of the existing buildings heating systems. We anticipate that a low temperature distribution network will likely be a strong option where buildings could utilize the low temperature heat to meet their needs or augment with local or centralized heat pumps to support existing building heating systems.

Geoexchange location viability will be evaluated against subsurface geological conditions (contaminant plumes), formation thermal performance parameters from preexisting thermal response tests, and nodal analysis for district loads. Optimal locations for geoexchange fields will be identified based on minimization of the district network delivered energy cost. A variety of factors including network piping, pumping energy, utilization factor, available heat sources and sinks, and load serviced will feed into this analysis.

Stantec utilizes the IES iVN modelling software package to assign energy demands to a virtual heat network. Simulations are then undertaken to ascertain the whole network demands. A key advantage of the IES iVN software is its ability to assign scenarios for future demands. Questions such as "*what is the impact of improving building envelope standards?"*; or *"what is the impact of increasing the volume of thermal store?"* can be evaluated.

The study will also consider the proposed buildings for connection based on the results of scope C.2.2, Building Mechanical System Evaluation. The extent of the required building interventions could simply comprise of an alteration to the piped services installation within a boiler room or may necessitate a large-scale system refurbishment. While the feasibility scope would not include the design of such interventions, we will develop typical standards for connections, and work with the City and relevant stakeholders to assist their connection to the Heat Network.

2.6 Detailed Network Modeling

Technical Lead: Neil Bates, James Bererton, Sean McInroy
Timeline: 5 weeks

Once the thermal energy model is completed, the district piping network will be developed. Underground obstructions/constraints including but not limited to rights of way, easements, utility crossings, and existing underground infrastructure will be considered when developing the pipe network (refer also to section 2.8 and 2,9 below). The alignment will also be developed considering aboveground obstructions/constraints such as roads, power poles, and trees, which may impede the initial construction and future maintenance. The alignment will be broken into sequential phases to inform the client how best to buildout the network. Pipe and network balancing equipment such as pump stations and heat transfer stations alongside thermal energy storage elements will be conceptually sized and located. We will optimize pipe and equipment sizing to minimize the power requirements for pumping.

2.7 Emissions Assessment

Technical Lead: Adrian Davison
Timeline: 1 week

There has been significant volatility in the global energy sector. This scope will explore the market trends, including rate forecasts and carbon intensities for various utilities. The City's carbon tax will be incorporated into the utility evaluation. We will quantify the potential for carbon abatement in two steps.

Initially, we will use building energy models, with the appropriate historical heating systems, to determine pre-implementation carbon intensity. Later, we will examine the district network model to determine the anticipated carbon intensity based on

[2] International Ground Source Heat Pump Association

current and future utility considerations. As part of this work, we will model long-term forecasts of emissions intensity for different energy sources.

2.8 and 2.9 Investigate Rights of Way, Easements, Utility Crossings, and Underground Infrastructure

Technical Lead: Curt Bjurlin, Neil Bates, Sean McInroy, Caz Zalewski
Timeline: 4 weeks

Members of our routing and civil engineering team will provide input into the proposed right-of-way (ROW) widths and public blocks to accommodate existing and proposed public and utility infrastructure. Part of this exercise will include a review of the ROW cross-sections for public roads. The routing and civil engineering team will review the proposed cross-sections and present recommendations. Cross-section review will take into consideration transportation, servicing, utilities, district energy, landscaping, pedestrian, and cycling needs.

2.10 Soil and Groundwater Contamination

Technical Lead: John Griggs
Timeline: Phase I 3-5 weeks: Phase II 3-6 months

Prior to development or redevelopment of real estate, standard due diligence practice includes an evaluation of the environmental condition of the subject property. Two environmental evaluations are commonly conducted to identify potential contamination. The first step is to conduct a Phase I Environmental Site Assessment (Phase I ESA). This consists of a review of readily available information about the past uses and environmental condition of the subject property and surrounding properties. In addition, the Phase I ESA includes an interview with a representative of the current owner or operator, if available, and a site visit to make visual observations. If this review finds potential environmental concerns, then it is typical to recommend a Phase II ESA. Stantec has included hours to complete only a Phase 1 ESA for each of the 3 geographic sites. A Phase II ESA as explained below could be completed with client approval of fees based on findings of the Phase 1 evaluation.

A Phase II ESA typically involves the collection of soil, groundwater, and soil vapor samples that are submitted to an analytical laboratory for chemical analysis. During collection of the soil samples, logs of the encountered soils are prepared and include visual and olfactory observations about the presence of contamination. In addition, we use portable field instruments that can detect volatile contaminants to screen the soil samples for zones of potential environmental contamination. The observations made during the field investigation and laboratory data are used to evaluate whether environmental contamination exists at the subject property. This information is used to develop plans to further investigate, mitigate, remediate, or manage the contamination consistent with the intended future use of the subject property to prevent additional spread of the contamination or exposure of humans to the contamination during drilling and installation of the geoexchange system.

Stantec offers a broad range of hydrogeological investigation services to define the nature, extent, fate, and transport of contaminants in the environment. The complex issues and interdisciplinary nature of characterizing environmental impacts requires the integration of expertise in geology, hydrogeological systems, geochemistry, surface water hydrology, and contaminant transport processes to understand and evaluate the combined and cumulative effects on environmental processes. Our focus, from the outset, on any project is to have the right level of involvement of the right technical specialists to get the nature and extent determined efficiently and accurately to inform sound mitigation decisions.

In addition to soil and groundwater contamination, vapor intrusion into buildings can be a concern. Stantec has experience and has been actively evaluating, investigating, mitigating, and monitoring vapor intrusion throughout its evolution as a prominent exposure pathway. Assessment strategies require a sound understanding of the underlying science, regulatory expectations, client risk tolerance, and stakeholder management. Stantec has an extensive, multi-disciplinary understanding of industrial, commercial, and residential vapor assessment developed through years of supporting our clients on complex vapor intrusion matters.

2.11 Permitting, Regulatory Issues

Technical Lead: John Griggs, James Berertton
Timeline: 2 weeks

Stantec will build upon our existing work for the City where we have produced two technical memos covering topics associated with installing geoexchange systems under buildings and mitigating existing soil contaminant plumes to support permitting and regulatory concerns.

Should testing or monitoring wells be desired under this mandate, Stantec will obtain county permits prior to drilling and installing monitoring or testing wells. Well construction and sealing will follow county and state rules and requirements and best practices outlined in the memo written by Stantec for the city to support drilling. Drilling would be conducted by a driller licensed in the State of Michigan. If contaminated soil or groundwater is encountered, then the materials will be containerized, characterized to identify disposal requirements, and managed in accordance with local, state, and federal regulations. As noted in our technical memo to the city, mitigation of contamination propagation can be addressed during the borehole development and best practices and guidelines for contamination management can be performed to prevent contamination spread.

We have allowed for one additional memo on geology and one additional memo on geothermal as part of this scope.

3. TECHNOECONOMIC STUDY

Prior to embarking on the feasibility study, it is important for all team members to understand the outputs that the study will produce. This will help develop the framework in which we will carry out our analysis and evaluations. We will discuss and gain consensus on many parameters, metrics, and assumptions, including the following:

- Economic analysis parameters (inflation, utility rate escalation, financial gearing, cost of borrowing, discount rate, etc.)
- Carbon Analysis (carbon intensity of the grid over time, time value of carbon, total carbon avoided, carbon tax scenarios, social cost of carbon, carbon offsets, etc.)
- Climate parameters (future temperature distributions, rainfall intensities, etc.)
- We will develop a detailed project economic analysis for each of these options:
- Cashflow projection
- OPEX, general and administrative costs, capital renewal
- Carbon policies, carbon tax/levies
- Net Present Value (NPV)
- Internal Rate of Return (IRR)
- Levelized Cost of Energy (LCOE)
- Sensitivity Analysis on key parameters such as Carbon Tax rate, utility costs.
- Multiple variable probability simulation (Monte Carlo analysis)

Levelized cost of energy (LCOE) is routinely used in public energy utility planning and analysis, especially when comparing electrical power supply options. However, it can be adapted to any form of utility scale energy, including thermal energy supplied by a DES.

LCOE analysis is a useful metric to help choose between competing energy options. LCOE provides a common metric by which the various alternatives can be evaluated equitably, notwithstanding changing project life spans, capacities, risk, and capital costs. It clearly highlights those options having the strongest financials by illustrating the lifetime costs (NPV) divided by thermal energy production for each option, informing decisions about whether to pursue a particular project on an economic basis. LCOE highlights the risk premium associated with choosing promising energy options that are not yet market competitive. Our LCOE calculations will consider annual operating expenses, initial costs including financing, the assumed discount rate, annual energy production including capacity factors, project lifespan, and the site-specific characteristics for the project.

It is important to note that LCOE rarely reflects the customer’s rate structure, but rather what the utility must collect from energy sales over the lifetime of the asset to recoup costs and provide a return on investment.

We will produce a risk assessment for each option, including assessments of system resiliency with respect to future climate scenarios, weather events, carbon tax regimes, and utility costs.

Regarding business terms, we have team members that have experience working with political and administrative leaders to develop district heating projects that support the development of utility companies.

3.1 Construction Cost Estimates

Technical Lead: Jeff Schroeder
Timeline: 3-4 weeks

Using Stantec's district energy network modeling, we will identify anchor clients who will be essential for a successful and affordable deployment, as well as design a network connecting geothermal sources to the various end-consumers. Based on key characteristics and reference projects, we will estimate Class 5 (AACE International Recommended Practice - Cost Estimate Classification System) construction costs of this network, heat sources, and any adjustments required at the consumer end. These estimates will also consider a realistic timeline for expanding the network and uptake of end-consumers, based on our experience in past and current projects.

3.2 Funding Support Analysis

Technical Lead: Mark Pascoe
Timeline: 2 weeks

The City of Ann Arbor will also be able to benefit from Stantec's broad experience in establishing frameworks to finance geothermal installations, such as setting appropriate rate structures, leveraging tax credits or incentives, cultivating partnerships, or applying for grants. For 30+ years, Stantec has partnered with clients to successfully apply for grants and loans, securing more than $6 billion in funding for our clients' projects. Stantec will address the City of Ann Arbor's priorities and specific needs by deploying our North American Funding Program (NAFP) team. Our funding specialists work directly with our technical experts at various stages of project development to provide funding guidance as a critical component in helping the City of Ann Arbor to affordably achieve their ambitious sustainability targets. We have assessed funding gaps, identified, secured, and managed funding for projects ranging from less than $10,000 to hundreds of millions. We have the experience and expertise to assess Inflation Reduction Act (IRA) funding, which is available in the form of competitive grants, loans, and technical assistance. In the accompanying Figure 3 we show the collaborative approach that Stantec utilizes in connecting the project need with the potential funding resources in collaboration with the City of Ann Arbor.

Figure 3

Large investments are needed upfront, with potentially long payback periods. Our collective goal must be to make district heating affordable for end-users to want to join while providing a clean energy solution to the city. One way to impact affordability is to leverage grants or subsidies to decrease the net CAPEX or OPEX cost. As part of the technoeconomic study we will assess which avenues of funding are available for the various elements in the geothermal network: from heat source to distribution network to end-consumer connection. Our funding and research specialists are monitoring and analyzing all the funding announcements as they are made. They will also prepare, plan, and position funding applications for Ann Arbor. Federal funding from the Inflation Reduction Act (IRA) does not only make district heating in Ann Arbor more feasible and affordable, but it can also help advance and expedite community resilience and environmental justice.

In this scope Stantec will evaluate opportunities for funding. Funding applications once identified would be additional scope.

3.3 Life Cycle Cost Analysis

Technical Lead: Richard van der Beek
Timeline: 2-4 weeks

Using the construction cost estimates established in 3.1, the parameters, metrics, and assumptions listed above, and any additional key characteristics where needed, we will build a Discounted Cashflow (DCF) model to provide insights into the life cycle cost of the system. A discounted cashflow model "discounts" future cashflows into the value of money today, using a discount rate – often based on the cost of borrowing and the financial gearing of the project. This model will take into account uncertainties and sensitivities, which will be presented using a tornado diagram. This allows Ann Arbor to identify what major risks are involved at which stage in the project and what their potential impact on the business case is. Together with the City of Ann Arbor, we will assess which mitigation strategies can be deployed to reduce uncertainty. Based on this DCF model, we will establish a rate model to explore what bandwidth of rates would meet both the return requirement of the project - a non-negative Net Present Value (NPV) based on the agreed discount rate - and result in utility bills which are "not more than usual" to customers. Utility bills which are not more than usual, i.e. at similar rates to what consumers pay for their heating currently, present geothermal district heating as a valid and affordable alternative to the end-users, thus improving the uptake rate and decreasing system risk.

The feasibility study of district heating at three locations including technoeconomic study evaluation will be concluded with a draft and final submission of a report. The report will include the study approach, findings, and recommendations.

Quality Assurance & Quality Control

Ensuring a quality report is a paramount concern on any type of assignment. Stantec will deploy a few measures to maintain quality over the course of the project.

STANTEC TECHNICAL QUALITY MANAGEMENT SYSTEM

Stantec has a formal quality management system in use across the organization which is registered to the ISO 9001:2015 Quality Management standard and is part of the Stantec PM Framework. Under this Framework the Stantec PM is responsible for overall coordination of the quality management plan prepared for each project. Stantec's PM Framework encompasses much more than the technical quality aspects of deliverables and spans the entire lifecycle of the project from inception to close-out. This effort commences upon the inception of the project by understanding and agreeing to the scope of the work, and subsequently preparing a detailed work plan for the project outlining the tasks, schedules of deliverables and responsibilities for each team member. The Stantec PM must also verify that quality reviews are accomplished in a timely manner and a reasonable sequence to avoid major re-work efforts if errors are found.

Project engineers are responsible for ensuring that all analyses and calculations are correct and that appropriate engineering checks have been completed. They are also responsible for reviewing the analysis approach and assumptions with the project manager and/or key stakeholders prior to moving forward. Once the analysis or deliverable is completed, it will be reviewed by a senior project team member. This level of review is referred to as the Quality Review (QR) process within the Stantec PM Framework.

All analysis and deliverables will be checked by an Independent Reviewer (IR), who is not deeply involved in the project details, but who has a detailed understanding of the client needs, expectations, and project deliverables. The IR only completes his review once the QR process has been fully completed. The Stantec PM and the technical lead will then review the IR comments and implement changes or modifications as needed.

Risk Management

Fully understanding risk is key to making informed decisions. We will advise the city of Ann Arbor on potential risks the project faces. We use risk registers and matrices to document and rate risks to help manage project risk exposure. The risk register will be a live document that will be discussed bi-weekly at check-in meetings and at larger group meetings. As a live document, the risks will be updated, added, and removed as needed to reflect the status of the project. By identifying, tracking, and addressing risks on an ongoing basis, the project risks can be navigated.

Reference Figure 2: Stantec's PM Framework

SITE SAFETY

Focused on People. Focused on Safety: At Stantec, one of our core values is to do what is right. The way we treat our people, clients, and neighbors reflects who we are, what we believe in, and how we do our work.

Integrating practical Health, Safety, and Environment (HSE) programs into our work helps protect our people from injuries, property loss, and environmental damage. We achieve this culture of safety by carefully aligning work processes, systems, and behaviors, and by supporting employees with the guidance and knowledge they need to be safe at all times. Our HSSE team develops practices and tools that support safe work methods by meeting or exceeding government regulations and establishing best practices and continuous improvement through our OHSAS 18001 accredited Occupational Health and Safety Management System.

The foundation of our safety program is a Hazard Recognition and Control process that enables employees at all levels to establish a healthy and safe work environment. Projects begin with the development of a Risk Management Strategy or Health and Safety Plan that identifies potential risks associated with the project site. Based on the risks identified, additional controls are implemented and then verified daily with a Field Level Risk Assessment process.

D. Fee Proposal

See separate fee proposal document.

E. Authorized Negotiator

Name	Jeff Schroeder
Phone Number	(613) 410-1337
Email Address	jeff.schroeder@stantec.com

F. Attachments

ATTACHMENT A
LEGAL STATUS OF OFFEROR

(The Respondent shall fill out the provision and strike out the remaining ones.)

The Respondent is:

- A corporation organized and doing business under the laws of the state of Michigan, for whom Jeff Schroeder bearing the office title of Senior Principal, whose signature is affixed to this proposal, is authorized to execute contracts on behalf of respondent.*

  *If not incorporated in Michigan, please attach the corporation's Certificate of Authority

- A limited liability company doing business under the laws of the State of _____, whom _____ bearing the title of _____ whose signature is affixed to this proposal, is authorized to execute contract on behalf of the LLC.

- A partnership organized under the laws of the State of _____ and filed with the County of _____ , whose members are (attach list including street and mailing address for each.)

- An individual, whose signature with address, is affixed to this RFP.

Respondent has examined the basic requirements of this RFP and its scope of services, including all Addendum (if applicable) and hereby agrees to offer the services as specified in the RFP.

_____ Date: 12/13,2023,
Signature

(Print) Name Jeff Schroeder Title Senior Principal, Business Center Practice Leader

Firm: Stantec

Address: 1168 Oak Valley Drive, Suite 100, Ann Arbor, MI 48108

Contact Phone (613) 410-1337 Fax _____

Email jeff.schroeder@stantec.com

ATTACHMENT B
CITY OF ANN ARBOR DECLARATION OF COMPLIANCE

Non-Discrimination Ordinance

The "non discrimination by city contractors" provision of the City of Ann Arbor Non-Discrimination Ordinance (Ann Arbor City Code Chapter 112, Section 9:158) requires all contractors proposing to do business with the City to treat employees in a manner which provides equal employment opportunity and does not discriminate against any of their employees, any City employee working with them, or any applicant for employment on the basis of actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight. It also requires that the contractors include a similar provision in all subcontracts that they execute for City work or programs.

In addition the City Non-Discrimination Ordinance requires that all contractors proposing to do business with the City of Ann Arbor must satisfy the contract compliance administrative policy adopted by the City Administrator. A copy of that policy may be obtained from the Purchasing Manager

The Contractor agrees:

(a) To comply with the terms of the City of Ann Arbor's Non-Discrimination Ordinance and contract compliance administrative policy.

(b) To post the City of Ann Arbor's Non-Discrimination Ordinance Notice in every work place or other location in which employees or other persons are contracted to provide services under a contract with the City.

(c) To provide documentation within the specified time frame in connection with any workforce verification, compliance review or complaint investigation.

(d) To permit access to employees and work sites to City representatives for the purposes of monitoring compliance, or investigating complaints of non-compliance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services in accordance with the terms of the Ann Arbor Non-Discrimination Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Non-Discrimination Ordinance, obligates the Contractor to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract.

Stantec
Company Name

12/13,2023
Signature of Authorized Representative Date

Jeff Schroeder, Senior Principal, Business Center Practice Leader
Print Name and Title

1168 Oak Valley Drive, Suite 100, Ann Arbor, MI 48108
Address, City, State, Zip

(613) 410-1337 / jeff.schroeder@stantec.com
Phone/Email address

Questions about the Notice or the City Administrative Policy, Please contact:
Procurement Office of the City of Ann Arbor
(734) 794-6500

Revised 3/31/15 Rev. 0 NDO-2

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ATTACHMENT C
CITY OF ANN ARBOR
LIVING WAGE ORDINANCE DECLARATION OF COMPLIANCE

The Ann Arbor Living Wage Ordinance (Section 1:811-1:821 of Chapter 23 of Title I of the Code) requires that an employer who is (a) a contractor providing services to or for the City for a value greater than $10,000 for any twelve-month contract term, or (b) a recipient of federal, state, or local grant funding administered by the City for a value greater than $10,000, or (c) a recipient of financial assistance awarded by the City for a value greater than $10,000, shall pay its employees a prescribed minimum level of compensation (i.e., Living Wage) for the time those employees perform work on the contract or in connection with the grant or financial assistance. The Living Wage must be paid to these employees for the length of the contract/program.

Companies employing fewer than 5 persons and non-profits employing fewer than 10 persons are exempt from compliance with the Living Wage Ordinance. If this exemption applies to your company/non-profit agency please check here [___] *No. of employees__*

The Contractor or Grantee agrees:

(a) To pay each of its employees whose wage level is not required to comply with federal, state or local prevailing wage law, for work covered or funded by a contract with or grant from the City, no less than the Living Wage. The current Living Wage is defined as $15.90/hour for those employers that provide employee health care (as defined in the Ordinance at Section 1:815 Sec. 1 (a)), or no less than $17.73/hour for those employers that do not provide health care. The Contractor or Grantor understands that the Living Wage is adjusted and established annually on April 30 in accordance with the Ordinance and covered employers shall be required to pay the adjusted amount thereafter to be in compliance with Section 1:815(3).

Check the applicable box below which applies to your workforce

[___] Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage without health benefits

[X] Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage with health benefits

(b) To post a notice approved by the City regarding the applicability of the Living Wage Ordinance in every work place or other location in which employees or other persons contracting for employment are working.

(c) To provide to the City payroll records or other documentation within ten (10) business days from the receipt of a request by the City.

(d) To permit access to work sites to City representatives for the purposes of monitoring compliance, and investigating complaints or non-compliance.

(e) To take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee covered by the Living Wage Ordinance or any person contracted for employment and covered by the Living Wage Ordinance in order to pay the living wage required by the Living Wage Ordinance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services or agrees to accept financial assistance in accordance with the terms of the Living Wage Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Living Wage Ordinance, obligates the Employer/Grantee to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract or grant of financial assistance.

Stantec	1168 Oak Valley Drive, Suite 100
Company Name	Street Address
	
12/13,2023	Ann Arbor, MI 48108
Signature of Authorized Representative Date	City, State, Zip
Jeff Schroeder, Senior Principal, Business Center Practice Leader	(613) 410-1337 / jeff.schroeder@stantec.com
Print Name and Title	Phone/Email address

ATTACHMENT D

VENDOR CONFLICT OF INTEREST DISCLOSURE FORM

All vendors interested in conducting business with the City of Ann Arbor must complete and return the Vendor Conflict of Interest Disclosure Form in order to be eligible to be awarded a contract. Please note that all vendors are subject to comply with the City of Ann Arbor's conflict of interest policies as stated within the certification section below.

If a vendor has a relationship with a City of Ann Arbor official or employee, an immediate family member of a City of Ann Arbor official or employee, the vendor shall disclose the information required below.

1. No City official or employee or City employee's immediate family member has an ownership interest in vendor's company or is deriving personal financial gain from this contract.
2. No retired or separated City official or employee who has been retired or separated from the City for less than one (1) year has an ownership interest in vendor's Company.
3. No City employee is contemporaneously employed or prospectively to be employed with the vendor.
4. Vendor hereby declares it has not and will not provide gifts or hospitality of any dollar value or any other gratuities to any City employee or elected official to obtain or maintain a contract.
5. Please note any exceptions below:

Conflict of Interest Disclosure*	
Name of City of Ann Arbor employees, elected officials or immediate family members with whom there may be a potential conflict of interest.	( ) Relationship to employee ( ) Interest in vendor's company ( ) Other (please describe in box below)

*Disclosing a potential conflict of interest does not disqualify vendors. In the event vendors do not disclose potential conflicts of interest and they are detected by the City, vendor will be exempt from doing business with the City.

I certify that this Conflict of Interest Disclosure has been examined by me and that its contents are true and correct to my knowledge and belief and I have the authority to so certify on behalf of the Vendor by my signature below:

Stantec	(613) 410-1337
Vendor Name	**Vendor Phone Number**

	12/13,2023	Jeff Schroeder
Signature of Vendor Authorized Representative	**Date**	**Printed Name of Vendor Authorized Representative**

Questions about this form? Contact Procurement Office City of Ann Arbor Phone: 734/794-6500, procurement@a2gov.org

Appendix A: Resumes

Jeff Schroeder P.Eng., LEED AP BD+C

Senior Principal, Mechanical Engineer, Practice Lead
19 years of experience
Ottawa, Ontario, Canada

As Project Manager, Jeff provides leadership on multi-disciplinary teams through all project phases – from initial project pursuit through programming and visioning, design, and project execution. A strategic thinker, Jeff works closely with the project team to draw out innovative and sustainable solutions. Jeff's role includes management of the design, staffing, and financial health of projects, and therefore has a holistic understanding of ongoing project success.

Sustainability is a core principle with Jeff, both professionally and personally. Jeff seeks appropriate sustainable design in all his work – leading integrated teams from early goal-seeking through to completion. He has designed and implemented systems that exceeded current standards, such as solar domestic and solar air heating systems, open loop aquifer cooling, closed loop geoexchange heating and cooling systems, river water free cooling, low temperature heating and cooling systems, cascading hydronic systems, combined heat and power (CHP), low energy radiant heating, passive cooling, natural ventilation, heat recovery and rainwater harvesting.

Jeff also develops equipment sequences for intelligent building controls and management systems.
Jeff combines his knowledge from mechanical design, building information modeling (BIM), contract administration, and commissioning to provide effective coordination and communication from conceptual design through to the end of construction. Jeff uses a multi-disciplinary approach to design and understands the importance of overall system coordination and integration, which ultimately benefits the client by reducing downstream operation and maintenance costs.

EDUCATION

B.Sc. Mechanical Engineering, University of Alberta, Edmonton, Alberta, Canada, 2005

REGISTRATIONS

Professional Engineer #100212216, Professional Engineers Ontario

Professional Engineer #M77072, Association of Professional Engineers and Geoscientists of Alberta

Professional Engineer #72914, Association of Professional Engineers and Geoscientists of Saskatchewan, 2022-11-16

MEMBERSHIPS

Member, Canada Green Building Council

Associate, American Society of Heating, Refrigerating & Air-Conditioning Engineers

AWARDS

2023 City Heritage Award of Excellence, Postal Station B

2022 RPIC 2022 Design Excellence in Building Projects, 875 Heron ESAP Pilot Project

2015 Ellerslie Fire Station - Gold Station Style Award for all of North America from Fire Chief Magazine

2014 Edmonton Clinic North - BOMA Edmonton – TOBY Award (The Outstanding Building of the Year)

2014 Edmonton Clinic North - BOMA Edmonton – Certification of Building Excellence

2014 Prince George RCMP – Article in Award Magazine

2013 Slave Lake Government Centre and Library - BOMA Edmonton Pinnacle Award for Above & Beyond the Call of Duty

PROJECT EXPERIENCE

NCC LeBreton Flats - Community Energy Plan | NCC | Ottawa, Ontario, Canada | 2021 | Project Manager, District Energy Specialist

The National Capital Commission (NCC) will develop LeBreton Flats, a downtown brownfield 200 acre development, into a diverse and vibrant residential community with affordable housing, mixed use retail and office, as well as a special event centre. Stantec developed a net-zero carbon community energy plan including targets for energy efficiency employing targets set by the City of Ottawa's High Performance Development Standards and options for net-zero carbon district energy at the site including ground source heat pumps with geo-exchange field, wastewater energy heat recovery, and possible connection to the nearby district energy systems. The analysis includes detailed energy modelling of proposed buildings, lifecycle costing, and carbon analysis. The development was analyzed based on three stages of growth over a 30-year development timeline, and the lifecycle analysis of carbon and costs was modelled for 60 years consistent with CaGBC's Zero Carbon Building framework. Comprehensive long-range forecasts of utility costs and emissions factors were employed to improve the accuracy of the analysis, and long-term weather forecasts were used to model the

impacts of climate change on energy, emissions, and resiliency. Jeff led the team and pulled in a team of experts from across north America to develop the energy plan.

University of Windsor - Campus Carbon Neutral Masterplan | Windsor, ON, Canada | CAD 0 | 2022-2023 | Principal, DES Specialist

UWindsor is committed to reducing the carbon emissions through the campus and achieve carbon neutrality by 2050. Stantec was selected to develop a Carbon Neutral Masterplan for the campus comprising of more than 50 buildings and a local district energy system. The masterplan includes a holistic evaluation of investments and measures expected on the short term (2030) and the long term up to 2050. The scope involved conducting site visits to understand the operations of existing buildings, analyzing utility data at building and campus level to benchmark energy use and emissions associated with operations, identifying energy conservation measures, developing energy models, conducting life cycle financial analysis, and developing a road map for the campus to reach net-zero carbon emissions by 2050. Jeff support as project principal as well as district energy specialist.

Energy Services Acquisition Program (ESAP) | PSPC | Ottawa, Ontario | Stantec Project Manager and Principal Mechanical Engineer

This project was established by the Government of Canada (PSPC) for their national capital region holdings for a $1.1 billion program known as the Energy Services Acquisition Program (ESAP) to modernize and privatize four district energy systems (DES) serving over 80 buildings (21 million SF) in Ottawa, Ontario and Gatineau, Quebec. When fully built, this DES will be one of the largest in North America and is expected to be carbon neutral by 2030. All buildings are supplied with either steam or high temperature hot water and chilled water where central to the modernization is converting to low temperature hot water heat distribution in order to increase the efficiency of the district energy system. The conversion to low temperature hot water and optimization of central plant operations to cleaner technologies will reduce carbon pollution of the district energy system. : Jeff was the project manager and principal in charge for Stantec on the ESAP DES modernization project since 2014. Jeff was involved in the project initiation phase where Stantec completed business case report and risk assessments regarding the energy centre modernization. He lead numerous feasibility studies and concept design for the different energy centres, distribution networks and many connected buildings. Cost estimates, stakeholder engagement, phasing and implementations strategies were all aspects of the project. Jeff also supported the development of the DES connection framework which guided both connection of new and existing buildings.

University of Alberta - North Campus Master Energy Plan | 116 St & 85 Ave, Edmonton, AB T6G 2R3, Canada | CAD 0 | 2022-2023 | DES and Building Conversions Engineer

The University's District Energy and Cogeneration System is a key stabilizing factor in controlling energy costs on campus. Costs are kept competitive by employing on-campus power generation to supplement purchases from the Alberta Grid. Power is generated on-campus whenever it saves money, which is most of the time. By becoming a long-term provider of reliable, environmentally responsible energy, the University will demonstrate great commitment to environmental leadership and social justice. The goal of this project is to help the university chart a resilient path forward that will drive significant ongoing reductions in direct and indirect carbon emission, achieving net zero by 2050. In support of the University's ambition to live and learn in harmony with nature, Stantec will explore energy supply options, extrapolate future energy and water usage, develop capital costing models, and evaluate project economics, which will let us assemble a suite of strategies to deploy across a range of alternative scenarios. Jeff supported the evaluation of building energy conversions for all buildings on the campus which are connected to an existing district energy system. Specifically the scope was to evaluate reducing heating water temperatures and converting from steam to hot water.

Canadian Federal Labs Initiative - Repeatable Design Framework | Government of Canada | Various Locations, Canada | CAD 2.8B | 2021-2022 | District Energy Specialist

FRAMEWORK Design Partners was awarded a contract for architecture, engineering, and laboratory design services to develope laboratory standards, functional programming, and concept designs for federal research and laboratory facilities across the country throughout the next five years. The effort involves innovative delivery models to renew aging science infrastructure and create a modern platform to support sustainable scientific and research program delivery while keeping people first to create lab environments that serve and enable our scientists to practice at the leading edge in service of all Canadians. The scope of work includes creating a framework around adaptive, flexible, attractive, and sustainable laboratory solutions within state-of-the-art science infrastructure. Jeff contributed to the framework regarding district energy solutions as a methodology for decarbonization of energy generation for large laboratory buildings and campuses.

NRC Campus Master Planning | Ottawa, Ontario | 2022-2023 | Campus Energy Specialist

Provided campus energy decarbonization concept designs and support regarding retrofits of existing district energy systems as well as nodal type energy generation options with localized generation, distribution and storage.

Thompson Rivers University (TRU) Low Carbon District Energy Centre Design | Kamloops, BC

The TRU Kamloops campus supports nearly 14,000 students and 1M SF of building area. Stantec supported the evaluation of a low carbon district energy system to meeting the campus GHG saving goals. Jeff provided senior engineering and peer review services as well as consulted on the detailed regarding connection of district energy to new buildings

Cooling Plant Optimization Study, Cliff Central Heating and Cooling Plant | Ottawa, Ontario | 2014-2016 | Technical Lead Engineer, Project Manager

This project consists of providing detailed analysis and engineering for a 15,000 ton cooling plant schematic design, involving preliminary equipment selections and adding different cooling technologies (such as TES, CHP with absorption chillers, and river water free cooling). The study involved plant layouts, cost estimates, load evaluation based on 41 buildings and life cycle costing.

Chiller Replacement, Cliff Central Heating and Cooling Plant | Ottawa, Ontario | 2014-2016 | Project Manager and Senior HVAC Designer (Mechanical Engineer)

This project consists of the replacement of an existing ,8000 ton steam turbine Chiller with an electrical 5,000 Ton Chiller with VFD. Schedule was an important factor to manage as the chiller had to be installed within a very narrow time frame in order to provide the main summer cooling supply to the Parliament Hill Buildings and surrounding area. Approximate Construction Cost: +/- $11M.

20 Buildings - Heating and Cooling Building Conversions | Confederation Heights and Cliff Campus | Ottawa, Ontario | 2014-2022 | Technical Lead Engineer, Project Manager

These buildings required completed detailed investigations, design and construction for both the heating and cooling systems within over 20 buildings to allow for the installation of new energy transfer stations (ETS) and also to allow for a reduced district energy system (DES) heating supply water temperature (from

140°C HTHW or steam down to 70°C). Jeff was the project manager and principal engineer for this project. Detailed investigations were completed within each building and testing and balancing to support the validity of the conceptual designs during peak seasonal conditions. An accurate thermal model of the building was created to calculate the peak thermal loads to size the new mechanical systems. On site data collection was performed at both winter and summer peak design conditions to capture data from the building automation that reflected actual peak operation. 3D laser scanning of the main mechanical rooms allowed 3D REVIT models to be developed. A detailed implementation plan was developed to support and minimize any system downtime since the building had to remain fulling occupied during construction. Constructability reviews with the building maintenance team and key stakeholders discussed phasing the equipment installation with seasonal systems shutdowns, allowing old equipment to be removed and new equipment to be installed.

New Carbon Neutral Gatineau Energy Centre | Gatineau, Quebec | Mechanical Engineer, Project Manager

A carbon neutral 20 MWth (load) heating and 20 MWth (load) cooling energy centre that interconnects the energy centre in downtown Ottawa. Detailed schematic design drawings were reviewed by Stantec to support bidding and compliance with performance specifications. Construction site observations were completed.

Curt D. Bjurlin

Vice President, Climate Solutions Leader · 27 Years of Experience
Cottage Grove, Wisconsin

Curt leads Stantec's Climate Solutions business in the United States. An experienced practitioner in the energy sector, Curt is knowledgeable in the delivery of climate change adaptation and greenhouse gas mitigation strategies. Curt has spent much of the last 18 years developing renewable energy projects both as an owner/operator and as a consultant. For these projects, Curt has organized and participated in countless stakeholder engagement discussions. One area of technical expertise for Curt is leading Stantec's linear infrastructure routing and siting technical team, in which he has worked for most of the largest utilities in the United States. His routing skill set will be of critical use during the route evaluation phase of a district heating retrofit. As executive sponsor he has assembled the team in this response and will stay connected with the City to make sure the best of Stantec's technical experts are available.

EDUCATION

Bachelor of Science, Biological Sciences, Binghamton University, Binghamton, New York, 1996

Masters of Science, Wildlife Biology, Utah State University, Logan, Utah, 2001

PROJECT EXPERIENCE

Sustainable Design

Confidential Energy Hub, New York City (Task Lead, 2023)

Served as task lead for integrating biodiversity solutions and a heating district into a large energy hub project proposal. The energy hub would transform an iconic location in New York City, delivering thousands or MW of clean, renewable energy into the greater metropolitan area. Our task was to help the developer integrate a variety of biodiversity components into the design, including green roofs, pollinator habitat, avian habitat, oyster habitat, and associated research projects. We also evaluated the feasibility of capturing waste heat from the system to redistribute to the surrounding buildings.

City of Ann Arbor | On-demand Geothermal Advisor Services, Ann Arbor, MI (Principal, 2023)

Serve as principal-in-charge for on-demand geothermal advisor services. Scope covers preparation of technical memos to address geoexchange environmental controls and system development beneath buildings. Specific topics include mitigating potential transport of volatile organic compounds, cross-contamination of aquifers during drilling, certification requirements for drillers, monitoring and addressing leaks, safety of heat transfer fluids, and unique considerations for installation of these systems below buildings.

Energy

Duke Energy Midwest | Multiple Transmission Line and Substation Projects, Indiana and Kentucky (Principal, 2016-Present)

Principal-in-charge for routing greenfield and relocation projects in Indiana and Kentucky. Projects included:

- Amanda to Todhunter to Worthington Steel 69kV Hebron to Oakbrook 138kV
- Carmel-Rohrer Rd 69kV
- Lafayette SE to Concord Rd Junction 138kV
- Oakbrook to Aero to Woodspoint 69kV
- Peabody 69kV Relocation
- West Lafayette Capacity Projects 138

Principal-in-charge for siting substations:

- Vincennes 138kV
- Beckjord 345kV
- BLM NE 69kV
- West Lafayette 138kV
- Maxwell 34.5kV
- Glenwood 69kV
- Westfield East 69kV
- Westfield 156th Street 69kV
- Rosston 69kV
- South Lapel 69kV

Curt D. Bjurlin

Vice President, Climate Solutions Leader · 27 Years of Experience
Cottage Grove, Wisconsin

Ameren | Multiple Transmission Routing Projects, Kansas & Illinois (2020-2021)
Principal-in-charge of routing for the 11-mile Benton NW to Franklin Junction, 50-mile 345 kV Mt. Vernon West to Albion South, 10-mile Sursee - Aviston 138kV project, 40-mile Mt Vernon Area Reliability 138kV projects, 90-mile Wolf Creek – Blackberry 345kV and the 21-mile Walkemeyer - North Liberal 115kV FERC Order 1000 Competitive Solicitations. Services included routing and siting, outreach, and planning for permitting.

National Grid | Gardenville to Dunkirk, New York (Principal in Charge, 2021-Present)
Serving as lead for a route evaluation of a 115kV rebuild through a constrained area in Western New York State.

American Transmission Company | Multiple Transmission line Projects, Wisconsin (Principal, 2023-Present)
Performed route evaluation for greenfield and rebuild transmission lines in eastern Wisconsin. Projects include Plymouth 5 138 kV transmission line, Mt. Pleasant four circuit 345 kV transmission line, and Milwaukee 230 kV to 345 kV conversion project. Supported preparation of CPCN documents and served as listed routing expert witness.

AEP | Multiple Transmission Line Routing Projects, Ohio & Kentucky (Principal, 2016-Present)
Principal-in-charge for 115 miles of routing evaluation and outreach support for the following projects: Adams-Rarden 69kV, Bellefonte Extension 138kV, Bigelow Switch-Plaza Street 34.5kV, Clutch Loop 69kV Extension, Lamping-Cranes Nest 69kV, Lick-Pedro 69kV, Lott 138 kV, Millbrook Park to South Point 138kV, New Lexington - Shawnee 69kV, New Liberty – Findlay 34.5kV, North Newark-Sharp Road 138kV, Plaza Street-East Findlay 34.5kV, Ross-Highland 69kV, Schafrath-Madisonburg 69kV, and Walhonding-Marathon 69kV, West Lafayette Capacity Project 138kV.

AEP | Multiple Substation Siting Projects, Ohio (Principal, 2017-2020)
Principal-in-charge for site evaluation and selection for the 69kV Compton, 138kV Lockbourne, 69kV Parlett, 69kV Schafrath Switch, and 69kV Tigers substations.

Transource | Duff-Coleman 345kV FERC Order 1000 Competitive Solicitation, Indiana and Kentucky (Project Manager, 2016)
Served in a project management and routing capacity for a 345kV transmission line bid package for the Duff to Coleman project for a confidential client. Responsible for conducting all desktop route reviews, leading preparation of permit matrix, survey and geotechnical review, and preparing a ROW acquisition plan for the project.

Dairyland Power Coop | 69kV Transmission Line Projects, Wisconsin and Illinois (Routing Reviewer, 2017-2020)
Reviewer for routing and siting of 90 miles of 69kV transmission lines for the Line 153 and N6 projects.

PacifiCorp | Segment C 138/345/500kV Routing Projects, Utah (Siting Director, 2021-Present)
Route creation and evaluation for multiple lines in congested area. Constraints include military lands, mining operations, development, and the Great Salt Lake.

COMMUNITY INVOLVEMENT

Board Member, Stewardship Committee Chair, Groundswell Conservancy, Madison, WI, USA
2018-present

Casimir Zalewski PE, LEED AP, CPD

Principal Engineer · 25 Years of Experience
Berkley, Michigan

Stantec

Casimir has 25 of experience in engineering systems design. He is an expert in a variety of HVAC and control system. In addition to his HVAC and control knowledge, he holds a wealth of knowledge in plumbing and fire protection systems, maintaining his ASPE certified plumbing designer. Casimir has dedicated his career to the design of education facilities and works closely with clients and the project teams to understand project goals and continues to provide his expertise throughout the project to maintain project development, coordination, schedule, and budget. During construction, he assists the team with system operation analysis of the mechanical, electrical and control systems.

EDUCATION

Bachelor of Science in Mechanical Engineering, University of Detroit Mercy, Detroit, Michigan, 2000

PROJECT EXPERIENCE

Post-Secondary Education

- St. Clair County Community College – North Building Renovation (Central Water to Water Heat pump with horizontal slinky field)*
- Oakland Community College, Southfield Campus – Central Plant Replacement*
- Oakland Community College, Royal Oak Campus – Central Plant Replacement*
- Saginaw Valley State University – Health and Human Services Building (Central Water to Water Heat pump with horizontal and pond geo-exchange)*
- Mid Michigan Community College – Central Plant Replacement*
- Michigan State University – Life Science Building (Central Water to Water Heat pump with horizontal slinky field)*
- Western Michigan University – Zhang Legacy Collections Center (Central Water to Water Heat pump with vertical bore field)
- Ann Arbor Public Schools – Clague Middle School (Central and De-centralized Water to water and water to air heat pumps)
- Denton Elementary Schools – Adkins (Decentralized heat pumps with vertical bore field)
- Denton Elementary Schools – Bell (Decentralized heat pumps with vertical bore field)
- Denton Elementary Schools – Union Park (Decentralized heat pumps with vertical bore field)

REGISTRATIONS

Professional Engineer #126332, State of Texas

Professional Engineer #23920, State of Iowa

Professional Engineer #062067820, State of Illinois

Professional Engineer #PE907430, Washington, D.C. (District of Columbia)

Professional Engineer #0044437, State of Maryland

Professional Engineer #79315, State of Ohio

Professional Engineer #6201053118, State of Michigan

LEED Accredited Professional, U.S. Green Building Council

MEMBERSHIPS

American Society of Heating, Refrigerating & Air-Conditioning Engineers, Member

American Society of Plumbing Engineers, Member

Neil Bates BEng (Hons)

Director
23 years of experience
Reading, United Kingdom

Mechanically biased Building Services Consulting Engineer

As an experienced Building Services Engineer, I have gained knowledge across most sectors within the industry, including defence, retail, commercial, education, and most recently healthcare. As a senior member of the design team, I have been involved with and lead many projects.

My recent role as Director of Building Services as a company shareholder with EDP Environmental has given extensive experience with the management of a number of MEP design teams, as well as the business management, resourcing, business development and quality assurance across the business.

My previous role as Design Director for a design and build (MEP lead) Main Contractor, gave me experience with other elements of the industry such as design development for construction, procurement, labour and sub-contractor management, with a programme and cost focus, whilst ensuring a high level of quality.

Whilst predominantly a Mechanical Engineer, I have a good level of understanding on the Electrical and Public Health elements and can confidently discuss such elements with others in the design team.

I am a driven individual, able to work within a team as well as lead a design team to programme and on cost.

EDUCATION

Bachelor of Engineering (Hons), Mechanical Engineering, University of Reading, Reading, 2000

MEMBERSHIPS

Associate Member, Chartered Institution of Building Services Engineers

PROJECT EXPERIENCE

Kingston University Decarb Strategy | 2021 to 2022

Appointed by the Estates and Sustainability Department at Kingston University, Neil led Stantec's Team of engineers and energy assessors to develop a Decarbonisation of Heating and Hot Water Strategy Report for the University's main campus at Penrhyn Road. Comprising 9 main heating and hot water generation sites, Stantec undertook detailed analysis of the existing energy consumption, profiling where meter data was unavailable to determine a "Business as Usual" (BAU) baseline. Numerous options for alternative energy solutions were reviewed, including site wide "Ambient Loop (5G)" District Heat Networks, connection to off-site District Heat Network, and River Source Heat Pump, utilising the heat from the nearby River Thames. The report developed a suitable "flexible" solution adaptable to future technologies, identified locations and pipework routes, and high-level costing and programming for delivery. The report is to be presented to the Board of Governors Q2/Q3 2022 following which the initial phases of implementation will commence.

Kingston University Decarb Implementation | 2023 to date.

Following the successful approval o f the decarbonisation strategy by the board of governors, Stantec have been appointed by the University to undertake the design of a new electric led Energy Heat Pump, site wide district heat network and associated works within the existing buildings.

Proposed for commencement on site in 205, the design is ongoing , with significant interaction with the University stakeholders to optimize equipment selections.

Eton College, DHN pipework Replacement | 2021-Present

Eton College comprises a circa 400 buildings, many of which have Listed Building status. The heating and hot water generation is provided by 7 central plantrooms, with below ground distribution pipework creating 7 distinct District Heat Networks. Last replaced circa 1970, much of the pipework and insulation has corroded and regular failures of the pipework are experienced, causing loss of heating and hot water whilst repaired. Working closely with the Estates Department, Neil led the feasibility and outline design for the replacement of this heating distribution pipework. The detailed phasing of these works was reviewed, to align with boiler plant replacement and building refurbishment to mitigate disruption and "down time", whilst working with the College's Historic Buildings advisor to ensure none of the works impacted the estate and or Listed Building status.

300 Harrow Road, Westminster

Appointed by Westminster City Council, Stantec are providing Mechanical and Electrical and Structural design services, from RIBA Stage 1 through to completion. Neil is leading the MEP services design, for this new build development comprising circa 110 apartments, community centre, nursery and retail areas, across 3 "blocks". The MEP services comprise ASHPs with gas fired boiler providing winter "top up" providing a site wide district heating network to all apartments and tenant areas.

** denotes projects completed with other firms*

Neil Bates BEng (Hons)

Director
23 years of experience
Reading, United Kingdom

Frank Towell Court, Feltham

The development of this existing underused community space to provide circa 110 dwellings over 4 new construction blocks with a NET ZERO carbon emissions target. As the Lead Building Services Engineer, Neil has led the development of the energy strategy, engagement with the key stakeholders, and outline services design. Appointed for Duties up to RIBA Stage 4, the outline design is in development, commenced on site in Q4 2020.

Plumstead Redevelopment, Woolwich

Lead MEP Consultant for the redevelopment of this existing College site, to accommodate circa 300 dwellings, and commercial space served from a central energy center via a site wide District Heating Network for heating and hot water generation served from ASHPs with Boiler providing peak lopping. Duties included energy appraisal, and outline strategy design and approval with GLA, through to detailed design. Design ongoing, commenced on site in Q4 2020.

Wickway Community Centre

The redevelopment of this existing community centre site, to include 2 “twin” towers, accommodating circa 150 apartments, with new community centre and nursery areas at ground floor level. Neil led the design of the MEP services design to develop the energy strategy and outline space planning for planning permission application.

Palliser Road, Hammersmith

Stantec were appointed to undertake a review of the energy strategy of this site following a project delay between planning approval, and commencement on site. Planning approval was granted based on now superseded energy performance criteria. Project budgets were also set on this basis, but the client’s desire was to improve the energy performance. Neil led the Energy Strategy review, to provide advise to the client as to how to best provide energy improvements whilst not increasing the overall project budget excessively.

Pudding Mill Lane, Stratford

Appointed by the London Olympic Legacy Corporation, Neil is leading the Stantec MEP Services team in providing Energy Assessments, initial services strategies and initial load demand estimates for this redevelopment of the “island” bounded by the Pudding Mill and Lea Rivers to the North, East and South, and the National Rail and TfL railway lines to the West. The proposed new development will incorporate over 3000m2 of commercial space, community centre and circa 1000 dwellings, over several buildings and construction phases.

The Curve, Slough | 2013-2017

A library, multi-purpose performance space and classrooms with space for council meetings and exhibitions, the building consolidates disparate community functions right in the centre of the town. We carried out Level 2 BIM on the project for the structural and MEP design. The steel-framed structure curves on plan and elevation, providing a sympathetic backdrop to the listed church in front, with steel composite floors at each level. The building achieves a BREEAM ‘Very Good’ score through the use of 300m2 of photovoltaic panels on the roof, and with an embodied carbon footprint reduction of 600T of CO2 compared to the original scheme.

** denotes projects completed with other firms*

Amy Sackaroff AICP

Senior Environmental Justice Specialist
23 years of experience
Raleigh, North Carolina

Amy has more than 23 years of experience in developing sustainable solutions for complex infrastructure projects. She has managed the development of Environmental Impact Statements (EISs), Environmental Assessments (EAs), Categorical Exclusions (CEs), and associated technical studies pursuant to the National Environmental Policy Act, including Community Impact Assessments (CIAs) and Indirect and Cumulative Effects (ICE) Assessments. Through this work, she has gained a keen awareness of the planning, design, and construction challenges associated with developing transportation projects in the built environment. Amy also leads the development of Environmental Justice (EJ) engagement and impact analyses pursuant to Executive Order (EO) 12898 (*Federal Actions to Address Environmental Justice to Minority and Low-Income Populations*) and related EOs including EO 14008 (*Tackling the Climate Crisis at Home and Abroad*) which includes the Justice40 Initiative. She has conducted EJ analyses, equity analyses and other community studies in both urban and rural settings and understands how approach and potential impacts vary depending on a project's setting and context.

EDUCATION

BS, Environmental Engineering, North Carolina State University, Raleigh, North Carolina, 2002

CERTIFICATIONS & TRAINING

Training Course, FHWA NEPA Project Development and Section 4(f) Training, FHWA Eastern Resource Center/Raleigh, NC, 2002

Training Course, Environmental Communication for Behavior Change, Duke University, Nicholas School of the Environment/Durham, NC, 2005

Training Course, Context Sensitive Solutions, North Carolina Department of Transportation, NC, 2004

Training Course, Indirect and Cumulative Impact Assessment, North Carolina Department of Transportation, NC, 2003

REGISTRATIONS

Certified Planner #169653, American Institute of Certified Planners

MEMBERSHIPS

Committee on Environmental Analysis and Ecology in Transportation (AEP70), Transportation Research Board, Committee Member

Committee on Equity in Transportation (AME10), Transportation Research Board, Friend of the Committee, Research Subcommittee and 2023 Mid-Year Conference Planning Committee

Member, National Association of Environmental Professionals

American Institute of Certified Planners, American Planning Association

Member, North Carolina Association of Environmental Professionals

AWARDS

2021 National Association of Environmental Professionals (NAEP) Environmental Excellence Award in Environmental Management, Stewardship, Conservation, and Protection, Corridor K Improvements, Graham County, NC

PROJECT EXPERIENCE

I-526 Lowcountry Corridor WEST | South Carolina Department of Transportation | Charleston, South Carolina | 2019-Present | Community Studies/Environmental Justice Task Lead

Amy was responsible for guiding the development of an Environmental Justice (EJ) Analysis, EJ outreach plan, EJ mitigation plan, Community Impact Assessment (CIA), Indirect & Cumulative Effects (ICE) Assessment, Section 4(f) Evaluation, Visual Impact Assessment (VIA), Section 6(f) Environmental Assessment (EA) and conversion application. Amy was also responsible for related portions of the Draft Environmental Impact Statement (Draft EIS), combined Final EIS/Record of Decision, as well as the lead technical writer for I-526 LCC WEST Reconnecting Communities Pilot Program (RCPP) Grant Application. Amy is currently part of the Stantec team leading the implementation of a $146M EJ Community Mitigation Plan.

5-Mile Pipeline Project | Confidential Client | Michigan | 2023-Present | Environmental Justice Subject Matter Expert

Amy is responsible for preparing an EJ Engagement Plan and EJ Assessment for a five-mile natural gas pipeline in northern Michigan. These documents are to support a US Army Corps of Engineers-led Environmental Impact Statement for the subject project.

Kansas Resilience Improvement Plan | Kansas Department of Transportation | Statewide | 2023-Present | Equity Subject Matter Expert / Senior Planner

Amy is providing Environmental Justice/equity subject matter expertise in the development of a statewide Vulnerability Assessment and Resilience Improvement Plan for transportation assets across Kansas. The goal of the project is to develop a set of priority projects that are eligible for federal funding through PROTECT using a risk-based evaluation of transportation assets that are vulnerable to the impacts of climate change. The scope of work includes data collection; GIS mapping of assets, natural hazards, and climate change projections; meaningful public and stakeholder engagement in compliance with Justice40; and project identification and prioritization to be developed with the DOT and stakeholders. Amy's role is to apply an equity lens throughout the project development process.

125-Mile Pipeline Project | Confidential Client | Tennessee | 2022-Present | Environmental Justice Subject Matter Expert

Amy is responsible for guiding the development of an Environmental Justice Analysis for a 125-mile natural gas pipeline through central Tennessee. The study is evaluating potential direct, indirect, and cumulative effects and potential mitigation measures for 35 "EJ focus areas" along the project corridor. This work includes the development of an existing conditions report and an impact assessment report to supplement the EJ analysis summary in FERC Resource Report 5.

Barriers to Mobility: Equity Assessment | Monmouth County | Monmouth County, New Jersey| 2023-Present | Senior Equity Analyst

Amy is leading the development of an equity assessment for Monmouth County's Barriers to Mobility Study. She is responsible for the development of a desktop analysis of socioeconomic and demographic data, coordination with the public outreach team to craft an inclusive engagement strategy, and evaluation of potential mobility solutions and other recommendations through an equity lens. Amy is also responsible for developing the equity assessment to be consistent with federal Executive Orders on Environmental Justice and the New Jersey Transportation Planning Authority's Title VI and Environmental Justice Assessment Guide for Planning Studies.

Inner Loop North Transformation Project | City of Rochester, NY | 2023-Present | Environmental Justice/Equity and NEPA Subject Matter Expert

Amy is leading the development of an Environmental Justice analysis for this expressway removal project in accordance with current EOs on EJ, USDOT Order 5610.2(a) (Final Order to Address Environmental Justice in Minority Populations and Low-Income Populations), and FHWA's EJ Order 6640.23A (FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations). Our work supports the City's goal of creating more diverse transportation choices, promoting healthy, equitable and active lifestyles, and inclusive placemaking.

Equitable Engagement Framework and Pilot Project | Fairfax County Department of Public Works and Environmental Services' Stormwater Management Program | Fairfax County, VA | 2022-Present | Project Manager

Amy is managing the development of an equitable stormwater management engagement framework that is consistent with "Engage Fairfax" and the DPWES "Enhancing Public Engagement Action Plan." This framework provides a roadmap for project managers to conduct more inclusive, equitable, and authentic community engagement to ensure all voices are represented in the planning and decision-making process.

Transportation Equity Training | Smart Growth America | Virtual/Online | 2022-Present | Senior Environmental Justice & Engagement Specialist

Amy developed training on how to create inclusive engagement plans for Complete Streets projects and is working with Smart Growth America to deliver training on how to develop active transportation projects using an equity lens, in alignment with federal requirements related to Environmental Justice and advancing racial equity.

Amtrak Northeast Corridor (NEC) Fencing Program: Oversight for Programmatic NEPA and Outreach | Amtrak | Various States – US Northeast | 2022-Present | Senior NEPA Practitioner

The NEC Fencing Program proposes to construct new or replace existing physical barriers, such as fencing, where feasible, along the 457-mile NEC right-of-way. Due to the scale and the incremental funding that will be required to implement the Program, Stantec is helping to develop a Programmatic Environmental Assessment / Finding of No Significant Impact (EA/FONSI) to document the anticipated impacts. Stantec is the National Environmental Policy Act compliance lead and are also responsible for Section 106 NHPA and Section 7 of the ESA compliance. Amy is responsible for providing subject matter expertise on NEPA environmental review processes/procedures and quality control. She is also providing oversight for the project's public engagement efforts, working with regional teams to scale and refine outreach strategies across the NEC.

Appalachian Development Highway System (ADHS) Corridor K Improvements | NCDOT | Graham County, North Carolina | 2005-2021 | Project Manager/Senior NEPA Planner

Amy served as the Project Manager and Senior Planner on this project from 2005 to 2021. She is responsible for project oversight, planning efforts, technical analyses, environmental documentation (including a Supplemental DEIS, Planning and Environment Linkages (PEL) Study, Environmental Assessment, Section 4(f) Evaluation, Community Impact Assessment (CIA), Environmental Justice (EJ) Analysis, and Indirect & Cumulative Effects (ICE) Assessment, Visual Impact Analysis (VIA), agency coordination, tribal coordination support, and public outreach related to the development of an improved transportation system through Graham County, NC.

Mark Pascoe P.E., LEED AP, ENV SP

Principal · 42 years of experience
Ann Arbor, Michigan

Mark is a Principal and Client Manager with 35 years of experience in site planning, design, and construction for a variety of public and private sector projects throughout the United States. These include brownfield sites, commercial and business developments, industrial and business parks, site condominiums, multi-family and single family residential developments, municipal facilities–including water and wastewater, transportation systems–, and educational and recreational facilities. Design elements include roads, streets and parking areas; non-motorized trails, sanitary and storm sewers; water mains; site drainage, grading, stormwater facilities and soil erosion control measures; site utilities, pump stations; subdivision and site condominium documents; and construction layout and observation. Mark is especially passionate in accessible and sustainable design solutions and has successfully prepared and administered numerous grant opportunities.

Mark is responsible for managing the basic design and daily activities of a project including the coordination of Stantec's support staff, maintaining work within project budgets and milestones, working with permitting agencies and coordinating permitting, client management, and following Stantec's QA/QC and ISO 9001 guidelines.

EDUCATION

BS, Civil Engineering, University of Michigan, Ann Arbor, Michigan, 1980

REGISTRATIONS

Professional Engineer, State of Kansas

Professional Engineer, State of Wisconsin

Professional Engineer #35266-E, State of Alabama

Professional Engineer #53960, State of Arizona, 12/31/2015

Envision™ Sustainability Professional (ENV SP), Institute for Sustainable Infrastructure, 12/26/2016

Professional Engineer #30207, Commonwealth of Kentucky, 6-30-16

Professional Engineer #25679, State of Mississippi, 12-31-15

Professional Engineer #52415, State of Washington, 9-3-15

Professional Engineer #16588, State of Arkansas, 12-31-16

Professional Engineer #00118099, State of Tennessee, 3-31-17

Professional Engineer #3904928, State of Illinois, 11/30/15

Professional Engineer #39801, State of Louisiana, 9-30-15

Professional Engineer #11400721, State of Indiana, 7-31-16

Professional Engineer #2015007439, State of Missouri, 12-31-15

LEED Accredited Professional, U.S. Green Building Council, 3/24/2009

Professional Engineer #48616, State of Florida, 2-28-17

Professional Engineer #34033, State of Michigan, 10/31/16

MEMBERSHIPS

Member, Construction Institute, American Society of Civil Engineers

Member, American Society of Civil Engineers

PROJECT EXPERIENCE

EDUCATION

Washtenaw Community College* | Ann Arbor, Michigan | Project Manager

Served as Project Manager for site work improvements to Washtenaw Community College's campus in Ann Arbor.

Eastern Michigan University Site Improvements* | Ann Arbor, Michigan | Project Manager

Served as Project Manager for site improvements to Eastern Michigan University's campus, including work on water mains, sidewalks, and landscaping improvements.

University of Michigan Site Improvements | Ann Arbor, Michigan | Project Manager and Principal-In-Charge

Served as Project Manager for site work improvements for the University of Michigan. Improvements included work on the University's Museum of Art, Law School, Briarwood #1, #3, and #4, EAAHCG Exterior Patio, Child Care Facility, Cardio Vascular Center, Kellogg Eye Center, and Radrick Farms Golf Course, as well as various medical and infrastructure facilities and studies.

FUNDING ADMINISTRATION

Chelsea Wellness Foundation (CWF) Grant | Lyndon Connector, Lyndon Township, Michigan | Project Manager

Served as Project Manager responsible for securing a $5,000 CWF Grant to conduct a feasibility study for a 7.5 mile non-motorized multi-use trail project.

Michigan Department of Transportation - Transportation Enhancement (MDOT-TE) Grant and Michigan Department of Natural Resources Trust Fund (MNRTF) Grant | Lakelands Trail, Putnam Township, Michigan | Project Manager

Served as Project Manager responsible for securing a $927,523 MDOT TE Grant and a $500,000 MNRTF Grant for a six-mile non-motorized multi-use pedestrian and equestrian pathway project. The objective was to provide as much separation between the two uses as possible while minimizing the impact on adjacent wetlands and vegetation. The project also included the rehabilitation and widening of five existing railroad bridges and an at-grade crossing of a state highway (M-36).

** denotes projects completed with other firms*

Michigan Department of Natural Resources (MDNR) Recreation Passport Grant, Unadilla Park | Unadilla Township, Michigan | Project Manager

Served as Project Manager responsible for securing a $30,000 MDNR Recreation Passport Grant for Unadilla Park Trail and Solar Lighting Improvements.

United States Environmental Protection Agency (US EPA) Brownfield Cleanup Grant, Seven Mile Road Project | Northville Township, Michigan | Project Manager

Served as Project Manager responsible for securing a $200,000 EPA Brownfield Clean-Up Grant for the 450 acre former State Hospital Seven Mile Road Project.

Michigan Department of Natural Resources (MDNR) Recreation Passport Grant, Gregory Trailhead | Unadilla Township, Michigan | Project Manager

Served as Project Manager responsible for securing a $45,000 MDNR Recreation Passport Grant for the Gregory Trailhead Improvement Project.

Michigan Department of Transportation Alternatives Program (MDOT TAP) Grant, Lohr-Textile Greenway Phase II | Pittsfield Township, Michigan | Project Manager

Served as Project Manager responsible for securing a $1.3M MDOT TAP Grant for a two mile trail project.

INDUSTRIAL DEVELOPMENT

Ann Arbor News Printing Facility* | Ann Arbor, Michigan | Project Manager and Principal-In-Charge

Served as Project Manager for this 86,000 sq. ft. state-of-the-art $38 million printing facility.

Ann Arbor Maintenance Facility | Ann Arbor, Michigan | Project Manager and Principal-in-Charge

Project Manager for this 26-acre site which houses multiple buildings; including an operations building (39,000 sq. ft.), maintenance garage (40,000 sq. ft.), vehicle storage building (65,000 sq. ft.), salt storage dome, fueling stations, and vehicle wash facilities. Environmentally friendly features included vegetative green roofs over two conference rooms to capture stormwater; use of natural lighting; energy-efficient heating, cooling, and lighting fixtures.

URBAN LAND

Seven Mile Road Site Master Plan | Northville Township, Michigan

Northville Township purchased this 330 acre site for the purpose of creating their version of New York's Central Park. Stantec was hired by the Township in order to lead them through a public process that resulted in a master plan and guide for future, phased development of the site. Stantec analyzed the site and prepared an Opportunities and Constraints plan, conducted focus group interviews, a community survey and questionnaire, workshop with a local middle school, and a day-long public design charrette. The project was overseen by the 2021 Green Ribbon Committee – a group of residents appointed by the township specifically for this project. Four unique concepts were prepared to demonstrate the sites potential and to determine the priorities and values of the community. The final $82 Million Plan was presented and adopted by the Township Board in January 2012.

Pittsfield Preserve | Pittsfield Township, Michigan

Project Manager for a Master Plan of the Township owned property that included a proposed administrative campus: a 30k sf maintenance facility, 60k sf public safety building and a 40k sf recreation center. However, the vast majority of the 700 acre property will be left natural with the only planned improvements serving the purpose of providing access to the sites natural features. These included walking paths, nature trails, parking, boardwalks, and signage.

Lakelands Trail | Unadilla Township, Michigan | Project Manager

Project Manager for a six-mile section of trail that will accommodate both pedestrian and equestrian users. Responsible for securing a $700k MDOT TAP Grant, $300k MNRTF Grant, and $200k Local Donor funding.

Lakelands Trail | Putnam Township, Michigan | Project Manager

Project Manager for a six-mile section of trail that will accommodate both pedestrian and equestrian users. The objective was to provide as much separation between the two uses as possible while minimizing the impact on adjacent wetlands and vegetation. The project also included the rehabilitation and widening of five existing railroad bridges and an at-grade crossing of a state highway (M-36).

Lohr Road Greenway | Pittsfield Township, Michigan | Project Manager

Project Manager for a 2.4 mile section connecting the Saline Recreation Center to numerous neighborhoods along Textile and Lohr Roads and ultimately to the City of Ann Arbor's pathway network.

Platt Road Greenway | Pittsfield Township, Michigan | Project Manager

Project Manager for the installation of a 2.5 mile long shared use path along Platt Road between Ellsworth Road and US-12 (Michigan Avenue) in Pittsfield Township including a new pedestrian bridge.

Washtenaw County Greenway Trail | Ann Arbor, Michigan | Senior Project Manager

Oversaw a greenway trail linking Dixboro Road to Hewitt Road. This segment of the Washtenaw County Greenway Trail (Border to Border) provides the critical first link in the overall County Greenway network east of Ann Arbor.

Ann Arbor Municipal Services Center | Ann Arbor, Michigan | Senior Project Manager

Stantec provided the civil services, including site plan submittal for the new $47 M, 102,000 square-foot Ann Arbor Municipal Services Center. This 3-acre urban redevelopment site is utilizing natural excavation/stone infiltration as BMP for underground stormwater detention system with zero runoff.

Georgetown Mall* | Ann Arbor, Michigan | Project Manager and Principal-In-Charge

This strip mall required underground stormwater detention as part of their improvements. Permitting through the City of Ann Arbor was required. The primary challenge of this site was the significant vertical grade change across the site. In an effort to reduce construction cost, the footprint was minimized through the use of taller structures. Concrete box structures were utilized on this 30-acre site.

and approval.

Lohr-Textile Greenway Phase 2 | Pittsfield Township, Michigan | Project Manager

Project Manager for a two-mile section of non-motorized multi-use pathway incorporating boardwalks, pedestrian bridge, mid-block road crossing, bioswales, retaining walls, signal and ADA intersection improvements, and two at-grade railroad crossings. Responsible for securing a $1.3M MDOT TAP Grant.

** denotes projects completed with other firms*

Sean McInroy P.Eng.

Senior Associate - Mechanical Engineer · 14 Years of Experience
Edmonton, Alberta, Canada

Stantec

Sean is a Senior Associate with 14 years' experience. His experience includes design, construction administration, project management, feasibility studies, and assessment/compatibility reports. Sean's specialization in district energy consists of: Distribution Piping Systems (e.g. above and below-grade hot water, steam, chilled water, EN 13941 pre-insulated pipe systems), Energy Centers (i.e. heating/cooling pant), and Energy Transfer Stations. His technical experience consists of hydraulic modelling, CAD modelling, pipe stress analysis (to ASME B31.1 and EN 13941), equipment/instrumentation sizing, and geo-exchange modelling.

EDUCATION

Diploma in Mechanical Engineering Technology, Northern Alberta Institute of Technology, Edmonton, Alberta, 2007

Bachelor's Degree in Mechanical Engineering, University of Victoria, Victoria, British Columbia, 2012

REGISTRATIONS

Registered Professional Engineer #197803, Engineers and Geoscientists British Columbia, 2019-Present

Registered Professional Engineer #179204, Association of Professional Engineers and Geoscientists of Alberta, 2021-Present

MEMBERSHIPS

International Ground Source Heat Pump Association, Member

PROJECT EXPERIENCE

Renewable, Alternative and District Energy

Geo-Exchange System – YVR Core Program*, Richmond, BC, Canada (Mechanical Engineer)
Project/design engineer for two closed loop geo-exchange systems totaling 841 boreholes at 500 feet depth.

Blatchford Redevelopment Geo-Exchange System*, Edmonton, AB, Canada (Mechanical Engineer)
Project/design engineer for a vertical closed loop geo-exchange system totaling 570 boreholes at 500 feet depth.

Downtown Calgary District Energy Expansion*, Calgary, AB, Canada (Mechanical Engineer)
Engineer of record for the mechanical aspects (thermal stress, welding, NDT, conditioning) of 1.2 km below-grade district energy distribution piping.

Below-Grade District Energy Piping System*, Surrey, BC, Canada (Mechanical Engineer)
Engineer of record for the mechanical aspects (thermal stress, welding, NDT, conditioning) of 2 km below-grade district energy distribution piping.

Downtown Edmonton Energy Centre and Distribution System*, Edmonton, Alberta, Canada (Mechanical Engineer)
Engineer of record for a 7 MW natural gas boiler heating plant, district energy distribution piping system, and three ETS' serving the heating needs of three high-rise buildings and the Energy Centre. The ETS sizes range from 1 MW to 5.5 MW.

Sewer Heat Recovery Energy Centre*, Edmonton, AB, Canada (Mechanical Engineer)
Engineer of record for the heat recovery component of the Blatchford Sewer Heat Exchange Lift Station and Energy Centre. The Energy Centre consists of four SHARC heat exchangers with total heating and cooling capacities of 12 MW and 10 MW respectively.

Thermal Energy Storage*, North Vancouver, BC, Canada (Project Manager; Mechanical Engineer)
Engineer of record and project manager for the preliminary design of a 20 MWh, 4 MW peak charge/discharge hot water thermal energy storage system.

** denotes projects completed with other firms*

Sean McInroy P.Eng.

Senior Associate - Mechanical Engineer · 14 Years of Experience
Edmonton, Alberta, Canada

Stephenfield WTP Geo-Exchange System Upgrade*, Stephenfield, MB, Canada (Mechanical Engineer)

Engineer of record for the review and upgrade of an existing horizontal geo-exchange field and heat pump system serving the WTP building and process loads.

Below Grade District Energy System - YVR Core Program*, Richmond, BC, Canada (Mechanical Engineer)

Project/design engineer for a new district energy distribution system consisting of approximately 2.4km of 400mm diameter insulated steel hot water distribution pipe and 2.4 km of 850mm diameter HDPE chilled water distribution pipe.

BCIT Aerospace Technology Campus - Geo-Exchange Field Assessment*, Richmond, BC, Canada (Mechanical Engineer)

Engineer of record for the assessment of the design, installation, and performance of the existing 120 borehole closed loop geo-exchange system. Operation, monitoring, and maintenance recommendations were provided as a result of the assessment.

Lottery Corporate Building - Geo-Exchange Feasibility Study*, Kamloops, BC, Canada (Mechanical Engineer)

Engineer of record for the feasibility review of a closed loop geo-exchange field to serve 400 kW peak and 450 MWh annual heating and cooling loads.

Carrier Sekani Family Services Centre - Geo-Exchange Feasibility Study*, Vanderhoof, BC, Canada (Mechanical Engineer)

Engineer of record for the feasibility review of closed loop, open loop groundwater, and lake geo-exchange options to serve 200 kW peak and 140 MWh annual heating and cooling loads.

Geo-Exchange Feasibility Study*, Terrace, BC, Canada (Mechanical Engineer)

Engineer of record for the feasibility review of a closed loop geo-exchange field to serve 180 kW peak and 105 MWh annual heating and cooling loads.

Geo-Exchange Preliminary Desktop Study*, Kingston, ON, Canada (Mechanical Engineer)

Engineer of record for the feasibility review of closed loop, open loop groundwater, lake, and effluent heat recovery geo-exchange options to serve 1.65 MW peak and 55 MWh annual base heating loads for a potential district energy system for CFB Kingston.

Riva 4, 5, and 6 Tower ETS', Above-Grade and Below Grade District Energy Piping System*, Richmond, BC, Canada (Project Manager; Mechanical Engineer)

Engineer of record and project manager for the design and construction of three 1.5 MW ETS' (one per building) and the parkade district energy distribution piping.

Park Residences II Towers D, E, and C ETS', Interior Piping, Interim Energy Centre Upgrades and Below-Grade District Energy Piping System*, Richmond, BC, Canada (Project Manager; Mechanical Engineer)

Engineer of record and project manager for the design of two ETS', interior piping, 5 MW interim energy centre upgrades, and district energy distribution piping.

Long River Condominium Energy Transfer Station*, Edmonton, AB, Canada (Mechanical Engineer)

Engineer of record for the design of a 550 kW ambient temperature ETS serving both heating and cooling.

Enmax Downtown District Energy CHP*, Calgary, AB, Canada (Mechanical Engineer)

Project/design engineer for the Combined Heat and Power upgrade to the ENMAX Downtown District Energy Centre (DDEC). The project included conceptual design, implementation planning and detailed design of a 3.3 MWe natural gas engine for the DDEC.

** denotes projects completed with other firms*

James Bererton P.Eng.

GeoExchange/District Energy Specialist · 30 years of experience
Calgary, Alberta, Canada

With 30 years' practical engineering and renewables experience, Mr. Bererton provides a grounded engineering perspective. Hailing from the oil and gas industry, he applies a rigorous and detailed approach to every project.

His passion for sustainable applications covers a wide range of technologies including: geo-exchange, photovoltaics, PV/Thermal, heat pumps, borehole thermal energy storage (BTES), biomass, and high performance building design. A key specialization is the combination of proven technologies into innovative, efficient, and cost effective hybrid solutions.

His project experience includes the design of the second largest net-zero facility in North America and multiple campus scale district energy systems. His involvement on the world-renowned Okotoks Drake Landing Solar Community provided him with a firm background in solar thermal and seasonal storage applications. As a specialist in geo-exchange, solar PV/Thermal, and energy storage designs, Mr. Bererton has contributed to the International Energy Agency standards as well as Canadian standards. Mr. Bererton performs independent research in decarbonization technologies including PV/Thermal collectors, heat pumps, and thermal/electrical energy storage. Achieving zero carbon electrification with minimized impact on the electrical grid is a key focus.

EDUCATION

B.Sc., Engineering Physics, University of Alberta, Edmonton, Alberta, 1995

TRNSYS Course, T.E.S.S., Madison, Wisconsin, 2005

RS100-8 Renewable Energy Project Analysis Certification Course, Wills College, Willis, Ontario, Canada, 2006

CERTIFICATIONS & TRAINING

Commercial Geoexchange Designer, Canadian GeoExchange Coalition, Calgary, Alberta, Canada, 2008

MEMBERSHIPS

Professional Engineer, Association of Professional Engineers and Geoscientists of Alberta, 1994 to Present

Member, American Society of Heating, Refrigerating & Air-Conditioning Engineers, 2023-Present

Research and Expert Committees:

Energy Storage https://iea-es.org/annex-21/ Thermal Response Test Standard for Geoexchange design, International Energy Agency

Solar Heating and Cooling https://task55.iea-shc.org/ Integrating Large SHC Systems into District Heating and Cooling Networks, International Energy Agency

Solar Heating and Cooling https://task60.iea-shc.org/ Application of PVT Collectors, International Energy Agency

Solar Heating and Cooling https://task68.iea-shc.org/ Efficient Solar Heating System, International Energy Agency

PROJECT EXPERIENCE

NET-ZERO ENERGY DESIGN (HIGH PERFORMANCE BUILDING DESIGN)

Sacramento Municipal Utility District (SMUD) | Sacramento, California

Lead sustainability engineer for the Sacramento Municipal Utility District net zero corporate yard facility. Led concept design including: horizontal geo-exchange field, air source heat pumps, district energy network, building efficiency measures, HVAC system design, and single axis tracking PV array design. Developed heating and cooling designs to minimize energy consumption for 6 buildings including a 200 person office complex using a local district energy network. Design and technology selection for a 1.5 MW photo voltaic farm. Innovative design reduced the levelized cost of electricity below the retail grid price.

SEASONAL ENERGY STORAGE

SAIC Canada - Okotoks Solar Thermal Seasonal Storage Project* | Okotoks, Alberta | 2004-2006 | Control Systems Consultant

Participated in extensive development of Seasonal Thermal Energy Storage pilot project. Activities included but not limited to: System optimization and controls design and operation, borefield geometry. West Jet – Corporate Campus Building | Calgary, Alberta | 2006-2009

Geo-exchange system design using geothermal piping integrated into structural piles. First implementation of energy piles in Western Canada. Integrated design using thermal storage and heat transfer from cooling to heating side using heat pumps Detailed life cycle cost analysis performed using TRNSYS thermal analysis tool.

** denotes projects completed with other firms*

CAMPUS/DISTRICT ENERGY

Fort McMurray District Energy | Fort McMurray, Alberta, Canada | Technical Lead

Technical lead for a class IV cost estimate for recovering waste heat from oil sands facilities in the Fort McMurray area and transporting this heat via hot water pipeline to provide district heating to a community of 24,000 people. Also evaluated other alternative energy, energy efficiency and building standards for this community to reduce the total environmental footprint.

Goodridge Corners Community Sustainable Energy | Edmonton, Alberta | 2011

Led concept engineering effort to evaluate and identify sustainable energy options for community wide implementation of a 5000 residence green field community in North Edmonton. Investigation included district heating network supplied by various carbon neutral technologies including straw fired biomass boilers and solar thermal with seasonal storage, distributed solar thermal hot water heating, and distributed geothermal systems.

Washington University in St. Louis | St. Louis, Missouri, United States

Lead designer for an innovative application of liquid desiccant thermal cooling process driven by hybrid PV/Thermal using seasonal heat storage. Campus scale district energy that projected a 70% reduction in energy consumption. At the heart of this concept is the use of liquid desiccant dehumidification to satisfy the hot humid summer climate. The high grade thermal input energy is recovered and stored in a Borehole Thermal Energy Storage field. The process is driven by a high efficiency hybrid PV/Thermal technology capable of the 65-80°C that drives the desiccant dehumidification cycle.

Berkeley Global Campus

Led green infrastructure design for planned 5.4M laboratory and higher educational facility located of the San Francisco Bay at Richmond. Innovations incorporated evaporative cooling, combined fire-water/district network, hybrid PV/Thermal, and fully independent resilient microgrid.

GEOEXCHANGE

Calgary Airport Geoexchange Expert Witness | Insurance Adjuster | Calgary International Airport (YYC), Airport Road Northeast, Calgary, AB, Canada | Expert Witness for Geoexchange Design

The Calgary Airport terminal expansion included the design of a geo-exchange system that was intended initially to cover 100% of the cooling loads. As the project progressed it was determined that the geofield would not be large enough to meet the cooling loads. As part of a design review, various options were considered and the possibility of errors in the original design was assessed. A detailed model of the initial design as well as options to address the full cooling loads were developed providing highly accurate assessment of the geoexchange design, the evolution of the engineering, and the determining factors for the adequacy of the original design as well as the mitigation options.

Wal-mart Canada Burlington Store Geo-Exchange | Burlington, Ontario | 2008-2009 | Sustainable Energy Designer

World 's first implementation of horizontal geo-exchange under Wal-Mart parking lot. Install 15km of piping in 5 days reducing geo-exchange payback from 40+ years to under 10. Harnessed roll-out radiant mats tied to geo-exchange field. Extensive TRNSYS modeling to optimize the system. Design assistance modeling of super-efficient HVAC system including: roll-out radiant floor system, specialized air handling units with dehumidification, heat recovery, heat pumps, and hot water coils, energy recovery ventilation, and complete building envelope model. Ongoing design assistance modeling to improve system performance using alternative energy options.

Direct Expansion Standard Development | Contributor

Participant in expert panel for the amendment of Canadian Standard CSA-448 on geo-exchange systems for the inclusion of direct expansion systems into the revised standard.
Supplied recommendations for field sizing criterion, long term thermal impact, frost protection and corrosion protection systems.

Energy Conservation through Energy Storage (ECES): Annex 21 Thermal Response Test | 2007-2011 | Sub-task leader

Sub-task leader responsible to facilitate development of international guidelines for standard thermal response test used for low temperature geothermal heating and cooling and energy.
Research and development of horizontal geo-exchange model and thermal response test protocol development for horizontal fields. Advisor regarding multi-step energy pulse test for numerical (parametric) estimation of formation thermal properties.

Vulcan Community Solar - Town of Vulcan Distributed Biomass/Solar Energy* | Vulcan, Alberta | 2004-2005 | Thermal Modeling Lead

Conceptual and FEED Engineering for a solar/biomass distributed energy system for a town of 800 homes and 200 commercial users using a combination of straw biomass boilers and a 20,000 m2 solar thermal array. TRNSYS modeling of system; Optimization and system design; Cost estimating.

** denotes projects completed with other firms*

Brad Dawe P. Eng., LEED AP

Mechanical Engineer · 19 Years of Experience
St. John's Newfoundland & Labrador, Canada

Stantec

Brad brings nearly 20 years of experience in mechanical system design for buildings, including defense, public safety, healthcare, commercial, institutional, and industrial facilities. Throughout his career, Brad has played a major role in the design and delivery of several dozen small and large scale vertical closed loop geo-exchange projects, for both new construction and retrofit projects. He has extensive experience as design lead and providing subject matter expertise to geo-exchange system designs ranging from small light commercial projects to large institutional projects. Brad specializes in designing cost effective mechanical systems that meet project requirements for reliability, maintainability, security, sustainability, and indoor air quality. He has a sustainable design focus with involvement in dozens of LEED certified projects ranging from LEED Certified to Gold, many of which include high-performance geothermal systems.

EDUCATION

LEED Accredited Professional, Canadian Green Building Council, St. John's, Newfoundland and Labrador, 2009

Bachelor of Engineering (Mechanical), Memorial University of Newfoundland, St. John's, Newfoundland and Labrador, 2004

PROJECT EXPERIENCE

EDUCATION

Faculty of Medicine Expansion & Craig L. Dobbin Genetics Research Centre | Memorial University of Newfoundland | St. John's, NL | CAD 55M | 2010-2014 | Mechanical EOR

Mechanical systems design for 14,500 square meter, LEED® Silver facility including fire protection, plumbing, HVAC, medical gas, IT infrastructure, rainwater harvesting, and building automation. Space program included laboratories, education space, patient simulation space, offices, and meeting space

College of the North Atlantic Heavy Equipment Centre of Excellence | College of the North Atlantic | Stephenville, NL | CAD 15M | 2016-2019 | Lead Mechanical Engineer

Lead mechanical engineer for this 40,000, $15M post-secondary education facility including classrooms, carpentry shop, high bay maintenance/ heavy equipment workshop, student lounge/ lunchroom and administration facilities.

International Brotherhood of Electrical Workers (IBEW) Headquarters and Training Facility | International Brotherhood of Electrical Workers Local 1620 | Holyrood, NL | CAD 8M | Project Manager

Project manager for this 47,000 SF, two-storey college including industrial shop spaces for safety, electrical and welding trades.

Octagon Pond Elementary K-8 School | Paradise, NL | Mechanical EOR

Mechanical systems design including fire protection, plumbing, HVAC, building automation, and geo-exchange heating/cooling system. Construction value approximately $18M.

New Carpenters College, Local 579 | Paradise, NL | EOR

2000 square meter extension to existing college facility including welding, machine, carpentry, and mechanical shops.

HEALTHCARE / INSTITUTIONAL

CMHIP Campus Geothermal Feasibility Study | Pueblo, CO | Geothermal Specialist

Geothermal feasibility study to assess the potential and economic viability of integrating a geothermal heat pump system with the campus central plant.

Inpatient Wing Redevelopment James Paton Memorial Regional Health Centre | Central Regional Health Authority | Gander, NL | 2018-2021| Project Manager / Mechanical EOR

Redevelopment for a new 16-bed inpatient unit including fire protection, plumbing, medical gas, HVAC, and building automation.

Brad Dawe P. Eng., LEED AP

Mechanical Engineer · 19 Years of Experience
St. John's Newfoundland & Labrador, Canada

New Operating Suite Penthouse and Interior HVAC Renovations | Eastern Health | St. John's, NL | CAD 5M | 2020 | Mechanical EOR

Major mechanical system upgrade and interior HVAC renovation to address aging infrastructure, redundancy and other Code related deficiencies for the OR Suite at Health Sciences Centre. The work involves significant construction phasing, sequencing, and infection control coordination to maintain operations with limited disruption.

New Diagnostic Imaging Penthouse and Interior HVAC Renovations | Eastern Health | St. John's, NL | CAD 5M | 2018 | Mechanical EOR

Major mechanical system upgrade and interior HVAC renovation to address Code related deficiencies and shortage of cooling capacity in DI suite. The work involved significant construction phasing, sequencing, and infection control coordination to maintain operations with limited disruption.

Central Regional Health Centre Laboratory Extension and Redevelopment | Central Regional Health Authority | Grand Falls-Windsor, NL | CAD 10M | 2016-present | Mechanical EOR

Redevelopment of existing laboratories, including new HVAC systems/equipment to meet healthcare standards. Anticipated $15M construction cost; design complete to tender ready.

Charles S. Curtis Memorial Hospital Microbiology and Pharmacy Renovations | Labrador Grenfell Health | St. Anthony, NL | CAD 3M | 2018 | Mechanical EOR

Redevelopment of microbiology and pharmacy areas of the hospital including new HVAC systems and connection to existing steam plant for heating.

New Long Term Care Facility | Carbonear, NL | 2014 | Mechanical Engineer

Mechanical systems design for new patient tower including, fire protection, plumbing, HVAC, kitchen ventilation, and building automation.

New Regional Healthcare Facility | Labrador City, NL | CAD 60M | 2014 | Mechanical Engineer

Mechanical systems lead for construction administration and commissioning for this new 9500 square meter regional hospital in Western Labrador.

FEDERAL INFRASTRUCTURE

Atlantic Science Enterprise Centre (ASEC) | Moncton, NB | Lead Mechanical Engineer | 2021

This project includes the development of a net zero laboratory and office building for the Government of Canada, located in Moncton, NB, with Stantec and its partners providing owner's advisor services as part of project delivery. Brad was the lead mechanical engineer for mechanical systems schematic design for this 300,000-sf renovation and expansion. Project requirements include net zero carbon achievement, and the mechanical design approach features a 150 well closed loop vertical geo-exchange system.

RCMP Net Zero Model Small Detachment | RCMP | 2021 | Lead Mechanical Engineer

Mechanical systems design for the development of a net zero carbon small detachment model for use by the RCMP in all regions and climate zones in Canada. Completion of life cycle costing and design development drawings for mechanical systems

Rocky Harbour RCMP Detachment | RCMP | Rocky Harbour, NL | CAD 6.5M | 2021 | Mechanical EOR

This new small RCMP detachment combines staff spaces for 5 members including offices, locker room, exercise facilities, multipurpose room, storage and equipment rooms, and cell block.

Canadian Coast Guard Search and Rescue Stations, Twillingate and Old Perlican, NL | Mechanical EOR | $9M CAD | 2020

This recently completed new construction project consists of operations buildings complete with living quarters, FRC maintenance/storage building, and new marine structures. LEED®v4 Gold certification has been achieved for Old Perlican and is pending for Twillingate. The building envelope is designed for high performance and high-efficiency mechanical heating/cooling systems include heat recovery ventilators and variable refrigerant flow air-to-air heat pump systems, as well as 15 kW onsite solar generation. The project energy performance is 60% better than ASHRAE 90.1 reference.

Brad Dawe P. Eng., LEED AP

Mechanical Engineer · 19 Years of Experience
St. John's Newfoundland & Labrador, Canada

New Minas RCMP Detachment | RCMP | New Minas, NS | CAD 12.2M | 2019 | Mechanical EOR

Precedent prototype for a new regional 11,000 SM RCMP detachment in an urban setting that combines a forensic unit, labs, office areas, meeting space, work bays, integrated cold storage, and holding area. The mechanical project design includes a ground source heat pump system to provide heating and cooling for the building, which allows for building energy performance to significantly exceed National Energy Code requirements for energy efficiency.

CORPORATE / OFFICE

ExxonMobil Canada Headquarters Fit-up | ExxonMobil | St. John's, NL | 2018-2020 | Lead Mechanical Engineer

In addition to the provision of conventional MEP systems for office, meeting, collaboration, and conference space, the tenant improvements also required the provision of customized mechanical systems for several unique spaces including onshore control centres (OSC), data centre, and emergency response spaces that are necessary to support offshore oil operations.

Cyber Centre Office Building | Pomerleau | Fredericton, NB | CAD 37M | 2018-2020 | Lead Mechanical Engineer

Brad was responsible for all elements of mechanical design for this design-build project. He analyzed and recommended an HVAC system approach that considered functionality, efficiency, reliability, and maintainability. He also collaborated with key stakeholders and all members of our integrated design team to see that practical, effective, and sustainable solutions aligned with client expectations were attained with the finished product.

Scotia Centre Expansion and Renovation | St. John's, NL | CAD30M | 2012-2016 | Lead Mechanical Engineer

Stantec, as prime consultant, lead architect and engineer used a construction management project delivery method for this 3000 m^2, 3-storey extension to existing office tower complex and parking garage. Mechanical scope included fire protection, plumbing, HVAC, controls, and geo-exchange heating system, as well as full mid-life retrofit of base building mechanical systems.

Fortis Place | St. John's, NL | 2012 | Mechanical EOR/Project Manager

LEED® Certified Gold 24,000 square meter office tower complex and Fortis Inc. corporate HQ, including 3 story interconnected parking garage structure. Services included base building design and construction, along with the majority of tenant improvements throughout the tower. The project includes a 30 well geo-exchange system for heating and cooling.

351 Water Street | East Port Properties | St. John's, NL | CAD 55M | Support Mechanical Engineer

LEED® Certified Gold 168,000SF office tower standing above a six-level parkade, and prime retail and commercial space.

OTHER GEO-EXCHANGE

Oshawa Rec Centre, Oshawa, ON
Currently in design stage and using a geo-exchange system paired with solar thermal panels for heating/cooling.

DND FCF Facility, Cold Lake, AB
Currently in design stage and using a geo-exchange system for building heating and cooling.

4ESR DND Facility, Gagetown, NB | Geothermal Specialist | Completed 2023
210,000 sf facility constructed under modified design build delivery method and consists of a 32 well geo-exchange system.

St. John's YMCA | $15M | Completed 2011
50,000 sf multi-use facility consisting of a natatorium, fitness centre, gymnasium, courts, daycare, corporate office, and community space uses a 20 well geo-exchange system for heating and cooling.

Carbonear School | $18M | Completed 2015
50,000 sf K-8 school, which uses a 20 well geo-exchange system for heating and cooling.

Municipality of Kings, Municipal Complex | Coldbrook, NS | Geothermal Specialist | 2019
24,000 sf complex uses a vertical closed loop geo-exchange system to achieve 31% less energy than energy standard requirement.

Richard Maria van der Beek MSc MPhil MSt MBA

Senior Consultant Energy and Sustainability · 11 Years of Experience
Sittard, Netherlands

Stantec

Richard is an experienced consultant with a demonstrated history of working on the interface of Science, Business, and Policy from Academic, Consultancy, and Industry angles, with particular interests in Finance, Energy, Aviation, IT, Supply Chain, Circular Economy, and the Rural Economy. Prior to joining Stantec, Richard worked in Corporate Social Responsibility, Sustainability Reporting, and Corporate Affairs roles, visiting offices, production and logistics sites across Europe. Within Stantec he focusses primarily on business cases and financial models for district heat networks and solar energy.

EDUCATION

Master of Business Administration, Quantic School of Business and Technology, Washington, District of Columbia, 2022

Master of Studies, Historical Studies, University of Oxford, Oxford, England, 2019

Master of Philosophy, Environmental Policy, University of Cambridge, Cambridge, England, 2012

Master of Science, Management and Information Technology, University of St. Andrews, St Andrews, Scotland, 2011

Bachelor of Science, Earth and Environmental Science, Utrecht University, Middelburg, Zeeland, 2010

CERTIFICATIONS & TRAINING

Financial Modeling and Valuation Analyst, Corporate Finance Institute, Vancouver, British Columbia, 2023

Supply Chain Management MicroMasters, Massachusetts Institute of Technology, Cambridge, Massachusetts, 2023

Investment Foundations Programme, CFA Institute, London, England, 2021

Circular Economy Masterclass, Exeter University Business School, Exeter, England, 2020

REGISTRATIONS

Licensed Member #990638553, British Computing Society, The Chartered Institute for IT, 2016-present

PROJECT EXPERIENCE

Financing & Financial Advisory Services

Rolneming warmtetransitie, Amersfoort, Netherlands (Financial consultant, 2022-present)

Performed heat demand and heat sources analysis. Created business cases for various geographical scopes and potential governance structures, creating insights in the CAPEX, OPEX, and income streams of several possible district heating networks in the municipality. Advised city council on opportunities to facilitate, finance, and operate a municipal heat utility company. Liaised with grid operators, public sector banks, and other layers of government to gauge willingness and interest in setting up a provincial heat utility company.

JTM Noordwest2, Groningen, Netherlands (Financial consultant, 2021-present)

Created a business case for the proposed expansion of the district heating network in the City of Groningen. Collaborated with the Ministry of Economic Affairs, the Netherlands Enterprise Agency, several public sector banks and the European Investment Bank to work towards a bankable business case covering heat sources (residual heat, solar thermal), power plants, primary and secondary network, and connections to some 12,500 houses. Applied for national subsidies and working towards a request for EU subsidies, grants, and low-interest loans.

Richard Maria van der Beek MSc MPhil MSt MBA

Senior Consultant Energy and Sustainability · 11 Years of Experience
Sittard, Netherlands

Provincial government's role in district heating, 's-Hertogenbosch, Netherlands (Financial consultant, 2023)

Proposed several potential governance structures for a Provincial Heat Utility Company and a roadmap for the next few years. Provided CAPEX estimates covering geothermal/aquathermal/residual heat sources, primary, secondary, and tertiary grids, and connections to end-consumers for three district heating scenario's: 1) all neighborhoods, 2) all neighborhoods in which medium-to-high temperature district heating was calculated to have the lowest national costs, and 3) the outcome of scenario 2, plus all neighborhoods for which the national cost of medium-to-high temperature district heating was calculated to be within 10% of the lowest national cost alternative.

Warmtering Gorecht-Noord, Hoogezand, Netherlands (Financial consultant, 2023)

Created a business case for a district heating network in the city of Hoogezand, connecting a cardboard box factory to various municipal buildings, houses, and apartment complexes. Created insights into several scenarios, ranging from different geographical scopes to rates.

Biovergister Groenhof Agro, Eijsden, Netherlands (Financial consultant, 2022)

Supported local government on whether and how to help finance a bio-fermenter turning the manure of 400 cows into biogas, as part of a wider discussion about the role of nitrogen in Dutch agriculture, sustainability projects in the municipality, and biogas projects.
Created business case in liaison with farmer, suppliers, and government. Advised local government how to structure a sustainability loan to allow the farm to modernize and build the bio-fermenter.

JTM Het Groene Net, Sittard, Netherlands (Financial Consultant, 2021)

Advised the Province of Limburg on developing and presenting a business case for the expansion of the district heating network "Het Groene Net" from the city of Sittard towards the city of Maastricht. Performed scenario and risk analysis, identified the need for equity and debt funding, and wrote investment memos for the Dutch Investment Agency and the European Investment Bank.

Feasibility Studies

Heating alternatives, Heusden, Netherlands (Consultant, Energy and Sustainability, 2021-2022)

Compared five different options for the heat transition in the neighborhood of Vliedberg in the town of Heusden: hybrid heat pumps, medium temperature heat pumps, low temperature all-electric heat pumps, district heating using biomass, and district heating with a collective heat pump. Identified reference buildings and calculated insulation, installation, and connection costs for these houses. Estimated CAPEX and OPEX costs for the district heating solutions. Used a discounted cashflow analysis to provide insights into the costs and benefits of the five solutions for the various reference buildings and presented recommendations to the municipal council.

Haalbaarheid Aquathermie, Nederweert, Netherlands (Consultant, Energy and Sustainability, 2021-2022)

Investigated potential for a district heating network connecting two neighborhoods in Nederweert, using the local canals as heat sources. Designed a network between neighborhoods and the proposed location of the aquathermal plant. Identified reference buildings to use as representative examples of the houses in the neighborhoods. Calculated insulation, installation and connection costs for the reference buildings. Estimated capital and operational costs for source, power plant, and network. Presented results to policy officers and aldermen.

Richard Maria van der Beek MSc MPhil MSt MBA
Senior Consultant Energy and Sustainability · 11 Years of Experience
Sittard, Netherlands

Collective and Individual heating solutions, Brunssum, Netherlands (Consultant, Energy and Sustainability, 2022-2023)
Performed a feasibility study for several heating alternatives in a neighborhood in the City of Brunssum. Compared and contrasted the technical and economic aspects of individual heat pumps, a district network with a collective heat pump, and a district network using local ponds and lakes as aquathermal sources. Used Stantec's suite of heating solution software to identify anchor clients and the preferred network route, estimated CAPEX, OPEX, and life cycle costs, calculated differences from baseline energy bills, and reported findings to the city administration.

De Kei, Reusel, Netherlands (Consultant, Energy and Sustainability, 2022)
Performed feasibility study into a potential district heating network centered around the town hall, civic center, school, and surrounding shops and houses in the village of Reusel as part as a rejuvenation program. Analyzed heat supply and demand, identified optimal network design, estimated construction and life cycle costs, and reported findings to municipal policy officers.

Policy Planning
WUP Gulpen-Wittem, Gulpen, Netherlands (Consultant, Energy and Sustainability, 2022-2023)
Created a heat transition policy for the municipality's roadmap to a decarbonized society, based on actionable projects in the short term and visions for projects after 2030. Designed a plan containing 34 projects, covering awareness initiatives, municipal policy changes, collaboration with housing and energy cooperatives, and active changes to the built environment, such as insulation. Developed detailed project proposals for hybrid heat pumps, district heating, and biogas. Identified local, national, and European funding opportunities including grants, subsidies, and low-interest loans.

John Griggs PhD, PG

Senior Principal · 35 Years of Experience
Lombard, Illinois

John is a Principal Hydrogeologist and licensed professional geologist with 35 years of experience leading, designing, costing, and driving the execution of hydrogeological investigations, groundwater flow and solute transport modeling, environmental impact assessments, and permitting programs in accordance with federal, state, and local rules and regulations. He has managed portfolios of Phase I and Phase II Environmental Site Assessments and large, multi-faceted remediation projects that include addressing vapor intrusion concerns. Much of John's recent experience is as the hydrogeological lead for a portfolio of sites that require the identification of impacts to groundwater above regulatory levels and evaluating potential corrective measures, including using bench- and field pilot-scale testing.

EDUCATION

Bachelor of Science, Geology with Honors, Indiana University, Bloomington, Indiana, 1984

Masters of Business Administration with High Honors, University of Chicago, Chicago, Illinois, 1998

Doctorate, Geology and Geophysics, University of Hawaii, Honolulu, Hawaii, 1989

PROJECT EXPERIENCE

Phase I Environmental Site Assessment Portfolio, Various Locations, Nationwide

Completed more than 60 Phase I Environmental Site Assessments in support of leasing warehouse space from Washington state to California to Florida to Pennsylvania.

Hydrogeological Investigation, Former Industrial Manufacturing Facility, Springfield, Missouri

Provided direction and senior review. Past uses of the property resulted in the release of chlorinated solvents and metals to the subsurface. Activities involved characterization of aquifers beneath the site and extent of impacts to groundwater and remediation of soil in one area of concern using enhanced in-situ bioremediation.

Groundwater Modeling, Kentucky and Tennessee

Program Manager for development of groundwater flow models for 8 fossil plants in in Kentucky and Tennessee. Ongoing activities include development of hydrogeological conceptual site models and development and calibration of groundwater flow models. The results of the modeling will be used to support risk assessments and, potentially, evaluation of remedial alternatives.

Hydrogeological Investigations, Power Generating Plants, Tennessee

Principal in Charge and lead hydrogeologist for responding to a state order to investigate and remediate unacceptable risks resulting from the management of CCR material. The overall scope includes responding to state information requests regarding hydrogeological and ecological characterization of 25 CCR management units, including impoundments and landfills, at seven fossil plants. The evaluations include human health and ecological risk assessments that will be used to identify unacceptable risks and inform the need for corrective measures. Related activities include pumping test to support pilot groundwater extraction systems and bench scale treatability testing for in-situ remedies.

Hydrogeological Investigations, Shale Gas Play, Pennsylvania

Program Manager for an energy development company for a shallow groundwater projection program related to shale gas development in the Marcellus Shale Play. Provide strategic direction for evaluation of gas migration and groundwater quality issues associated with gas production and stimulation activities. Develop investigative approaches with a goal of rapidly characterizing the issue and providing recommendations to address the issue and receive closure from the Pennsylvania Department of Environmental Protection. Provide quality control and schedule maintenance services. Projects include investigation of residential water sources following complaints by residents of water quality issues. Complaints include issues related to dissolved gases, turbidity and salinity.

** denotes projects completed with other firms*

John Griggs PhD, PG

Principal · 35 Years of Experience
Lombard, Illinois

Site Characterization and Remediation, Former Manufactured Gas Plant, Sterling, Illinois

Project manager for the investigation and remediation of a former manufactured gas plant site. The site is located near in an industrial part of Sterling and was also occupied by a steel mill that was partially constructed over the footprint of the former gas plant. Provided community relations support, including developing fact sheets and mailing to nearby residences prior to investigation activities. Serve as the point of contact with Illinois EPA to gain approval of project documents according to the state voluntary program. Received no further remediation letter with approval of an alternative site-specific indoor inhalation model and an impractical remediation determination for coal tar in fractured bedrock.

Groundwater Contamination Investigation, Nuclear Generating Station*, Illinois

Lead hydrogeologist for characterization of the hydrogeologic system and groundwater quality. Determined the direction of groundwater flow in the vicinity of the power station and monitored groundwater quality near potential sources of tritium. The project included reviewing existing hydrogeological information, designing a groundwater monitoring network and installing monitoring wells.

Site Characterization and Remediation, Former Manufactured Gas Plant, Blue Island, Illinois

Project manager for the investigation and remediation of a former manufactured gas plant for a 6-acre site located along a surface water body near residential properties and a school. Provided community relations support, including developing fact sheets, conducting door-to-door informational updates, preparing presentation materials, and leading an open house prior to remediation activities. Obtained permits from the US Army Corps of Engineers related to wetlands and Illinois EPA for an NPDES permit and Sediment and an Erosion Control Plan. Consulted with the US Fish and Wildlife Service and the Illinois Department of Natural Resources regarding endangered species. Consulted with the Illinois Historic Preservation Agency regarding cultural resources. The remediation scope included providing contractor oversight, conducting continuous 24 hour per day, 7 days per week perimeter ambient air monitoring using Summa canisters and PUF/XAD media samplers

Permitting and Compliance, Wood Treating Facility, Wisconsin

Project Manager for permitting and compliance requirements for an industrial facility. Activities include WPDES permitting, air permitting, Storm Water Pollution Prevention Plan preparation and revisions, groundwater and surface water sampling, and compliance reporting including air, surface water, groundwater, drinking water, and hazardous waste.

Groundwater Modeling, Nebraska Public Power District FERC Relicensing*, North Platte, Nebraska

Project hydrogeologist for development of a groundwater flow model to predict the effect operational and physical changes to the existing surface water system would have on groundwater levels, including impacts on wetlands and return flows to the Platte River. Existing operational parameters had altered natural flows within the Platte River resulting in loss of habitat for certain migratory birds. The study involved evaluating the interaction between groundwater and surface water, including natural drainage features, irrigation canals and power generation facilities in support of FERC relicensing with a goal of optimizing the use of water resources to renew wildlife habitat. The modeled region extended 145 miles from west to east and up to 60 miles from north to south. Model results were used to illustrate how changes to the generation plant operations might restore natural surface water flow patterns.

Groundwater Contamination Investigation and Remediation, Southeast Rockford Groundwater Contamination Superfund Site, Rockford, Illinois

Provided technical direction and quality assurance. The site was a 12-acre manufacturing facility which required addressing source material and associated dissolved chlorinated solvents from past operational activities. The remediation systems included air sparging and soil vapor extraction. A groundwater management zone was established and monitored as part of the system performance evaluation. As contaminant recovery rates decreased as expected, the system was optimized by implementing a pulse-on/pulse-off operating schedule.

** denotes projects completed with other firms*

John Griggs PhD, PG

Principal · 35 Years of Experience
Lombard, Illinois

Site Characterization and Remediation, Former Manufactured Gas Plant*, Oak Park, Illinois

Project Manager for the investigation and remediation of the former manufactured gas plant. Led negotiations with the park district, local municipality and residential property owners to develop the scope of investigations and define cleanup criteria. Provided community relations support, including developing fact sheets, conducting one-on-one informational meetings with adjacent residents, and preparing presentation materials for and representing the Represented the remedial applicant at monthly public meetings for 4 years. Served as the point of contact with Illinois EPA to gain approval of project documents according to the state voluntary cleanup program. Completed remediation within strict time constraint driven by air quality goals. Remediation included excavation, disposal and backfilling of over 300,000 tons of soil by rail in a densely populated residential are. Met air quality goals and received a No Further Remediation Letter from the Illinois EPA. Restored the property as a park.

Groundwater Contamination Investigation and Remediation, Former Industrial Manufacturing Facility, Jamestown, New York

Provided direction and senior review with regard to investigation and remediation of a former ball bearing manufacturing facility. Past uses of the property resulted in the release of oil to the subsurface. Activities involved characterization of the location and movement of a light non-aqueous phase liquid to develop recommendations for mitigation of the release that are protective of site workers, the environment and a nearby river.

** denotes projects completed with other firms*

Adrian Davison P.Eng., C.Eng.

Senior Energy Engineer, 31 Years of Experience
Calgary (25th Street SE), Alberta, Canada

Stantec

Adrian is a commercially and operationally experienced energy and utilities professional engineer with 31 years of experience in district energy, power generation and energy efficiency for power generation utilities, industrial, and municipal clients. A Six Sigma Blackbelt, Adrian is skilled at creating and executing original business strategies from concept through construction into commissioning. He has been engaged in the design, construction, and operation of first-in-class systems and contracts, increasing viability and leading cross functional teams with P&L accountability.

EDUCATION

Accreditation, Energy Consultant, UK's Carbon Trust, 2009

Six Sigma Black Belt, 2001

B.Eng., Fuel and Energy (Honors), Leeds University, Leeds, England, 1992

MEMBERSHIPS

Association of Professional Engineers and Geoscientists of Alberta, Professional Engineer, 2013-Present

Energy Institute, Charted Engineer, 2010-Present

Association of Professional Engineers and Geoscientists of Saskatchewan, Professional Engineer, 2022: Present

PROJECT EXPERIENCE

Energy

Confidential Project, Saudia Arabia (Subject Matter Expert, 2023)
Part of a team originating a large low carbon district heat, cooling and power grid, reviewed low and zero carbon power system including hybrids for the facility.

Moreno Valley (Subject Matter Expert, 2022)
Reviewed low and zero carbon power system options for a confidential 40m sq.ft. logistics facility including a combination of geothermal, solar hybrid, biomass, gas turbine on renewable fuel and thermal energy storage applications.

Confidential Project, Saskatchewan, Canada (Cogeneration Lead, 2022-Present)
Design of a new high efficiency, low emissions 45MW Cogeneration power station, adding to existing facilities in a Saskatchewan, Canada Potash mine. Worked on the Interconnection Study for SaskPower and NERC compliance, gas supply from SaskEnergy, emissions compliance, detailed engineering design for fired HRSG and gas turbines and supporting Procurement activities.

Confidential Project, United States (Subject Matter Expert , 2022)
Reviewed low and zero carbon power generation and cooling options for a 1,000MW data centre complex in eastern United States. Analyses included a combination of gas turbines with heat recovery, hydro-electric refurbishment, biomass, solar hybrid and thermal energy storage applications.

Vervantis Inc. *, Phoenix, AZ, USA (Director of Process and Compliance)
Established internal processes and external sustainability accreditations, developed marketing strategy for new Net Zero business lines. Created energy strategy for book publisher J Wiley's HQ in Hoboken NJ, with site visit resulting in recovering accidental utility overpayments from the landlord.

Deep Corp.*, Saskatchewan, Canada (Project Manager and Overall Design Lead)
Created overall design and detailed operational and financial models integrating Solar PV, battery storage and gas turbine cogeneration into geothermal ORC technology, working closely with geologists and drillers, reviewing samples for heat recovery opportunities, and negotiating renewable export tariffs and grid connections. Flare gas and local biomass were also reviewed as augmenting energy sources.

** denotes projects completed with other firms*

Adrian Davison P.Eng., C.Eng.

Senior Energy Engineer, 31 Years of Experience
Calgary (25th Street SE), Alberta, Canada

Genalta Power*, Alberta, Canada (Vice President Operations and Construction, 2014-2019)

Managed $35M P+L with 12 employees in Alberta and BC, generating wholesale power within long term PPA's and partnerships. Managed all aspects of operations and construction, maintained and re-negotiated Regulatory and ATCO/Fortis connections, improving quality at low/no cost.
Oversaw construction of sour flare gas and merchant power from natural gas power whilst operating existing renewable and fossil fuel power stations.

Bantrel*, Alberta, Canada (Senior Project Engineer/Cable Program Manager)

Responsible for electrical distribution systems ($220M+) and electrical design team's deliverables within the $6.5B, 110,000 bbl/d Surmont 2 oilsands project in Alberta including work with ATCO on the 120MW 144kV to 25kV Interconnection and interface tower's design.
Managed standby generation plant specification and build.

Parsons Brinckerhoff*, Multiple in UK (Regional Director, Energy Solutions)

Regional Director providing energy strategy, master-planning, audits, commercial reviews, procurement support and Owners Engineer services to Power Stations, Utilities, cities, hospitals and universities. Providing support to clients in negotiating electricity and gas tariffs that included for district energy schemes. Negotiated Regulatory permits and purchase of cogeneration plants and detailed review of historic billing for over-charge recovery. Obtained the air permitting of the 2012 London Olympic Energy Centres.

United Utilities*, United Kingdom (Group Energy Manager)

Created group strategy and delivered action plans to reduce demand and increase efficiency across water, wastewater, electricity and telecoms group businesses. Operated all UU's standby generation and digester gas biomethane baseload cogeneration power plants, and ran the expansion program to double renewable generation within 2 years. Negotiated all electricity, gas and renewables contracts for UU including set up and operation of trading desks for power and negotiated with Environmental Regulators on emissions.

Kodak Ltd. , United Kingdom (UK Energy Manager)

Utilities strategist and trained utilities negotiator for all UK sites ranging from 10-45 acres, managing site utility connections and capacities for the internal and external clients on sites, with steam, ultra-pure water, 5kV and 415V power, chilled water, glycol, compressed air, trade effluent and Silver Recovery networks. Served as power station's chemist and held the borehole abstraction licence and managed the site RO plant. For my Six Sigma Black Belt project, originated, designed and commissioned a 1 year payback $1.2M absorption chiller.

Dalkia Energy Management*, United Kingdom (Operations/Commercial Manager)

First-line manager of steam power generation on multiple sites providing 3rd party contract supplies of steam and electricity for manufacturers, hospitals, universities, schools, shopping centres, high rise housing and government buildings, with networks of up to 30 acres. Re-programmed a loss-making dyeworks heat recovery plant to recover more heat, and ensure dyewater was within Regulatory permit conditions. Created Operational Performance systems, then trained all UK Operations Managers on its use.

Energy Modeling

DEPCOM, Multiple sites (SME Energy Modelling, 2023-present)

Owners Engineer to a 3rd party heat and power supplier, identifying cogeneration plant opportunities on over 18 client sites, creating outline designs and high level capex/opex to form cost-effective business cases.

** denotes projects completed with other firms*

Rogier Dieteren BEng

Senior Manager Heating and Built Environment · 31 Years of Experience
Sittard, Netherlands

Rogier brings over 20 years of experience as an environmental and acoustic engineer, focusing on innovation and sustainability, predominantly in the public sector. Rogier works with political and administrative leaders in local governments to develop district heating projects and advises on facilitation or direct participation in heating utility companies. Additionally, he has designed projects tackling Energy Poverty for various cities in The Netherlands. Through his technical background he is also able to be a sparring partner for building contractors and project developers.

EDUCATION

Bachelor of Engineering, Zuyd University of Applied Sciences, Heerlen, The Netherlands, 1992

CERTIFICATIONS & TRAINING

Energy Technology, Eindhoven University of Technology, Eindhoven, The Netherlands

Acoustics, University of Antwerp, Antwerp, Belgium

Environmental Science, Utrecht University of Applied Sciences, Utrecht, The Netherlands

PROJECT EXPERIENCE

District Heating Governance

Rolneming warmtetransitie, Amersfoort, Netherlands (Policy Officer, 2022-present)

Supported the Municipality of Amersfoort in rolling out district heating in the municipality. Seconded as policy officer to the Municipality to be the connecting factor between politicians, civil servants, and the commercial utility company in the city. Performed a sources study and developed a business case. Liaised with grid operators, public sector banks, and other layers of government to gauge willingness and interest in setting up a provincial heat utility company.

JTM Noordwest2, Groningen, Netherlands (Consultant, 2021-present)

Created a business case for the proposed expansion of the district heating network in the City of Groningen. Collaborated with the Ministry of Economic Affairs, the Netherlands Enterprise Agency, several public sector banks and the European Investment Bank to work towards a bankable business case covering heat sources (residual heat, solar thermal), power plants, primary and secondary network, and connections to some 12,500 houses. Applied for national subsidies and working towards a request for EU subsidies, grants, and low-interest loans.

Provincial government’s role in district heating, 's-Hertogenbosch, Netherlands (Policy consultant, 2023)

Supported provincial government on taking a role in the development, financing, realization and exploitation of district heating networks in the province. Interviewed policy officers, grid operators, and potential funding bodies. Proposed several potential governance structures for a Provincial Heat Utility Company and a roadmap for the next few years.

JTM Het Groene Net, Sittard, Netherlands (Consultant, 2021)

Advised the Province of Limburg on developing and presenting a business case for the expansion of the district heating network "Het Groene Net", which Rogier founded, from the city of Sittard towards the city of Maastricht. Performed scenario and risk analysis, identified stakeholders and potential governance structures, and wrote investment memos for the Dutch Investment Agency.

Rogier Dieteren BEng

Senior Manager Heating and Built Environment · 31 Years of Experience
Sittard, Netherlands

Feasibility Studies

Haalbaarheid Aquathermie, Nederweert, Netherlands (Consultant, Energy and Sustainability, 2021-2022)

Investigated potential for a district heating network connecting two neighborhoods in Nederweert, using the local canals as heat sources. Performed stakeholder analysis and connected housing cooperatives, city administration, and an energy cooperative. Identified buildings to use as representative examples of the houses in the neighborhoods. Presented results to policy officers and aldermen.

De Kei, Reusel, Netherlands (Consultant, Energy and Sustainability, 2022)

Performed feasibility study into a potential district heating network centered around the town hall, civic center, school, and surrounding shops and houses in the village of Reusel as part as a rejuvenation program, following on from the heat transition policy.

Policy Planning

WUP Gulpen-Wittem, Gulpen, Netherlands (Consultant, Energy and Sustainability, 2022-2023)

Created a heat transition policy for the municipality's roadmap to a decarbonized society, based on actionable projects in the short term and visions for projects after 2030. Designed a plan containing 34 projects, covering awareness initiatives, municipal policy changes, collaboration with housing and energy cooperatives, and active changes to the built environment, such as insulation. Developed detailed project proposals for hybrid heat pumps, district heating, and biogas. Identified local, national, and European funding opportunities including grants, subsidies, and low-interest loans.

WUP Reusel-De Mierden, Reusel, Netherlands (Consultant, Energy and Sustainability, 2022-2023)

Created a heat transition policy for the municipality's roadmap to a decarbonized society, based on actionable projects in the short term and visions for projects after 2030. Designed a plan containing 20 projects, covering awareness initiatives, municipal policy changes, collaboration with housing and energy cooperatives, and active changes to the built environment, such as insulation. Developed detailed project proposals for district heating and identified local and national funding opportunities including grants, subsidies, and low-interest loans.

Energy Poverty

Energy Poverty projects, Sittard, Netherlands (Project leader, 2021-2023)

Project manager and developer of Energy Savings campaigns which help people on low incomes to save energy. Set up projects for municipalities and housing cooperations which have facilitated over 3,000 renters and owner-occupiers, covering awareness and outreach. Supplied “quick win” items like radiator reflectors, weather strips, energy-saving shower heads, and LED lights.

Susan C. Larson P.E.

Senior Account Manager · 38 Years of Experience
Minneapolis, Minnesota

Stantec

Susan Larson, P.E., is an experienced leader and project manager with 38 years in the energy sector who has managed numerous multimillion-dollar district energy and electric utility industry EPC (Engineer, Procure, Construct) and traditional prime contracting projects from feasibility/proforma, development, regulatory/permitting, RFI/RFP, acquisition of major equipment, interconnection agreements, bid evaluation, engineering and construction contract negotiations and award, project management, engineering management, commissioning, start-up/energization, and contract close-out. Ms. Larson's career at Xcel Energy has included project management and technical support of utility-scale combined cycle, peaking, cogeneration, solar, electric substation, and district energy plants and infrastructure projects. Her project management work has followed Project Management Institute and best-practice standards and owner specific requirements. Ms. Larson led organizational development efforts to establish departments in both Transmission and Generation. These responsibilities included establishing a best practice engineering and construction Project Management Office (PMO).

EDUCATION

Bachelor of Science Mechanical Engineering, University of Minnesota, Minneapolis, Minnesota, 2020

Advanced Leadership Studies, University of St. Catherine, Minneapolis, Minnesota, 2008

REGISTRATIONS

Professional Engineer #16501, State of Minnesota, 1980 - 2023

AWARDS

2009 Xcel Energy Chairman's Award, Highest level of recognition for excellence, leadership and dedication to Xcel Energy's values and service to the community.

1985 ASHRAE Industry Technology Award

PROJECT EXPERIENCE

Boiler Plant Design

Hennepin County Energy Center Asbestos Abatement and Burner Replacement*, Minneapolis, Minnesota (Project Manager)

Steam and hot water piping system asbestos insultation and cooling tower baffles inventory and abatement. Manage the asbestos survey, report, permitting and development of plans and specifications for the asbestos abatement contractor. Issued bids for asbestos abatement and new piping insulation. Managed the contracts and coordinated the field work, industrial hygiene and safety inspections and testing for all asbestos abatement work and the installation of new pipe insulation. Permitting application and boiler burner specification preparation, negotiated and awarded burner contract and coordinated the installation of new natural gas boiler burners and controls, testing, commissioning and start-up.

** denotes projects completed with other firms*

Susan C. Larson P.E.

Senior Account Manager · 38 Years of Experience
Minneapolis, Minnesota

Chestnut Service Center Boiler Steam Piping Redesign and Asbestos Abatement, Xcel Energy, Chestnut Avenue, Minneapolis, MN, USA (Project Manager)
Manage the asbestos survey, report, permitting and development of plans and specifications for the asbestos abatement RFP. Prepare boiler modification and new steam piping system insulation system design documents and RFP preparation. Issued bids for asbestos abatement and new piping system. Managed contracts and coordinated field work, industrial hygiene and safety inspections and testing for all asbestos abatement work and the installation of new piping system and insulation by the mechanical contractor.

Power Plants

Xcel Energy MERP High Bridge 530MW Gas-Fired Combined Cycle Power Plant* (Project Director)
Led the regulatory filings and testimony before the Minnesota EQB (Environmental Quality Board) for the approval of the new 530MW High Bridge Gas-Fired Combined Cycle Power Plant. EPC contract development, competitive bidding, negotiations and award, secondary market power island (Combustion Turbines and Steam Turbine) contract negotiations and procurement. Oversight of project cost, schedule and scope, MPUC regulatory reporting and response to formal Information Requests.

Bayou Cove 224MW Gas-fired Peaking Plant and Substation*, Jennings, Louisiana (Project Manager)
EPC target price contract development, competitive bidding, negotiations and award, Combustion Turbine Generator (CTG) RFP, contract negotiation and award. Responsible for management of engineering design, construction, start-up, performance testing, commissioning, contract close-out and operations planning.

Big Cajun 2 100MW Gas-Fired Peaking Plant and Substation Addition*, Baton Rouge, Louisiana (Project Manager)
EPC target price contract development, competitive bidding, negotiations and award, Combustion Turbine Generator (CTG) RFP, contract negotiation and award. Responsible for management of engineering design, construction, start-up, performance testing, commissioning, contract close-out and operations planning.

Millennium Petrochemicals 100MW Gas-Fired Turbine & HRSG Cogeneration Plant*, Morris, Illinois (Project Manager)
Proforma, EPC contract development, competitive bidding, negotiations and award, Combustion Turbine Generator (CTG) RFP, contract negotiation and award. EPC contract development, competitive bidding, negotiations and award, Design and installation of petrochemical plant hydrogen off-gas (flare) control and filtration system for CTG dual fuel system (natural gas, hydrogen). Plant steam/water balance and design and installation of RO system. Responsible for management of engineering design, permitting, utility interconnection agreement, bank's engineer reporting, control system narrative, construction, start-up, testing, commissioning, contract close-out and operations planning.

Power Renewable Energy, Solar

1,200MW Vista Sands Solar, Wisconsin, USA (CPCN Technical QA/QC, 2023)
Technical review and QA/QC of Wisconsin CPCN submittals.

Facilities & Infrastructure Development

Facility Renovation and Energy Efficiency Upgrade Projects*, Minnesota (Project Manager)
- Lumber Exchange Building (220,000 square feet), Minneapolis, MN – Project Manager
Project Manager for development of a design-build scope of work, bid solicitation and award, asbestos abatement, removal and installation of HVAC and digital control system.
- YWCA Uptown Fitness Facility, Minneapolis, MN

** denotes projects completed with other firms*

Susan C. Larson P.E.

Senior Account Manager · 38 Years of Experience
Minneapolis, Minnesota

Project Manager for development of a design-build scope of work, bid solicitation and award, asbestos abatement, existing system removal, and installation of a new HVAC and digital control system.

- Loring Nicollet Bethlehem Community Center and School, Minneapolis, MN

Project Manager for development of a design-build scope of work, bid solicitation and award, Complete interior demolition and new office and classroom construction, asbestos abatement, new HVAC, fire protection/ sprinkler and lighting systems. Façade, new roofing, envelope insulation, and window replacement.

- Edina Service Center, Edina, MN

Project Manager for development of a design-build scope of work, bid solicitation and award, New vehicle storage addition, complete office remodeling, new HVAC, fire protection and lighting systems.

Renewable, Alternative and District Energy

Pittsburgh PNC Ballpark District Energy System*, Pittsburgh, Pennsylvania (Project Manager)

Planning, design and construction of new hot-water boiler, control system, and underground hot water and chilled water distribution piping from Central Plant to the Pittsburgh, Pennsylvania PNC Ballpark.

400-ton Electric Chiller Installation*, Minneapolis, Minnesota (Project Manager)

Responsible for management of the design, procurement and installation of new electric-driven chillers, cooling towers, chilled water piping, pumps, control system, and 4160V electric service design, installation, and interconnection. Manage the district energy chilled water system pipeline interconnection, chiller performance testing, and commissioning.

400-ton Electric Chiller Plant Expansion, Northern States Power Company General Office*, Minneapolis, Minnesota (Project Manager)

Project Management of design, procurement, installation, construction, testing, and commissioning of 400-ton electric-driven chiller plant, cooling towers, pumps and mechanical, electrical, and controls systems.

300-ton Steam-Driven Chiller Installation, Target Center Plant, Minneapolis Energy Center*, Minneapolis, Minnesota (Project Manager)

Management of detailed design and procurement of a new 300-ton steam-driven chiller, cooling tower and control system design and installation, district energy steam, pump impeller redesign and installation, district energy chilled water piping interconnections, chiller and pump performance testing, commissioning, and start-up.

Minneapolis Federal Reservice 200 Ton Chiller Plant and Historical Renovation*, Minneapolis, Minnesota (Project Manager)

Managed the detailed design, abatement, renovation and repurposing of the Foster House, built in the 1880's and on the National Registry of Historic Places. Managed the architectural and historical team in the design and restoration of the building façade and details. Coordinated the asbestos survey, report and permitting, and development of plans and specifications and oversight for the asbestos abatement. Managed demolition of the building interior, design of internal steel superstructure and building façade restoration, design and specification of chiller plant (electric-driven chillers, cooling towers, pumps and associated mechanical, electrical and control systems, standby generation) and chilled water distribution system and interconnection with the Minneapolis Federal Reserve. Developed bid documents, negotiated contracts, developed project controls, managed project to completion, testing and commissioning. The project received the Minneapolis Historic Preservation Award.

PRESENTATIONS

Turbidity Reduction Filtration for District Energy Chilled Water Supply. *International District Energy Association (IDEA) Annual Conference* , 1994.

** denotes projects completed with other firms*