Final Utility Thermal Energy Network Pilot Proposal for Syracuse, New York

Case 22-M-0429

Niagara Mohawk Power Corporation d/b/a National Grid

December 15, 2023

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Introduction

In the October 7, 2022 filing made in accordance with the *Order -On Developing Thermal Energy Networks Pursuant to the Utility Thermal Energy Network and Jobs Act* Issued on September 15, 2022 ("Initiating Order") by the Commission in Case 22-M-0429, Niagara Mohawk Power Corporation d/b/a National Grid NY ("NMPC" or "National Grid") indicated that it may propose either one or two fully developed pilots for its gas service territory for submission to the Commission on January 9, 2023 ("January 9 UTEN Pilot Proposal"). National Grid engaged CHA Consulting to support its pilot site selection in its NMPC electric and gas service territory. National Grid evaluated potential sites for needed load diversity, in addition to other criteria, prioritized sites within a Disadvantaged Community ("DAC") and is proposing two pilot projects in its NMPC gas and electric service territory, both of which were previously evaluated in scoping studies under New York State Energy Research and Development Authority ("NYSERDA") PON 4614. One of the pilot projects will be located in the City of Syracuse (Onondaga County) ("Syracuse UTEN Pilot").

This supplemental filing made by NMPC entitled "Final Utility Thermal Energy Network Pilot Project Proposal for Syracuse, New York" ("Final Syracuse UTEN Pilot Proposal") is hereby submitted in compliance with the Commission's *Order Providing Guidance on Development of Utility Thermal Energy Network Pilot Projects* issued and effective on September 14, 2023, in Case 22-M-0429 ("Guidance Order"). In accordance with the Commission's Guidance Order, this Final UTEN Pilot Project Proposal includes the following Stage 1 elements detailing the Syracuse UTEN Pilot Scope, Feasibility, and Stakeholder Engagement:[1]

[1] See Guidance Order at 19-20.

a. The specific objectives of the Syracuse UTEN Pilot, including the novel or unique technical or business model approaches it will explore and anticipated findings;
b. Preliminary cost estimates and timeline associated with the Syracuse UTEN Pilot;
c. Potential barriers and risks associated with the proposed Syracuse UTEN Pilot and steps National Grid will take to address them;
d. A description of benefits to residents of the Disadvantaged Community within which the Syracuse UTEN Pilot is located; and
e. A Preliminary Customer Protection Plan, including a description of required customer engagement activities and a customer agreement template that recognizes customer protections.

In addition to the elements set forth above, this Final Syracuse UTEN Pilot Project Proposal also includes the following elements which are required by the Commission's Initiating Order and Guidance Order:

a. Description of the project and potential energy users, the engineering design of the Syracuse UTEN Pilot including a single line drawing, and point of demarcation of ownership between the NMPC infrastructure and the Customer's infrastructure and equipment;
b. Safety, Reliability, and Resiliency aspects of the Syracuse UTEN Pilot;
c. Plans for energy efficiency upgrades for connected customers; and
d. A comparative analysis of the cost to electrify through the Syracuse UTEN Pilot versus other forms of building electrification or the continuation of natural gas service to the Syracuse UTEN Pilot participants.

Section 1: Project Description and Potential Energy Users

National Grid has identified a site studied in NYSERDA PON 4614 involving a Thermal Energy Network system serving the Inner Harbor area of Syracuse that will utilize the existing Metropolitan Syracuse Wastewater Treatment Plant ("Metro WWTP") outfall to Onondaga Lake as a thermal resource. The Metro WWTP is located on the southern shore of Onondaga Lake in Syracuse, NY. It has a design capacity of 84.2 million gallons per day (mgd) and can provide full secondary and tertiary treatment for up to 126.3 mgd. Average flow through the plant is between 60-65 mgd. Fully treated flow is discharged through Outfall 001, which is located at the Onondaga Lake shoreline. Metro has a total hydraulic capacity of 240 mgd during wet weather events. The daily average temperature of the effluent has been recorded as being 50°F in the winter months and 70°F in peak summer months. Temperatures have dropped into the mid-40°F 's during periods of prolonged sub-zero outdoor air temperatures in the winter, and as high as 75°F during prolonged dry and hot periods.

In 2012, the City of Syracuse sold 28 acres of land in the Inner Harbor area to COR Development Co., who has proposed $350M of mixed-use investments for the area. Several supporting investments in the area have been made or have been proposed, including $1.5 billion dollars in the past 30 years which has been spent cleaning up pollution in Onondaga Lake. The lake is one of the few superfund sites that has been remediated, and at this point it has been repaired to the level that is required by law. $10.3 million was spent in 2017 dredging the harbor to 7.5 feet depth to allow for boat traffic. $350 million of mixed-use development has been proposed by private developers. The City of Syracuse has proposed spending up to $108 million on improvements in public spaces and streetscapes and Onondaga County has approved $85 million for the design and construction of an aquarium at the north shore.

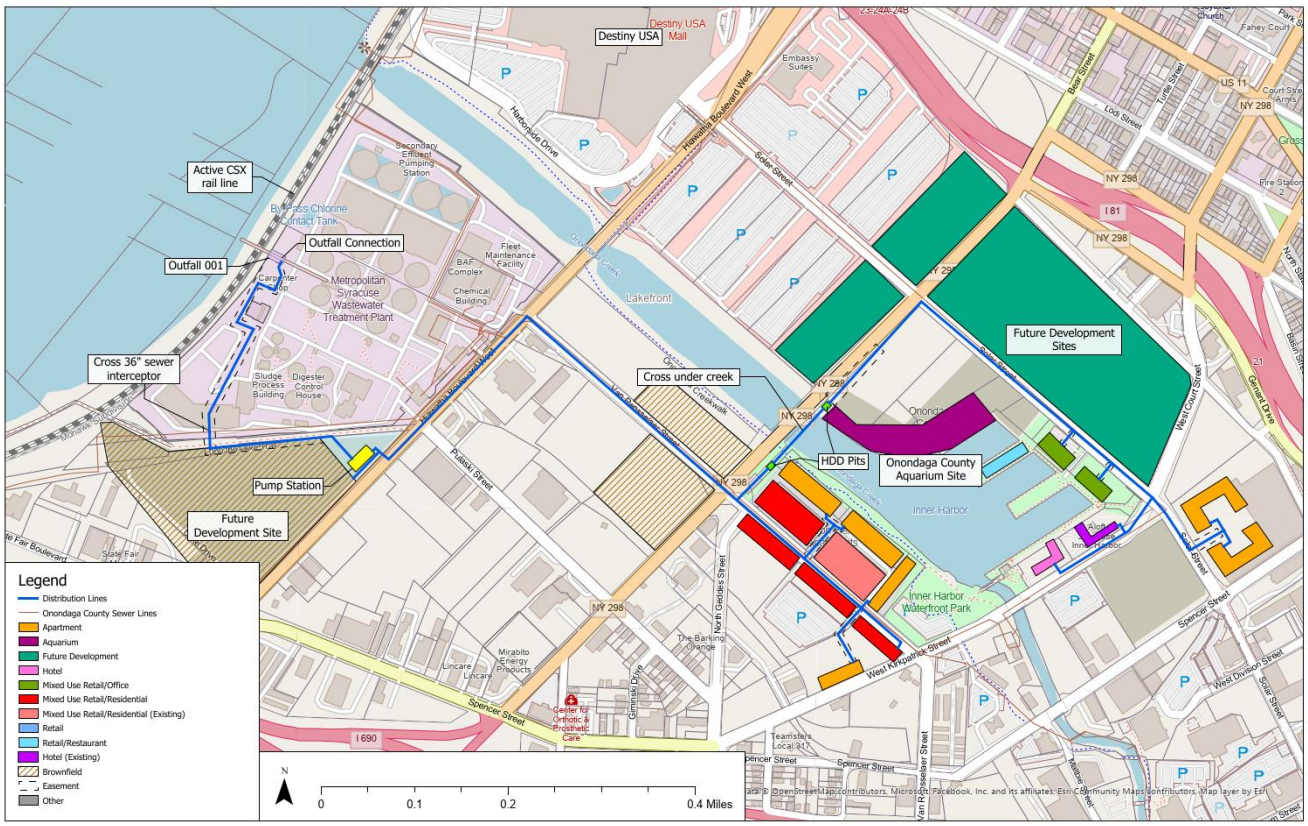
The project proposed in this Final Syracuse UTEN Pilot Proposal represents a first phase of development for a Thermal Energy Network that serves the Inner Harbor area of Syracuse. The outfall of the Metro WWTP has the capacity to serve up to four times the phase one connected customer load that is planned. To date, a 207,000 square-foot ("sf") mixed use building and an 88,000 sf hotel have been built in the area. An additional 14 buildings have been proposed within the project area. The Syracuse UTEN Pilot will target the thirteen (14) proposed new construction buildings and the aquarium, resulting in a total of 15 connected buildings, and approximately 1,600,000 square feet of conditioned mixed-use office, multifamily, and retail space. The existing mixed-use building is on a geothermal system and the hotel has a fairly new VRF system so they are not targeted at this time but could be investigated in the future as their equipment ages. The Utility Distribution System initially will be oversized to accommodate the full capacity of the outfall of the Metro WWTP. If future pilot phases are authorized by the Commission, or if Utility Thermal Energy Networks become full-scale utility offerings in the future, National Grid intends to connect additional thermal energy customers to the Utility Distribution System that will be constructed as part of this initial Syracuse UTEN Pilot project. A description of the potential target customers for the Syracuse UTEN Pilot is provided below:

- Two 135,000 sf, Mixed Use Office and Retail Buildings with parking.
- One 207,360 sf Mixed Use Retail and Apartment building
- One 90,300 sf Senior Apartment Building with parking
- One 222,240 Mixed Use Retail and Apartment building
- One 195,840 sf Mixed Use Retail and Apartment Building
- Three 30,000 sf, Mixed Use Office and Retail Buildings
- One 165,444 sf Mixed Use Retail and Apartment Building

- One 68,640 Apartment Building (Affordable Housing)
- One 88,000 sf Hotel
- Two 146,000 sf, Mixed Use Retail and Apartment Buildings
- One 80,000 sf Aquarium Facility

An image of the project area of Syracuse within which the Syracuse UTEN Pilot site will be located is shown in Figure 1 below:

Figure 1: Syracuse Inner Harbor – Syracuse UTEN Pilot Site Location[2]



Total connected capacity of the customer systems would be approximately 1,600 tons of cooling and 27,000 MBH (7.9 MW) of heat pump heating. The announcement of a new semiconductor manufacturing facility by Micron in the northern suburbs of Syracuse has created a renewed

[2] Figure 1 can also be found as Appendix A.

urgency to build more housing. Since the January 9 UTEN Pilot Proposal filing, an additional 400,000 sf of residential space has been added to the planned development to address this need. The Utility Distribution System would consist of a 2-pipe, uninsulated HDPE ambient temperature loop serving customer-based heat pumps. Heat addition and rejection would be provided by a connection to the existing flow of treated water from Metro WWTP at the Energy Center. As similar wastewater treatment plants may be found all over the country, the pilot will provide the learnings necessary to create a template for utilizing this underutilized resource in other communities. A total of 5,000 gallons per minute (gpm) (7.2 mgd) would be extracted from the effluent flow in this phase with critical infrastructure sized for future expansion to 20,000 gpm (28.8 mgd). The expected temperatures in the system are shown in Table 1 below:

Table 1: Entering Water Temperatures vs. Leaving Water Temperatures for Syracuse UTEN Pilot System Components During Design Cooling and Heating Conditions.

	Design Cooling (EWT / LWT)	Design Heating (EWT / LWT)
Outfall Discharge at Lake	75 (+2°F)	48°F (-2°F)
Outfall Loop	73 / 83	50 / 40
Utility Distribution System	75 / 85	38 / 48
Customer Side of Heat Exchanger	77 / 87	36 / 46

At the 10°F temperature differential shown above, this phase would be able to provide up to 25,000 MBH (7.3 MW) of heat, which would support 36,200 MBH of heat pump heating. In a vapor compression heating cycle, the compressor work is rejected to the useful heating stream, contributing to the heating load and requiring less input energy. For a typical heating coefficient

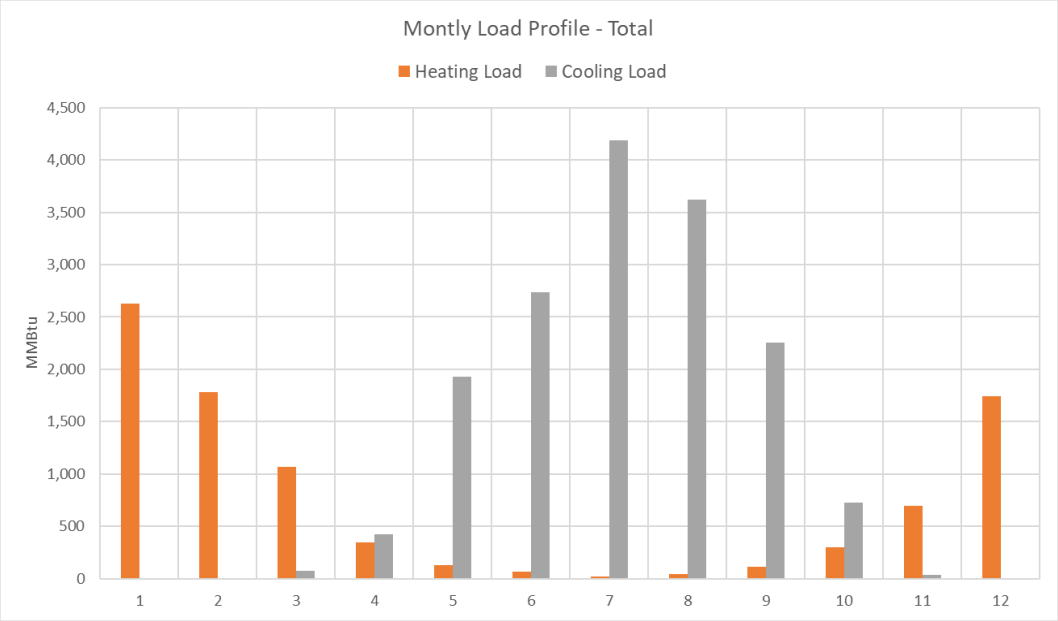
of performance ("COP") of 3.2, sixty-nine (69%) percent of the heating load is required from an external source, with the remaining thirty-one (31%) percent provided by the electrical input to the compressor.

The same 25,000 MBH of heat rejection capacity can support a connected peak load of 1,667 Tons of cooling load. The total system volume as described is approximately 700,000 gallons, which provides a significant amount of thermal inertia which will have the effect of dampening the peak loads over several hours and allowing the system to serve a greater peak load.

At the full build out, 20,000 gpm would be extracted from the outfall to provide 100,000 MBH (29 MW) of heating capacity, enough to serve 144,000 MBH (42.5 MW) of connected heat pumps. A cooling load of 6,700 Tons could be served by the system.

The graph in Figure 2 below shows aggregated monthly load profiles for the current phase. The highest monthly load occurs in the month of January for heating, and July for cooling. The district system as a whole is estimated to have sixty-four (64%) percent diversity in cooling loads and sixty-six (66%) percent in heating, where load diversity is defined as the ratio of the peak system load to the sum of connected loads. Heat removed from buildings with cooling loads can offset a portion of the heating load during the shoulder months. Currently the aquarium building is not included in the load profile because its usage pattern is unknown, though from comparisons to other similar size facilities the load is anticipated to be a substantial portion of the total system load. An estimate of the aquarium load is included in annual totals for the system.

Figure 2: Aggregated Monthly Load Profile for the Current Phase



The Metro WWTP is a large thermal energy resource that can serve more buildings than currently are proposed. The current system design includes piping that would allow for future connections. It is estimated that the connection to the Metro Wastewater Treatment facility could support at least 2-4 times the capacity currently envisioned in the pilot, which would mean that the investment in the thermal energy network of the pilot would create additional value if future phases are implemented. The thermal energy network will provide an alternative to connecting to the natural gas main currently serving this Inner Harbor area.

Conceptual level estimates of the total operation and maintenance ("O&M") costs and total construction costs for the Syracuse UTEN pilot to be funded by National Grid have been prepared based on a representative group of buildings. The total O&M costs to be borne by National Grid over the 5-year lifetime of the pilot is estimated at $19.9 million. The total construction cost to be borne by National Grid is estimated at $112.8 million. The total cost of the project (total O&M + total construction) is $132.7 million.

Section 1a: Benefits to Members of the Disadvantaged Community

NYSERDA classifies the project area in Syracuse as a Disadvantaged Community ("DAC")[3]. Benefits to the residents of the DAC include but are not limited to the following environmental and financial factors.

The thermal energy network will support Onondaga County's efforts to meet the CLCPA emissions reduction goal of at least 85% by 2050. Based on current estimates, in its first year of service, the Syracuse UTEN Pilot will eliminate 2,798 metric tons ("MT") carbon dioxide equivalent ("CO_2e") when compared to the baseline systems the new construction buildings would have utilized if not for the Syracuse UTEN Pilot. This change will lead to improved air quality for residents of the community.

Customers will benefit from the improved equipment life cycle of water source heat pumps vs boilers and Packaged Terminal Air Conditioner ("PTAC") systems, including longer expected life and higher equipment efficiencies as compared to alternative options that could be chosen as the buildings are constructed. Customers will also see lower energy costs and fixed monthly heating/cooling costs than with these other options. Equipment costs will be lower for customers as well since National Grid will aid in funding portions of the building construction pertaining to the thermal energy network pilot.

The area at large will benefit from workforce development that the project brings, including the labor required for system construction, operation, and maintenance. Additionally, a living lab will help educate community members on urban design and technology solutions for sustainable communities. Finally, the community will benefit from avoided electrical infrastructure upgrade

[3] https://www.nyserda.ny.gov/ny/Disadvantaged-Communities

cost. These upgrades are often required when implementing less energy efficient electrification projects.

Interest around the benefits of geothermal heat pumps for electrification is increasing as evidenced by the recent DOE Report, *Cost and Total Emissions Reductions Through Mass Deployment of Geothermal Heat Pumps for Building Heating and Cooling Electrification in the United States* dated November 2023.[4]These benefits include consumer heating bill decreases due to higher efficiency and CO2e reductions with the driving benefit being the avoided electric system upgrades and costs, impact and timing required, as well as other advantages that National Grid hopes to demonstrate with the Syracuse UTEN Pilot.

Section 2: Potential Barriers and Risks Associated with the Syracuse UTEN Pilot and Steps for Addressing Risks

Table 2 below lists the potential barriers and risks of the project, and steps that National Grid and its partners can take to mitigate the risks.

[4] Pub196793.pdf (ornl.gov)

Table 2: Barriers, Risks and Mitigation

Barrier or Risk	Risk Mitigation
Economic conditions delay construction of new buildings	National Grid will communicate frequently with property developers and Onondaga County to ensure that the buildings that are planned for the area are proceeding according to their planned development schedule.
New buildings are built with incompatible system types	Communicate with developers and project teams on compatible system types. Identify retrofit solutions for where changes are not possible.
Coordination with other local projects	Ensure ongoing communications with Authority Having Jurisdiction ("AHJ").
Equipment and material availability and costs	Build contingencies for cost escalation into cost estimates. Contact vendors for equipment lead time estimates.
Customers reluctant to buy in	Present robust customer protection plan. Educate potential customers about the system and its benefits.
Property ownership transitions	Acquire customer enrollment documentation for existing contacts. After ownership transitions, contact the new owner promptly.
Final Design Modifications based on changes to ultimate customer enrollment	The Final Engineering and Design submitted in Stage 2 will assume customer enrollment based on customer outreach and engagement. Since formal customer enrollment will not occur until Stage 3, there is a risk that the final design and engineering will require modifications if the anticipated customers do not enroll. To mitigate that risk, National Grid will enter into Letters of Intent with participating customers during Stage 2
NYSDEC requires further study into impact to Onondaga Lake	Thermal impact has been identified as the most likely parameter of interest and experts on the hydrology of the lake have been identified and included into the design team.
NYSDEC requires modification of State Pollutant Discharge Elimination System (SPDES) permit.	Schedule delay may occur if lengthy review periods and modifications to existing wastewater permits occur. Submission of basis of design will get that review started during design and communication with the permitting agency will help but ultimately we will have limited ability to dictate timelines.

Obtaining Permits in Stage 2	Permitting agencies and boards require engineering plans be advanced to a high level of design and any impacts and mitigation identified. For that reason, National Grid may be able to submit permit applications towards the end of Stage 2 but those applications may not be acted upon while still in Stage 2 and may require modification if the design changes after customer enrollment. National Grid will maintain close engagement and communications with all permitting agencies to mitigate these risks, especially in relation to any SPDES permit requirements.

Section 3: Engineering Design for Syracuse UTEN Pilot

National Grid designed the Syracuse UTEN Pilot in its NMPC gas service territory in furtherance of the Climate Leadership & Community Protection Act's ("CLPCA") and the Utility Thermal Energy Network and Jobs Act's greenhouse gas ("GHG") emissions reduction goals. The Syracuse UTEN Pilot will evaluate the performance of a Utility Thermal Energy Network that utilizes waste heat from a WWTP as its thermal source and investigate how and where to optimally deploy thermal energy networks to create the most value for customers, leveraging the renewable and bi-directional nature of thermal energy space conditioning. A set of engineering design drawings for the Syracuse UTEN Pilot can be found in Appendix B. A set of architectural drawings for the Syracuse UTEN Pilot utility distribution system energy center can be found in Appendix C.

When the customer equipment is used to condition some portion of a customer's space, heat is extracted and rejected from the distribution system, and then to outfall of the Metro WWTP by the UDS Energy Center. For the Syracuse Pilot, it is proposed to be a two-pipe system, where separate supply and return lines distribute energy to customers with each customer

being connected in parallel. The loop is classified as an “Ambient Loop” since it operates at temperatures similar to the average ambient air temperature. It is not intended to do heating or cooling itself but is a source/sink for heat pump-based systems, which is distinct from other forms of district energy (e.g., district steam) The target temperature range of the ambient loop is 50-80 degrees F, with the lowest temperature being achieved during the winter and the highest during the summer. This temperature range ensures that customers will have access to a thermal network that can provide high coefficients of performance. Two pipe connections to each customer will be isolated from the system through a heat exchanger.

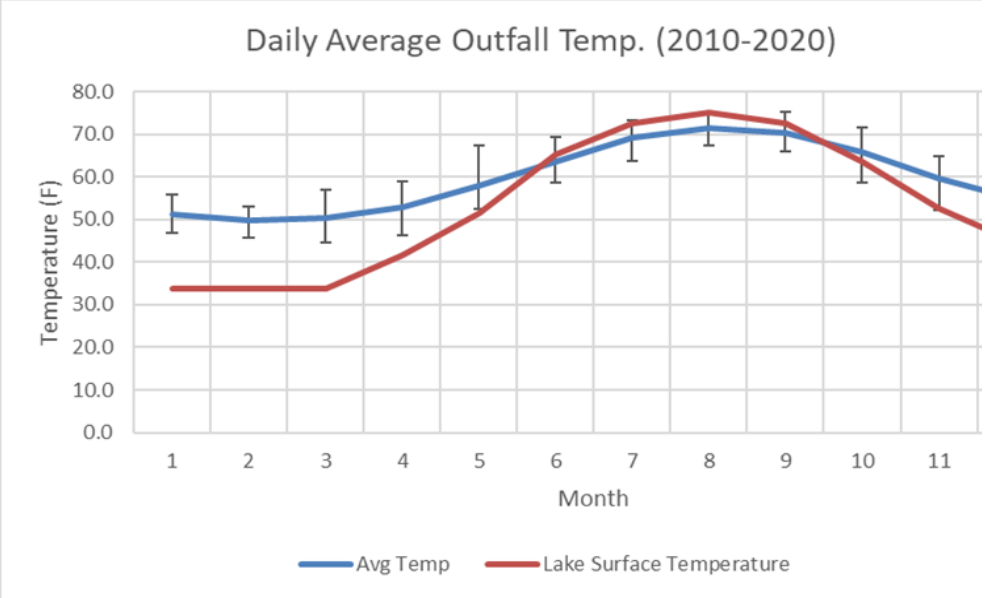
3.1 Thermal Energy Resource

To access the flow in the main 96” concrete outfall pipe (Outfall 001), a connection must be established between the Energy Center and the outfall pipe, which flows partially filled, by gravity, from the plant to the lake outlet. Water must be extracted from the unpressurized pipe and pumped through a pressurized pipe through a heat exchanger, then returned to the pipe. The proposed method of interface is the creation of a direct connection to the outfall pipe through a tap created while the system is online with a gate valve to prevent flow during construction. The tap will allow water to flow into an adjacent wet well, where vertical turbine pumps will extract the water from the open pipe, and into a force main that will transport the water to the Thermal Energy Center. The interaction between the ingoing, outgoing and bypassing flows is complex and will need to be evaluated to ensure that the net impact to the flow of the outfall is negligible. A detailed computational fluid dynamics (“CFD”) analysis will be required to confirm a final design approach. The outfall is in continuous operation and no service interruptions are possible, however there may be emergency scenarios, however unlikely, that are identified that would predicate an interruption of service to the thermal utility to protect the plant or to protect the

utility distribution system from fouling due to untreated effluent. An area near the edge of the property has been identified as an acceptable area to consider, though the available area is very limited due to existing infrastructure and future expansion needs. A CSX rail line borders the property to the northwest. Several constructability challenges on the site will also have to be weighed with the technical viability of the hydrologic connection. The top of the outfall pipe is located about 3 feet below grade, though the area has a high-water table due to proximity to the lake, so any excavation effort would likely require a significant dewatering effort. The site is not known to have any soil contamination but if an extended dewatering effort is required it is possible the soil contamination could migrate from other known contaminated sites in the area. The geotechnical conditions on the site are generally very poor, with soft, compactable soils and deep bedrock. It is assumed that all structures will require structural piles to a depth of 200-250 ft. The site is very thoroughly characterized from a geotechnical perspective from decades of construction on site, so the information required to design foundations is available to the team. Considerations for project phasing will be taken into account. It is anticipated that there are considerable fixed costs for construction of the outfall connection that would make it advantageous to allow for considerable future capacity to be built into any physical structures that are constructed. Mechanical components such as pumps would be phased appropriately to meet the load for the current phase. In the initial phase described here, (2) two 5,000 gpm pumps would be installed at the outfall, operating in an n+1 configuration. Allowances for future capacity up to 20,000 gpm will be considered if the hydraulic modeling suggests that it is possible within the operating constraints. Else a system maximum flow of the system will be determined as part of the detailed analysis.

Effluent temperature and flow tracking by the wastewater treatment plant is the basis for the analysis to determine the quality of available heat recovery. Daily averages were provided for a period spanning from January 2010 through December 2020. Including the full ten years of data demonstrates the data consistency and the source reliability. Monthly averages observed 10 year daily maximum and minimum temperatures are included, with a comparison with the 22-year average lake surface temperature taken at the southern deep buoy maintained by the Upstate Fresh Water Institute. April through December temperatures are observed, a surface temperature of 33°F was assumed for the January – March period where surface ice is generally observed, and the lake monitoring buoy is not deployed. The graph in Figure 3 below provides the daily average temperature of the outfall for January 2010-December 2020.

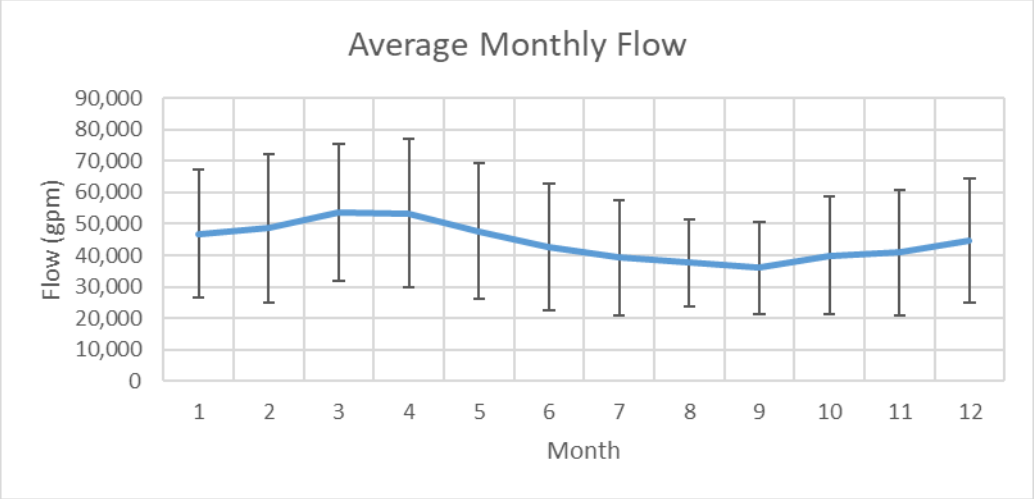
Figure 3: Daily Average Temperature of the Outfall of Metro WWTP



The effluent temperature follows a seasonal temperature variation with outdoor air temperature; however, the extremes are greatly moderated by the municipal cold water temperature and heat

transfer from the fluid to sewer pipes and the surrounding soil. The standard deviation is ± 1.96°F annually, showing high data consistency year-to-year. The plant serves a combined sewer and overflow ("CSO") area and therefore precipitation events and runoff will impact the effluent flow in addition to wastewater production. The larger flow ranges are caused by sustained rain or melting events. Figure 4 below provides the average monthly flow.

Figure 4: Average Monthly Flow



3.2 Discharge Permitting

The current State Pollutant Discharge Elimination System ("SPDES") permit held by Onondaga County Water Environment Protection ("OCWEP" or "WEP") for Outfall 001 does not have any temperature limits associated with it, although it is listed as a monitored parameter. In this phase, using a design flow of 5,000 gpm (7.2 mgd), the interaction with the UTEN system could modify the bulk temperature of the fluid leaving the outfall in the order of 1.2°F during periods of peak heat rejection (cooling load) on the system. This is within the typical current variation in temperature seen in the historical data. Future expansion would be desirable but the current

request for capacity would be limited to the design flow stated. The current phase could be utilized for study of this type of installation since direct comparison examples are not readily available. The most analogous scenario from a permitting perspective would be in other HVAC applications as seen in several locations on the Hudson River and the Cornell Lake Cooling System where heat is being added to a natural source but at a highly variable rate. Furthermore, the interaction of the system typically changes the flow temperature to be closer to the lake surface temperature which could have a marginally beneficial effect by lessening the thermal impact of the flow on the lake. There are complex hydrology effects that will need to be evaluated to determine the impact of the thermal variation both on the temperature of the lake but also the flow and mixing patterns. The plant has a net heat addition of approximately 1,400,000 MMBtu to the lake annually, largely owing to the +15-20°F temperature difference between the flow and the lake surface temperature during the December – March period in the winter when the surface temperature is 32-33°F. Metro provides about 20% of the lake inflow, which makes any variations in the conditions leaving the plant have an outsized effect on the local hydrology. The New York State Department of Conservation is the issuer of the SPDES permit and will need to be consulted and asked to review the potential impact of any thermal utility. It is unknown if any additional study or requirements will be directed by the DEC, if/how the existing permit would need to be modified, and what impact on the project would be created by any additional permitting requirements.

3.3 UDS Energy Center

This section describes the proposed concept for the UDS energy center that will take the water provided from the WWTP connection and either remove or add heat to the utility distribution system. The UDS energy center will house the main utility distribution system pumps, heat

exchangers and support equipment. The building will be sized for future capacity, with mechanical systems sized for the current project requirements.

3.4 Location

The UDS energy center is proposed to be located on the former Roth Steel plant site on Hiawatha Blvd on land owned by the Onondaga County Industrial Development Authority. The site is immediately adjacent to the west from Metro WWTP. The site has an existing brownfield site remediation plan filed with the NYSDEC. It is anticipated that any excavation for piping or underground structure will be required to be removed from the site and disposed of as hazardous waste due to longstanding issues with petroleum waste and known trace levels of PCBs. An area in the eastern corner of the property was identified as viable for this project as it is not utilized in any current site development proposals. The site would require a subdivision of the existing 13-acre property to allow National Grid to purchase approximately 1.25 acres of the site.

3.5 Architectural

The building is proposed to be about 9,500 ft^2 in size on a parcel of 1.25 acres allowing for the required space to fit UDS pumping and heat exchange equipment, future expansion, and allowing a space to enable facility tours and educational opportunities. The building programming will include the primary mechanical space and support electrical equipment. Additional spaces include plant office space, visitor viewing area, storage, and restrooms. Refer to attached architectural plans in Appendix C for an initial site layout and external renderings. The building construction will be a steel frame and concrete with a standing seam roof. Installation of photovoltaic panels on the southern facing roof will be evaluated to emphasize the sustainability attributes of the system and help to offset a portion of the energy usage. The

existing foundation on site will be removed, and new structural piles and building pad will be installed.

3.6 Civil Design

Civil design will include a site grading and drainage plan. Subsurface utilities include potable water, sanitary, storm and underground electrical will be identified and coordinate with the building requirements. Special attention will be paid to contamination of site soils and potential remediation required to make the site usable. A parking area will be provided for the building staff and anticipated visitors. A connection to the existing Onondaga Lake loop trail will be created to encourage users of that trail to investigate the facility.

3.7 Mechanical – General HVAC and Plumbing

Spaces will be served by indoor water source heat pump equipment tied into the utility distribution system. A dedicated outdoor air unit will be provided to precondition code required outdoor air for use with the WSHPs.

3.8 Mechanical – Pipe Materials

Piping entering and leaving the plant from the exterior is 36” (DIPS) DR13.5 fusion welded high-density polyethylene (“HDPE”). Utility distribution system main pipe runs will be run with HDPE, transitioning to schedule (“Sch”) 40 black steel at a point to be determined. All valves and pipe accessories shall be steel with flanged connections. Piping will be supported off the floor by posts or a pipe grid.

3.9 Mechanical - Pumping

Pumping will be sized at (3) x 50% for n+1 redundancy. For this phase, pumps are sized with a motor size of 150 horsepower ("hp") at duty point of 2,500 gpm at 165 ft. Several styles of pumps were investigated, and inline pumps have been selected for having a good performance match to the system requirements and favorable space requirements. The pumps would be installed on concrete equipment pads. Pumps would be provided with variable frequency drives to provide part load operation and meet energy code. Air/dirt separators are provided in the main suction line and inline y strainers at each pump. Motors will be heavy-duty, inverter-duty, totally enclosed fan-cooled ("TEFC"), and premium efficiency per NEMA MG-1 Standard. Locations for (6) total pumps will be provided, with (3) three pumps rated for 5000 gpm each providing the future 20,000 gpm of design load. The varying pumps sizes will allow for better staging and turndown of the system both at current design and the future flows.

3.10 Mechanical - Heat Exchangers

Two (2) plate and frame heat exchangers rated at 5000 gpm on both the district and outfall sides would be provided. Heat exchangers will be selected at no more than 10 psi pressure drop and 2° log mean temperature difference ("LMTD"). The heat exchangers are operated in an n+1 configuration and are protected by basket strainers upstream.

3.11 Electrical

A 480 V, 3 phase, 600A service and a 400 kVA pad mounted transformer will be provided to the energy center, which will feed both that building and be fed out to power the outfall pumps on a common electrical meter. An additional 1600A service and 1000 kVA transformer would be required for the future full build out. Space for future panels and transformers will be

programmed, and empty conduits and duct banks will be provided where they can allow for easier future expansion. All major equipment will be provided with 480V/3 ph power, with 120 V /1 ph power provided for lighting, controls, and other support areas

3.12 Instrumentation and Control

The UDS energy center will be provided with a BACNet compatible building monitoring system ("BMS") for monitoring and control of the outfall and network pumps. Instrumentation and points will be provided to maximize the amount of remote observation available in order to minimize the need for on-site staff. Customer connections will be integrated remotely through customer internet connections to allow monitoring of the whole system and for data collection for research purposes.

The thermal energy resource will be provided with SCADA controls that can be interfaced with the existing WWTP instrumentation and control system to allow viewing and possibly emergency override by the plant control room.

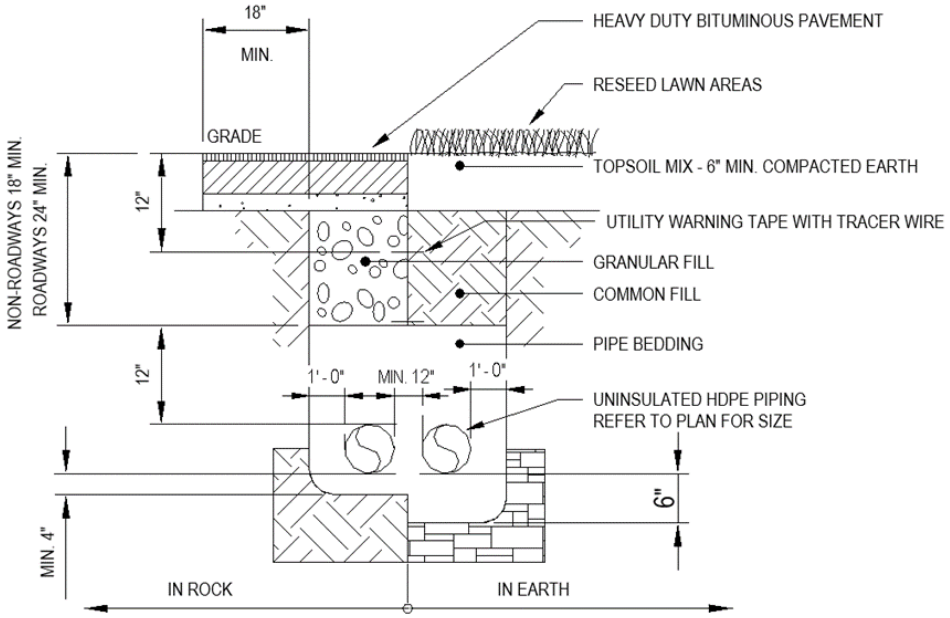
3.13. Energy Usage

Energy usage from the system pumps was estimated assuming variable speed flow and load matching. Further refinement in detailed design will include effects of thermal mass and thermal storage on required outfall pumping. Pump operation is 1 pump at minimum flow and 2 pumps and 1 standby at maximum flow. Pumps will be staged for maximum efficiency. Annual pump energy usage is estimated at 200,00 kWh per year, which includes the outfall pumps as well as the network distribution pumps.

3.14 Utility Distribution System

The Utility Distribution System ("UDS") will be accomplished as a two-pipe system, using uninsulated HDPE piping. Piping will be direct-buried with top of pipe at about 5' below grade. Shallower depths will be investigated if allowed by the city. The general configuration of the trench installation is shown below. Pipe runs are oversized where indicated to allow for future capacity. Work within streets will require removal of existing granite curbs, restoration of the pavement from the road centerline to the curb and the reinstallation of the curbs. All road crossings will be normal to the flow of traffic. Additional coordination will be required where crossing the state DOT road at Bear St. Insufficient space is likely at elbows in the system, therefore thrust blocks will be provided at all 90 degree turns. All work will be in accordance with the City of Syracuse road cut permit standards, which include a 12" concrete subbase but this requirement may be able to be relaxed dependent on the condition and composition of the street that is being excavated.

Figure 5: General Configuration of Trench Installation



Pipes are sized for maximum velocity of 6-7 ft/s at the design flow rate. The routing described below is what has been proposed and is subject to change and coordination with existing conditions and connected buildings. Each segment will be coordinated with existing utilities and conflicts identified. A sample of how the main would fit within the existing infrastructure on Van Rensselaer St can be found in Appendix B.

Table 3: Utility Distribution System Main Routing

SEGMENT	DESCRIPTION	SIZE (IN)	FLOW (GPM)	LENGTH (FT)
1	Outfall to WEP Prop Line	36	20000	**1,100**
2	WEP Prop Line to CUP	36	20000	**861**
3	Crossing - Hiawatha Blvd	36	20000	**110**
4 -> 5	Hiawatha Blvd	36	20000	**1,100**
5 -> 6	Van Rensselaer to Bear St	36	20000	**1,404**
6-7A	Bear St to Take off	30	20000	**90**
7A->8A	Creek Crossing to W Kirkpatrick	30	13000	**1,300**
7A->7B	Creek Crossing	20	7200	**1,100**
7B->8B	Bear St ROW to Solar St	20	6100	**450**
8B->9B	Solar St to Docks	16	4100	**1,100**
9B->10B	Docks to West Kirkpatrick	12	2100	**583**
10B->11B	Cont on Solar St to Building 11b	8	450	**580**
10B->12B	West Kirkpatrick to Hotel Site	10	1400	**680**
8C	Branch to Mixed Use Site	10	1400	**250**
8D	Branches to Apartment Sites	10	1700	**200**
				10,908

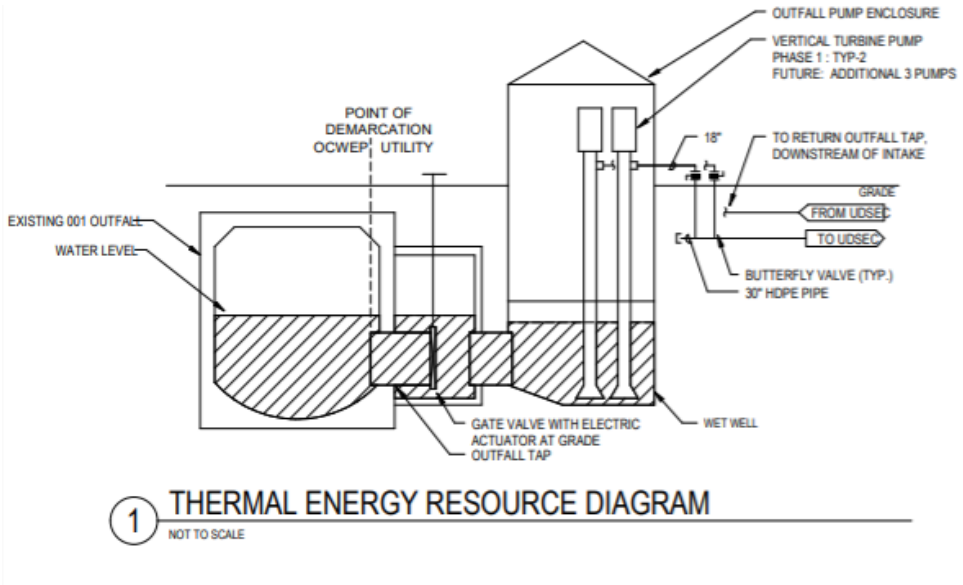
Each street segment outlined above presents the following challenges to be coordinated: Onondaga Creek must be crossed to access the buildings on the eastern side as well as additional undeveloped land. A horizontal direction bore will be utilized to route (2) 20” HDPE pipes below the creek and to the other side. Initial layout of the bore pits is provided in Appendix B. The slope of the banks is such that the entry and exit will be required to be set back 300-400 ft from the water line. On the north bank that would encroach on private land that is currently undeveloped, which will require coordination and a utility easement with that owner.

Further data collection and survey work will be undertaken in future design phases.

Section 3a: Point of Demarcation between NMPC Utility Thermal Energy Network Infrastructure and Customer Property

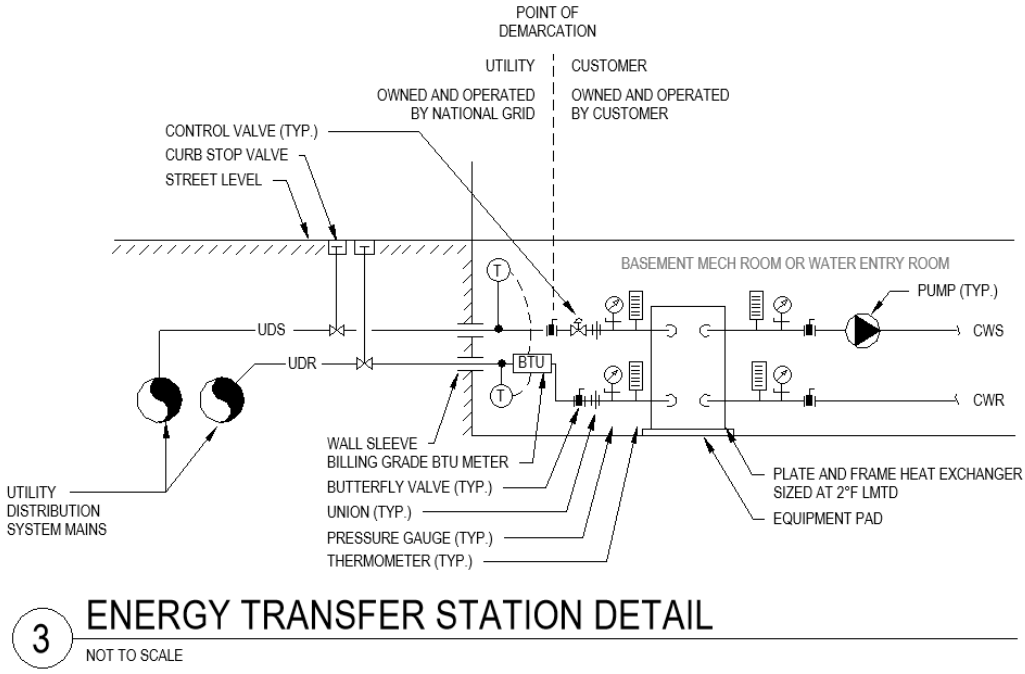
In the Syracuse UTEN Pilot, the thermal energy source is the effluent being discharged from Metro WWTP to Onondaga Lake by means of Outfall 001. National Grid will purchase thermal energy from WEP at a rate to be determined later and distribute it to customers via the National Grid owned Utility Distribution System. WEP will transfer ownership of the thermal energy to National Grid at the point of demarcation. The point of demarcation between National Grid and the Metro WWTP will be the inlet of the National Grid owned outfall tap, which will be constructed as part of the outfall connection structure. All equipment and infrastructure past this point makes up the Utility Distribution System and will be owned and operated by National Grid. Figure 6 below depicts a subsection of the one-line drawing of the Utility Thermal Energy Network and indicates the point of demarcation between National Grid and the Metro WWTP.

Figure 6: View of the Outfall Structure, Indicating the Point of Demarcation Between National Grid and the Metro WWTP



In the Syracuse UTEN Pilot, a second point of demarcation, representing the point of ownership transfer from National Grid to the customer is required. To protect the integrity of the Utility Distribution System, each customer building load is isolated from the Utility Distribution System. Isolation of the Customer Equipment and the UDS is achieved at the Energy Transfer Station ("ETS") installed at each customer's premise. As part of the ETS, National Grid will install a heat exchanger. Pumps will be located on both the Utility Distribution System side and the Customer Equipment side. The flow rate and temperature delta are measured here to determine the energy extracted or added to the UDS by each customer. The point of demarcation between National Grid and the customer will be the outlet of the National Grid owned shutoff valve on the supply service line and it will be the inlet of the National Grid owned shutoff valve on the return service line. All equipment and infrastructure leading up to the point of demarcation point on the Utility Distribution Side will be owned and operated by National Grid. All equipment and infrastructure past the point of demarcation on the Customer Equipment side will be owned and operated by the customer. Figure 7 below depicts a view of a typical customer connection and illustrates the point of demarcation between National Grid infrastructure and customer-owned equipment.

Figure 7: Energy Transfer Station- Point of Demarcation Between National Grid and Customer Property



Section 3b: Single-Line Drawing Identifying the Thermal Energy Sources

A one-line drawing showing an overview of the Syracuse UTEN Pilot can be found in Appendix D.

Section 3c: Safety, Reliability and Resiliency

Safety, reliability, and resiliency are key features of any UTEN system to provide customers with safe and reliable service. National Grid will design the Syracuse UTEN Pilot to meet the standard of safety, reliability, and resiliency that gas and electric customers expect from a utility. To ensure the UTEN system is operating reliably within design conditions, National Grid will monitor, analyze, and control the performance of the UTEN system using a SCADA system. National Grid

will design and construct UTEN infrastructure to comply with all relevant codes and standards including any relevant National Grid standards and future editions of the ANSI / CSA / IGSHPA C448 Bi – National Standard for GSHP installations. National Grid has involved its internal process safety department in project development meetings. National Grid internal process safety will be continually consulted during the design and development of the Syracuse UTEN Project. append

National Grid will not install, nor will National Grid require WEP to install permanent backup heat addition or removal equipment. If in an emergency event the outfall of the Metro WWTP cannot provide the thermal energy necessary to operate the UTEN, National Grid will provide temporary backup heat addition and/or removal equipment to ensure continued service to customers until the system is operational again. National Grid will install a permanent 300 kW diesel electric generator, onsite at the UDS Energy Center, to produce enough power to operate the UTEN in the event of an emergency that results in a power outage. In the event of an emergency that results in a failure of UTEN pumps, including redundant UTEN pumps, National Grid will supply temporary pumps to ensure operation of the UTEN. All temporary back-up equipment will be supplied within a maximum response time, to be defined at a later time. If changes in system performance are related to the operation of the Utility Distribution System, National Grid will dispatch maintenance crews to diagnose the issue, repair it, and return the system to its standard design performance.

Throughout the lifetime of the Syracuse UTEN Pilot, National Grid will keep detailed records of the maintenance and emergency backup requirements of the system. The information contained in these records will be used to inform the design of UTEN systems in the future. The records, or a summary of the records, will be shared in the Stage 5 Pilot Project Review and Recommendations Report which National Grid will file with the Commission.

Section 3d: Energy Efficiency Plans for Connected Customers

National Grid does not intend to include on-site energy efficiency upgrades for customer buildings as part of the Syracuse UTEN Pilot projects scope and has not included the cost of energy efficiency upgrades in any estimates. The target buildings included are planned new construction, limiting the applicability of many existing energy efficiency programs. National Grid intends to educate customers about the benefits of on-site energy efficiency upgrades, as well as educate customers about what incentive or rebate programs may be available. It will be important to tailor education for specific audiences, such as tenants vs. building owners, and residential vs. commercial. National Grid has an existing services and rebates webpage that allows customers to select their service territory and type of account throughout the engagement process and beyond. National Grid can introduce customers to trade-ally partners, participating contractors, vendors, or Program Managers to fully support any application activity. Acknowledging that there may not be applicable incentive programs, National Grid will share our e-commerce webpage where customers can find reduced cost, energy efficient items, as well as educate customers on energy saving tips and best practices to help reduce energy usage. Should customers choose to pursue energy efficiency upgrades in their building, National Grid is currently developing metrics that may be useful in determining the cost-effectiveness of energy efficiency upgrades. These metrics will be recorded, and the results will be compared against customer buildings with similar usage profiles who did not pursue energy efficiency upgrades.

Section 4: Specific Pilot Objectives and Anticipated Findings

The Syracuse UTEN Pilot project will collect data and gather learnings that will be novel when compared to the data and learnings gathered by the portfolio of other UTEN pilot projects that

National Grid and other utilities will be submitting. National Grid intends to share the data and learnings, or a summary of the data and learnings, with the Commission through the Stage 5 Pilot Project Review and Recommendations Report. The information gathered throughout the pre-construction, construction, and operational phases of the pilot project will be used by National Grid and may be used by others in the future to inform the design, development, construction, and operation of future UTEN systems. A description of the learnings National Grid is seeking from the Syracuse UTEN Pilot, and the anticipated findings, are detailed below:

1. Evaluate benefits of thermal networks: Evaluate how a Thermal Energy Network can facilitate wider deployment and customer adoption of water source heat pump technologies by creating more efficient thermal energy systems that could provide financial and operational benefits, through overall electric load levelization, as compared to unbalanced (i.e., non-diverse) thermal energy networks, air source heat pumps ("ASHPs"), natural gas-fired equipment, or other fossil fuel heating. Wider deployment may also be facilitated by enabling utilization by customers in densely populated areas, who may not have the space required to install individual systems, and by enabling utilization by customers for whom financing the installation of a system could represent a barrier (e.g., customers in low-income communities).

- **Anticipated finding**: Expected benefits to disadvantaged communities are outlined in the section above. Additionally, the system will allow for a demonstration of utilization of waste heat sources to increase system efficiency.

2. Evaluate an equitable thermal fee. National Grid intends to test out a thermal fee for the pilot participants that initially will be a flat monthly fee during the term of the pilot. National Grid will determine the thermal fee, or possibly thermal fees for different customer classes,

based on the participant with the current lowest usage and total energy wallet to mitigate the possibility that pilot participants experience a material increase in their total energy bill if they participate in the pilot. National Grid is aware that a thermal fee that is too high could deter potential customers, particularly those in DACs. In determining the thermal fee, National Grid may also consider the overall cost of thermal network infrastructure that benefits a participant. National Grid will install BTU meters as well as temperature and flow sensors for each pilot participant and will use the data collected to analyze whether a thermal rate can be developed based on usage.

- **Anticipated finding**: It is anticipated that there will be multiple thermal fees established to ensure an equitable solution. The pilot fee will be established based on the customer with the lowest energy usage and scaled up for all other customers, to ensure lower energy costs for all connected customers.

3. **Evaluate rate design and cost recovery mechanisms**: National Grid continues to evaluate the rate design and cost recovery mechanism for the Syracuse UTEN Pilot and will include updated costs once final design is completed, along with the associated bill impacts and any other specific details regarding the allocation of costs, rate mechanisms to be used, and proposed treatment of any future unknown costs in the Final UTEN Pilot Project Engineering Design and Customer Protection Plan submitted *in* the Stage 2 filing as required by the Guidance Order.

- **Anticipated finding**: It is anticipated that pilot costs will be recovered via a surcharge and amortized over an approved period of time and the collected thermal fees will reduce the revenue requirement.

4. **Evaluate utility distribution system performance:** National Grid will install sensors across the Utility Distribution System as well as the Customer Equipment systems, to monitor and record information such as, inside temperature, outside ambient temperature, energy flow etc. and evaluate the performance and efficacy of the system across different times and seasons that will aid in designing an optimal system size and scale of Thermal Energy Networks in accordance with any Evaluation, Measurement, and Verification ("EM&V") guidance provided by the Commission.

- **Anticipated finding**: Real time data from the Utility Distribution System will allow for optimization of systems. These metrics may include flow rates and temperatures at different points along the loop as well as electric consumption for connected pumps and heat pumps. This data will enable system operators to identify and locate any issues, leaks, or variations within the system.

5. **Evaluate overall utility costs for thermal energy customers:** Evaluate the thermal energy customers' electricity costs versus other electrification options and the total utility bill impact to a thermal customer compared to that customer's previous total utility bill obligation. Incorporate electric utility's infrastructure upgrade information and costs to understand the total societal cost for these thermal energy networks.

- **Anticipated finding**: Utility bills for thermal energy customers will be evaluated as part of the EM&V stage of the Syracuse UTEN Pilot. This study will also analyze and consider aspects such as a customer's change in energy usage and overall electric customer cost savings from avoided future electric upgrade costs to determine appropriate total utility costs for thermal energy customers.

6. **Evaluate third-party thermal generation**: Evaluate financial and legal agreements for thermal energy resource generation by the Metro WWTP. Evaluate the redundancy or back-up capacity requirements for any source not owned by National Grid.

- **Anticipated finding**: A mutually agreed upon rate for thermal energy will be established between WEP and National Grid as well as a long-term contract.

7. **Evaluate labor requirements for system operations**: Evaluate the workforce development needs to be completed to adequately staff Utility Thermal Energy Networks that will be constructed. Evaluate how school or training programs can educate students on Thermal Energy Networks and prepare them for the workforce.

- **Anticipated finding**: Training programs will be beneficial for staffing similar systems in the future. It is expected that a system will need two full-time equivalent employees for operations and maintenance, however as more systems come online there will be an economy of scale in developing a group to oversee operations.

8. **Evaluate education opportunities for the community**: Evaluate how opportunities including, but not limited to, programming, signage, and learning labs can educate the public on Thermal Energy Networks.

- **Anticipated finding**: Educating the public about UTENs may increase future customer adoption rates. Awareness of such systems will be a benefit for the area and provide additional draw for businesses due to the lower building operational costs.

9. **Evaluate cost of UTEN through a comparative analysis**: Evaluate the savings associated with construction and operation of a UTEN as compared to baseline systems, individual ground source heat pumps, or individual building electrification.

- **Anticipated finding** Construction costs of a UTEN pilot are expected to be higher than in-kind equipment replacements of baseline systems and higher than individual building electrification projects. Energy costs for a UTEN are expected to be lower than both baseline systems and individually electrified systems due to higher thermal energy equipment efficiencies that are not dependent on ambient temperatures. The analysis may find that when electric grid upgrade costs are included, the UTEN pilot costs become more comparable. Further, the network technology as it is further studied, developed and scaled may also result in the reduction in overall costs.

10. **Evaluate impact of energy upgrades**: Evaluate the impact of energy efficiency upgrades on building thermal loads if customers choose to implement

- **Anticipated finding**: It is expected that heating and cooling loads and therefore energy consumption will decrease as a result of energy efficiency upgrades if they are implemented and may include building envelope measures such as window and door replacements and installation of insulation. While night setbacks could reduce energy consumption, it may also increase peak heating load and therefore required system capacity by increasing the temperature difference required at morning warm up.

11. **Evaluate the effectiveness of a permanent, on site, backup electric generator:** Evaluate the effectiveness of a permanent, on site, backup electric generator and compare to National Grid's other UTEN Pilots which will utilize a temporary, mobile, backup electric generator(s).

- **Anticipated finding:** Metrics including, capital and operating expenditure, annual deployment, and annual up-time will be recorded for the permanent, onsite, backup electric generator, planned to be installed at the UDS Energy Center. It is expected that the system will not require frequent or prolonged usage of the backup generator. The

results of the Syracuse UTEN Pilot's backup electric generation requirements will be compared to the results of National Grid's other UTEN Pilot, in which temporary, mobile**,** backup generators will be utilized. The results of this comparison will be used to help inform National Grid's design of UTEN systems in the future.

12. **Evaluate the GHG Emissions Reductions of a UTEN**: Evaluate the carbon reductions associated with implementing a UTEN and switching buildings from existing systems with natural gas heating to UTEN systems.

- **Anticipated finding**: A baseline CO_2 footprint was established using EPA values for NYS upstate grid carbon intensity and onsite combustion of natural gas. The baseline carbon emissions are 3,149 MT CO_2e per year.

Table 4: GHG Emissions Factors

Fuel Source	**Emissions Factor** (MT CO_2e/therm)	**Emissions Factor** (MT CO_2e/kWh, 2021)	**Projected Emissions Factor** (MT CO_2e/kWh, 2026)
Natural Gas	0.0058		
Electricity		0.0001054	0.0000777

The first year of the pilot is anticipated to be in 2026. To project an electricity emissions factor for that year, a straight-line reduction was assumed from 2021 emissions levels to zero emissions in 2040 as required by the CLCPA for New York State. Baseline annual emissions are shown in Table 5 below.

Table 5: 2026 Annual Baseline GHG Emissions

	Natural Gas Usage (therms/year)	**Electricity Usage (kWh/year)**	**Natural Gas Emissions (MT CO_2e/year)**	**Electricity Emissions (MT CO_2e/year)**
Heating	518,133	0	3,005	0
Cooling	0	1,853,903	0	144
Total	**518,133**	**1,853,903**	**3,149**	

The thermal energy network would eliminate natural gas for space heating. The reduction in natural gas is partially offset by increased electrical consumption from heat pumps located within connected buildings as well as the system distribution pumps.

Table 6: 2026 Annual UTEN GHG Emissions

	Natural Gas Usage (therms/year)	Electricity Usage (kWh/year)	Natural Gas Emissions (MT CO_2e/year)	Electricity Emissions (MT CO_2e/year)
Heating and Cooling	0	4,515,736	0	351
Total	**0**	**4,515,736**	**351**	

In the first year fully in service, it is estimated this system will produce 351 MT CO_2e per year, providing a reduction of approximately 2,798 MT CO_2e when compared to the baseline system. It is expected that the thermal energy network will further reduce the greenhouse gas emissions associated with it as the NYS Upstate electric grid moves towards the 2040 0% emissions goals by incorporating an increased percentage of renewable energy sources.

At approximately 2,798 MT per year lower GHG emissions, it is equivalent of to the annual emissions of 623 gasoline powered cars or 353 single family homes. The system will be expandable to 2-3 times the current size using additional capacity from the outfall source, which would also increase the associated emissions savings.

Section 5: Proposed Metrics by which to Measure Cost-effectiveness

National Grid intends to develop a robust Evaluation, Measurement, & Verification ("EM&V") program to collect useful data which may be used by National Grid, and others, in the future to inform the design of future UTEN systems. National Grid intends to participate in the technical conference which will be convened by Staff to develop a list of standardized metrics which

should be measured across all the pilot projects developed by the seven largest utilities in New York state. Found below are National Grid's proposed metrics by which to measure cost-effectiveness. This list will be updated to reflect the results of the technical conference(s) and the updated list will be published as part of National Grid's Final UTEN Pilot Project Engineering and Customer Protection Plan filings.

The results of the EM&V program will help answer the following questions:

What are the optimal methods for a utility to:

- Maintain thermal energy network assets
- Isolate customers in abnormal events to maintain overall system operation
- Bill customers properly and fairly for their energy use
- Gauge customer experience vs. natural gas
- Determine the influence of thermal energy sources such as wastewater heat on the network

The following metrics may be used to evaluate the performance of the project:

Technical

- Type of thermal energy network system
- Time heat transfer medium temperature is within/outside a defined range
- Frequency UDS is operating outside of temperature range
- Hydronic flow to each customer at various stages of operation and peak design demand
- Duration of time UTEN system is operating outside of optimal flow requirements
- Thermal energy capacity and output of each thermal source
- Frequency and duration backup heating is required for customer and system
- Electricity consumption at customer site, both pre- and during project operation

- Other fuel consumption at customer site, both pre- and during pilot project operation
- Permits required
- On-site energy consumption relative to various levels of energy efficiency.

Financial

- UTEN Capital Expenses
- UTEN Customer Expenses
- UTEN System Operating Expenses
- Customer bill impacts compared to previous energy costs
- Customer bill impacts, without protections, compared to previous energy costs
- UTEN System cost compared to individual customer owned air source installations
- Cost performance with varying levels of energy efficiency
- National Grid's capital expenses on a per customer basis
- National Grid's capital expenses on a per unit output basis
- National Grid's capital expenses on a maximum system output basis
- National Grid's operating expenses on a per customer basis
- National Grid's operating expenses on a per unit output basis
- National Grid's operating expenses on a maximum system output basis

Customer/Societal

- Customer site GHG emissions
- UTEN system GHG emissions
- Billing accuracy and timeliness
- Customer complaints
- Customer engagement

- Customer service
- Customer billing
- Customer participation
- Jobs and economic impacts
- Gas customer knowledge/awareness of thermal energy networks
- Gas customer willingness to adopt thermal energy

Safety/Reliability

- Number of leaks
- Frequency and duration of Metro WWTP downtime
- Cause of each leak (corrosion, natural force, excavation, other outside force, pipe/weld/joint failure, equipment failure, incorrect operation, other)
- Incidences of facility failures including types of failure
- Number of customer outages
- Duration of customer outages
- Emergency response time
- Excavation damages
- Pipe data, including miles of main, number of services, material, size, and installation year(s)
- Heat transfer medium type (water, glycol, mix solution, etc.)
- System operating hours, including planned and forced maintenance hours

Section 6: Development Schedule Detailing Major Milestones for the Pre-Construction, Construction, and Operational Phases of the Project

Based on the deadlines and requirements for each Stage, as stated in the September Guidance Order, National Grid has created the following development schedule for the Syracuse UTEN Pilot. The development schedule is broken down into five distinct phases; past work, pre-construction, construction, operational, and post-pilot. The development schedule displays the critical activities that will be completed within each Stage and provides an estimated completion time for each milestone. The development schedule is based on assumed approval timelines, and the dates contained within the development schedule may change depending on when approvals are obtained.

The following permits and review will be required for construction and operations:

- State Environmental Quality Review Act (SEQR)
    - Lead Agency must be determined.
- Stormwater Permit for Construction Activity (SWPPP)
    - Total Area of project disturbance is greater than one acre.
- NYS DEC will be requested to review the 30% basis of design document as an interested party to determine if and how a modification of the existing Metro Wastewater Treatment Plant Outfall 001 SPEDES permit is required.
- UDS Energy Center
    - Building Permit – City of Syracuse
    - Site Plan Application City of Syracuse Zoning Office

        - Approval of the new site improvements in compliance with the current zoning classification of the property. Lot is currently zone LI: Light Industrial, which is compatible with the proposed use.
    - Subdivision Application to City of Syracuse Zoning Office
    - Approval for the creation of a new property line to establish the UTEN parcel boundary.
    - Amendment to the current brownfield remediation plan
- Utility Distribution System Piping (Mains and Services)
    - Road Cut Permit – City of Syracuse
    - Utility Easements:
        - Easements will be required for areas where piping is routed through anything other than a public street.
    - NYS DOT coordination will be required to cross Bear St (Rt 298).
- Outfall Connection
    - Building Permit – City of Syracuse
    - Utility Easements – Onondaga County
    - Modification of SPDES Permit (if required)
- The following utility service applications will be required:
    - New Electrical Service Application
    - New Water and Sewer Service Connection

In addition to these permits, a thermal resource access fee agreement will need to be negotiated and executed between National Grid and Onondaga County.

National Grid also will need the consent of the municipal authorities in the form of an agreement to install the thermal energy network in public ways or places.

Table 7: Project Development Schedule

Stage 1 and 2 Schedule		
Timing (Estimated)	**Action**	**Phase**
January 9, 2023	Syracuse Pilot Project Site Proposal filed with Commission	**Past Work**
Month 0 ~ September 14, 2023	Guidance Order published by Commission	**Pre-Construction**
Month 3 ~ December 15, 2023	15% Design complete	
	Final UTEN Pilot Project Proposal filed with Commission	
Month 6 ~ March 2024	Compliance letter advancing the pilot project to Stage 2 from Director of Energy System Planning and Performance received	
	30% Design complete: Utility Distribution System	
	Onondaga County WEP Review and Comment	
	Engage NYSDEC to begin permitting review	
Month 7 ~ April 2024	Onondaga County WEP approval to proceed	
Month 10 ~ July 2024	60% Design complete: Utility Distribution System[5]	
	Submit 60% drawing set to the City of Syracuse for permit review	
	Onondaga County WEP Review and Comment	
Month 11 ~ August 2024	Onondaga County WEP approval to proceed	
	90% Design Complete: Utility Distribution System	
Month 12 ~ September 2024	Receive and incorporate NYSDEC initial comments	
	100% Design: Utility Distribution System	
	Submit to NYSDEC for final review	
Month 13 ~ October 2024	Final UTEN Pilot Project Engineering Design and Customer Protection Plan filed with the Commission	
Month 15 ~ December 2024	NYSDEC final review complete[6]	

[5] National Grid, among many of the other utilities, is unable to finalize a system design without having firm commitment from participating customers. As currently stated by the Guidance Order, formal customer enrollment may not occur until Stage 3a. Modifications to the design will be required if all anticipated customers do not enroll.
[6] It will be difficult to obtain all necessary permits for construction before submitting the Final UTEN Pilot Project Engineering Design and Customer Protection Plan Filing as the completion of 100% design drawings is required for some permit applications. National Grid will have at a minimum applied for all required permits but is unable to ensure that the permit authorities will have approved their applications before it is required to submit its Stage 2 filing.

Stage 3a Schedule		
Timing (Estimated)	**Action**	**Phase**
Month 16 ~ January 2025	Issue for Bid ("IFB") Package and Request for Proposal ("RFP")	**Pre-Construction**
April 19 ~ April 2025	Commission Order authorizing pilot project advancement to Stage 3 received	
	Contractors notice of award. Construction submittal and review period beings.	
Month 20 ~ May 2025	Customer Agreement executed with at least the prescribed minimum number of customers	
	Letter filed with the Secretary of the Commission documenting the completion of this milestone	

Stage 3b Schedule		
Timing (Estimated)	**Action**	**Phase**
Month 20 ~ May 2025	Letter filed with the Secretary of the Commission documenting the completion of this milestone	**Pre-Construction**
Month 21 ~ June 2025	Commission approval to begin Stage 3b received	
	Contract execution and material procurement	
	Procurement of site for Energy Center	
Month 22 ~ July 2025	Contractor mobilization	
Month 23 ~ August 2025	Begin Construction: Outfall structure	**Construction**
	Begin Construction: Utility Distribution System	
Month 26 ~ October 2025	Energy Center site prep and demolition	
	Outfall structure Wet Well constructed	
	Piping from Outfall to Energy Center	
Month 27 ~ November 2025	Begin Construction: Energy Center foundation and shell	
Month 28 ~ December 2025	Construction Pause: Utility Distribution System	
Month 29 ~ January 2026	Begin Fit Out: Energy Center	
Month 31 ~ March 2026	Construction Resumed: Utility Distribution System	
Month 32 ~ April 2026	Complete Fit Out: Energy Center	
	Procurement of Customer Equipment	
Month 34 ~ June 2026	Substantial Completion: Utility Distribution System	

Month 35 ~ July 2026	Startup and Commissioning: Utility Distribution System	
Month 36 ~ August 2026	Begin connecting customers to the Utility Distribution System	
Stage 4 Schedule		
Month 37 ~ September 2026	System placed into service	**Operational**
Month 49 ~ September 2027	1 year of service complete	
Month 61 ~ September 2028	2 years of service complete	
Month 73 ~ September 2029	3 years of service complete	
Month 85 ~ September 2030	4 years of service complete	
Month 97 ~ September 2031	5 years of service complete	
	Pilot phase concluded	
Stage 5 Schedule		
Month 94 ~ July 2031	Pilot phase concluded	**Post-Pilot**
Month 100 ~ January 2032	Pilot Project Review and Recommendations Report filed with the Commission	
	Project Close-Out Report filed with the Commission	

Legend
Past Work
Documentation from the Commission
Deliverable Submitted to the Commission

The development schedule has also been produced in a Gantt Chart view. The Gantt Chart view of the development schedule can be found in Appendix E.

Section 7: Estimated Capital and Operations Expenses Associated with the Implementation and On-going Costs of the Network

In the January 9 UTEN Pilot Proposal, National Grid indicated that the construction cost of the Syracuse UTEN Pilot was $66.8M and the annual operation and maintenance ("O&M") cost of the Syracuse UTEN Pilot was $0.155M. In May 2023, National Grid responded to a Request for Information ("May RFI") from DPS Staff which requested updated cost estimates for its Syracuse UTEN Pilot. In its response, National Grid indicated that the construction cost estimate for the Syracuse UTEN Pilot had been updated to $86.3M and the annual O&M cost was

unchanged. National Grid stated that the cost estimate NMPC submitted on January 9, 2023, was based solely on an Opinion Probable Cost of Construction ("OPCC") document from its engineering design consultant. The cost estimate submitted on January 9, 2023, did not consider the costs of permitting, third-party construction oversight consultants, including senior field engineer(s) and quality inspector(s), the contractor performance bond, and contractor insurance. Additionally, NMPC used a 24% contingency for its January 9, 2023, cost estimate. NMPC stated that the construct cost increase from $66.8M to $86.3M was a result of the inclusion of the aforementioned elements, as well as an increase in the rate of contingency from 24% to 40%, to account for the additional degree of uncertainty presented by a pilot.

Since responding to the May RFI, National Grid has received an updated OPCC for the Syracuse UTEN Pilot from its engineering design consultant. National Grid's internal estimating department ("Estimating") conducted a review of the updated OPCC. During their review, Estimating considered additional costs, outside of those already in the OPCC, that are typically borne by National Grid during the design, construction, and O&M of capital projects. The estimate shown below is based on a conceptual level of design and should only be used for budgetary purposes.

Table 8: Summary of Total Syracuse UTEN Pilot Costs by Cost Category

Item	Amount (Millions)
Construction of the UTEN	$56.5
Customer Equipment	$8.8
Construction Oversight	$3.1
Design Engineering	$4.8
National Grid Labor	$6.7
Permitting	$0.7
Construction Subtotal (Sum of all rows above)	$80.6
Construction Contingency (40% of Construction Subtotal)	$32.2
Construction Total (Sum of Construction Subtotal & Contingency)	$112.8
O&M Subtotal (total over the 5-year pilot lifetime)	$14.2
O&M Contingency (40% of Operations Total)	$5.7
O&M Total (Sum of Operations Subtotal & Contingency)	$19.9
Total Cost (Sum of Construction Total & O&M Total)	**$132.7**

Based on the conceptual level of design, the Total Cost of the Syracuse UTEN Pilot is $132.7M, the Construction Total is $112.8M, and the Total O&M cost over the 5-year lifetime is $19.9M. The current Construction Total of the Syracuse UTEN Pilot differs from previous construction cost estimates for several reasons:

- National Grid and its engineering design consultant have refined details about the design of system components between the submission of previous cost estimates and the current cost estimate presented here within.
- Previously, sales tax had not been included. In the current Construction Total cost estimate sales tax has been included.
- In previous cost estimates, National Grid had not considered any internal labor hours, and their related costs. In the current cost estimate, National Grid has included the required manhours, and subsequent costs, of several departments within National Grid including, but not limited to, engineering, project management, and process safety.

- The number of hours, and subsequent cost, of construction oversight has increased to more accurately reflect the level of construction oversight required for a project of this scale.

The current O&M cost of the Syracuse UTEN Pilot differs from the previous estimates of O&M costs for several reasons:

- Previously, only the labor, and associated cost, of one full time employee ("FTE") was considered. In the current O&M cost estimate, two FTEs, and their costs, have been included. An additional FTE was added to accurately reflect the labor required for safe, reliable, and resilient, operation and maintenance of the Syracuse UTEN Pilot.
- Previously, property tax had not been included. In the current O&M cost estimate property tax has been included.
- Previously, the purchase of critical spare parts had not been included. In the current O&M cost estimate, the cost of critical spare parts has been included.

It is important to note the following exclusions:

- The current O&M cost estimate does not include a cost for a thermal fee which National Grid will pay to OCWEP for access to the thermal energy available in the outfall of the Metro WWTP. National Grid intends to pay a fair market value for the thermal energy resource and will update the O&M cost of the Syracuse UTEN Pilot once negotiations have concluded with OCWEP. National Grid may look to similar projects to determine what a fair market value for the thermal energy resource is.
- The current total cost estimate does not consider any incentives, grants, co-funding, or other third-party contributions (collectively "Cost Contributions") that are available to offset the cost of the Syracuse UTEN Pilot.

- The current total cost estimate does not reflect Allowances for Funds Used during Construction ("AFUDC"), Capital Overheads ("COD"), and Administrative and General ("A&G"), as National Grid's proposed recovery mechanism is to record all pilot costs, net of participant's thermal fee, as a regulatory asset with carrying charges calculated from the initial spend at the Company's Weighted Average Cost of Capital ("WACC") and recovered over ten years. The forecasted costs that will be characterized as able to be submitted for recovery include incremental labor but exclude labor costs that are currently through base rates under National Grid's current rate plan.

Cost adjustments reflecting any Cost Contributions will be included only after NMPC has received approval of the applicability of any Cost Contributions to these pilot projects. Upon further design progression, the Syracuse UTEN Pilot cost estimates will be updated. It is important to note that these costs are not fully indicative of the costs of a full scale UTEN with influential factors such as economies of scale and incentives that will optimize costs. Through the results of National Grid's EM&V program, a better understanding of how UTENs can improve their cost effectiveness at scale will be obtained.

Section 7a: Economic Life-Cycle Analysis

The Guidance Order requires that utilities provide economic lifecycle cost analyses ("LCCA") in their Stage 1 filings of a "UTEN versus individual building electrification." An LCCA was performed for (1) the baseline, business-as-usual ("BAU") case wherein there are systems with continued natural gas service, (2) an electrification case wherein individual electrification of buildings occurs via air source heat pumps, (3) an individual GSHP case wherein buildings convert to standalone geothermal systems, and (4) the UTEN case.

7a.1 LCCA Assumptions

For all scenarios, the LCCA makes the following assumptions:

- Analysis is for 25 years of operation starting in 2026
- Electric and natural gas utility rates per November 2023 National Grid rates
- Energy escalation of 2% for natural gas and electricity per National Institute of Standards and Technology ("NIST") tables[7]
- General inflation rate is assumed to be 2% per year
- System efficiency is assumed to degrade at a rate of 0.25% per year
- Social cost of carbon included at a rate established by the New York State Department of Environmental Conservation ("NYS DEC")[8], using the federal U.S. Interagency Working Group's ("IWG") recommended 3% discount rate. The social cost of carbon has been calculated and included; however, carbon emissions are not currently penalized.
- Electricity carbon emissions for upstate New York are calculated using a straight-line approximation from 0.0001054 MT CO_2e/kWh in 2021[9] to 0 MT CO_2e/kWh in 2040, per NYS CLCPA carbon goals.
- The UTEN case OPC includes several contingency, escalation and contractor overhead percentages that increase the assumed construction cost. A factor of 40% was added to the alternate cases that would represent design and construction contingencies, contractor O&P and construction inflation.
- A sales tax of 8% was included for all options.

[7] https://nvlpubs.nist.gov/nistpubs/ir/2021/NIST.IR.85-3273-36.pdf
[8] https://www.dec.ny.gov/docs/administration_pdf/vocapp23.pdf
[9] https://www.epa.gov/egrid/data-explorer

7a.2 LCA Limitations

- The Business-As-Usual case does not include current and potential future policies requiring decarbonization or electrification. Currently under the All Electric Buildings Act ("AEBA"), any new construction buildings under seven stories must be all-electric by 2026.
- No rate of phase-in is included to simplify the analysis, all measures are set to be fully implemented at year 1.
- Electric grid upgrades will also contribute to project costs, the specifics of which are still being estimated. It is anticipated that the ASHP case, with the highest electric demand, will require the highest cost upgrades while the GSHP case may require some less major upgrades, and the UTEN with the least upgrades compared to the baseline case.
- Alternates are focused on mechanical systems; a detailed analysis of impact on electrical systems has not been done at this time.
- The baseline, Business-As-Usual case does not include the significant National Grid capital costs that are required to maintain the existing gas network. Since this network is intricately connected to provide redundancy and resiliency to customers, it is difficult to calculate as a standalone cost and has not been included in this analysis.

7a.3 Baseline, Business-As-Usual Case (Continuation of Natural Gas Service)

Assumptions applicable for the baseline case are as follows:

- Natural gas will be replaced with renewable natural gas ("RNG") and/or hydrogen in line with National Grid's long-term plans. However, since there are currently many unknown

details regarding cost, schedule, etc., this analysis maintains that natural gas will remain for 25 years.

- Financing for equipment is at a rate of 5% over 20 years.
- Details of heating and cooling systems for connected customers are shown in the tables below, including assumed efficiency and useful life.

Table 9: BAU Assumptions - Aquarium

Metric	Assumption	Source
Space Type	Aquarium	N/A
System Type	ACH + HW Boiler	N/A
Cooling efficiency (EER)	13.7	ILPV ASHRAE 90.1 Min Eff, ACH <150 Tons
Life Expectancy (years)	15 (ASHP), 24 (Boiler)	NYS Technical Resource Manual

Table 10: BAU Assumptions - Midrise Apartment

Metric	Assumption	Source
Space Type	Midrise Apartment	N/A
System Type	Furnace + DX Cooling	N/A
Heating efficiency (% AFUE)	92%	
Cooling efficiency (EER)	13.0	
Life Expectancy (years)	22 (Furnace), 15 (CU)	NYS Technical Resource Manual

Table 11: BAU Assumptions - High Rise Apartment

Metric	Assumption	Source
Space Type	High Rise Apartment	N/A
System Type	WSHP + Boiler + Tower	N/A
Boiler heating efficiency (% AFUE)	95%	Equipment Selection
WSHP heating efficiency (COP)	5.0	
Cooling efficiency (EER)	15.9	
Life Expectancy (years)	25 (WSHP), 24 (Boiler), CT (15)	NYS Technical Resource Manual

Table 12: BAU Assumptions - Hotel

Metric	Assumption	Source
Space Type	Hotel	N/A
System Type	Condensing HW Boiler + DX Cooling	N/A
Heating efficiency (% AFUE)	92%	
Cooling efficiency (EER)	13.0	
Life Expectancy (years)	15	NYS Technical Resource Manual

7a.4 Individual Electrification Case

Assumptions applicable to the electrification case are as follows:

- All electrification installation costs occur in 2026.
- Customers will be eligible for National Grid incentives through the NY Clean Heat program
- Financing for equipment is at a rate of 5% over 15 years.
- Details of heating and cooling systems for connected customers are shown in the tables below, including assumed efficiency and useful life.

Table 13: Individual Electrification Assumptions - Aquarium

Metric	Assumption	Source
Space Type	Aquarium	N/A
System Type	ASHP + Electric Boiler	N/A
ASHP heating efficiency (COP, >34°F)	2.44	Equipment Selection
Boiler heating efficiency (COP, <34°F)	1.0	Equipment Selection
Cooling efficiency (EER)	9.3	Equipment Selection
Life Expectancy (years)	15 (ASHP), 24 (Boiler)	NYS Technical Resource Manual

Table 14: Individual Electrification Assumptions - Apartment

Metric	Assumption	Source
Space Type	Apartment	N/A
System Type	Split ASHP	N/A
Heating efficiency (HSPF)	7.7	ASHRAE 90.1 2019, Minimum Efficiency Requirements
Cooling efficiency (SEER)	13.0	ASHRAE 90.1 2019, Minimum Efficiency Requirements
Life Expectancy (years)	15	NYS Technical Resource Manual

Table 15: Individual Electrification Assumptions - Hotel

Metric	Assumption	Source
Space Type	Hotel	N/A
System Type	VRF	N/A
Heating efficiency (COP)	2.92	
Cooling efficiency (IEER)	13.9	
Life Expectancy (years)	15	NYS Technical Resource Manual

7a.5 Individual GSHP Case

Assumptions applicable to the electrification case are as follows:

- All geothermal installation costs occur in 2026.
- Customers will be eligible for National Grid incentives through the NY Clean Heat program
- Financing for equipment is at a rate of 5% over 20 years.
- Details of heating and cooling systems for connected customers are shown in the tables below, including assumed efficiency and useful life.

Table 16: GSHP Assumptions - Aquarium

Metric	Assumption	Source
Space Type	Aquarium	N/A
System Type	GHX + Heat Recovery Chiller	N/A
Heating efficiency (COP)	3.0	
Cooling efficiency (EER)	17.0	
Life Expectancy (years)	25	NYS Technical Resource Manual

Table 17: GSHP Assumptions - Apartment

Metric	Assumption	Source
Space Type	Apartment	N/A
System Type	GSHP	N/A
Heating efficiency (COP)	3.7	Bosch WSHP – AHRI Conditions
Cooling efficiency (SEER)	15.0	Bosch WSHP – AHRI Conditions
Life Expectancy (years)	25	NYS Technical Resource Manual

Table 18: GSHP Assumptions - Hotel

Metric	Assumption	Source
Space Type	Hotel	N/A
System Type	GSHP	N/A
Heating efficiency (COP)	3.7	AHRI
Cooling efficiency (SEER)	15.0	AHRI
Life Expectancy (years)	25	NYS Technical Resource Manual

7a.6 UTEN Pilot Case

Assumptions applicable to the UTEN case are as follows:

- A 40% contingency was applied to the Construction of the UTEN and the Customer Equipment costs in Table 6 to determine upfront costs to National Grid.
- Cost recovery for the upfront National Grid distribution system cost is amortized over 80 years with a real weighted average cost of capital ("WACC") of 7.66%.
- Cost recovery for upfront customer connection and equipment that National Grid is providing is amortized over 25 years with a real WACC of 7.66%.
- Customers will be eligible through National Grid incentives at a rate comparable to those listed for GSHP in the NY Clean Heat program
- Details of heating and cooling systems for connected customers are shown in the tables below, including assumed efficiency and useful life.

Table 19: UTEN Pilot Assumptions - Aquarium

Metric	Assumption	Source
Space Type	Aquarium	N/A
System Type	GHX + Heat Recovery Chiller	N/A
Heating efficiency (COP)	3.0	Equipment Selection
Cooling efficiency (EER)	17.0	Equipment Selection
Life Expectancy (years)	25	

Table 20: UTEN Pilot Assumptions - Apartment

Metric	Assumption	Source
Space Type	Apartment	N/A
System Type	GSHP	N/A
Heating efficiency (COP)	4.44	
Cooling efficiency (SEER)	15.0	
Life Expectancy (years)	25	NYS Technical Resource Manual

Table 21: UTEN Pilot Assumptions - Hotel

Metric	Assumption	Source
Space Type	Hotel	N/A
System Type	GSHP	N/A
Heating efficiency (COP)	4.44	
Cooling efficiency (SEER)	15.0	
Life Expectancy (years)	25	NYS Technical Resource Manual

7a.7 Results

The LCAs were calculated for both societal costs and for customer costs. The societal lifecycle cost analysis is conducted with a 3% discount rate over 25 years. Incentives that would otherwise be available to individual installations are included as a separate line item. Results are shown in Figure 8 below.

Figure 8: Societal LCA Results

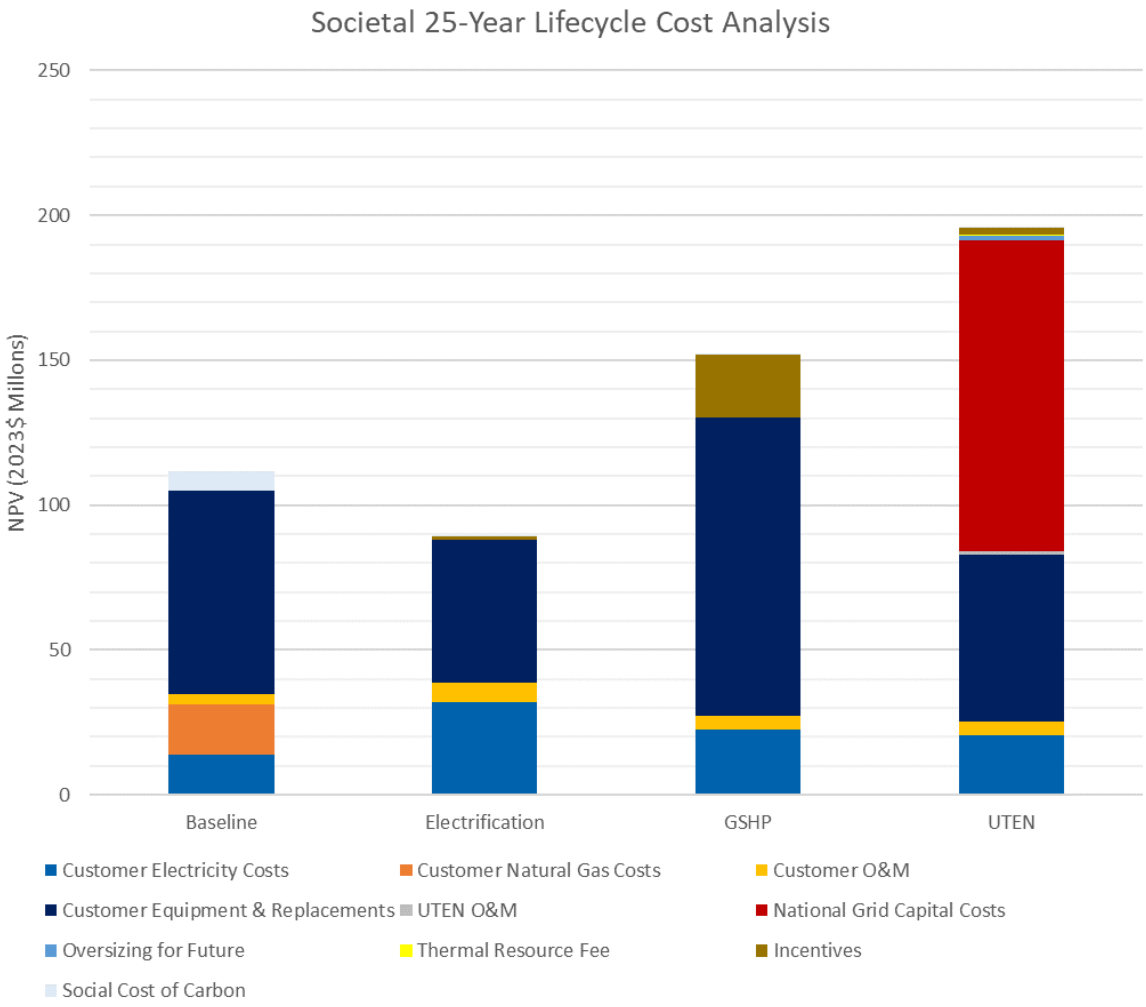


Table 22: Societal LCA Results

	BAU	ASHP	GSHP	UTEN
Customer Electricity Costs	$13,910,000	$32,210,000	$22,420,000	$20,550,000
Customer Natural Gas Costs	$17,460,000	$0	$0	$0
Customer O&M	$3,330,000	$6,510,000	$4,850,000	$4,850,000
UTEN O&M	$0	$0	$0	$1,150,000
Social Cost of Carbon	$6,400,000	$370,000	$230,000	$240,000
Customer Equipment	$70,440,000	$49,490,000	$103,050,000	$57,400,000
Incentives	$0	$820,000	$21,440,000	$2,250,000
Oversizing for Future	$0	$0	$0	$1,410,000
Thermal Resource Fee	$0	$0	$0	$580,000
National Grid Capital Costs	$0	$0	$0	$107,500,000
Total	**$111,540,000**	**$89,400,000**	**$151,990,000**	**$195,930,000**

The customer lifecycle cost analysis is conducted with a 14% discount rate over 25 years. National Grid incentives are included in customer equipment costs. Results are shown in Figure 9 below.

Figure 9: Customer LCA Results

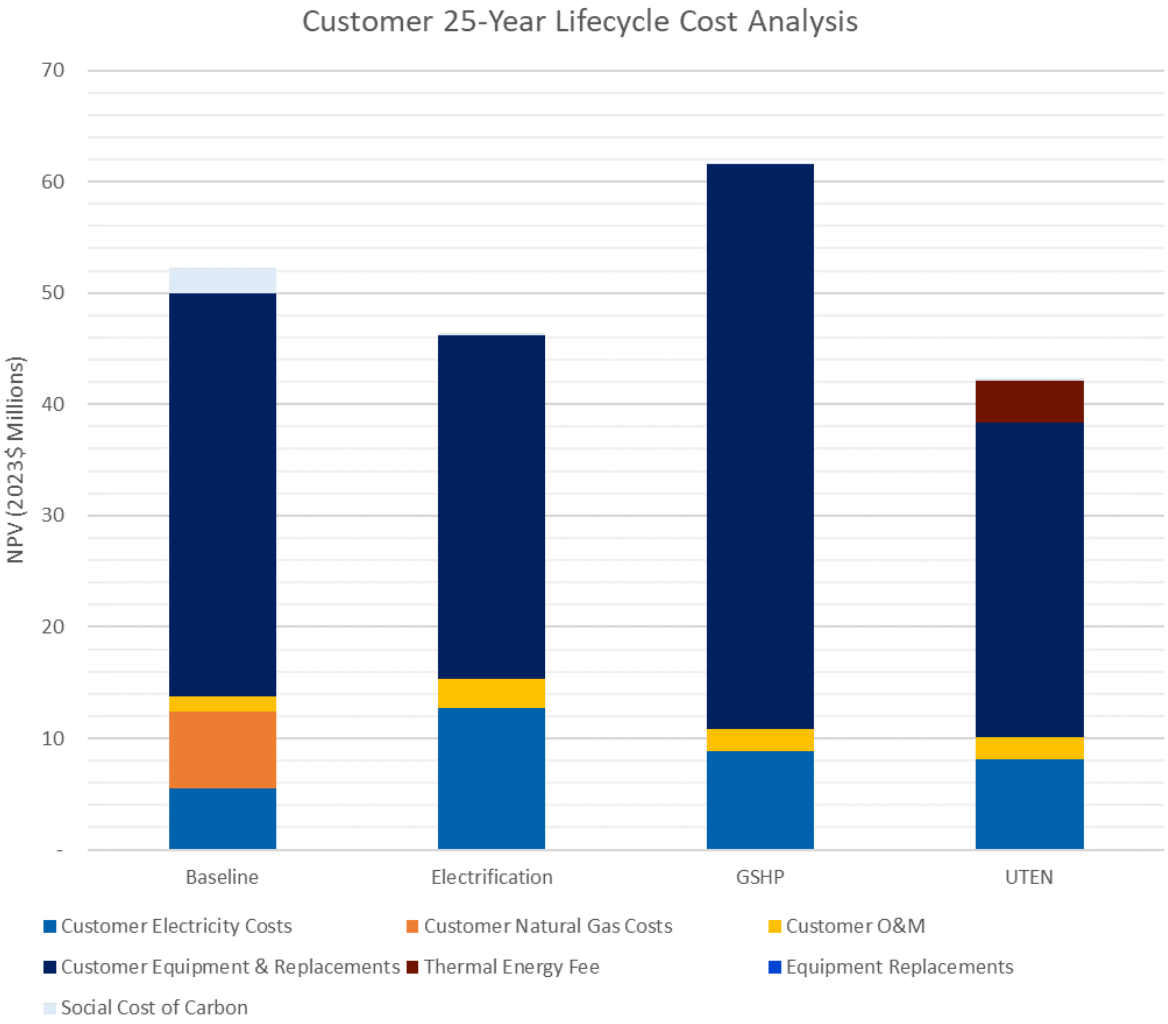


Table 23: Customer LCA Results

	BAU	ASHP	GSHP	UTEN
Customer Electricity Cost	$5,510,000	$12,750,000	$8,880,000	$8,130,000
Customer Natural Gas Costs	$6,920,000	$0	$0	$0
Customer O&M	$1,330,000	$2,600,000	$1,940,000	$1,940,000
Thermal Energy Fee	$0	$0	$0	$3,780,000
Social Cost of Carbon	$2,370,000	$240,000	$150,000	$150,000
Customer Equipment & Replacements	$36,180,000	$30,804000	$50,780,000	$28,280,000
Total	**$52,310,000**	**$46,390,000**	**$61,750,000**	**$42,280,000**

Section 8: Preliminary Customer Protection Plan

National Grid's preliminary Customer Protection Plan includes a preliminary Customer Agreement Template and customer and community engagement, education, and marketing strategies. An anticipated budget of $150,000 has been estimated for these customer activities.

Section 8.1 Stakeholder, Community, and Customer Education and Engagement

Recognizing that effective education and marketing engagement to solicit a majority of the building owners and/or occupants in the selected area to connect to heat pump systems instead of natural gas heating will be the core to UTEN success, National Grid shall implement a comprehensive set of activities to increase awareness and motivate customers to participate with education, guidance, and assistance to ensure a positive program experience.

The Syracuse UTEN Pilot will seek to reduce barriers to customer participation by increasing customer, OCWEP, and developer knowledge of this technology and its benefits. Activities related to education and marketing engagement are discussed in the following sections.

National Grid will implement outreach to customers to inform them about the program opportunity, heat pump technology, and recruit them to participate. National Grid anticipates that customer costs of connection and utility bill impacts, along with construction impacts and timeline, benefits of heat pump technology and post-pilot activity will be some of the primary customer concerns. To minimize financial risk to participants and allay concerns about enrolling in the pilot, National Grid will develop a thermal fee designed to approximate a participant's total energy bill. Customer, stakeholder, and community education may include some or all the following:

- Customer benefits of ground source heat pumps, waste heat recovery, and the thermal energy network and its ability to provide a clean sustainable heating and cooling source
- Community benefits of thermal energy networks
- Reduced carbon emissions benefits
- Pilot duration
- Construction duration, specific areas being worked on, and potential impacts such as expected noise and sound mitigation measures and work hours. National Grid will also advise on how this may impact normal operations and will ensure that all pumps and manifolds are concealed following installation.
- Bill impacts
- Benefits of lower operational costs and longer anticipated equipment life
- Customer responsibilities
- Electric appliances that may be covered by the program
- Energy efficiency programs, incentive opportunities and benefits
- Customer protection details

Section 8.2 Customer Agreement Template and Marketing Materials

National Grid has developed a Customer Agreement Template that includes the requirements in the Guidance Order. The Customer Agreement Template, a draft of which is attached as Appendix F, provides details of the Customer's and National Grid's rights, responsibilities, and obligations including, without limitation:

1. Installation and maintenance responsibilities and costs;
2. Pricing, metering, billing process, fees, costs covered by the UTEN Pilot Program, and payment options;
3. Customer exit options during the UTEN Pilot Project operation and at the conclusion of the pilot phase;
4. Customers' participation/withdrawal options;

5. Home Energy Fair Practices Act protections, including, but not limited to, service terminations and the complaint process for residential customers;

6. Customer consents and customer privacy.

National Grid understands the complex nature of legal agreements and plans to create a user-friendly fact sheet to support and summarize key provisions in the agreement, in addition to other methods of engagement, education and ongoing support listed below. National Grid will be engaging with local residents, business owners, customers, and other community members to create a transparent and informative process and appreciates and understands the benefit of educating the broader collective on the project for awareness and community support. Customer, stakeholder and community engagement may include some or all of the following materials and methods:

- An abbreviated fact sheet
- A detailed pamphlet for distribution
- Signage posted in buildings around the project area to be updated as needed
- Signage posted around and near the work area
- Public sessions hosted by National Grid and project partners
- Email communications
- Applicable contractor materials
- Press releases
- A website landing page that includes user-friendly educational content, project information and additional resources that will be updated periodically.[10]

[10] ngrid.com/thermalenergynetworks

A sample pamphlet describing thermal energy networks and the pilot is attached as Appendix G. Further, the project will ensure alignment with any municipal commitments to environmental stewardship, sustainability, and/or energy efficiency. This messaging will be communicated via ongoing conversations with the customer, posted on the project website, and included in signage posted in impacted campus buildings.

Section 9: Appendices

Appendix A: Syracuse UTEN Pilot Site Plan

Appendix B: Set of Engineering Design Drawings for Syracuse UTEN Pilot

Appendix C: Architectural Drawings for Syracuse UTEN Pilot

Appendix D: Syracuse UTEN Pilot One-Line Diagram

Appendix E: Gantt Chart of Syracuse UTEN Pilot Development Schedule

Appendix F: Customer Agreement Template

Appendix G: Sample Customer Pamphlet

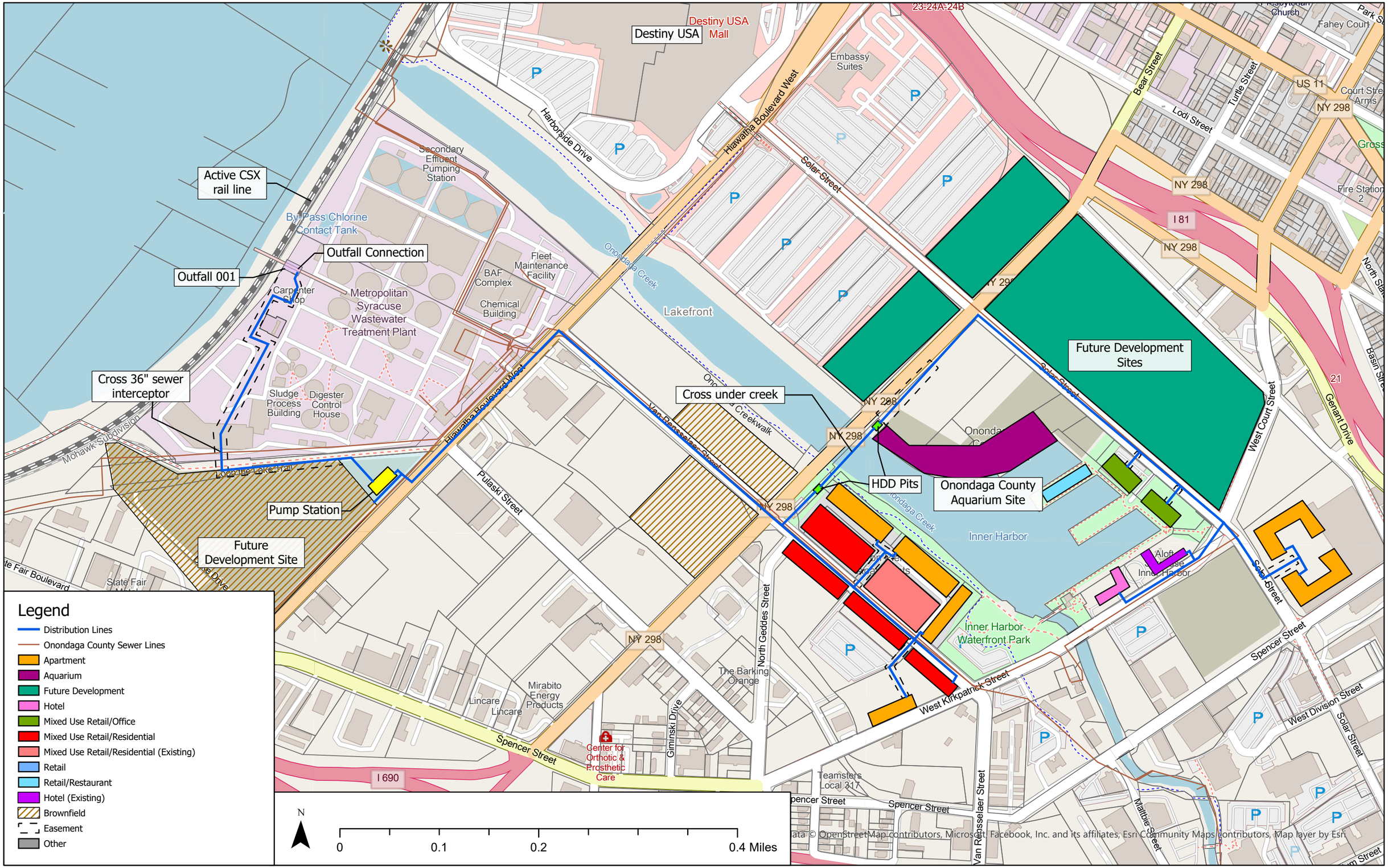
Appendix H: City of Syracuse Letter of Support

Appendix I: Office of the County Executive Letter of Support

Appendix J: Central New York Regional Planning and Development Board Letter of Support

Appendix A

Syracuse UTEN Pilot Site Plan


Destiny USA
Destiny USA Mall
Embassy Suites
Harborside Drive
Hiawatha Boulevard West
Solar Street
Bear Street
Turtle Street
Lodi Street
US 11
NY 298
I 81
Fahey Court
Court Street Arms
Fire Station 2
Secondary Effluent Pumping Station
Active CSX rail line
By-Pass Chlorine Contact Tank
Outfall Connection
Outfall 001
Carpenter Shop
Metropolitan Syracuse Wastewater Treatment Plant
Fleet Maintenance Facility
BAF Complex
Chemical Building
Onondaga Creek
Lakefront
Future Development Sites
Cross 36" sewer interceptor
Sludge Process Building
Digester Control House
Mohawk Subdivision
Loop the Lake Trail
Pump Station
Future Development Site
Cross under creek
Creekwalk
Van Rensselaer Street
Pulaski Street
HDD Pits
Onondaga County Aquarium Site
Inner Harbor
Inner Harbor Waterfront Park
Aloft Inner Harbor
West Court Street
Genant Drive
North Geddes Street
Giminski Drive
The Barking Orange
Mirabito Energy Products
Lincare
Center for Orthotic & Prosthetic Care
Spencer Street
West Kirkpatrick Street
West Division Street
Solar Street
Teamsters Local 317
Van Rensselaer Street
Malibu Street
I 690
State Fair Boulevard
Legend
Distribution Lines
Onondaga County Sewer Lines
Apartment
Aquarium
Future Development
Hotel
Mixed Use Retail/Office
Mixed Use Retail/Residential
Mixed Use Retail/Residential (Existing)
Retail
Retail/Restaurant
Hotel (Existing)
Brownfield
Easement
Other
N
0
0.1
0.2
0.4 Miles
ata © OpenStreetMap contributors, Microsoft, Facebook, Inc. and its affiliates, Esri Community Maps contributors, Map layer by Esri

Appendix B

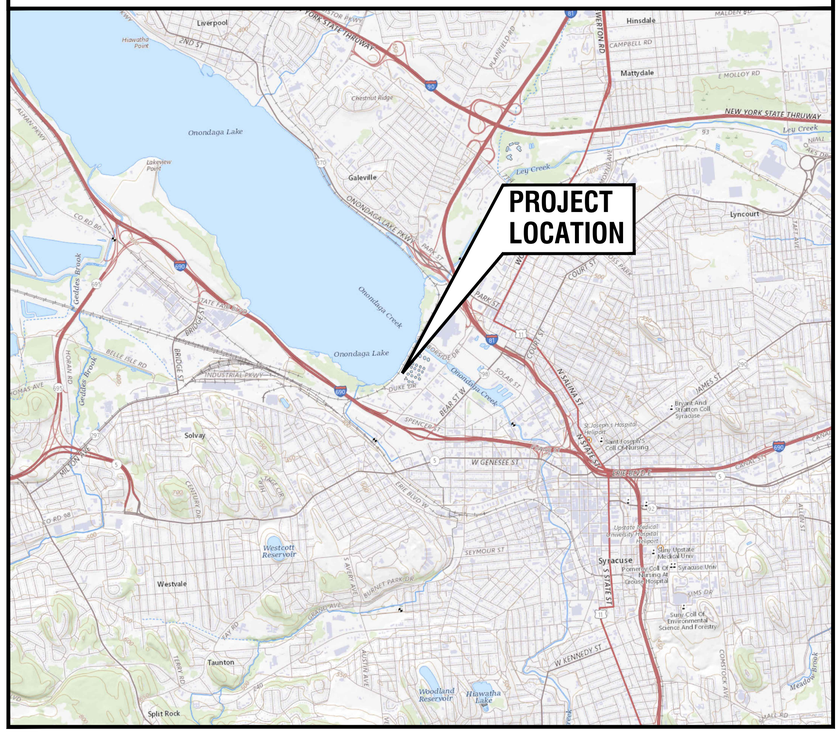
Set of Engineering Design Drawings for Syracuse UTEN Pilot

THERMAL ENERGY RESOURCE AND UTILITY DISTRIBUTION SYSTEM

PUMPING STATION AND CONVEYANCE FORCE MAIN

Vicinity Map:

SCALE: 1"=3,000'



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THERMAL ENERGY RESOURCE AND UTILITY DISTRIBUTION SYSTEM PUMPING STATION AND CONVEYANCE FORCE MAIN

No.	Submittal / Revision	App'd	By	Date

TITLE SHEET

Designed By:	Drawn By:	Checked By:
RCJ	PDA	ETH
Issue Date:	Project No:	Scale:
12/8/2023	081002	AS SHOWN

Drawing No.:

G-001

File: \\CHA-LLP.COM\PROJ\PROJECTS\ANY\K6\079587.000\09_DESIGN\DRAWINGS\01_SHEETS\079587_G-001 TITLE SHEET.DWG
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INDEX OF DRAWINGS	
SHEET NUMBER	SHEET TITLE
G-001	TITLE SHEET
G-002	GENERAL NOTES AND SHEET INDEX
C-001	EXISTING SITE PLAN
C-002	PROPOSED SITE PLAN
C-003	PUMP STATION ENLARGED AREA PLAN
C-101	FORCE MAIN PLAN & PROFILE
C-102	FORCE MAIN PLAN & PROFILE
C-103	FORCE MAIN PLAN & PROFILE
C-104	FORCE MAIN PLAN & PROFILE
C-105	FORCE MAIN PLAN & PROFILE
C-106	**PROPOSED PRELIMINARY HDD PLAN**
C-107	**PROPOSED PLAN VAN RENSSELAER ST PLAN**
D-101	PUMP STATION, WET WELL, & DIVERSION STRUCTURE PLAN
D-201	PUMP STATION, WET WELL, & DIVERSION STRUCTURE SECTION

LEGEND		
DESCRIPTION	EXISTING	PROPOSED
FORCE MAIN/ FORCE MAIN LINING	FM	FM
PROPERTY LINE		
PERMANENT EASEMENT		
SHEET MATCHLINE		
FENCELINE		
COMPOST FILTER SOCK		FS
WETLAND PROTECTION FENCE		WP
VALVE		
CAP/PLUG		
ACCESS PIT OR HDD PIT		
CONSTRUCTION ENTRANCE		
TIMBER MATTING		
WETLAND		
WETLAND FLAG	FLAG	
BORING	BORING NO.	
TEST PIT		TP
DETAIL CALLOUT	X / X-XXX — DETAIL IDENTIFICATION NO. / SHEET NO. WHERE DETAIL IS SHOWN	

LIST OF ABBREVIATIONS

APPROX	APPROXIMATE
ASPH	ASPHALT
AVE	AVENUE
BL	BASELINE
BLDG	BUILDING
CF	CUBIC FEET
CI	CAST IRON
CIP	CAST IRON PIPE
CIPP	CURED-IN-PLACE PIPE
CO	CLEANOUT
CONC	CONCRETE
CONT	CONTINUATION
CS	CARBON STEEL
DWG	DRAWING
EA	EACH
ELEC	ELECTRIC/ELECTRICAL
ELEV	ELEVATION
EX	EXISTING
EXIST	EXISTING
FM	FORCEMAIN
HDD	HORIZONTAL DIRECTIONAL DRILL
HDPE	HIGH DENSITY POLYETHYLENE PIPE
HORIZ	HORIZONTAL
DI	DUCTILE IRON
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
MAX	MAXIMUM
MIN	MINIMUM
MJ	MECHANICAL JOINT
NPT	NATIONAL PIPE THREAD
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTER DIAMETER
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PVC	POLYVINYL CHLORIDE
R	RADIUS
RD	ROAD
REQD	REQUIRED
ROW	RIGHT OF WAY
SCH	SCHEDULE
SPECS	SPECIFICATIONS
SS	STAINLESS STEEL
STA	STATION
SY	SQUARE YARD
T/CONC	TOP OF CONCRETE
TPKE	TURNPIKE
TREL	THEORETICAL RAILROAD EMBANKMENT LINE
TYP	TYPICAL
VERT	VERTICAL
W/	WITH

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THERMAL ENERGY RESOURCE AND UTILITY DISTRIBUTION SYSTEM PUMPING STATION AND CONVEYANCE FORCE MAIN

No.	Submittal / Revision	App'd.	By	Date

GENERAL NOTES AND SHEET INDEX

Designed By:	Drawn By:	Checked By:
RCJ	PDA	ETH
Issue Date:	Project No:	Scale:
12/8/2023	081002	AS SHOWN

Drawing No.:

G-002

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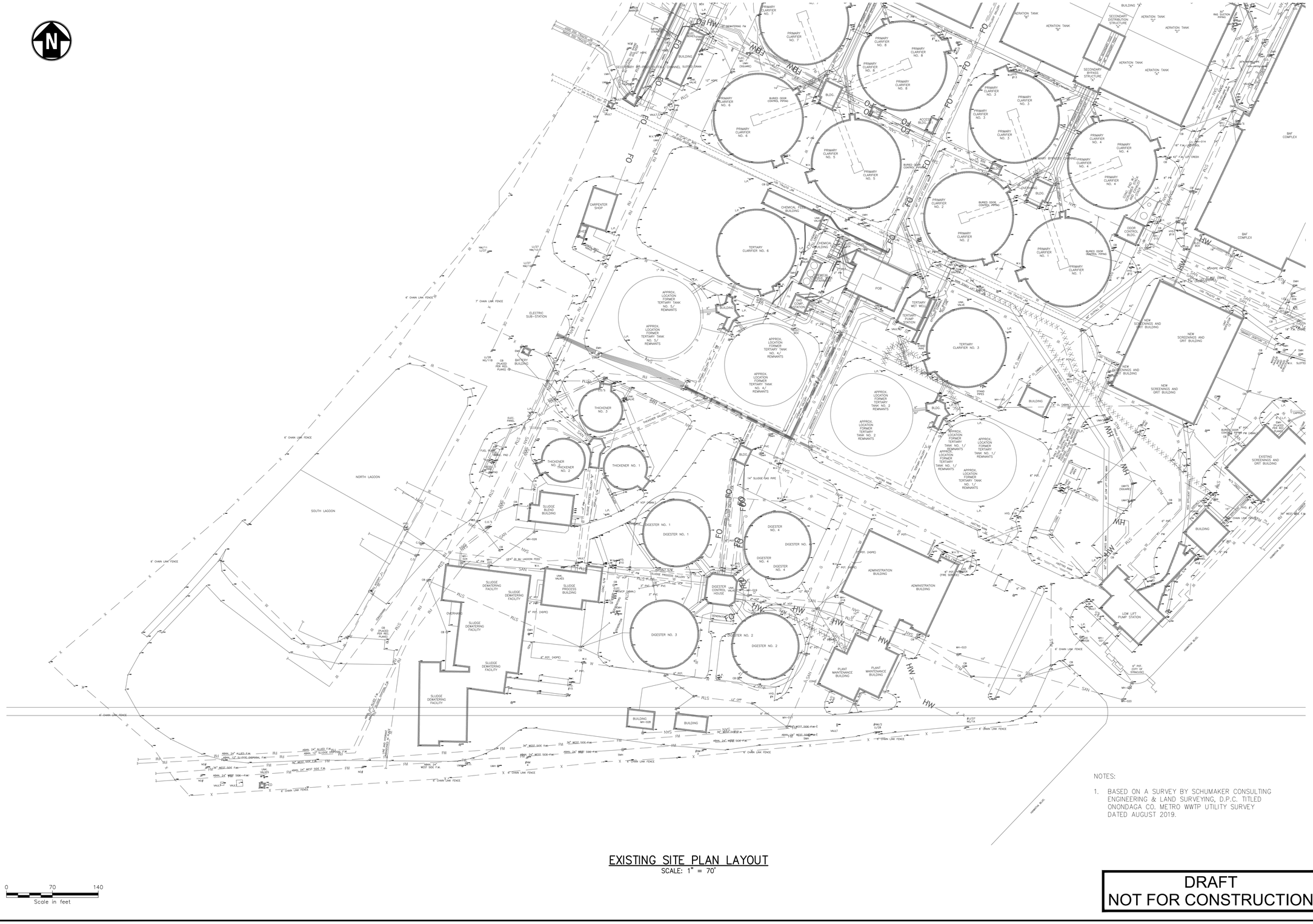

EXISTING SITE PLAN LAYOUT

SCALE: 1" = 70'

NOTES:

1. BASED ON A SURVEY BY SCHUMAKER CONSULTING ENGINEERING & LAND SURVEYING, D.P.C. TITLED ONONDAGA CO. METRO WWTP UTILITY SURVEY DATED AUGUST 2019.

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THERMAL ENERGY RESOURCE AND UTILITY DISTRIBUTION SYSTEM PUMPING STATION AND CONVEYANCE FORCE MAIN

No.	Submittal / Revision	App'd.	By	Date

EXISTING SITE PLAN

Designed By:	Drawn By:	Checked By:
N/A	PDA	ETH
Issue Date:	Project No:	Scale:
12/8/2023	081002	AS SHOWN

Drawing No.:

C-001

File: \\CHA-LLP.COM\PRO\PROJECTS\ANY\K6\079587.000\09_DESIGN\DRAWINGS\01_SHEETS\079587_C-001 EXISTING SITE PLAN.DWG
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No.	Submittal / Revision	App'd.	By	Date

PROPOSED SITE PLAN

Designed By:	Drawn By:	Checked By:
RCJ	PDA	ETH
Issue Date:	Project No:	Scale:
12/8/2023	081002	AS SHOWN

Drawing No.:

C-002

EXISTING TWIN 60" RCP OUTFALL 002

EXISTING 96" RCP OUTFALL 001

PROPOSED FINISHED EFFLUENT PIPELINE SUPPLY / RETURN CHAMBER

PROPOSED 36" RETURN FORCE MAIN

PROPOSED PUMP STATION

PROPOSED 36" SUPPLY FORCE MAIN

MAIN SUBSTATION RELOCATION AREA

EXISTING CSX RAIL

ALTERNATE ROUTE PROPOSED 36" SUPPLY AND RETURN FORCE MAINS

ALTERNATIVE ROUTE PROPOSED 36" SUPPLY FORCE MAIN

APPROXIMATE PAVEMENT BOUNDARY OF EMPIRE STATE TRAIL

EXISTING SITE SECURITY FENCE

PROPOSED 36" SUPPLY FORCE MAIN

CONNECTION POINT TO HEAT EXCHANGER BUILDING

PROPOSED 36" RETURN FORCE MAIN

PROPOSED 36" RETURN FORCE MAIN

PROPOSED 36" SUPPLY FORCE MAIN

PROPOSED 36" RETURN FORCE MAIN

PROPOSED SITE PLAN

SCALE: 1" = 70'

0 70 140
Scale in feet

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File: \\CHA-LLP.COM\PROJ\PROJECTS\ANY\K6\079587.000\09_DESIGN\DRAWINGS\01_SHEETS\079587_C-002 PROPOSED SITE PLAN.DWG
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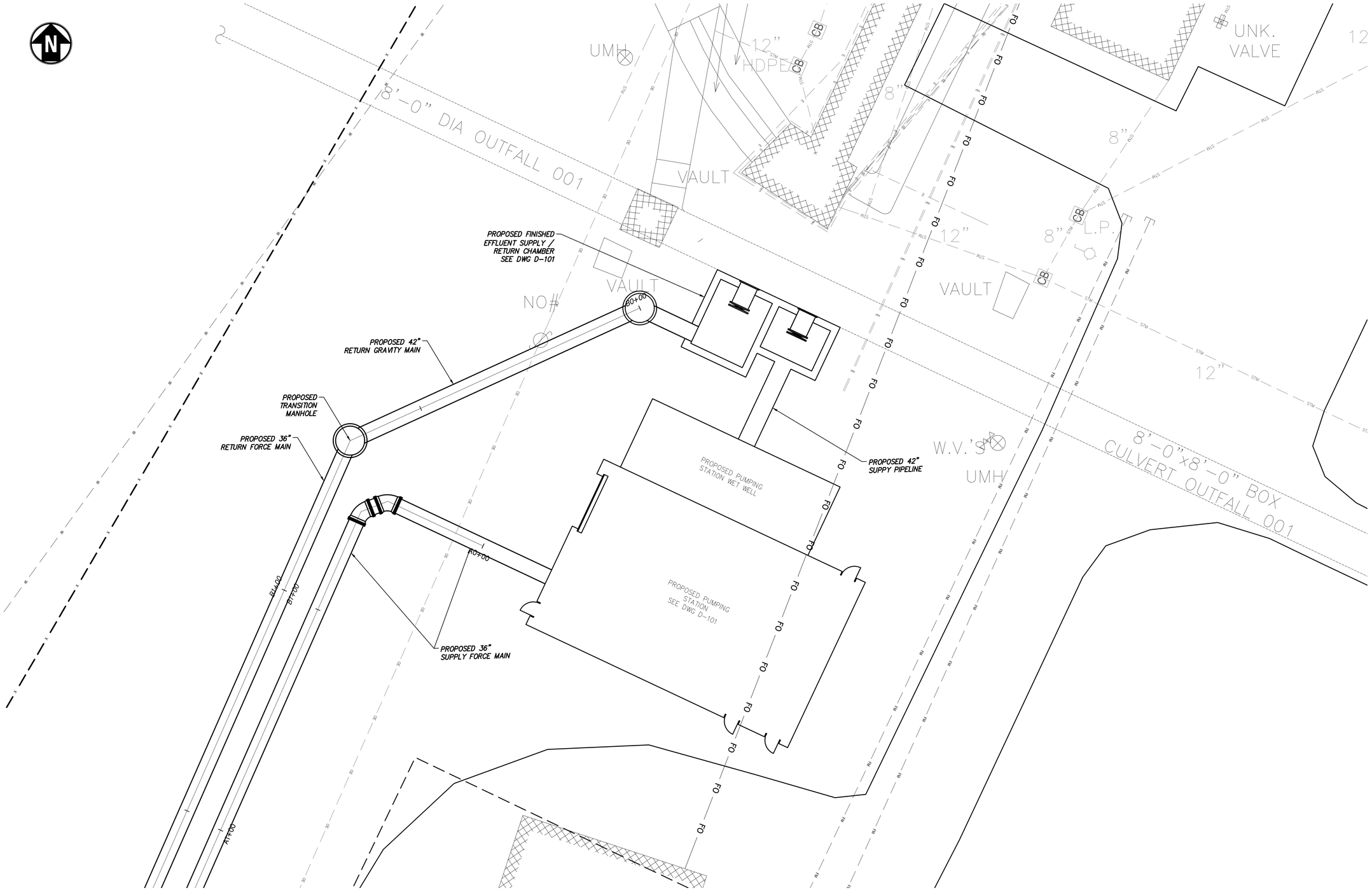

PROPOSED SITE PLAN LAYOUT
SCALE: 1" = 10'

0 10 20
Scale in feet

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No.	Submittal / Revision	App'd.	By	Date

PUMP STATION ENLARGED AREA PLAN

Designed By:	Drawn By:	Checked By:
RCJ	PDA	ETH
Issue Date:	Project No:	Scale:
12/8/2023	081002	AS SHOWN

Drawing No.:
C-003

File: \\CHA-LLP.COM\PROJ\PROJECTS\ANY\K6\079587.000\09_DESIGN\DRAWINGS\01_SHEETS\C-003 PUMP STATION ENLARGED AREA PLAN.DWG
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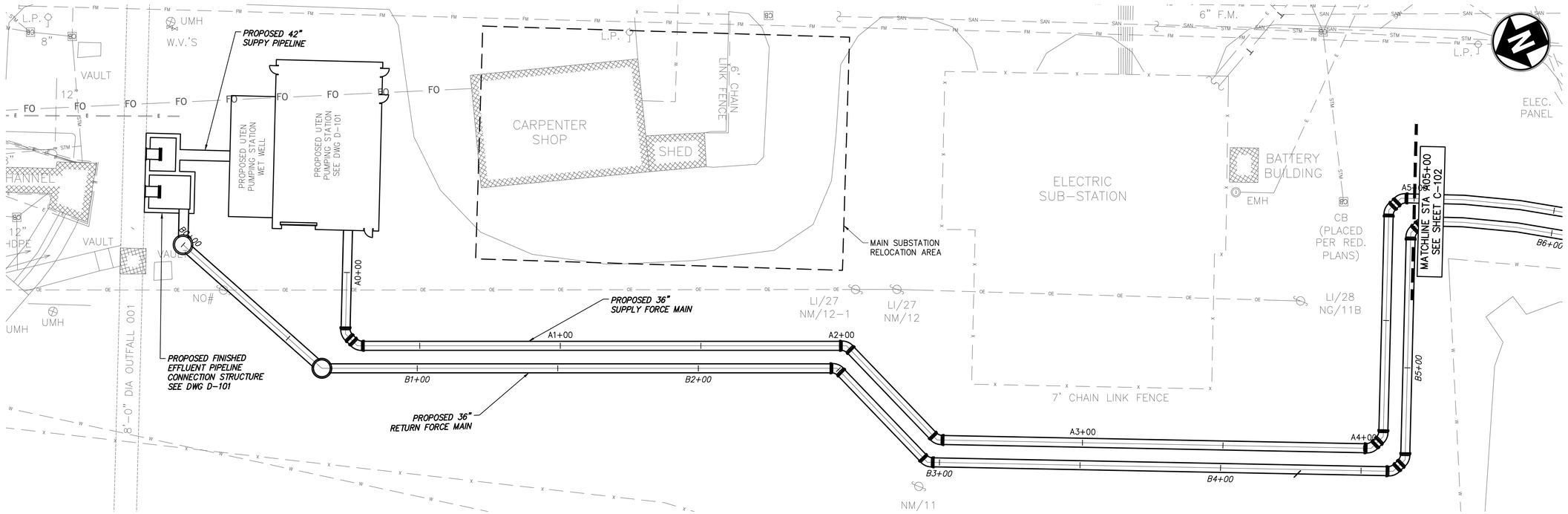
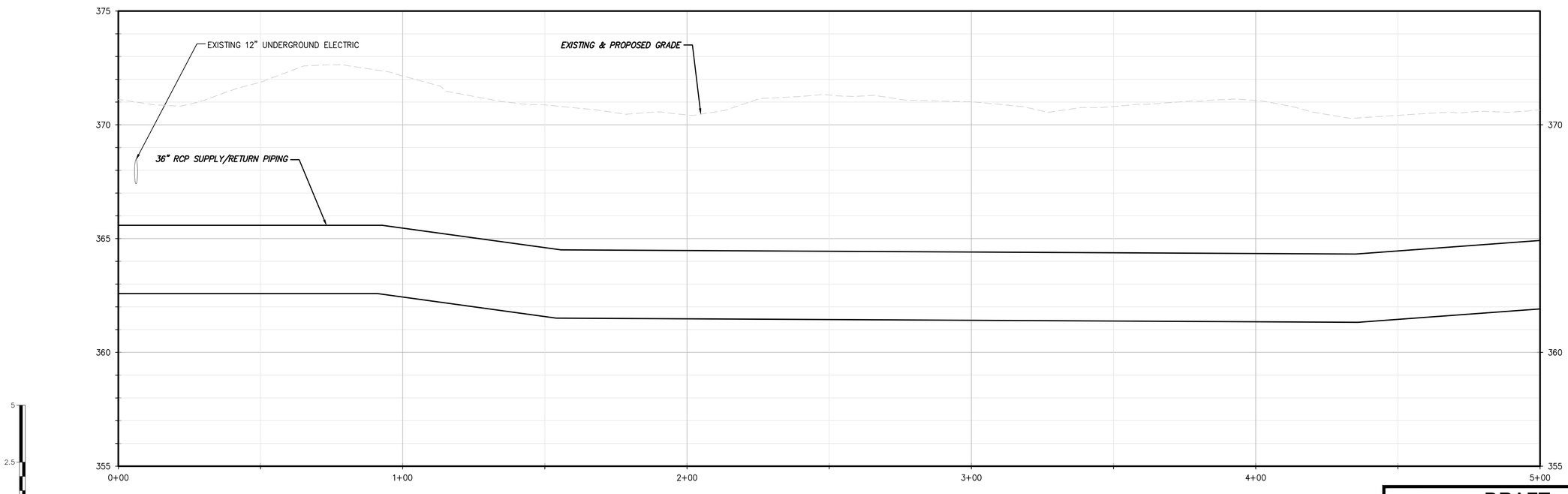


0 20 40
Scale in feet

FORCE MAIN PLAN – STA A00+00 TO A05+00
SCALE: 1" = 20'



5
2.5
0
0 20 40
Scale in feet

FORCE MAIN PROFILE – STA A00+00 TO A05+00
HORIZ SCALE: 1" = 20'
VERT SCALE: 1" = 2.5'

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No.	Submittal / Revision	App'd.	By	Date

FORCE MAIN PLAN & PROFILE

Designed By:	Drawn By:	Checked By:
RCJ	PDA	ETH
Issue Date:	Project No:	Scale:
12/8/2023	081002	AS SHOWN

Drawing No.:
C-101

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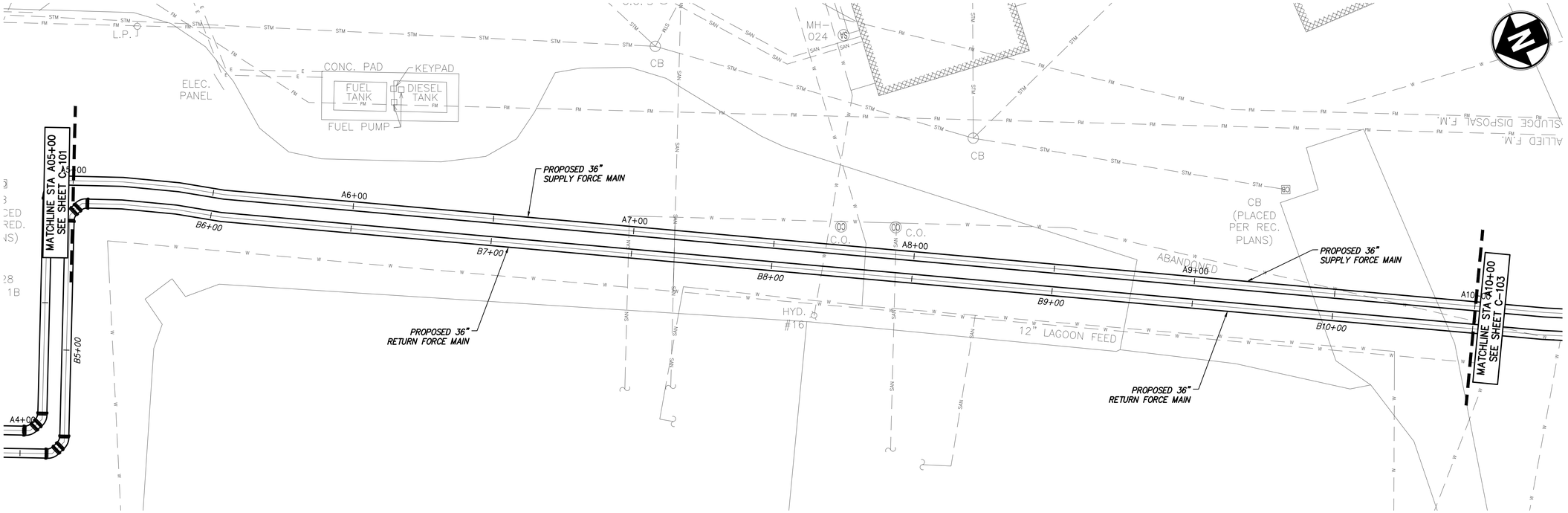
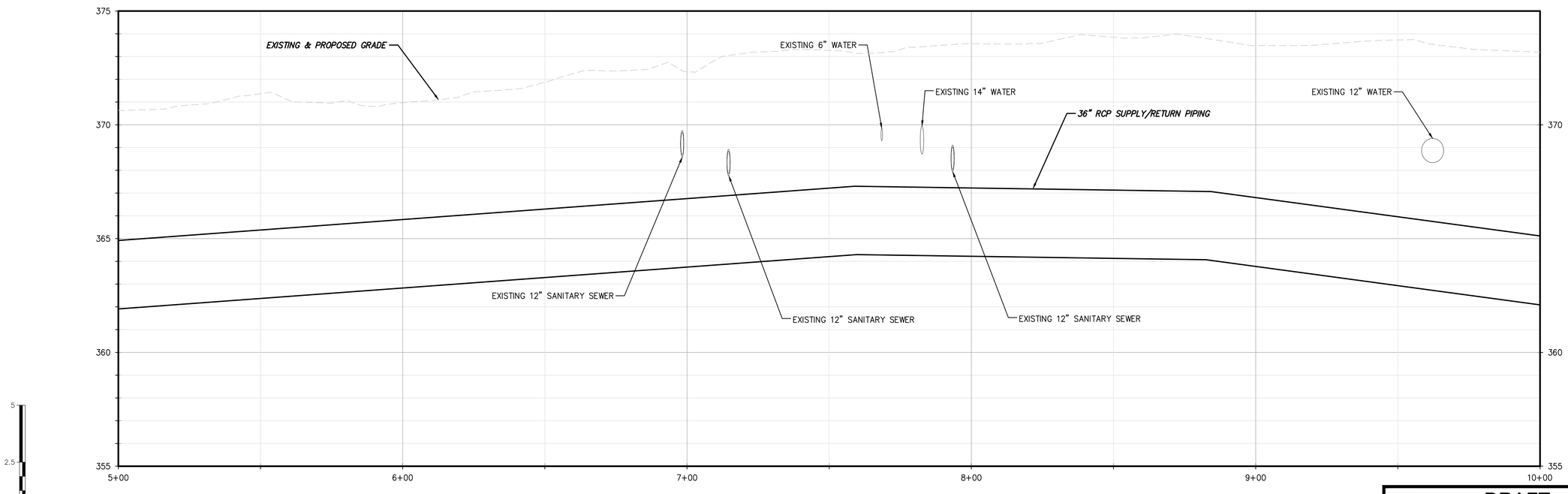


FORCE MAIN PLAN – STA A05+00 TO A10+00
SCALE: 1" = 20'



FORCE MAIN PROFILE – STA A05+00 TO A10+00
HORIZ SCALE: 1" = 20'
VERT SCALE: 1" = 2.5'

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No.	Submittal / Revision	App'd.	By	Date

FORCE MAIN PLAN & PROFILE

Designed By:	Drawn By:	Checked By:
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Issue Date:	Project No:	Scale:
12/8/2023	081002	AS SHOWN

Drawing No.:
C-102

File: \\CHA-LLP.COM\PRO\PROJECTS\ANY\K6\079587.000\09_DESIGN\DRAWINGS\01_SHEETS\079587_C-102 FORCE MAIN PLAN & PROFILE.DWG
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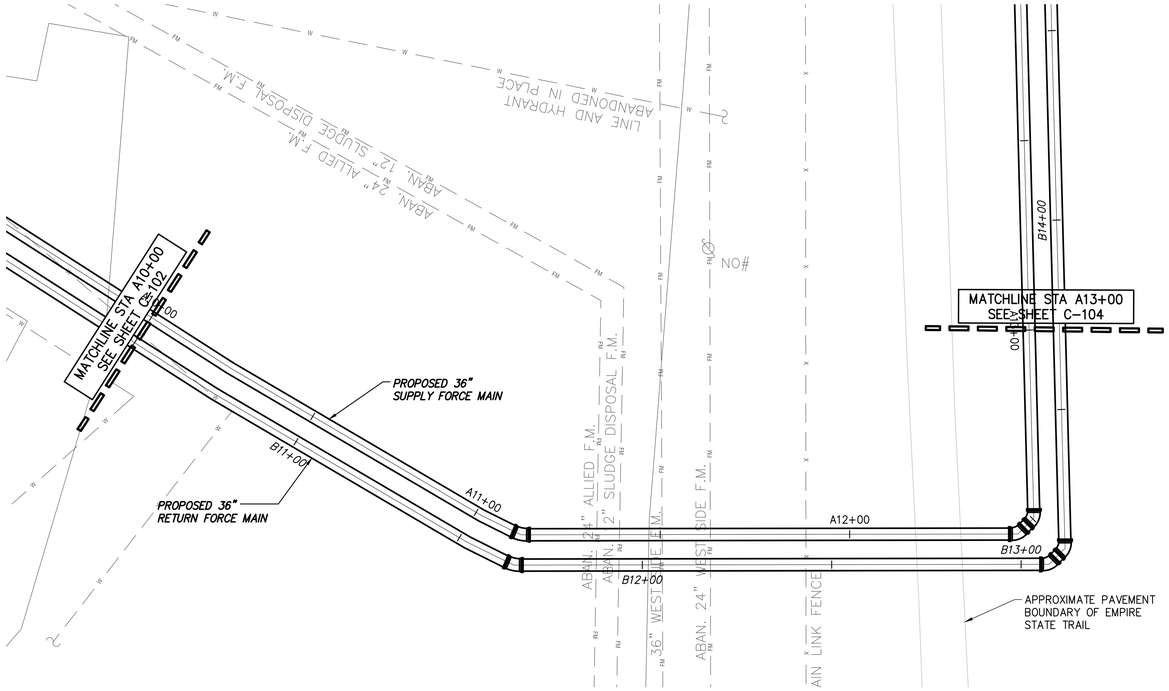
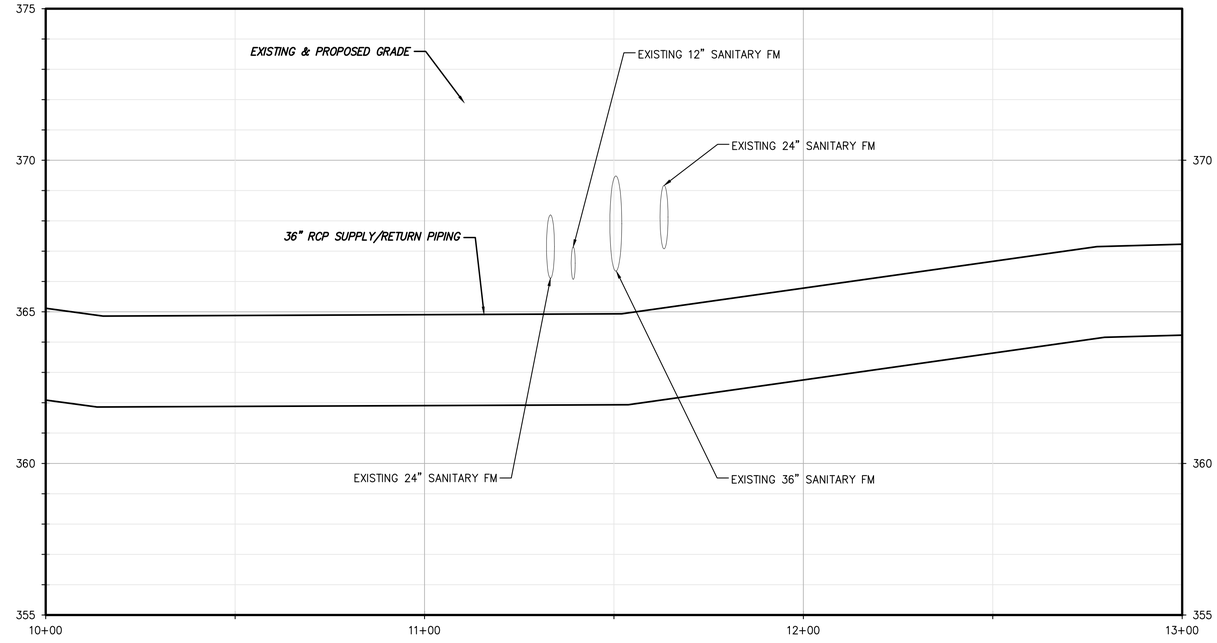


FORCE MAIN PLAN – STA A10+00 TO A13+00
SCALE: 1" = 20'



FORCE MAIN PROFILE – STA A10+00 TO A13+00
HORIZ SCALE: 1" = 20'
VERT SCALE: 1" = 2.5'

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No.	Submittal / Revision	App'd.	By	Date

FORCE MAIN PLAN & PROFILE

Designed By:	Drawn By:	Checked By:
RCJ	PDA	ETH
Issue Date:	Project No:	Scale:
12/8/2023	081002	AS SHOWN

Drawing No.:
C-103

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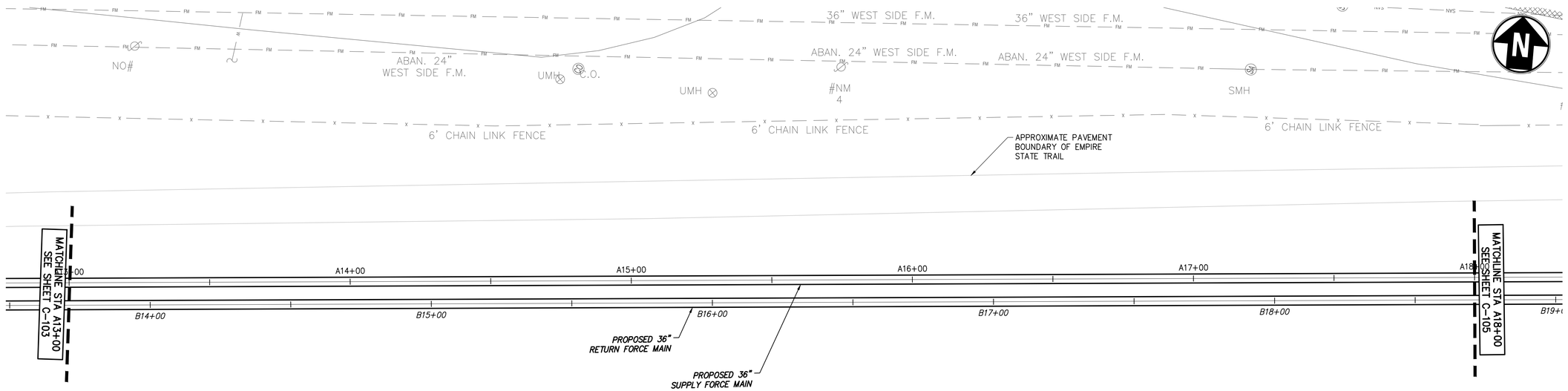

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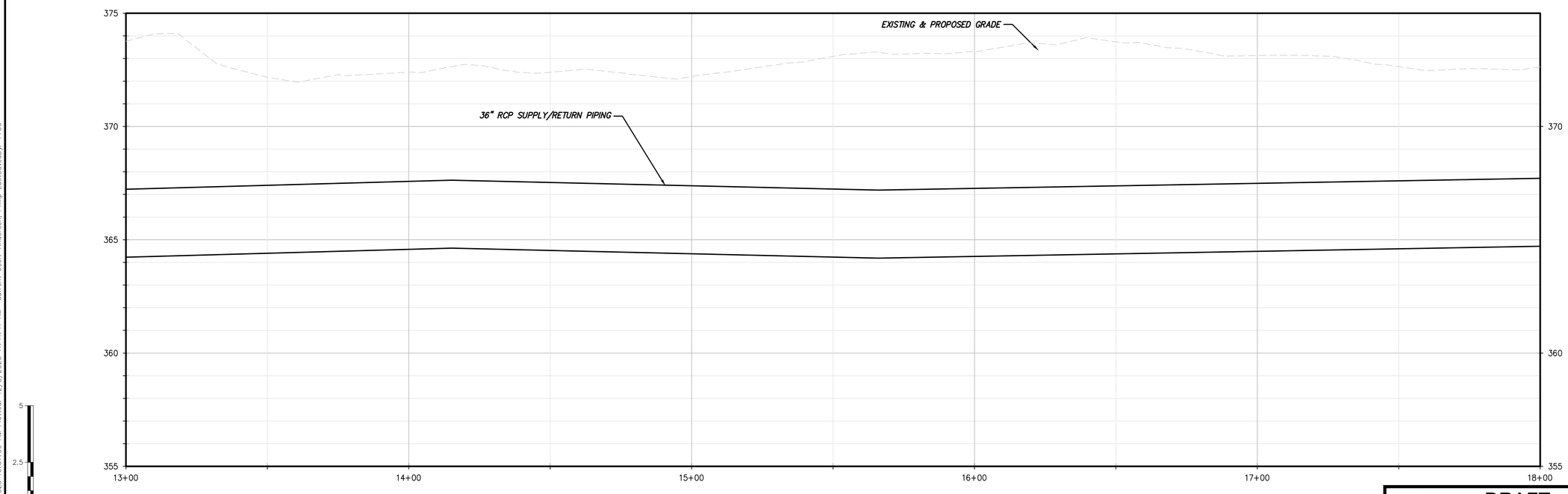
Scale in feet

FORCE MAIN PLAN – STA A13+00 TO A18+00

SCALE: 1" = 20'



5
2.5
0
0 20 40
Scale in feet

FORCE MAIN PROFILE – STA A13+00 TO A18+00

HORIZ SCALE: 1" = 20'
VERT SCALE: 1" = 2.5'

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THERMAL ENERGY RESOURCE AND UTILITY DISTRIBUTION SYSTEM PUMPING STATION AND CONVEYANCE FORCE MAIN

No.	Submittal / Revision	App'd.	By	Date

FORCE MAIN PLAN & PROFILE

Designed By:	Drawn By:	Checked By:
RCJ	PDA	ETH
Issue Date:	Project No:	Scale:
12/8/2023	081002	AS SHOWN

Drawing No.:

C-104

File: \\CHA-LLP.COM\PROJ\PROJECTS\ANY\K6\079587.000\09_DESIGN\DRAWINGS\01_SHEETS\079587_C-104 FORCE MAIN PLAN & PROFILE.DWG
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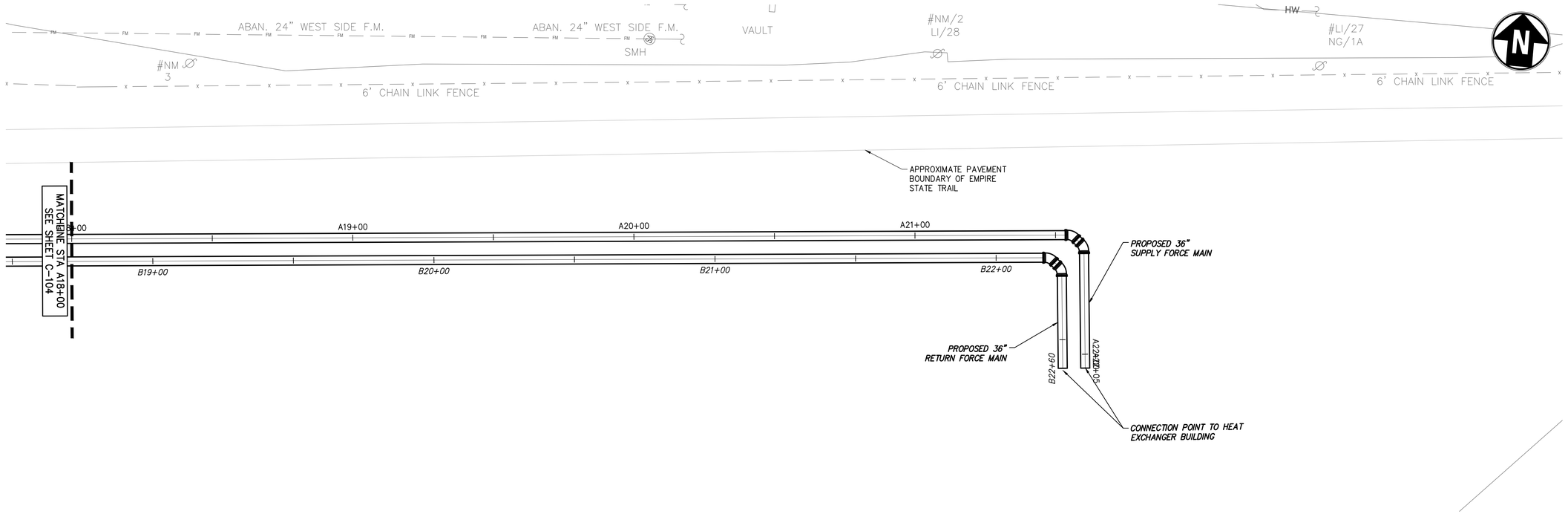
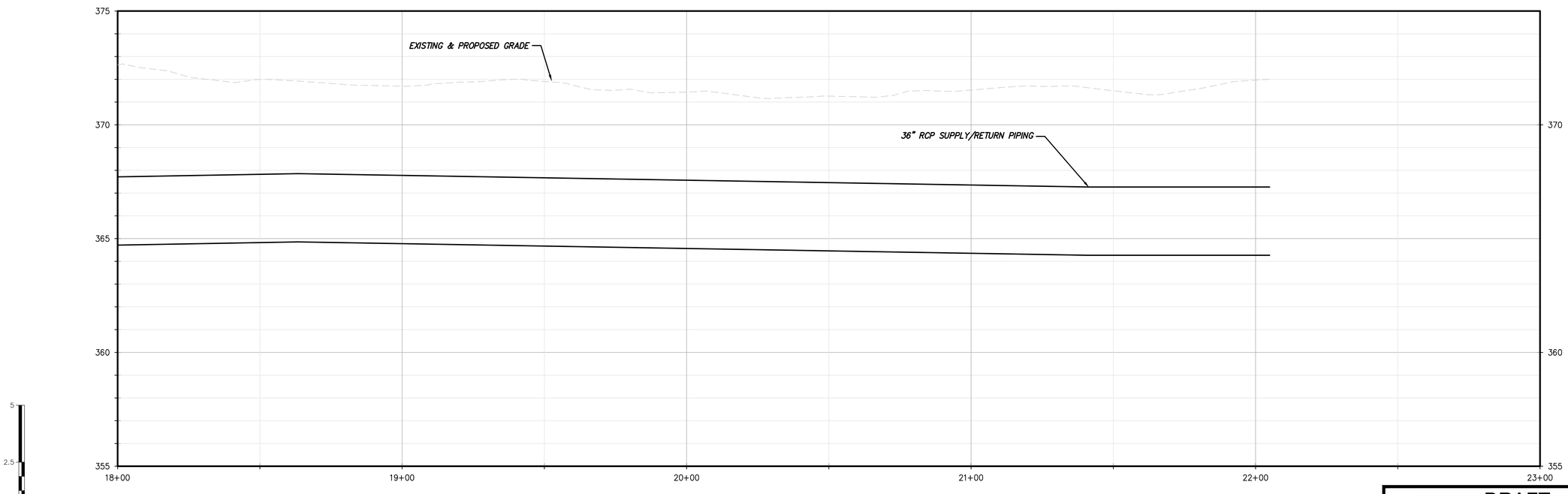


FORCE MAIN PLAN – STA A18+00 TO A21+99

SCALE: 1" = 20'



FORCE MAIN PROFILE – STA A18+00 TO A23+00

HORIZ SCALE: 1" = 20'

VERT SCALE: 1" = 2.5'

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THERMAL ENERGY RESOURCE AND UTILITY DISTRIBUTION SYSTEM PUMPING STATION AND CONVEYANCE FORCE MAIN

No.	Submittal / Revision	App'd.	By	Date

FORCE MAIN PLAN & PROFILE

Designed By:	Drawn By:	Checked By:
RCJ	PDA	ETH
Issue Date:	Project No:	Scale:
12/8/2023	081002	AS SHOWN

Drawing No.:

C-105

File: \\CHA-LLP.COM\PROJ\PROJECTS\ANY\K6\079587.000\09_DESIGN\DRAWINGS\01_SHEETS\079587_C-105 FORCE MAIN PLAN & PROFILE.DWG
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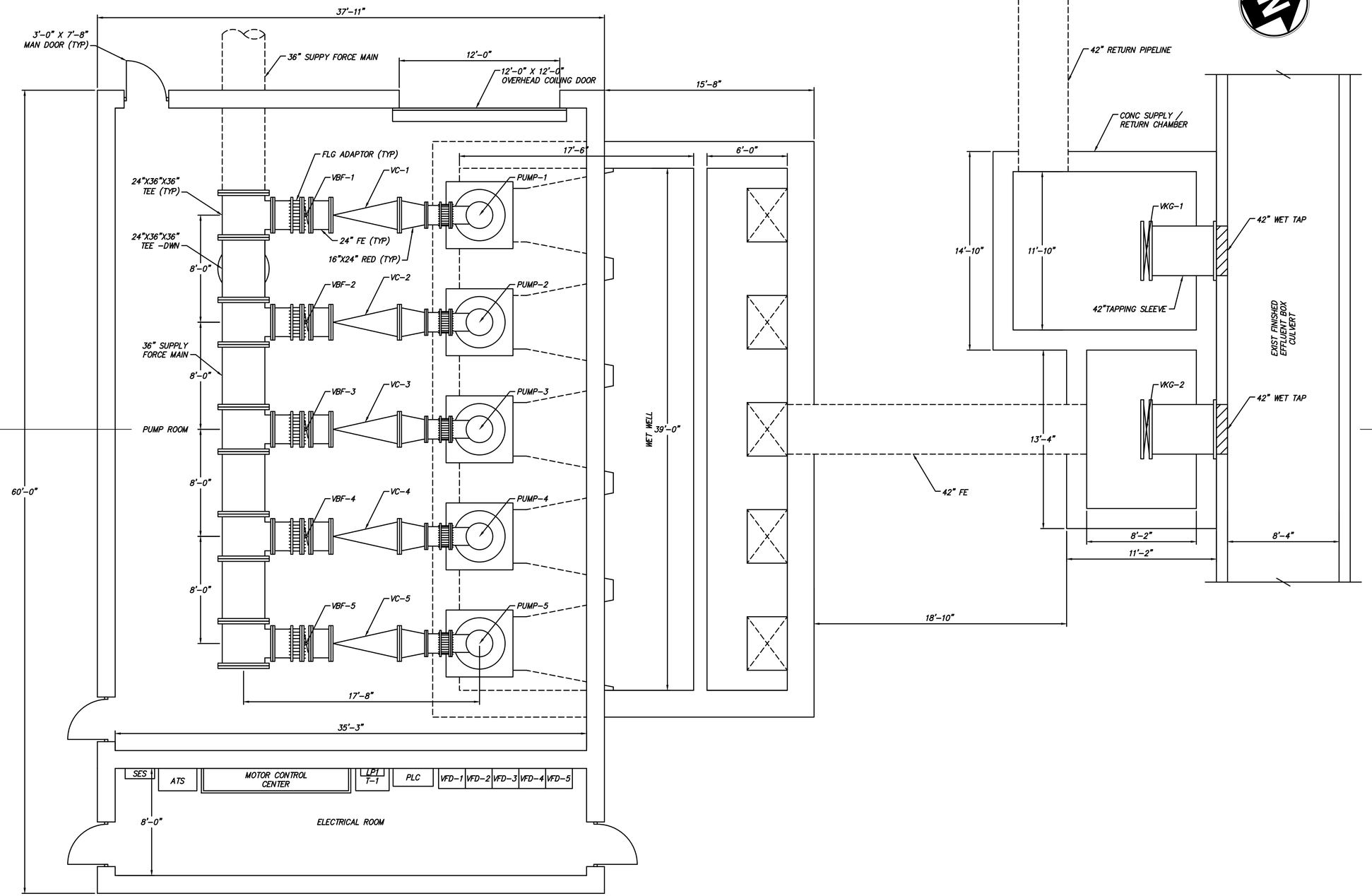

PUMP STATION, WET WELL, AND SUPPLY / RETURN CHAMBER PLAN
SCALE: 1/4" = 1'-0"

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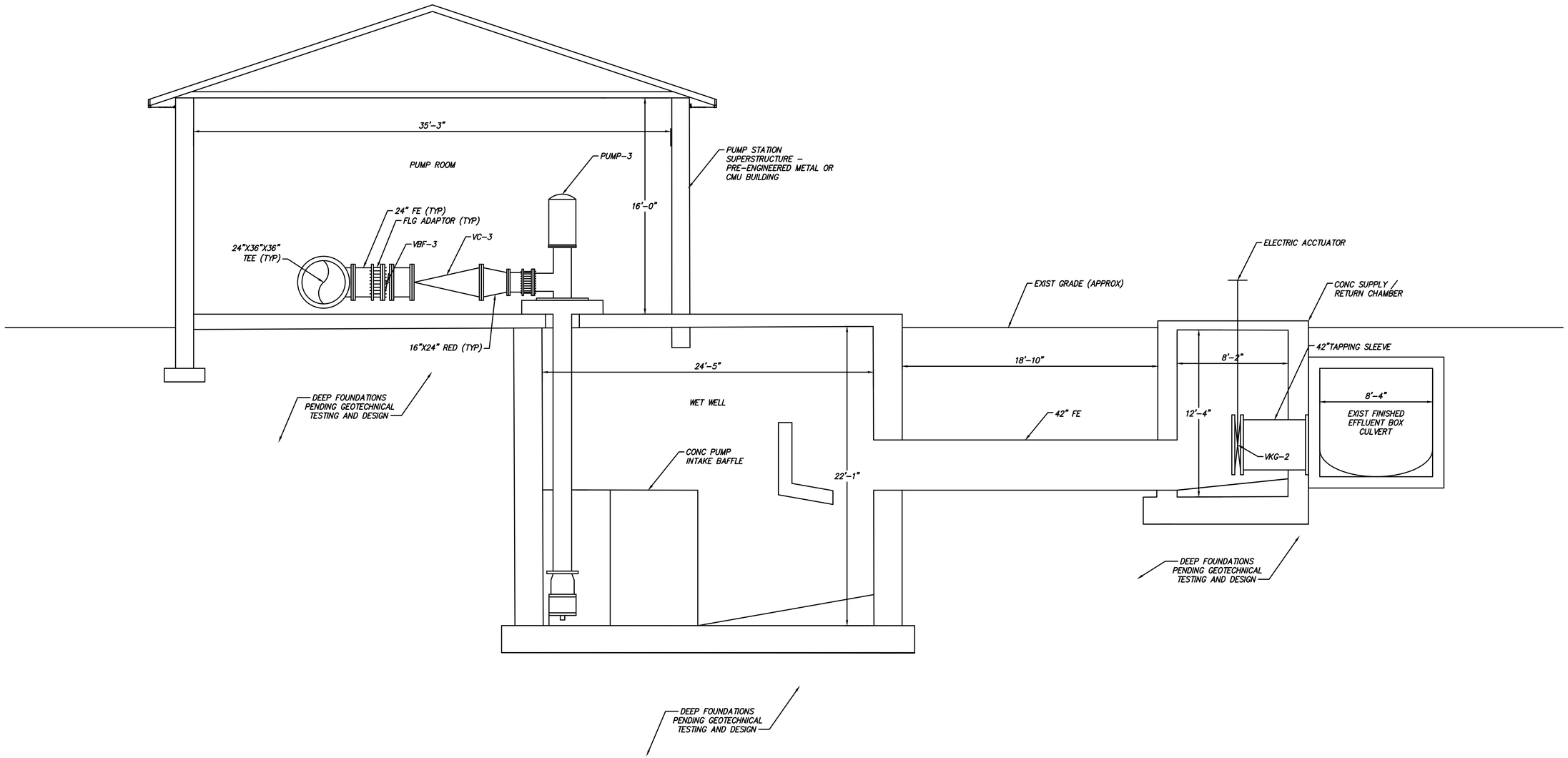
No.	Submittal / Revision	App'd.	By	Date

PUMP STATION, WET WELL & SUPPLY - RETURN CHAMBER PLAN

Designed By:	Drawn By:	Checked By:
RCJ	RCJ	ETH
Issue Date:	Project No:	Scale:
12/8/2023	081002	1/4" = 1'-0"

Drawing No.:
D-101

File: \\CHA-LLP.COM\PROJ\PROJECTS\ANY\K6\079587.000\09_DESIGN\DRAWINGS\01_SHEETS\D-101 PUMP STATION, WET WELL, & DIVERSION STRUCTURE PLAN.DWG
Saved: 12/7/2023 4:49:46 PM Plotted: 12/8/2023 11:42:17 AM Current User: Anderson, Philip LastSavedBy: 8977



A PUMP STATION, WET WELL AND SUPPY / RETURN CHAMBER SECTION
SCALE: 1/4" = 1'-0"

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No.	Submittal / Revision	App'd.	By	Date

PUMP STATION, WET WELL & SUPPY - RETUNG CHAMBER SECTION

Designed By:	Drawn By:	Checked By:
RCJ	RCJ	ETH
Issue Date:	Project No:	Scale:
12/8/2023	081002	1/4" = 1'-0"

Drawing No.:
D-201

File: \\CHA-LLP.COM\PROJ\PROJECTS\ANY\K6\079587.000\09_DESIGN\DRAWINGS\01_SHEETS\D-201 PUMP STATION, WET WELL, & DIVERSION STRUCTURE SECTION.DWG
Saved: 12/7/2023 4:49:13 PM Plotted: 12/8/2023 11:42:21 AM Current User: Anderson, Philip LastSavedBy: 8977

0 50 100
Scale in feet

PROPOSED PLAN VIEW
SCALE: 1'=50'

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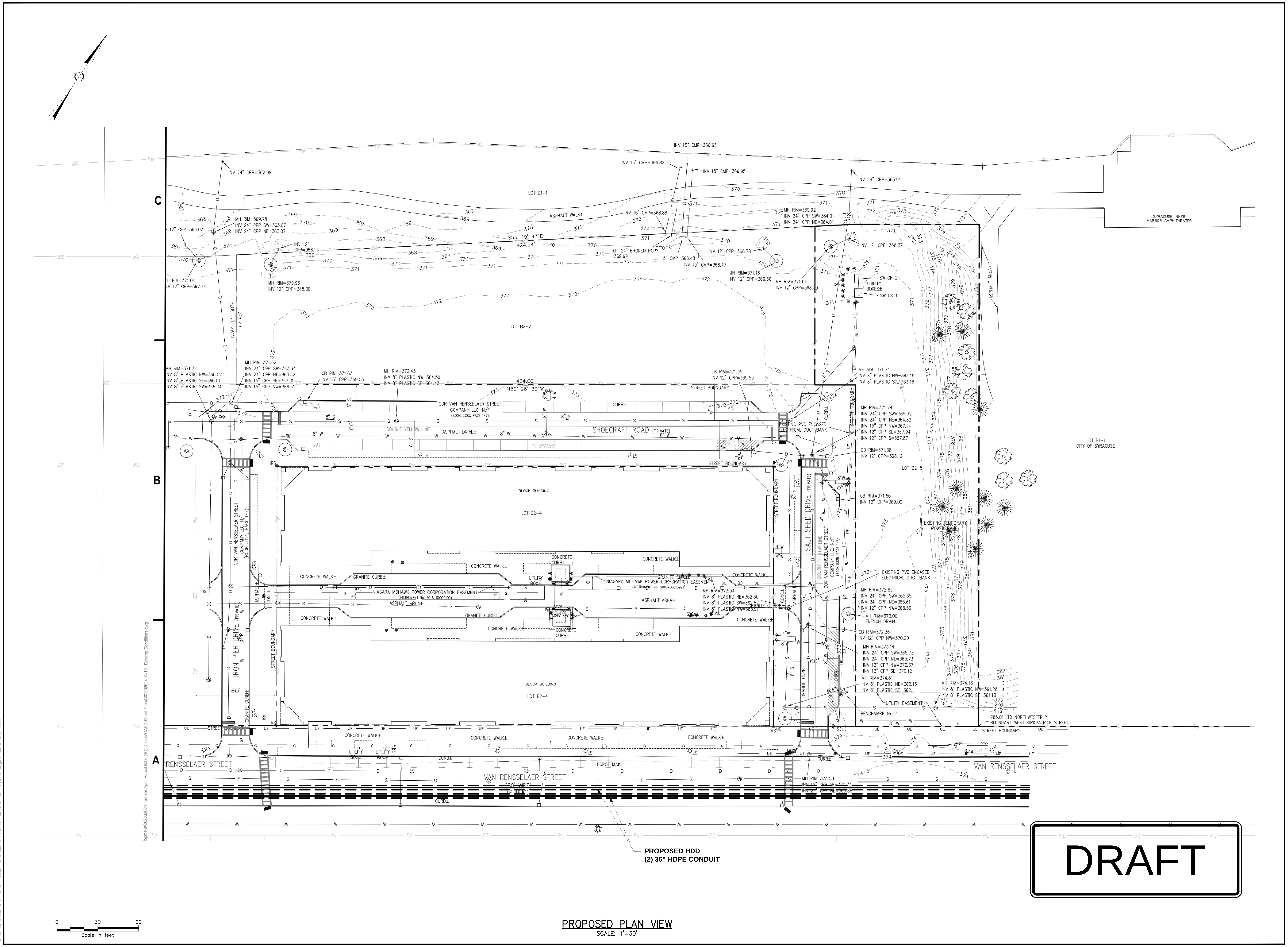

PROPOSED PLAN VIEW

SCALE: 1"=30'

DRAFT

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CHA

III Winners Circle, PO Box 5269
Albany, NY 12205-0269
518.453.4500 . www.chasolutions.com

NIAGARA MOHAWK POWER CORPORATION
d/b/a
nationalgrid
SYRACUSE, NY 13202

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Appendix C

Architectural Drawings for Syracuse UTEN Pilot

NATIONAL GRID UDS ENERGY CENTER

SITE PLAN

north

01

PRINTED 12 | 13 | 2023

QPK DESIGN

NATIONAL GRID UDS ENERGY CENTER

VIGNETTE

PRINTED 12 | 13 | 2023

QPK DESIGN

NATIONAL GRID UDS ENERGY CENTER

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NATIONAL GRID UDS ENERGY CENTER

VIGNETTE

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QPK DESIGN

NATIONAL GRID UDS ENERGY CENTER

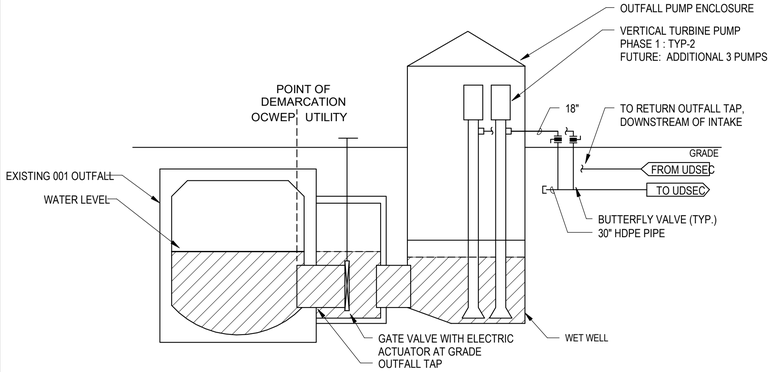
VIGNETTE

PRINTED 12 | 13 | 2023

QPK DESIGN

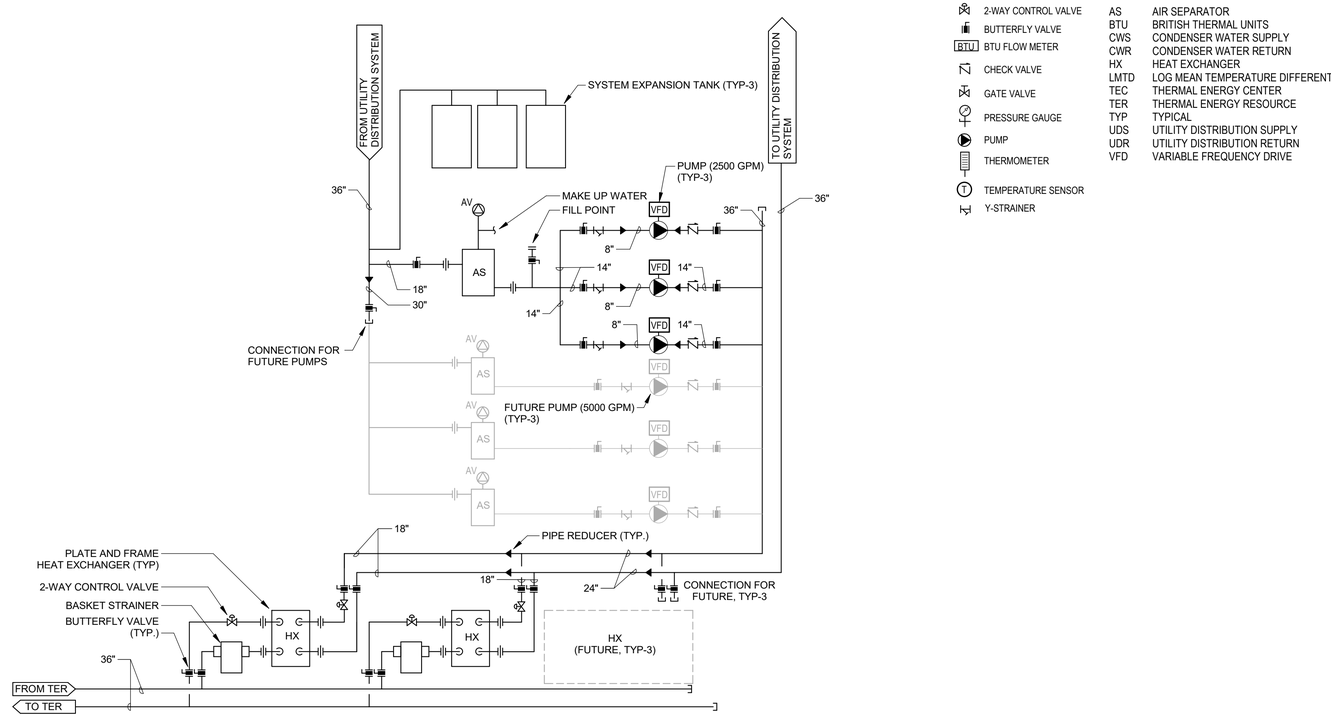
Appendix D

Syracuse UTEN Pilot One-Line Diagram



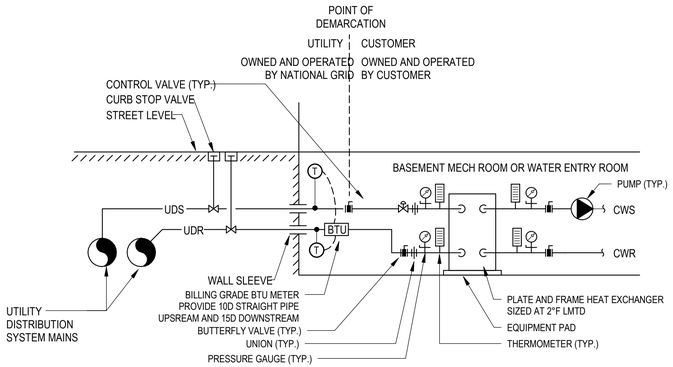
1 THERMAL ENERGY RESOURCE DIAGRAM

NOT TO SCALE



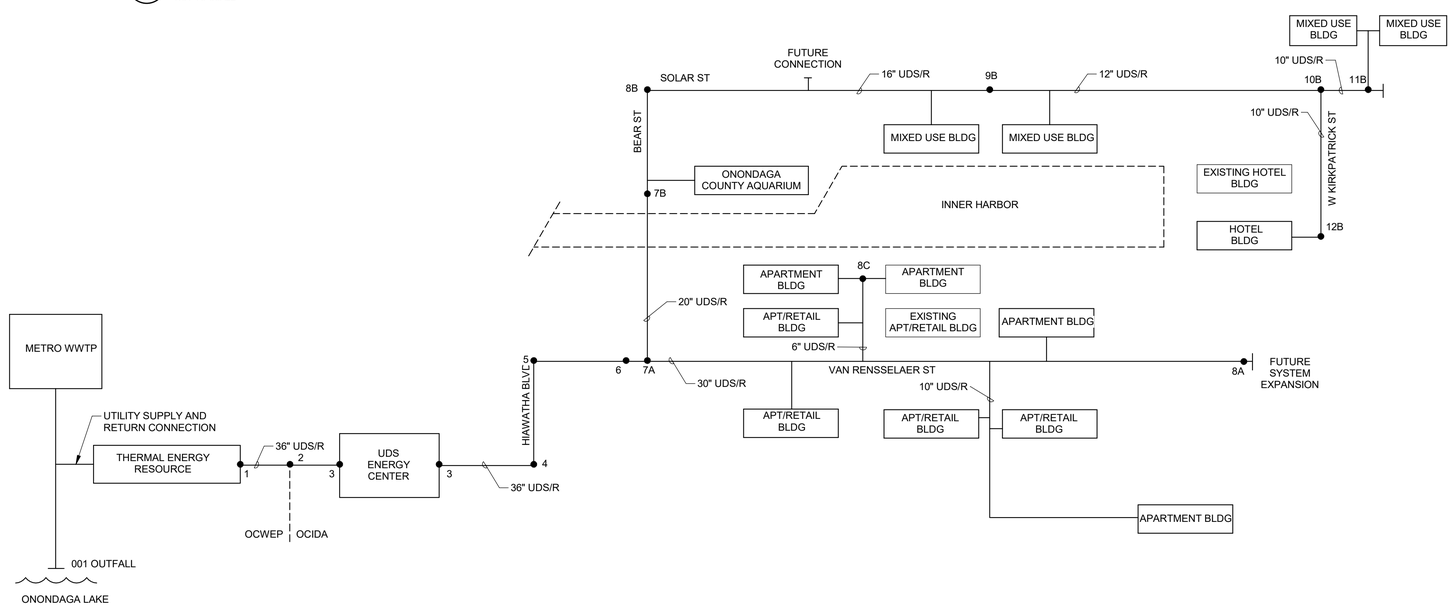
2 UDS ENERGY CENTER DIAGRAM

NOT TO SCALE



3 ENERGY TRANSFER STATION DETAIL

NOT TO SCALE



4 DISTRIBUTION SYSTEM

NOT TO SCALE

LEGEND

- 2-WAY CONTROL VALVE
- BUTTERFLY VALVE
- BTU FLOW METER
- CHECK VALVE
- GATE VALVE
- PRESSURE GAUGE
- PUMP
- THERMOMETER
- TEMPERATURE SENSOR
- Y-STRAINER

ABBRIVIATIONS

AS	AIR SEPARATOR
BTU	BRITISH THERMAL UNITS
CWS	CONDENSER WATER SUPPLY
CWR	CONDENSER WATER RETURN
HX	HEAT EXCHANGER
LMTD	LOG MEAN TEMPERATURE DIFFERENTIAL
TEC	THERMAL ENERGY CENTER
TER	THERMAL ENERGY RESOURCE
TYP	TYPICAL
UDS	UTILITY DISTRIBUTION SUPPLY
UDR	UTILITY DISTRIBUTION RETURN
VFD	VARIABLE FREQUENCY DRIVE

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NOT FOR CONSTRUCTION

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UTILITY THERMAL
ENERGY NETWORK
SYRACUSE, NY

No.	Submittal / Revision	App'd.	By	Date
A	15% BOD			12/22/23

MECHANICAL SYSTEM
DIAGRAMS

Designed By:	Drawn By:	Checked By:
BH	BC	BH
Issue Date:	Project No:	Scale:
12/15/23	81002	AS SHOWN

Drawing No:

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Central File: Update this text with Central file location
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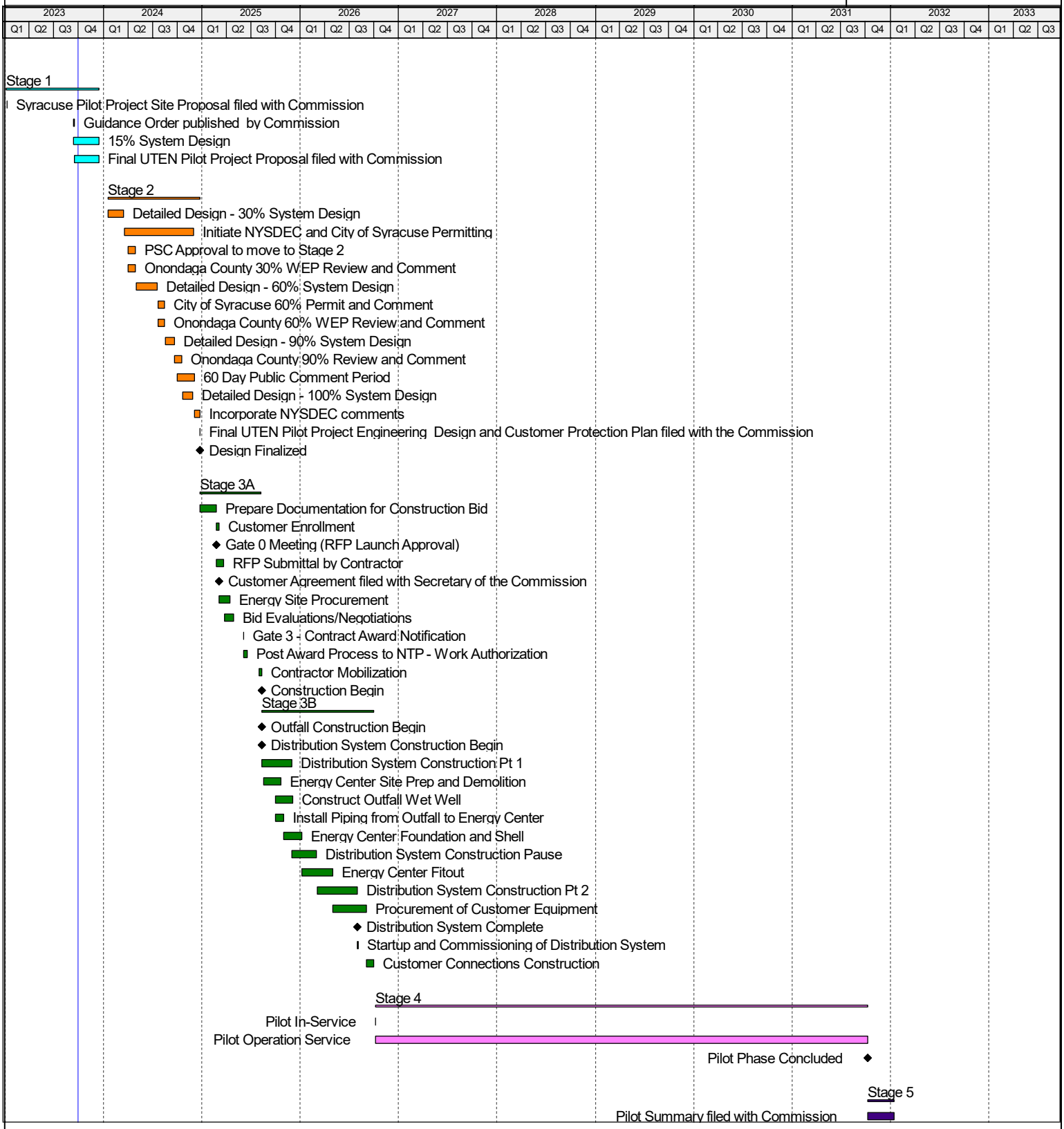
Appendix E

Gantt Chart of Syracuse UTEN Pilot Development Schedule

Utility Thermal Energy Network NMPC Syracuse Pilot

As Of: 13-Dec-23



stage 1
stage 1 LOE
stage 2
stage 2 LOE
stage 3 LOE
stage 4 LOE
stage 5 LOE
stage 3
stage 4
stage 5
Milest...

Layout: Thermal Pilot Stage Layout
Filter: TASK filters: (Untitled Filter)_88,

National Grid

Appendix F

Customer Agreement Template

UTILITY THERMAL ENERGY NETWORK
CUSTOMER AGREEMENT TEMPLATE

THIS UTILITY THERMAL ENERGY NETWORK CUSTOMER AGREEMENT ("Customer Agreement") is entered into as of the ____ day of , 202_ ("Effective Date"), by and between d/b/a National Grid, a New York corporation, with an address at ("Company") and , with an address at, New York ___ ("Customer"). The Company and Customer are each referred to herein singularly as a "Party" and collectively as "Parties".

Background:

The Company has received approval of the New York Public Service Commission ("Commission") for a pilot program for the installation and operation of a utility thermal energy network ("UTEN") in Case No. 22-M-0429 (the "UTEN Pilot Program"). Pursuant to the UTEN Pilot Program, the Company is to install, own and operate certain thermal network equipment (defined below as the "Utility Thermal Energy Network"), which would provide the primary heating service at _____.
Customer is the owner or has a long-term lease (i.e., a lease term for at least the duration of the Pilot Period defined below) for that entire property located at ("Site"), and desires to participate in the UTEN Pilot Program. The provisions of this Customer Agreement provide details of the Customer's and the Company's rights, responsibilities, and obligations including, without limitation:

1. Installation and maintenance responsibilities and costs;
2. Pricing, metering, billing process, fees, costs covered by the UTEN Pilot Program, and payment options;
3. Customer exit options during the UTEN Pilot Project operation and at the conclusion of the pilot phase; Customers' participation/withdrawal options;
4. Home Energy Fair Practices Act protections, including, but not limited to, service terminations and the complaint process for residential customers;
5. Customer consents and customer privacy.

The Parties hereby agree as follows:

A. Installation and Maintenance Responsibilities and Costs

1.0 The Company agrees to provide, and the Customer agrees to utilize, a thermal–based heating service (referred to herein as the "Thermal Energy Service") for the Site using the Utility Thermal Energy Network to be installed by the Company and described in Exhibit A hereto, and the Customer's air handling, distribution, and ventilation system (the "Customer Equipment") described in Exhibit B hereto (the Utility Thermal Energy Network and the Customer Equipment are collectively referred to herein as the "Thermal Network"), for a [60] month period commencing on the In–Service Date (the "Pilot Period").

2.0 The Customer will own and maintain the Customer Equipment at its own expense and the Company will own and maintain the Utility Thermal Energy Network. The Company has no obligation to operate or maintain the Customer Equipment, or to correct any code violations or other deficiencies with the Customer Equipment. The Customer will be responsible for heating and electricity costs for the Customer Equipment. The In–Service Date shall be agreed to and established by the Parties following the completion, testing, inspection, and acceptance of the Thermal Network by the Company. Upon the expiration of the Pilot Period the Company may, but is not obligated to, continue to provide Thermal Energy Service on terms acceptable to the Company and Customer. In the event the Company does not elect or is not authorized to continue to offer the Thermal Energy Service, the Company will work cooperatively with the Customer to either find a third party to assume responsibility for the ownership and operation of the Utility Thermal Energy Network or otherwise ensure the Site has heating service

3.0 The specific location of the Utility Thermal Energy Network and the schedule for installation of the Utility Thermal Energy Network shall be determined by the Company in coordination with the Customer. The delivery point for the Thermal Energy Service shall be at the outlet of the supply service line valve on the utility side of the heat exchanger ("Delivery Point"). The Utility Thermal Energy Network is defined as the equipment and piping installed up to the Delivery Point. Customer Equipment is defined as all equipment and piping installed after the Delivery Point both outside and inside of Customer's building(s) including the ground source heat pump(s). The Company agrees, at the Company's expense, to install the Utility Thermal Energy Network and to operate and maintain the Utility Thermal Energy Network for the duration of the Pilot Period. The Company shall obtain all permits and approvals required for the installation of the Utility Thermal Energy Network. The Company may use contractors to perform installation and maintenance/ repair work and assessment services, and all personnel shall carry proper identification, which shall be shown to the Customer

4.0 **[The following provision will be included in this Customer Agreement only for existing customers currently served by gas and only if Company is requiring they disconnect from gas service to participate in the pilot]** In order to participate in the UTEN Pilot Program, the Customer understands and agrees that the Customer shall be disconnected from Company's gas distribution system and will no longer have natural gas service for heating, hot water, cooking, clothes drying or any other purpose. The Company agrees to provide Customer reimbursement for the costs of new appliances needed to convert from natural gas usage to electric up to the amount described in Exhibit C attached hereto ("Customer Appliances"). The Customer agrees, at the Customer's expense, to maintain the Customer Appliances. The Company has no obligation to operate or maintain the Customer Appliances, or to correct any code violations or other deficiencies with the Customer Appliances and the Customer will be responsible for heating and electricity costs for the Customer Appliances.

5.0 The Customer warrants and represents that to the best of the Customer's knowledge there are no obstructions or conditions that would impair the installation, maintenance, or operation of the Utility Thermal Energy Network at the Site, and that there are no hazardous substances or materials, as defined under State or Federal law, located in the area where the Utility Thermal Energy Network is to be installed. In the event such

conditions are found, the Company shall have the right to suspend work and to terminate this Customer Agreement, without any further liability to Customer other than restoration of the area disturbed by the Company. The Customer will be responsible for compliance with any tenant leases if the Site is utilized as a rental property and warrants and represents that no such leases would impair the installation, maintenance, or operation of the Utility Thermal Energy Network at the Site.

6.0 The Customer and the Company shall, prior to the date set for the installation of the Utility Thermal Energy Network, coordinate to mark out any private utilities (including, but not limited to, underground electric, sewer, water and septic lines and systems) which are located on the premises where the Utility Thermal Energy Network is to be installed in compliance with the "UDig NY" requirements.

7.0 Customer grants to the Company and its contractors the right and access to install, repair, replace, maintain, and remove the Utility Thermal Energy Network, the Customer Equipment, if necessary, and communication lines for control and metering purposes at the Site, and to monitor, evaluate and enhance the performance of the Thermal Network. The Company shall provide advance notice of work at the Site. The Customer agrees to execute easement, lease or license agreements as are necessary to document the Company's right to access the Site, to locate the Thermal Network at the Site, or to own, operate and maintain the Utility Thermal Energy Network at the Site as provided in this Customer Agreement.

B. Pricing, Metering, Billing Process, Fees, and Payment Options

8.0 Fee. The Customer agrees to pay the thermal fee specified in Exhibit E. The foregoing rate is for the Pilot Period and may not apply to any Thermal Energy Service offered following the Pilot Period. The Company may change any fees and charges listed in Exhibit E only after providing notice to Customer and receiving approval from the Commission.

9.0 Billing. The Company shall render to Customer a statement of charges for the preceding month. The bill is due and payable within twenty (20) calendar days of receipt. The Customer shall be deemed to have received its bill three (3) days after the date of mailing.

10.0 Overdue Payments. Any payment made more than twenty (20) calendar days after the date payment was deemed received will be considered overdue and thereafter subject to a late payment charge calculated in accordance with the provisions of 16 NYCRR Section 11.15 as from time to time amended. In the case of residential service, the Company may not impose a continuing late payment charge on an unpaid balance that has been restructured under a deferred payment agreement, if the regularly scheduled bill (current charges plus agreed upon installment amount) is paid within twenty (20) days of when the bill is deemed received. The Company may, however, impose a late payment charge on monies still owing more than twenty (20) days after the Company has rendered a bill for payment of both the agreed upon installment amount and any applicable current charges.

11.0 Other charges. A late payment charge, penalty, fee, interest or other charge of any kind shall not be imposed on any residential customer for any late payment, collection effort, service termination or deferred payment agreement occasioned by the customer's failure to make timely payment for services. The Company may impose a

charge pursuant to this tariff for other lawful purposes. The Company may not impose on a non-residential customer a late payment charge, penalty, fee, interest or other charge of any kind for any late payment or deferred payment agreement occasioned by the customer's failure to make timely payment of services. The Company may impose on non-residential customers a reasonable charge for dishonored checks, reconnection of service, failure to provide access and court costs.

12.0 The Company shall offer residential customers on fixed incomes the opportunity to pay their bills on a reasonable schedule that is adjusted for such customer's periodic receipt of income without incurring late payment charges, provided, however, that any such offer may prescribe a late payment charge where payment is not made within twenty (20) days of the adjusted date shown on the bill.

13.0 The Company may impose a continuing late payment charge on the balance due under a non-residential, deferred payment agreement, offered pursuant to the Rules and Regulations of Part 13, 16 NYCRR. The Company may impose a continuing late payment charge on an amount billed for service used, that was provided through tampered equipment and previously unbilled, if the Company can demonstrate either that the condition began since the customer initiated service or that the customer knew or reasonably should have known that the original billing was incorrect.

14.0 Handling Charge. The Company may impose a handling charge of $10.00 on any negotiable instrument from an applicant or customer which was rendered to the Company as payment of any bill, charge or deposit due, returned as dishonored or uncollectible for any reason. This charge shall include any amount the Company is required to pay its bank for handling said instrument.

15.0 If the Thermal Energy Service is metered, the customer shall be obligated to pay for all service to premises until final reading of the meter if such reading be taken not later than forty-eight hours after proper notice has been received by Company to discontinue service. In the event that a customer is a tenant in a multiple occupancy building, the customer will be obligated to pay only for service supplied for his use or for service for which he has agreed to pay.

C. Withdrawal and Termination Options

16.0 Customer will have the ability to terminate its Thermal Energy Service only if the Thermal Network is not performing properly by notifying the Company in accordance with this Customer Agreement. If the UTEN Pilot Program is terminated in accordance with this Customer Agreement during the Pilot Period, the Customer shall have the following options ("Termination Alternatives") prior to termination. Termination Alternatives

16.1 Termination Alternative 1 – Shift to All Electric Air Source Heat Pump ("ASHP") System

The Customer would move to an air source heat pump for heating and reuse UTEN Pilot Program equipment and facilities to the extent possible. The Customer would reuse the new distribution ductwork installed for the UTEN Pilot Program and the

Company would replace the thermal heat pump with a new central electric ASHP system.

Cooling services that were part of the UTEN Pilot Program will end with the selection of Termination Alternative 1. Cooling services are typically included as part of the ASHP system.

The Customer may be able to take advantage of energy efficiency incentives available for ASHPs. These costs were not included or contemplated by the Program. Selection of Alternative 1 would enable the customer to use the ASHP system for heating and cooling.

16.2 Termination Alternative 2 – Shift to Individual Ground Source Heat Pump (GSHP) System

The Customer moves to an individual, non-networked ground source heating system with a private geothermal ground loop. Termination Alternative 2 is only available if, during the UTEN Pilot Program's design phase, the Company determines that a ground loop can be located on Customer property. For purposes of the UTEN Pilot Program, the Company, in its sole discretion, will determine the optimal location of the ground loop. If the Company identifies a viable location on the Customer's property for a ground loop and does not locate a ground loop on the Customer's property as part of the UTEN Pilot Program, as part of Termination Alternative 3, the Company will install a new private ground loop as soon as practicable upon termination of the UTEN Pilot Program. The Customer would keep the UTEN Pilot Program equipment inside the building. Cooling services that were part of the UTEN Pilot Program will continue with the selection of Termination Alternative 2.The costs for this alternative are site specific and will be quantified for each customer.

16.3 The Company will provide to Customer a high level estimate of the costs for Alternatives 1 and 2 for which the Customer would be responsible if implemented prior to the Customer's termination alternative selection. Customer must select one of the two (2) termination alternatives prior to the design of the thermal energy system as the Customer's choice of termination alternative may affect the design of the system. Selecting the Termination Alternative during the design phase will minimize cost and disturbance to the Customer if one of the termination alternatives are implemented, ensure retention of the infrastructure necessary for the Termination Alternative selected, and allow for the installation of UTEN Pilot Program equipment that, to the extent possible, is compatible with the selected Termination Alternative. The Company will use reasonable business judgment to accommodate Customer's subsequent request to change a selected Termination Alternative but shall not be obligated to honor a request to change a Termination Alternative. For all customer alternatives, the Company will work to include all available energy efficiency incentives available through energy efficiency programs.

16.4 The Customer Agreement will document the Termination Alternative selected by the Customer. This selection will be included as Exhibit F to this Customer Agreement executed by the Company and the Customer.

D. Home Energy Fair Practices Act (HEFPA) [To be included in Agreements with residential thermal customers]

17.0 The Home Energy Fair Practices Act (HEFPA) provides residential energy customers with comprehensive protections in areas such as customer billing, and payment and complaint procedures and are set forth in Title 16 NYCRR Parts 11 and 12. The relevant provisions are set forth in Exhibit D attached hereto.

E. Pilot Evaluation and Customer Consents

18.0 By participating in the UTEN Pilot Program Customer understands and agrees that the Company will be engaging and coordinating with consultants and contractors to design, construct, and administer the UTEN Pilot Program, evaluate performance of the Utility Thermal Energy Network, and develop analyses and reports of the UTEN Pilot Program. By signing this Customer Agreement, the Customer authorizes the Company to disclose the Customer's name, address, bill account number, status as tenant or owner, Customer's energy usage information, building information, and results of any energy audit for the Customer's Site ("Customer Information") to the Company's geothermal service contractors, energy efficiency program administrators, evaluation, verification, and measurement representatives, and other designees of the UTEN Pilot Program ("Authorized Representatives").

F. General Provisions

19.0 This Customer Agreement must be signed by the Customer or an authorized representative of the Customer, and the Customer agrees to provide documentation of that authority if requested by the Company. In the event the Customer is not the exclusive owner of the Site or is a tenant at the Site, Customer shall notify the Company, and the Company's obligations under this Customer Agreement are subject to obtaining all necessary consents from all applicable owners and tenants. The Customer agrees to cooperate with the Company in obtaining those consents. In the event that the Customer is a tenant, the Customer represents that the Customer's lease rights extend through at least the end of the Service Period. If the Customer owns the Site and desires to sell the Site during the Pilot Period, the Customer shall notify the Company prior to the sale, and further agrees that this Customer Agreement shall be binding on any successor owner. The Customer agrees to obtain and provide to the Company an assignment and assumption by the successor owner of Customer's obligations under this Customer Agreement. Any other assignment by the Customer of its rights or obligations under this Customer Agreement shall require the advance written consent of the Company.

20.0 If the Company installs and pays for energy efficiency upgrades to the Site as part of the Program, it shall be entitled to any and all energy efficiency program rebates and incentives related to the Utility Thermal Energy Network and Thermal Energy Service. The Customer agrees to pursue energy efficiency programs to which it is entitled and will have the right to claim energy efficiency program rebates and incentives unrelated to the Utility Thermal Energy Network and Thermal Energy Service, if any. The Company will work with the Customer to support the Customer's participation in any and all available energy efficiency programs.

21.0 The Customer agrees to provide information and documentation that the Company may request regarding the installation, repair, maintenance, operation, and performance of the Thermal Network, and regarding the Customer's other utility and fuel usage, and further agrees to complete customer satisfaction surveys regarding the Thermal Energy Service. Further, the Customer consents to the Company sharing any of this information with the Company's UTEN Pilot Program contractors and the Customer's electric distribution provider as needed.

22.0 The terms and conditions applicable to the Thermal Energy Service shall include the provisions of this Customer Agreement **[insert for residential customers "and the provisions of the Terms and Conditions for Thermal Distribution Service attached as Exhibit D]**, and incorporated herein. It is the intent that Customer have the same rights, responsibilities, protections, and obligations as the Company's customers.

23.0 Any notice to Company shall be directed to:

d/b/a National Grid

, NY

Attn:

Email

Any notice to the Customer shall be directed to:

[Add]

or such other address as either party may designate by formal written notice.

24.0 The Company is a public utility subject to regulation by the Commission. Compliance by the Company with any order or rule of the Commission or any other regulatory or legislative authority with jurisdiction shall not constitute a breach hereof.

25.0 This Customer Agreement which includes the accompanying Exhibits embodies the entire agreement between the Parties with respect to the subject matter hereof. There are no third-party beneficiaries to this Customer Agreement. All exhibits to this Plan Agreement are hereby incorporated by this reference into this Customer Agreement. This Customer Agreement may be executed in counterparts, each of which shall be deemed an original.

26.0 This Customer Agreement is subject to the laws of the State of New York, without regard to principles of conflicts of law, and shall be subject to the jurisdiction of the Commission and any other governmental entity having jurisdiction over a Party or the subject matter of this Customer Agreement. The sole venue and jurisdiction for any action related to this Customer Agreement shall be in New York.

ACCEPTANCE OF THE ABOVE TERMS BY THE AUTHORIZED REPRESENTATIVES OF THE PARTIES:

_____ d/b/a NATIONAL GRID

By:
Name:
Title:

[CUSTOMER]

By:_____
Name: _____
Title (if applicable):

EXHIBIT A

UTILITY THERMAL ENERGY NETWORK

TO BE INSTALLED BY THE COMPANY

[Insert Site specific Description and sketch if available]

EXHIBIT B

CUSTOMER EQUIPMENT (to be specific for each Customer site)

1. Customer Equipment that preexisted the UTEN Pilot Program

[Describe the Customer equipment and heating distribution system that pre-existed the Program]

2. (Site Specific) Customer Equipment to be installed as part of the UTEN Pilot Program

EXHIBIT C

NEW CUSTOMER ELECTRIC APPLIANCES
(Only if existing gas customer and currently receiving gas service and being required to disconnect from gas service to participate in pilot)

The Company will reimburse Customer for the following electric appliances if the customer currently has gas service and is being required to disconnect from gas service

{Note: reimbursement is offered only to existing gas customers with gas appliances who are being required to disconnect from their gas service. Reimbursement for electric appliances will not be offered for new construction. The appliances needed will vary by customer and these specifics will be added based on the UTEN Pilot Program after Commission approval}

EXHIBIT D

ADDITIONAL TERMS AND CONDITIONS

1. Company will endeavor at all times to provide a regular and uninterrupted supply of service but in case the supply of service shall be interrupted or irregular or defective or shall fail from causes beyond Company's control or because of the ordinary negligence of Company, its employees, servants or agents, Company will not be liable therefore. See Rule 3. The provision of Credits and Reimbursements made available to eligible customers pursuant to Rule 24 as required by law are recognized as an exception, but does not constitute an admission of liability.

2. Except for the payment of bills already due, neither the Company nor the customer shall be liable for damages, including the payment of minimum billing amounts, for interruptions of service caused by an act of God, windstorm, flood, fire, public enemy, governmental interference, explosion or any other cause whether of the kind here enumerated, or otherwise not reasonably within the control of the Company or customer. Prompt notice shall be given by the party claiming relief under this provision of the nature and duration of the event leading to such a claim.

3. Neither by inspection, if any, nor non-rejection, nor in any way, does Company give any warranty, expressed or implied, as to the adequacy, safety or other characteristics of any structures, equipment, pipes, appliances or devices owned, installed or maintained by customer or leased by customer from third parties.

4. Company will not be liable for any injury, casualty or damage resulting in any way from the supply or use of gas or from the presence or operation of Company's structures, equipment, pipes, appliances, wires or devices on customer's premises, except injuries or damages resulting from the negligence of Company.

5. The Company may, without liability therefore, interrupt or curtail service to any customer or customers if an emergency may threaten the health or safety of a person, a surrounding area, the Company's generation, transportation or distribution systems if, in its sole judgment, such action will prevent or alleviate the emergency condition, or, in the case of non-residential customers, if there is a need to make permanent or temporary repairs, changes or improvements in any part of the system, or there is a governmental order or directive requiring the Company to do so.

6. The Company shall, to the extent reasonably feasible under the circumstances, provide advance notice to those whose non-residential service will be interrupted for any of the above reasons.

7. The Company shall act promptly to restore non-residential service as soon as possible after disconnection under this section, provided, however, that service need not be restored to any

building unit or piece of equipment if, at the time restoration is to occur, the Company has the lawful right to terminate service for another reason pursuant to 16 NYCRR, Parts 11, 12 and 13.

8. At the request of the customer, the Company will provide service for safety related calls free of charge.

9. Neither by inspection nor non-rejection, nor in any other way, does the Company give any warranty, express or implied, as to the adequacy, safety or other characteristic of any structure, equipment, wires, pipes, appliances or devices owned, installed, or maintained by the customer, or leased by the customer from third parties.

10. Company is not responsible for the adequacy or safety of customer's equipment or piping beyond the end of the service line. The Company reserves the right to discontinue service whenever customer fails to maintain such equipment and piping in a safe and adequate condition or fails to utilize gas in such a manner as to avoid interference with the service furnished by Company to other customers.

    Company may discontinue the supply of thermal energy for non-payment of bills rendered for service or for failure to post a required deposit when Company has complied with:
    Non-Residential Customers:

The procedure and form of notice required by Part 13, 16 NYCRR provided that there will be no discontinuance of service until at least eight (8) days after the mailing of the final notice of termination, five (5) days if notice has been personally served upon the customer.

Residential Customers:

The procedures and form of notice required by 16 NYCRR Parts 11 and 12, provided that there will be no discontinuance of service until at least fifteen (15) days after the mailing of the final notice of termination.

Multiple Dwelling Customers:

Where service is to an entire multiple dwelling (as defined in the Multiple Dwelling Law or Multiple Resident Law), the procedures and form of notice required by 16 NYCRR, Part 11.7, provided that there will be no discontinuance of service until at least eighteen (18) days after the mailing and posting of the appropriate notices.

Copies of the Company's discontinuance of service and complaint handling procedures along with the provisions contained in Parts 11, 12 and 13, 16 NYCRR, are available for inspection at Company offices where applications for service may be made in person.

11. Any complaint filed with the Company regarding disputed bills, charges or deposits will be promptly investigated in accordance with the procedures and form of notice required by Public Service Commission rules contained in Part 275 - Notice of Discontinuance and

Complaint Procedures, of Subchapter D - Rates and Charges of Chapter III of Title 16 of the New York Code of Rules and Regulations, Sections 275.8 and 275.9.

12. Company may discontinue service to a customer who has disputed a bill or deposit when Company has complied with said Commission rules.

13. Copies of Company's Notice of Discontinuance and Complaint Handling Procedures and form of notice are on file with the Commission and are available to the public upon request at Company offices where applications for service are received.

14. In addition to the provisions of the Service Classifications as to the term of their respective agreements for service, the Company reserves the right to withhold service or to discontinue service or terminate any agreement therefore, in such manner as may be permitted by law under the circumstances, if the customer at any time refuses or fails to make application and agreement for service as provided by this rate schedule or defaults in the payment of a bill rendered for service, or if the customer refuses or fails to comply with any applicable provision, rule, regulation, term or condition of this rate schedule, or with any applicable law or order of the Public Service Commission or other authorities having jurisdiction, or if the customer's installation or parts thereof is deemed by the Company to be unsafe, inadequate or unsuitable for receiving the Company's service, or to interfere with or impair the continuity or quality of the Company's service to the customer or to others, or if changes at customer's premises cause Company's facilities to become unsafe, inadequate or unsuitable.

15. If any fraud upon Company shall be practiced upon customer's premises, Company may, at any time, without notice, discontinue the supply of thermal energy to the residential customer and remove its meter or meters, apparatus and pipes provided the Company has complied with all applicable provisions of 16 NYCRR, Parts 11, 12 and 13. In the case of non-residential customers, prior to discontinuing service, the Company must have evidence that the customer opened the account and used the service prior to the creation of the condition or that the customer knew, or reasonably should have known, that service was not being fully billed. When the thermal service has been discontinued for any of the reasons set forth in this Rule 16, the Company is obligated to reconnect terminated service within 24 hours, unless prevented by circumstances beyond the Company's control or unless a customer requests otherwise, in the following situations:

    a. Receipt by Company of the full amount of arrears and/or a security deposit for which service was terminated, and, in the case of non-residential customers, any other tariff charges billed after the issuance of the termination notice which are in arrears at the time reconnection is requested.
    b. Agreement by the Company and the customer on a deferred payment plan and the payment of a down payment, if required, under that plan.
    c. Company shall reconnect service that has been terminated within 24 hours after the direction of the Commission or its designee. In the case of non-residential service, such direction may occur only where the termination was in error, or the customer has filed a complaint with the Commission and has either paid in full the undisputed

amount or has entered into a deferred payment agreement and has paid the required down-payment.

d. Upon receipt by the Company of a commitment of a direct payment or written guarantee of payment from the social services official of the social services district in which the residential customer resides.
e. Where the Company has notice that serious impairment to health or safety is likely to result if residential service is not reconnected.
f. The Company shall reconnect service that has been terminated solely for failure to provide access within 24 hours of the non-residential customer's request for reconnection, provided the customer has allowed access and has made a reasonable arrangement for future access.
g. The Company shall reconnect non-residential service that has been terminated for two or more independent reasons when the customer has requested reconnection and has satisfied all conditions for reconnection.
h. Whenever circumstances beyond the Company's control, as set forth in 2.1.4.2 prevent reconnection of service within 24 hours in any of the events specified, service shall be reconnected within 24 hours after those circumstances cease to exist.

16. Late payment charges will be charged when the amount billed for non-residential service used that was previously unbilled because the service was being provided through tampered equipment and the Company can demonstrate either that the condition began since the customer-initiated service or that the customer actually knew or reasonably should have known the original billing was incorrect.

EXHIBIT E

THERMAL PILOT PROGRAM SERVICE AGREEMENT

RATE SCHEDULE

Rate Type	**Thermal Fee**
Residential	
Residential Low Income	
Commercial/Industrial	

**Please note that these billing rates will be charged on a [monthly/quarterly/or annual] basis and will be effective for the duration of the UTEN Pilot Program. Rate schedules at the end of the UTEN Pilot Program may change subject to Commission approval.*

The Thermal fee will be calculated prior to execution of this customer agreement and will be a flat fee during the UTEN Pilot Period. The Thermal Fee will be calculated to reflect current gas usage and total energy costs adjusted for weather and increases in supply and delivery charges with the goal that pilot participants not experience an increase in their total energy costs from what they would have incurred if they did not participate in the UTEN Pilot Program based on information of electric and gas rates and customer's prior energy usage available at the time. The calculations will not include projections for future electric and gas rates or increase in customer usage that may occur due to a change in behavior and usage, occupancy, or if customer did not previously have central air conditioning.

EXHIBIT F

CUSTOMER TERMINATION SELECTION (Insert Customer Selection of either Termination Alternative 1 or 2)

Appendix G

Sample Customer Pamphlet

nationalgrid

A clean energy future is closer than you think.

In fact, it's right outside your door.

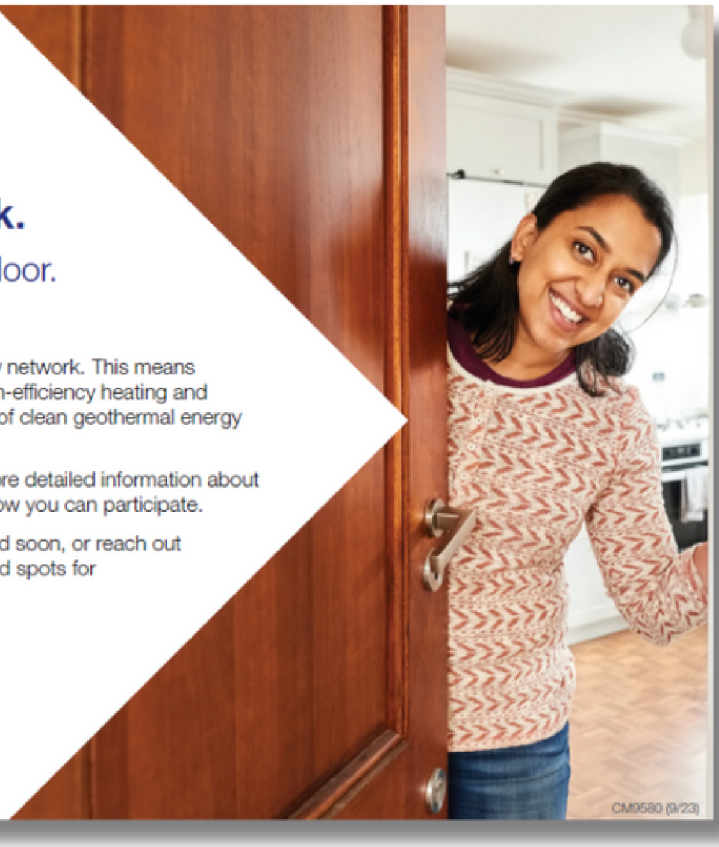
Dear neighbor,

Your area has been selected for a thermal energy network. This means you may have the opportunity to obtain new, high-efficiency heating and cooling equipment and connection to a network of clean geothermal energy — at no cost.

In the coming weeks, we will be in touch with more detailed information about the program, the technology, the benefits, and how you can participate.

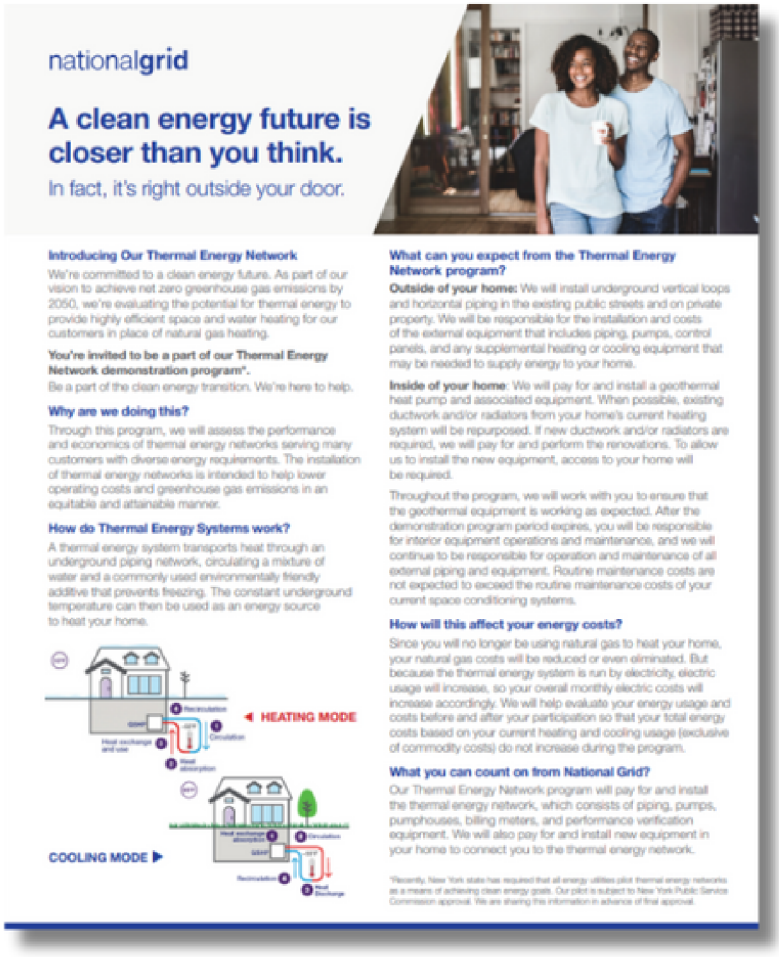
Look for our team members in your neighborhood soon, or reach out to us at **geothermal@nationalgrid.com**. Limited spots for participation will be available in this program.

Scan the QR code or visit
ngrid.com/geothermal

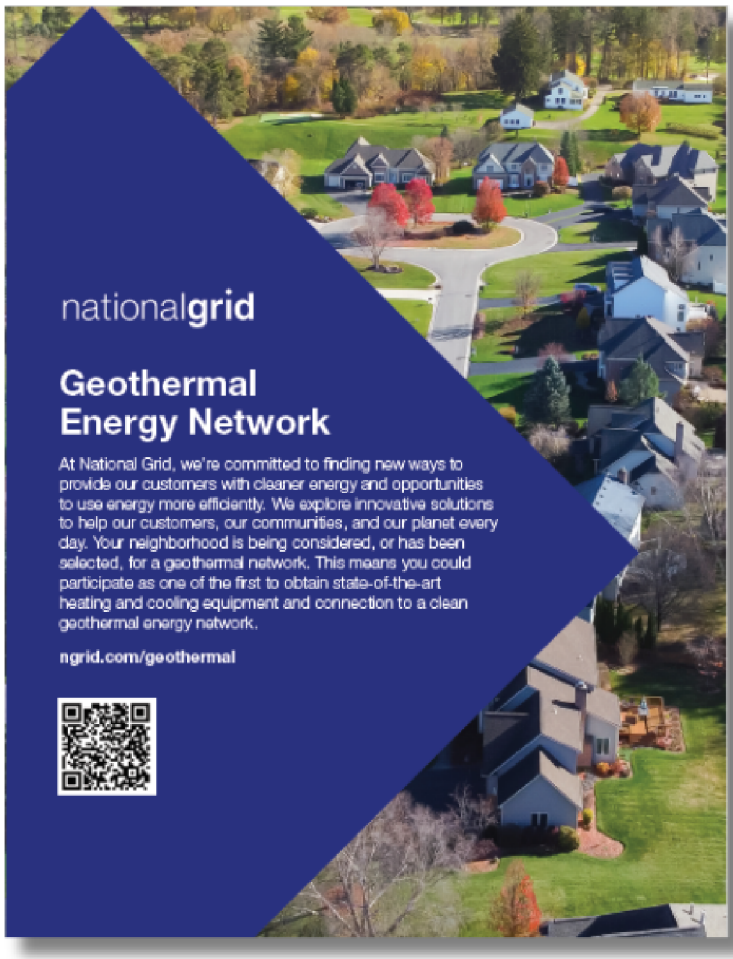


CM9580 (9/23)

Customer outreach sample materials



Customer educational booklet



nationalgrid

Geothermal Energy Network

At National Grid, we're committed to finding new ways to provide our customers with cleaner energy and opportunities to use energy more efficiently. We explore innovative solutions to help our customers, our communities, and our planet every day. Your neighborhood is being considered, or has been selected, for a geothermal network. This means you could participate as one of the first to obtain state-of-the-art heating and cooling equipment and connection to a clean geothermal energy network.

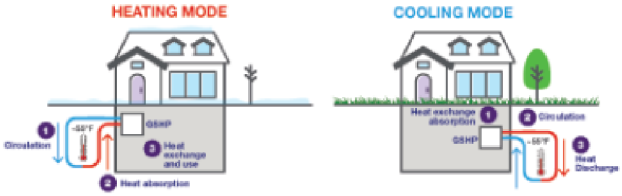
ngrid.com/geothermal

What is networked geothermal energy and how does it work?

A networked geothermal energy system uses the Earth's ground temperature to provide heating and cooling through a buried piping network, called a "ground loop". The constant underground temperature serves as a heat source during winter and transfers indoor heat to the ground for cooling during the summer.

When a building requires heat in cold weather, fluid circulated through the ground loop absorbs the warmth from underground and brings it indoors where a geothermal heat pump delivers comfortable, clean, warm air throughout your indoor space.

When a building requires cooling in summer months, excess heat from indoors is absorbed and concentrated by the heat pump and sent out of the building through the ground loop and back into the ground. Your geothermal heat pump provides cool, conditioned air throughout your indoor space.



Efficient Heating & Cooling
Heat pumps spread the warmth more efficiently than conventional oil, propane, or standard electric heating systems such as electric resistance. They also cool more efficiently when summer temperatures climb, saving money and energy.

Cozy Comfort
Heat pumps provide quiet, even heating and cooling throughout your home or business.

Low-maintenance
Geothermal heat pumps are durable and can last longer than conventional furnaces and AC units. All equipment is indoors, protected from the weather, and there are no burners to clean. The system only requires basic filter changes and standard AC maintenance.

Clean, Healthy and Safe
Most of the energy used with geothermal comes from exchanging heat with the ground, these electric-based system have no on-site combustion. A residential customer can reduce their annual carbon footprint by up to 60% and be on a path to zero emissions.

What program participants receive:

1. Access to a geothermal network — an efficient, clean, and renewable energy source for heating and cooling.
2. A new ground source heat pump system. The pilot program may also provide new appliances including hot water heater, cooktops, stoves, and clothes dryers if the participant needs to disconnect from gas completely as part of the pilot.
3. Potential energy savings. Participants will pay a low fixed charge each month for access to the geothermal network and be responsible for their electric bill (which powers the heat pump). However, geothermal heat pumps are many times more efficient than natural gas, propane, oil, or baseboard electric heating systems. Natural gas customers will likely see modest heating savings, while customers converting from oil, propane, or standard electric resistance will likely see substantial savings. For all customers, geothermal heat pumps cool more efficiently in summer, saving money and energy.
4. No-cost conversion. The biggest expense of a geothermal system is the up-front cost of converting — acquiring and installing all equipment. As part of our program, we provide this up-front cost of conversion to participants.
5. Ongoing support from National Grid. Networked geothermal systems have been in use for decades with great success. However, if something does not function as planned, we are committed to ensuring reliable heating and cooling for participants.

Why are we conducting this program?

Our geothermal energy networks will evaluate the comfort, performance, and economics of a geothermal network in serving a variety of customers with diverse energy requirements. Our pilot projects are approved by state and local regulators.

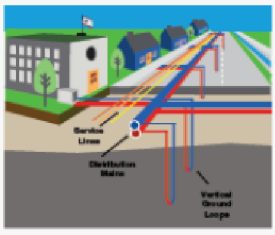
What to expect as a participant:

Inside of your home or business

We will provide and install a geothermal heat pump and associated equipment at no cost to you as a program participant. When possible, existing ductwork from the current heating system will be repurposed. Our team will meet with you to determine the location of the geothermal heat pump equipment and the best way to convert your building.

During the program period, we will work with participants to ensure that their heat pump and associated equipment is working as expected. After the program period, participants will be responsible for equipment operations and maintenance within the property, just as you are with your current heating system. We will continue to be responsible for the operation and maintenance of all external equipment and piping.

Outside of your home or business



Similar to any new natural gas or electricity service brought to a building, National Grid will be responsible for the installation of the external piping and equipment needed to supply geothermal energy to your building.

To learn more about geothermal energy networks, visit **ngrid.com/geothermal** or email **geothermal@nationalgrid.com**

CM9587 (P-23)

Appendix H

City of Syracuse Letter of Support

OFFICE OF THE MAYOR

MAYOR BEN WALSH

December 11, 2023

Secretary Michelle L. Phillips
New York State Public Service Commission
Empire State Plaza
Agency Building 3
Albany, NY 12223-1350

Dear Secretary Phillips,

The City of Syracuse is interested in becoming a progressive leader in energy efficiency by aligning with the goals of the Mayors National Climate Action Agenda and Climate Leadership and Community Protection Act (CLCPA). National Grid has proposed designing and constructing a Utility Thermal Energy Network that would recover waste heat from the outfall of the nearby Onondaga County wastewater treatment plant to provide decarbonized-electrified heating and cooling to the City's Inner Harbor neighborhood. The City of Syracuse has a vested interest in the project because of the economic development, land use, and permitting responsibilities that will be involved.

The proposed Syracuse Utility Thermal Energy Network could provide a solution for the Inner Harbor neighborhood buildings to reduce energy usage, utility costs, and carbon emissions, as well as other potential benefits:

- Attracting new businesses to the Inner Harbor of Syracuse looking to construct residential and commercial "Zero Carbon" buildings and connect high-load users such as the Onondaga County Aquarium.
- Reducing the use of cooling towers would improve views, reduce long-term capital costs, and reduce legionella concerns for hospitals and other businesses connected to the district system.
- Help address climate justice in the surrounding areas, which are in disadvantaged communities.

The City of Syracuse is fully committed to providing the information requested by National Grid to help determine the best path forward for the project. We appreciate the Public Service Commission's consideration to support the pilot project, which will be instrumental in progressing the project beyond its current concept.

Sincerely,

Ben Walsh
Mayor

Office of the Mayor
233 E. Washington St.
201 City Hall
Syracuse, N.Y. 13202

Office 315 448 8005
Fax 315 448 8067

www.syrgov.net

Appendix I

Office of the County Executive Letter of Support

County of Onondaga
Office of the County Executive
John H. Mulroy Civic Center, 14th Floor
421 Montgomery Street, Syracuse, New York 13202
Phone: 315.435.3516 Fax: 315.435.8582
www.ongov.net

J. Ryan McMahon, II
County Executive

Ann Rooney
Deputy County Executive, Human Services

Brian J. Donnelly
Deputy County Executive

Mary Beth Primo
Deputy County Executive, Physical Services

December 12, 2023

Secretary Michelle L. Phillips
New York State Public Service Commission
Empire State Plaza
Agency Building 3
Albany, NY 12223-1350

Dear Secretary Phillips:

The New York State Public Service Commission provided guidance to the seven largest utilities in New York State regarding the development of utility thermal energy network pilot projects. To align with this guidance and the goals of the CLCPA Scoping plan, National Grid has proposed a pilot Utility Thermal Energy Network serving the Inner Harbor area of Syracuse, NY as part of the NYSEREDA PON 4614 community heat pump program.

The proposed project would conceptually recover waste heat from the outfall of Onondaga County's Syracuse Metropolitan wastewater treatment plant and provide decarbonized-electrified heating and cooling to buildings in the Syracuse Inner Harbor neighborhood. The proposed Utility Thermal Energy Network could provide a solution for the Inner Harbor commercial and residential buildings to reduce energy usage, utility costs, and cut carbon emissions.

Onondaga County is pleased to review a clean energy concept in a disadvantaged community. The County is supportive in providing the information needed to National Grid to help advance this pilot project through concept engineering, including basis of design, refined cost estimates and facilitating permitting discussions with New York State Department of Environmental Conservation.

Thank you in advance for your consideration of this proposal.

Sincerely,

J. Ryan McMahon, II
County Executive

Appendix J

Central New York Regional Planning and Development Board
Letter of Support

Central New York Regional Planning & Development Board
126 N. Salina Street, Suite 200, Syracuse, New York 13202 • Tel. (315) 422-8276 • Fax: (315) 422-9051
Paul W. Pinckney, Chairman David V. Bottar, Executive Director

Hon. Michelle L. Phillips
Secretary to the Commission
New York State Public Service Commission
Empire State Plaza
Agency Building 3
Albany, NY 12223-1350

Dear Secretary Phillips:

The Central New York Regional Planning and Development Board (CNY RPDB), a public agency established in 1966 by Cayuga, Cortland, Madison, Onondaga and Oswego Counties under the provisions of Article 12B of New York State General Municipal Law, is pleased to support the proposal submitted to the New York Public Service Commission by National Grid to design and construct a utility-owned thermal energy network (UTEN) in Syracuse, New York.

National Grid's proposal builds on the study prepared by the CNY RPDB with support from the New York State Energy Research Development Authority (NYSERDA) through PON 4614: Community Heat Pump Systems (Category A). Our scoping study investigated the feasibility of a thermal energy network that would recover waste heat from the outfall of Onondaga County's Metropolitan Syracuse Wastewater Treatment Plant to provide decarbonized-electrified heating and cooling to the city's Downtown Business District and Inner Harbor neighborhood. The study determined that such a system would provide significant financial, environmental, and public health benefits through elimination of cooling towers and associated Legionella concerns as well as avoided carbon emissions, equipment replacement costs in buildings and utility system upgrades that would be required to install alternative electrification measures such as electric boilers.

The project proposed by National Grid, which focuses on providing affordable, low-carbon heating and cooling to buildings in the Inner Harbor, would attract new investment to a disadvantaged community which is critical to the city's overall development. The project would also be an important step towards advancing the larger system considered under our NYSERDA-funded study and would serve as an example to other projects in Syracuse and throughout Central New York.

The CNY RPDB identified thermal energy networks as a key strategy to achieving the region's energy goals in our ***Vision CNY Regional Sustainability Plan*** and is committed

to working with its member counties and partners such as National Grid to implement such projects wherever feasible. We appreciate the Public Service Commission's consideration to support this pilot project, which will be instrumental for progressing the project beyond its current concept.

Sincerely,

Chris Carrick

Chris Carrick
Energy Program Manager