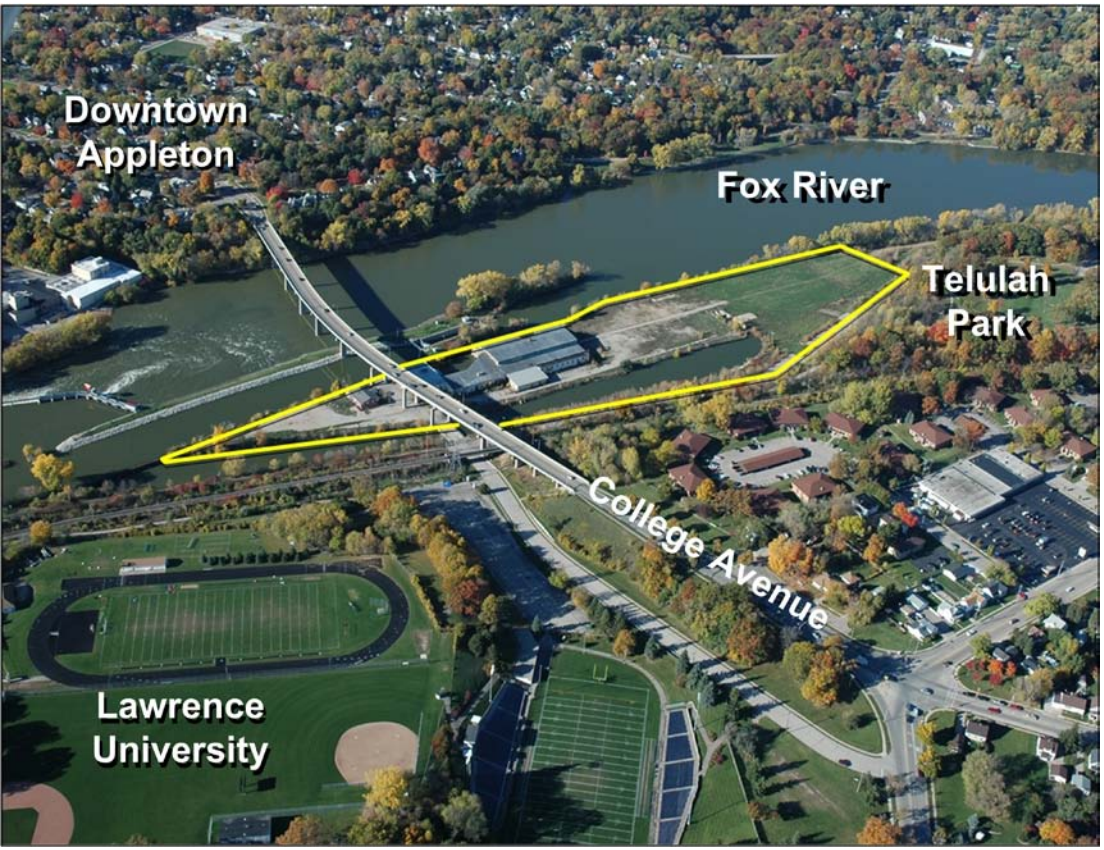


RiverHeath

RiverHeath
Appleton, WI

May 19, 2010

Mark Geall
Tanesay Development
Chicago, IL

RiverHeath Overview

- RiverHeath is a 16 acre mixed use development along the shores of the Fox River in Appleton, Wisconsin
- The goal of the project is to produce a closed loop neighborhood-wide geothermal exchange system using the river as the source of heat exchange
- Using heat exchangers plates in water requires less capital infrastructure than boreholes, so the key is to quantify both infrastructure and operational savings
- Total first phase budget = $20M
  - Grant amount: ~$1M
  - Estimated payback: 7 years (vs. 11-14 with boreholes)
- Neighborhood loop system capacity: 600 tons

Goal: Increase adoption of geothermal

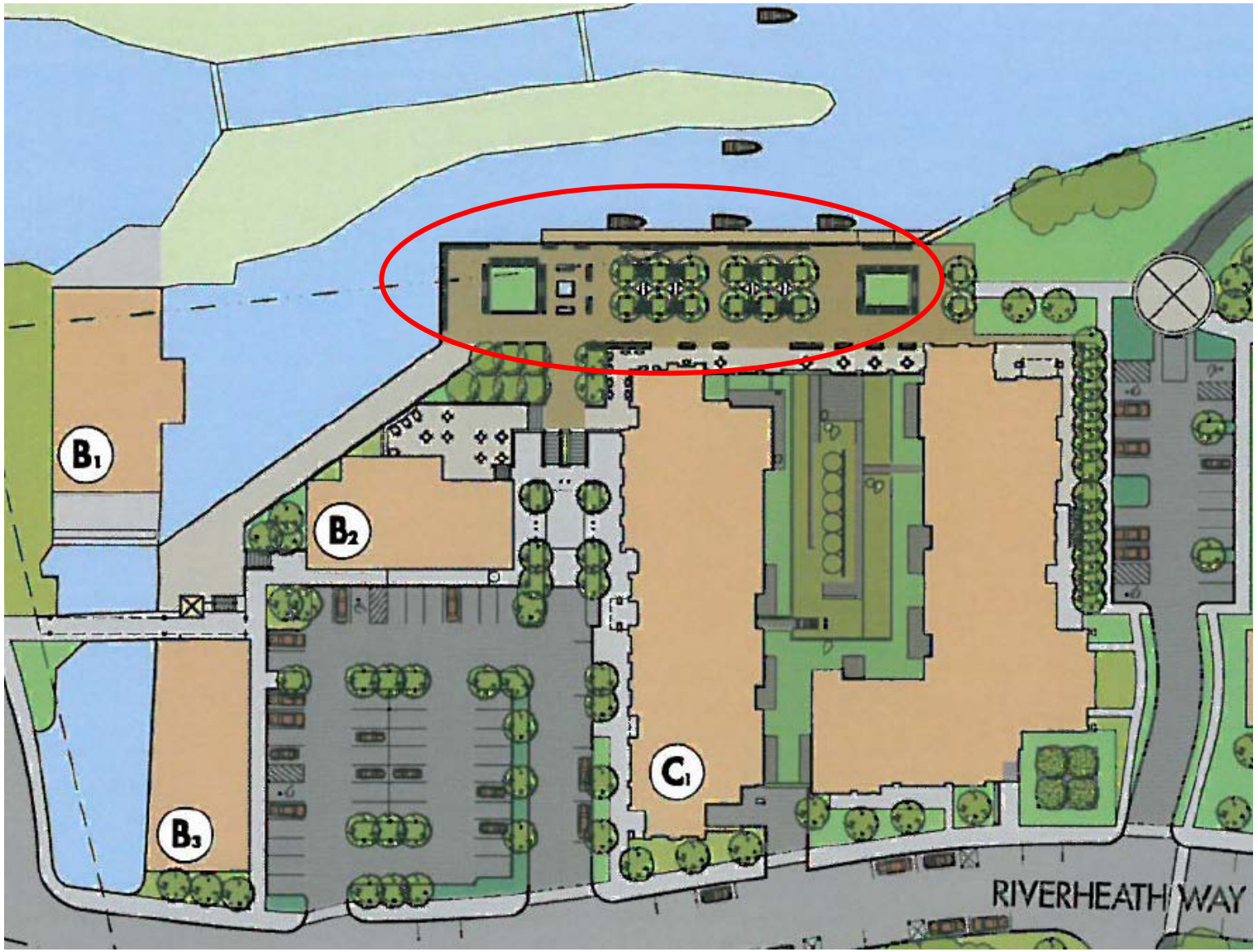
RiverHeath project data: broad applicability

- 45 of the 50 largest US Cities are located on the water
- Lower capital infrastructure cost makes systems more appealing
- River-based system lowers payback by 35%
- Partnership with major HVAC distributor will broaden appeal and adoption of geothermal exchange systems

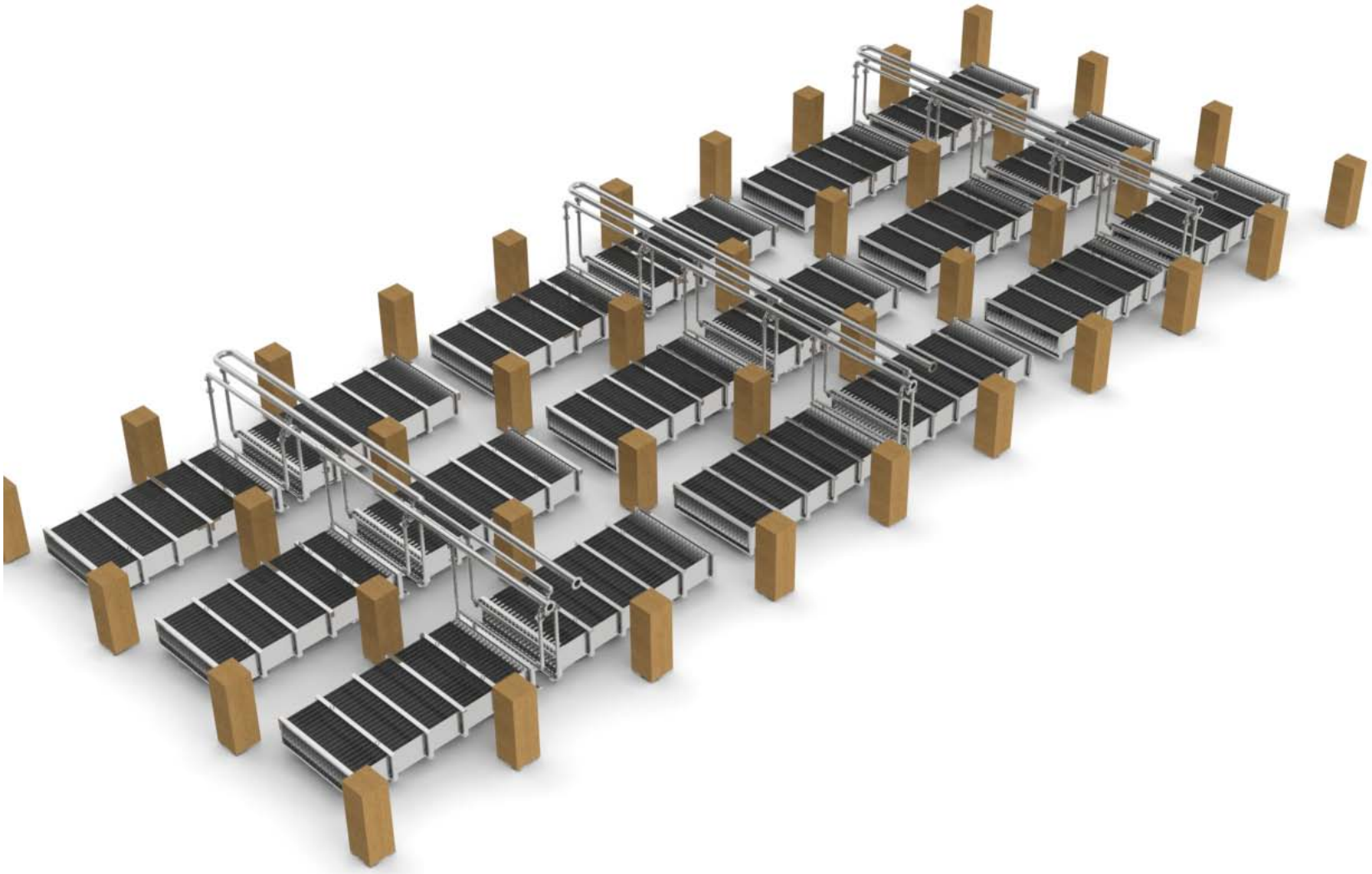
RiverHeath: Master Plan

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

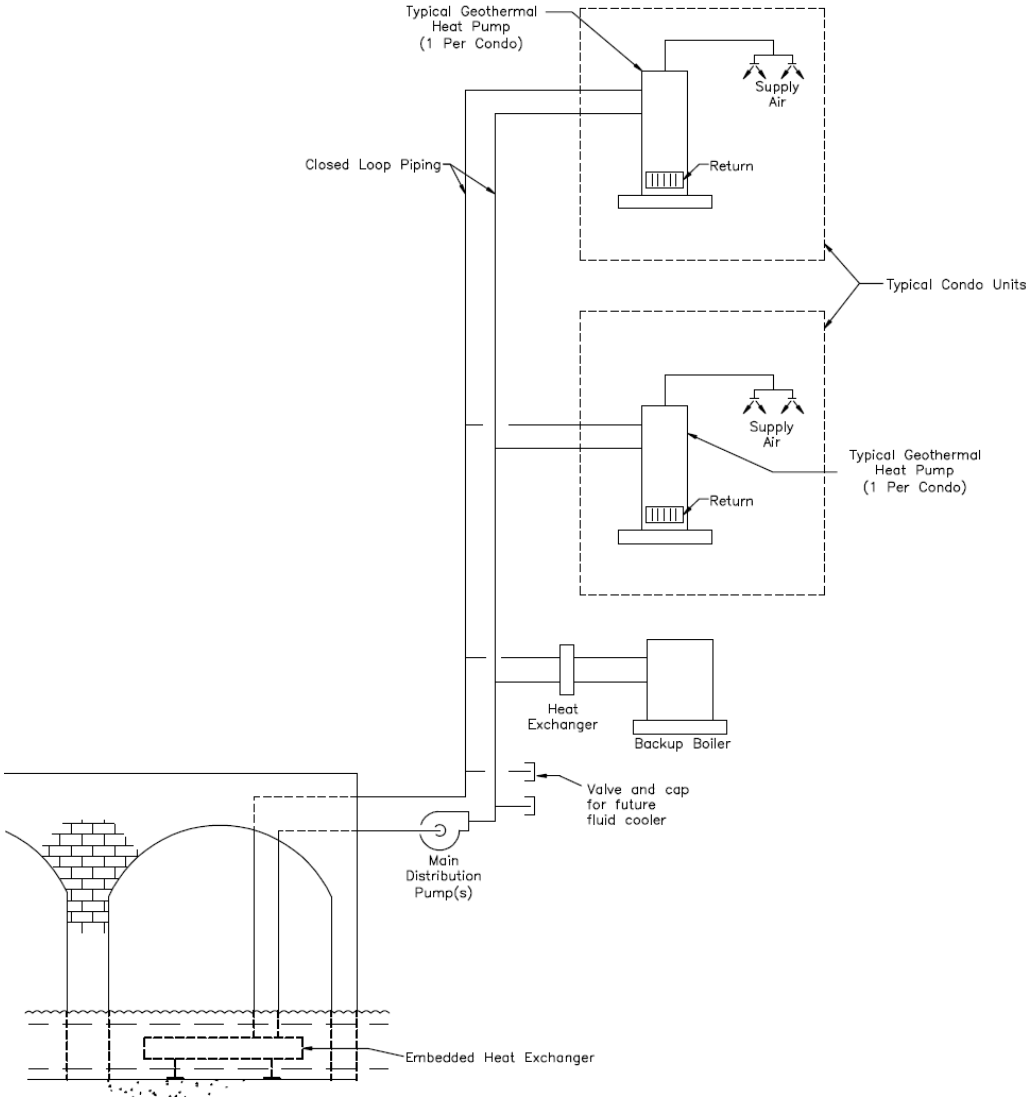
System below hydroelectric plant



System installed below boardwalk



River-based closed-loop system



Barriers: Regulatory

- Wisconsin Department of Natural Resources: understands the importance of embracing geothermal exchange systems, yet still uncertain as to impact to waterway
- Demonstration project: need to collect data to quantify that system will not impact river
- Over 1000cfs water flowing from adjacent hydroelectric facility, yet concerns over temperature differentials

Data Collection: Essential

- All of key barriers to geothermal exchange systems are addressed by collection and dissemination of data
- Regulatory: show that system does not impact waterway
- Capital infrastructure: show that system performance supports relatively short payback period
- Widespread adoption in marketplace: show that system is stable, effective, and reliable

RiverHeath: Summary

- Technology demonstration projects are critical to gathering the data necessary to overcome barriers to widespread geothermal exchange adoption
- Neighborhood closed loop system in visible mixed use development will bring attention and acceptance by residential, office, and retail users
- Data collection will provide reassurance to developers considering geothermal systems
- Data collection will satisfy regulators that systems do not impact environment

Table 1: System payback periods

	Conventional Furnace Phase I	Geothermal Vertical Wells Phase I	Geothermal River Heat Exchanger Phase I
B2, Retail (5,000 SF)	$55,000	$89,000	$73,750
B3, Retail (5,000 SF)	$55,000	$89,000	$73,750
C1, Condominium and Retail (110,000 SF)	$1,210,000	$1,958,000	$1,661,366
E1, Retail (5,000 SF)	$55,000	$89,000	$73,750
E2, Retail (5,000 SF)	$55,000	$89,000	$73,750
Total First Cost	*$1,430,000*	*$2,314,000*	*$1,956,366*
Additional First Cost	Base	$884,000	$526,366
First Year Gas Cost	$47,210	$27,388	$27,388
First Year Electric Consumption Cost	$182,366	$151,235	$151,235
Total First Year Energy Cost	*$229,576*	*$178,623*	*$178,623*
First Year Maintenance Cost	$26,000	$13,000	$13,000
Total First Year Building Cost	*$255,576*	*$191,623*	*$191,623*
First Year Savings	**Base**	**$63,953**	**$63,953**
Simple Payback (Years)	Base	13.8	7.6
Life Cycle Cost Payback (Years)	Base	11	7
Cost Savings (25-Year basis)	Base	$1,093,592	$1,435,286

Table 2: Project Timetable

Act ID	Description	Orig Dur
C1000	Mobilize	0
C1001	Soil stabilization	4w
C1005	Excavate building C1	4w
C1004	Form & pour footings & foundations	8w
C1003	Erect precast garage	4w
C1002	Frame Retail areas	4w
C1013	Install MEPFP garage & mechanical rooms	6w
C1018	Enclose Retail areas	4w
C1014	Install MEPFP Retail areas	4w
C1008	Frame South Residential tower	8w
C1010	Install site utilities	8w
C1006	Install heat exchangers in river	2w
C1017	Install finishes for Retail areas	4w
C1011	Install underground heat pump piping	2w
C1020	Enclose South Residential tower	6w
C1007	Frame North Residential tower	8w
C1009	Install MEPFP South tower	12w
C1025	Final site grading	4w
C1019	Enclose North Residential tower	6w
C1012	Install MEPFP North tower	12w
C1023	Install exterior site hard surfaces	6w
C1021	Install green roof	4w
C1016	Install finishes for South Residential tower	10w
C1022	Landscaping	4w
C1015	Install finishes for North Residential tower	10w
C1026	Final commissioning	4w
C1024	Project substantially complete	0