Northwestern University
Should We Move Our Central Plant?

February 22, 2017

Northwestern

Agenda

I. Introduction

II. Capacity & Expansion

III. Site Evaluation

IV. Conclusions

Introduction

Facts about Northwestern University

Two Primary Campuses – Evanston & Chicago

- ~21,000 Students
- ~12,300 fulltime Faculty & Staff
- 296 Acres with 213 Buildings
- $10.5 Billion Endowment
- $650 Million in Annual Sponsored Research

Evanston Campus

- ~8,530 Undergraduate Students
- ~7,640 Graduate Students
- ~6,150 Faculty & Staff (of which ~1,350 are “off-campus”)
- ~4,350 Beds in Undergraduate Residence Halls
- 281 Acres – of which roughly a third are Lakefill
- 200 Buildings – of which 54 are under 10,000 gsf

1851 — State of Illinois approves Northwestern's Act of Incorporation

1855 — First building on the Evanston campus

1905 — Burnham hired to create master plan for the Evanston campus; his ideas were not well-received

1911 — Hornbostel is hired as University Architect and designs the North Residential Campus

1922 — J. G. Rogers is appointed University Architect and oversees period of large-scale development on campus.

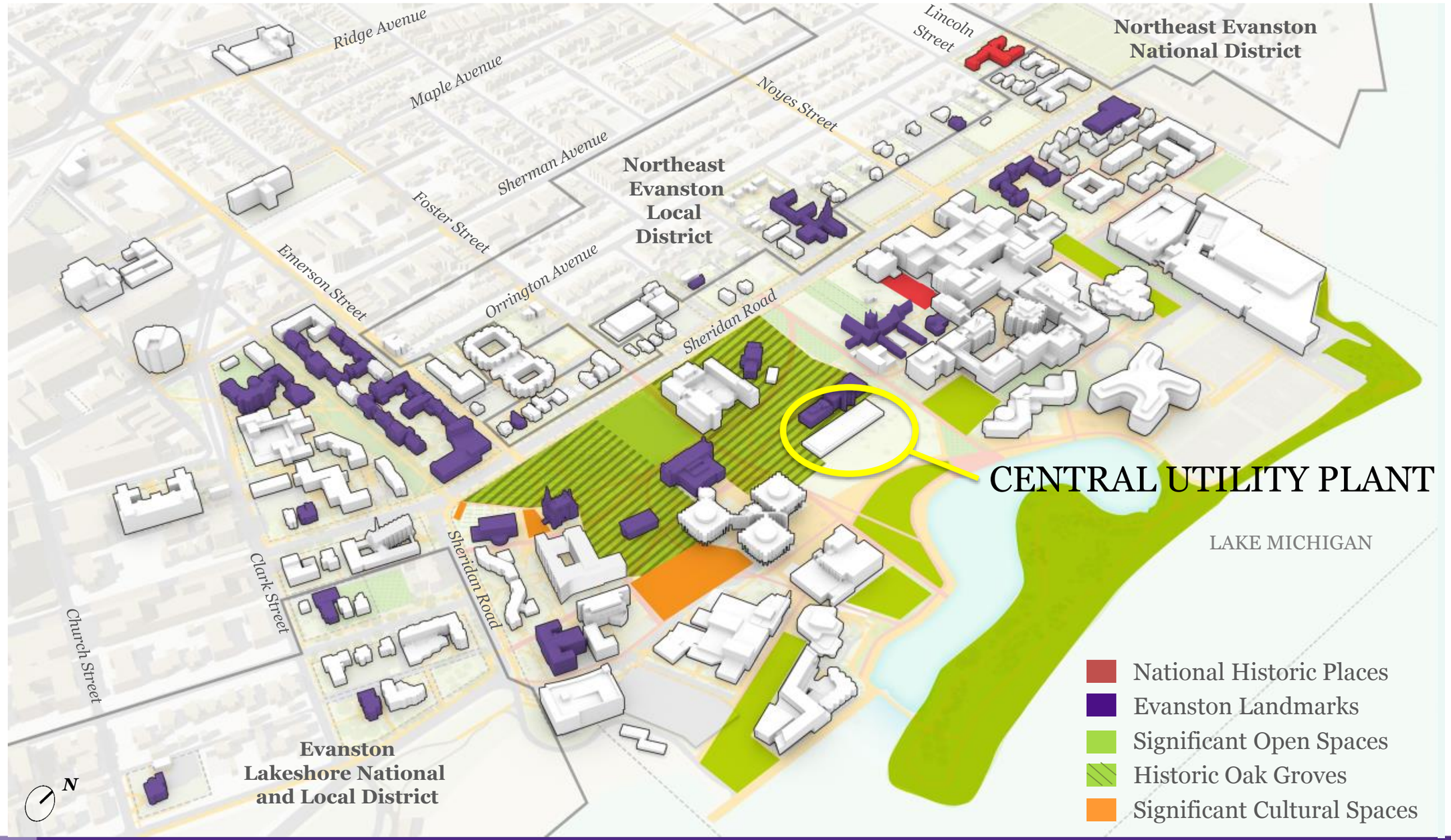
1949 — James Roscoe Miller appointed University President; oversees fund-raising efforts to expand campus

1960 — Campus Trustees approve purchase of underwater land for reclamation and eastward campus development

1962 — Campus Lakefill begins

1964 — Campus Lakefill is completed at a cost of $5.2 million for 99 new acres of land

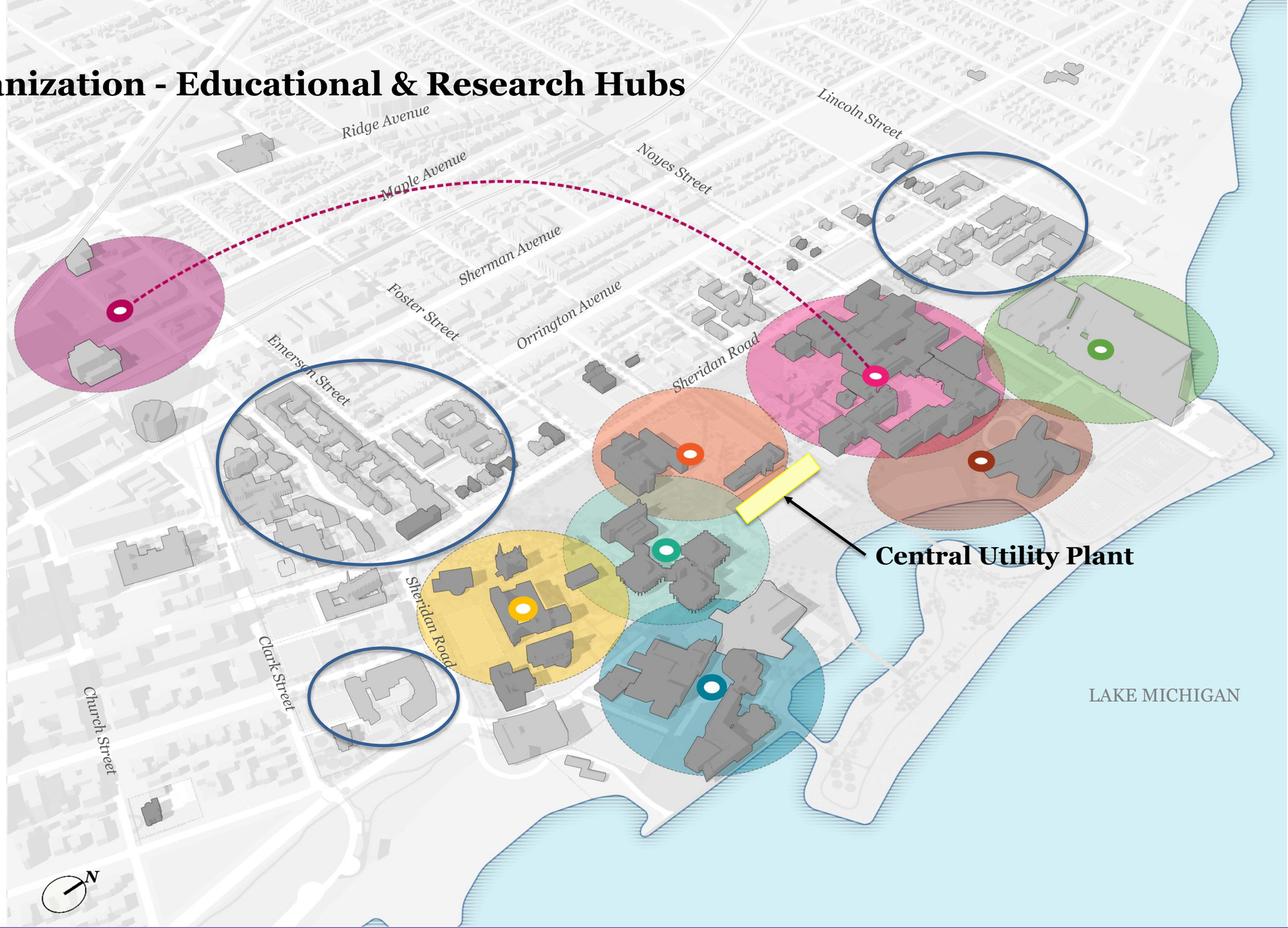
Overview of the Historic Evanston Campus



Campus Organization - Educational & Research Hubs

- Academic Buildings
- Non Academic Buildings

- Technology & Sciences Hub
- Translational Research Hub
- Social Sciences Hub
- Interdisciplinary Hub
- Business & Economics Hub
- Humanities and Journalism Hub
- Arts & Music Hub
- Athletics & Recreation Hub
- Residence Halls



View of Campus in Early 20th Century

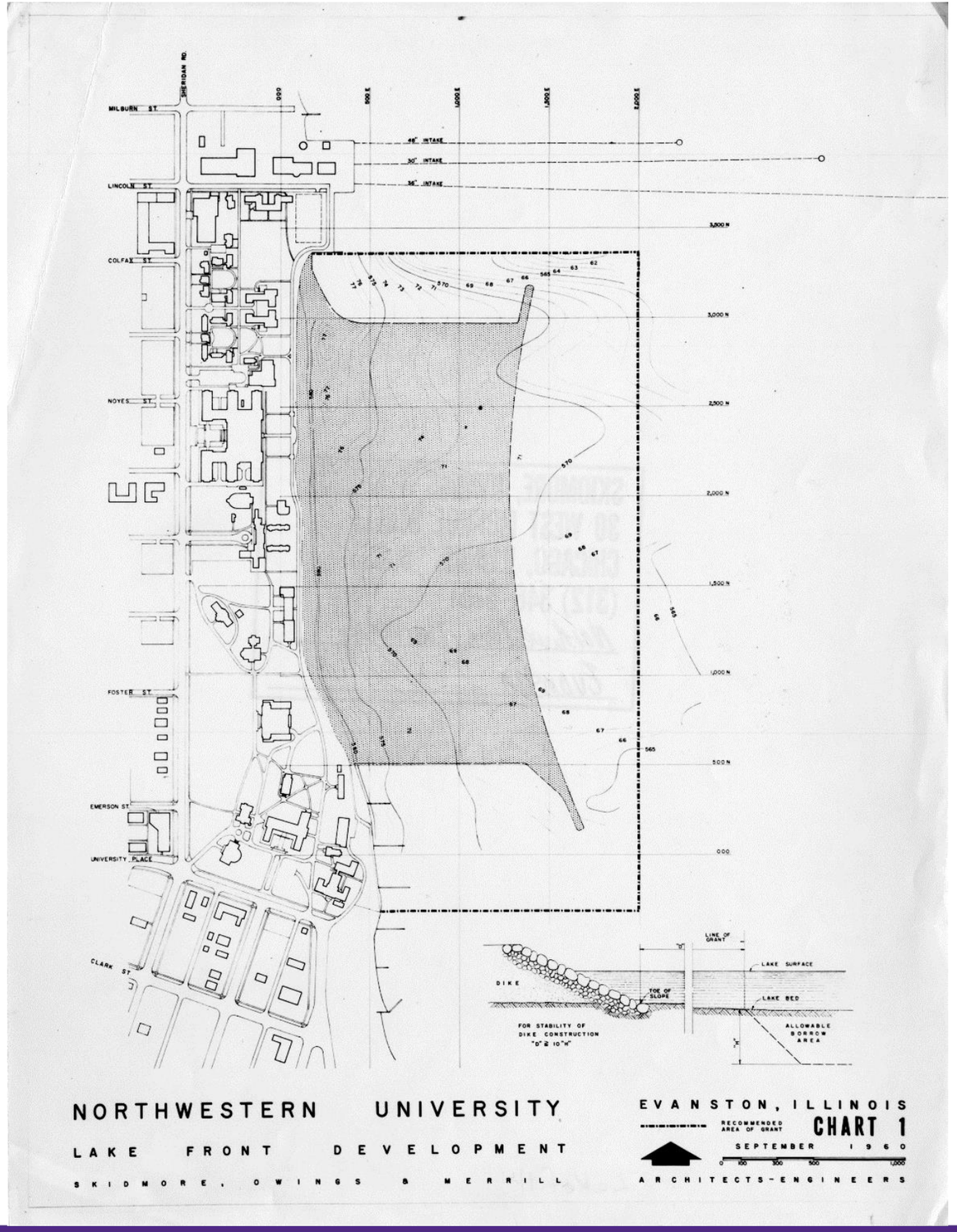
Lakefill Plan
SOM 1960

- 1960 – Northwestern poised for Significant Growth

- Expensive and controversial to expand in Evanston because of the Property Tax Exemption

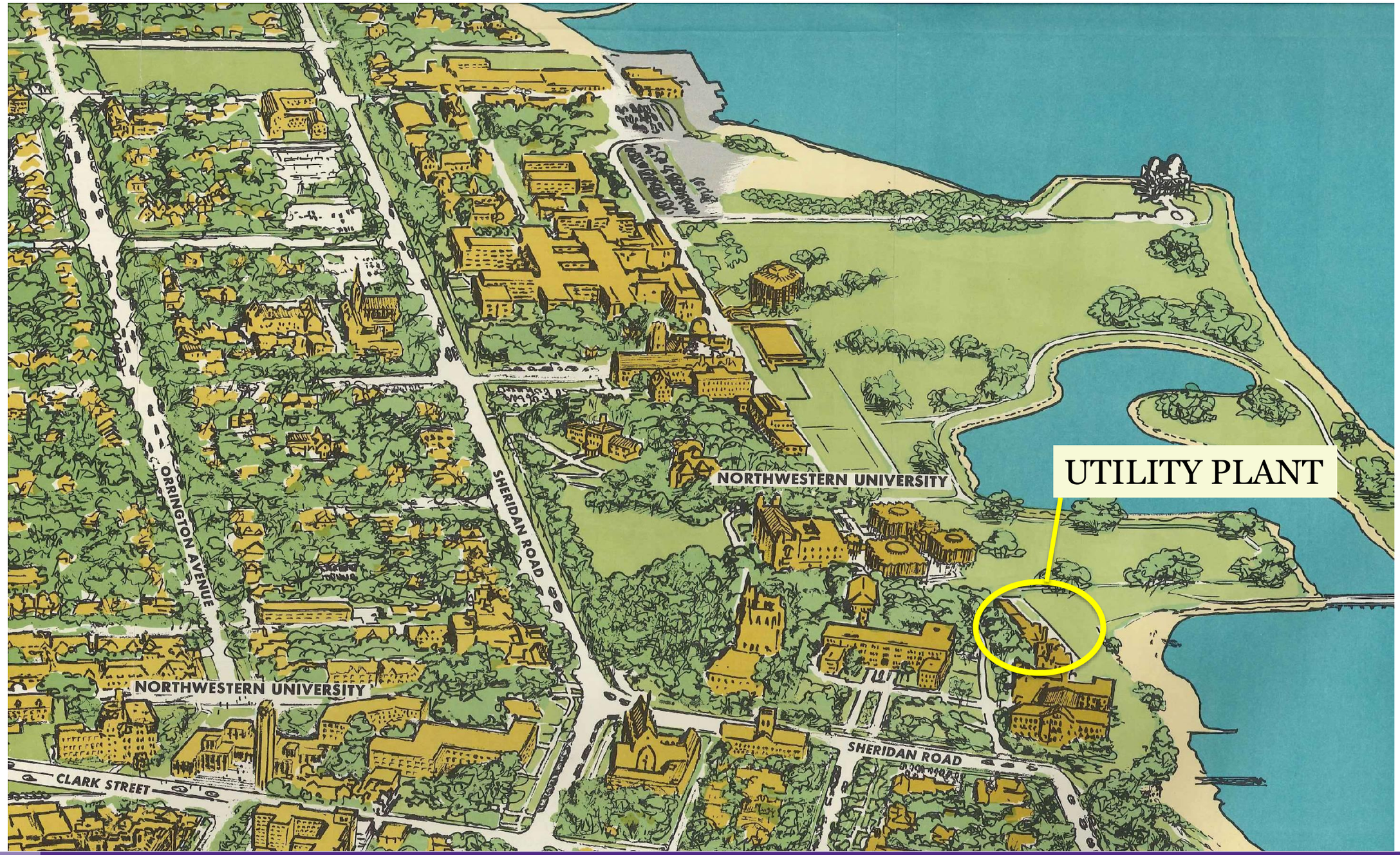
- 1961 – Legislative approval for sale of 152 acres of Lake Michigan to Northwestern

- 1962 – Lakefill begins
  99 Acres filled

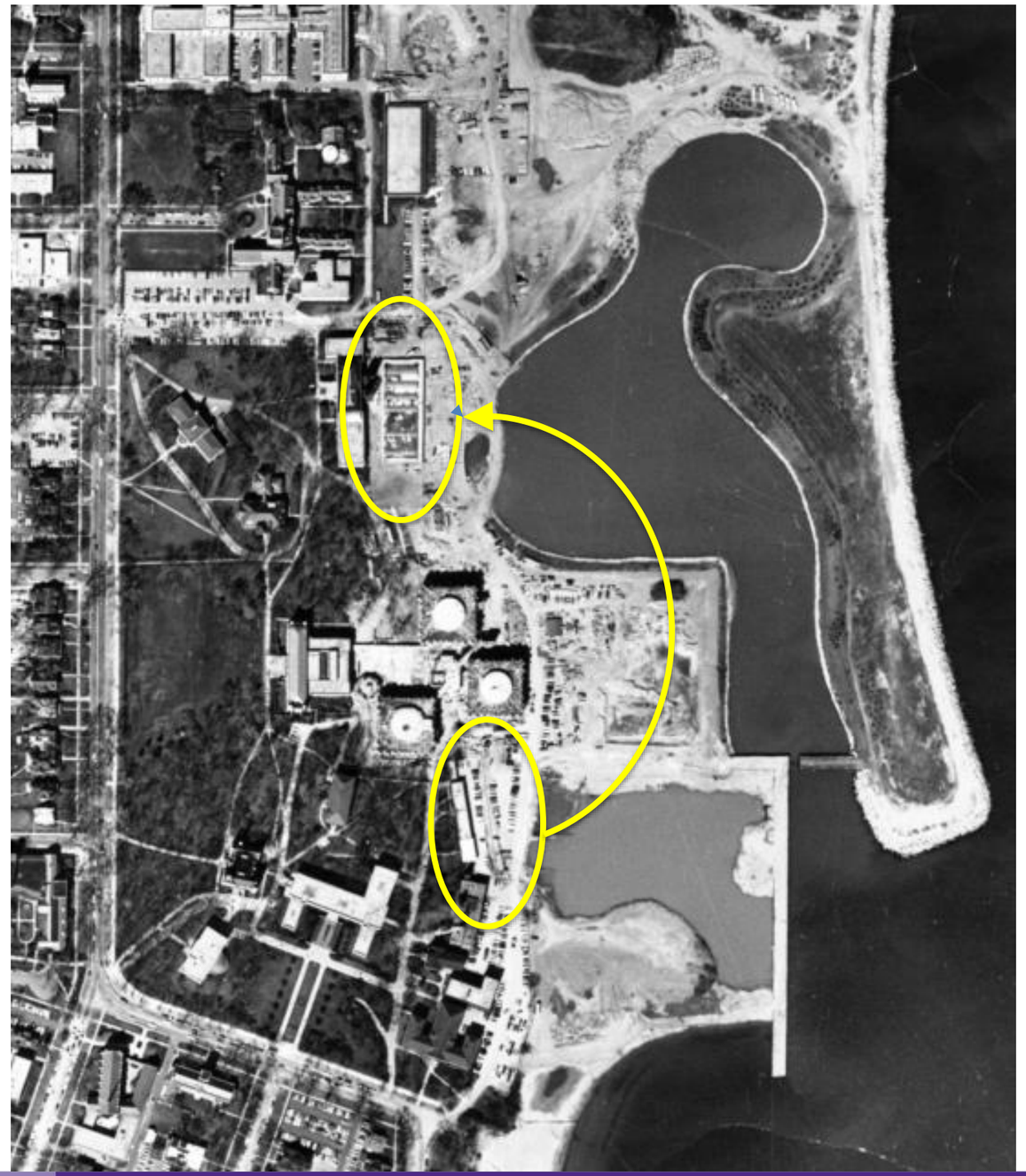


Aerial View of Lakefill Construction in 1963

Map & View of Campus in 1967



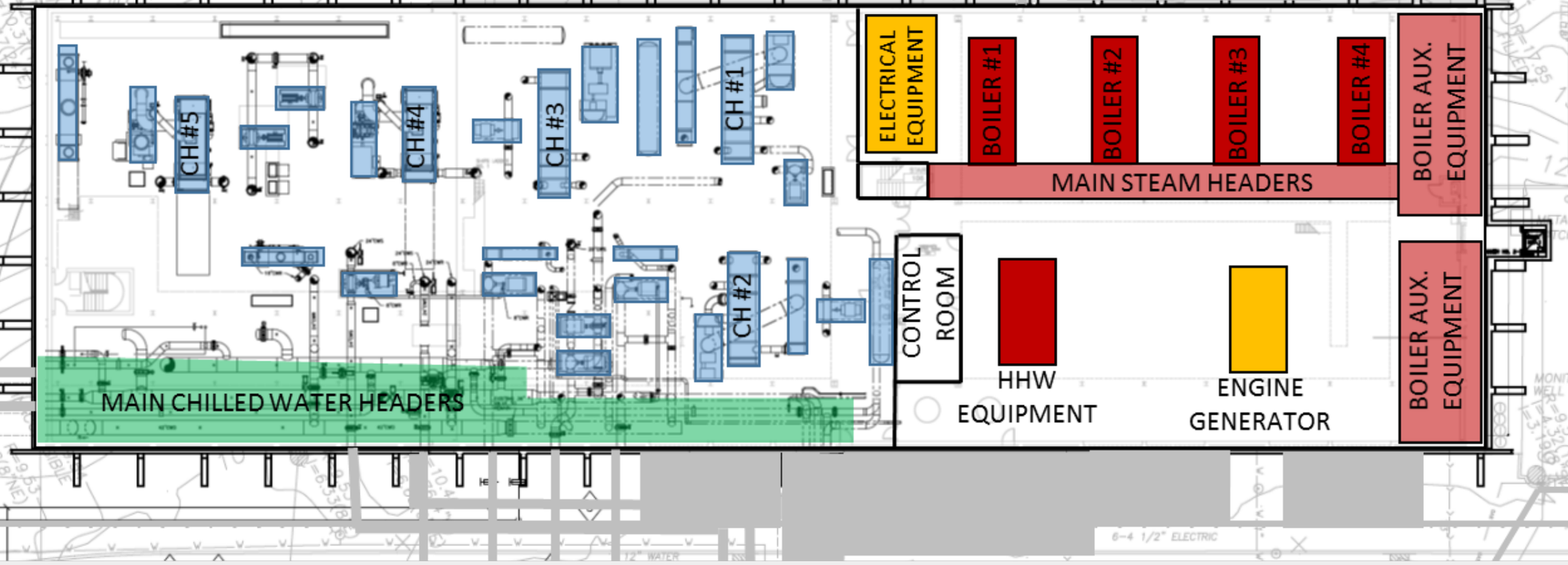
New Central Utility Plant under Construction in 1968



- Relocation of Utility Plant in late 1960s
- Use of lake water to provide central cooling
- Deep water intake constructed in 1987
- Pond used to cool water returned to lake


Northwestern University

Capacity & Expansion



Chillers:

RM-1 – 5,000 ton steam driven (1967)
RM-2 – 5,000 ton electric driven (1972)
RM-3 – 5,000 ton steam driven (1993)
RM-4 – 5,000 ton electric driven (2007)
RM-5 – 5,000 ton steam driven (2007)

Boilers:

B-1 – 77,000 PPH (1967)
B-2 – 70,000 PPH (1967)
B-3 – 70,000 PPH (1967)
B-4 – 150,000 PPH (1983)

EXISTING BOILER STACKS

EXISTING CUP

EXISTING FUEL OIL STORAGE

EX. AIR INTAKE

EX. TRANSFORMER VAULT

EX. AIR INTAKE

EX. AIR INTAKE

EXISTING PUMP HOUSE

UTILITY

CONDENS

REFER 9/M8.1.2

20"CHS

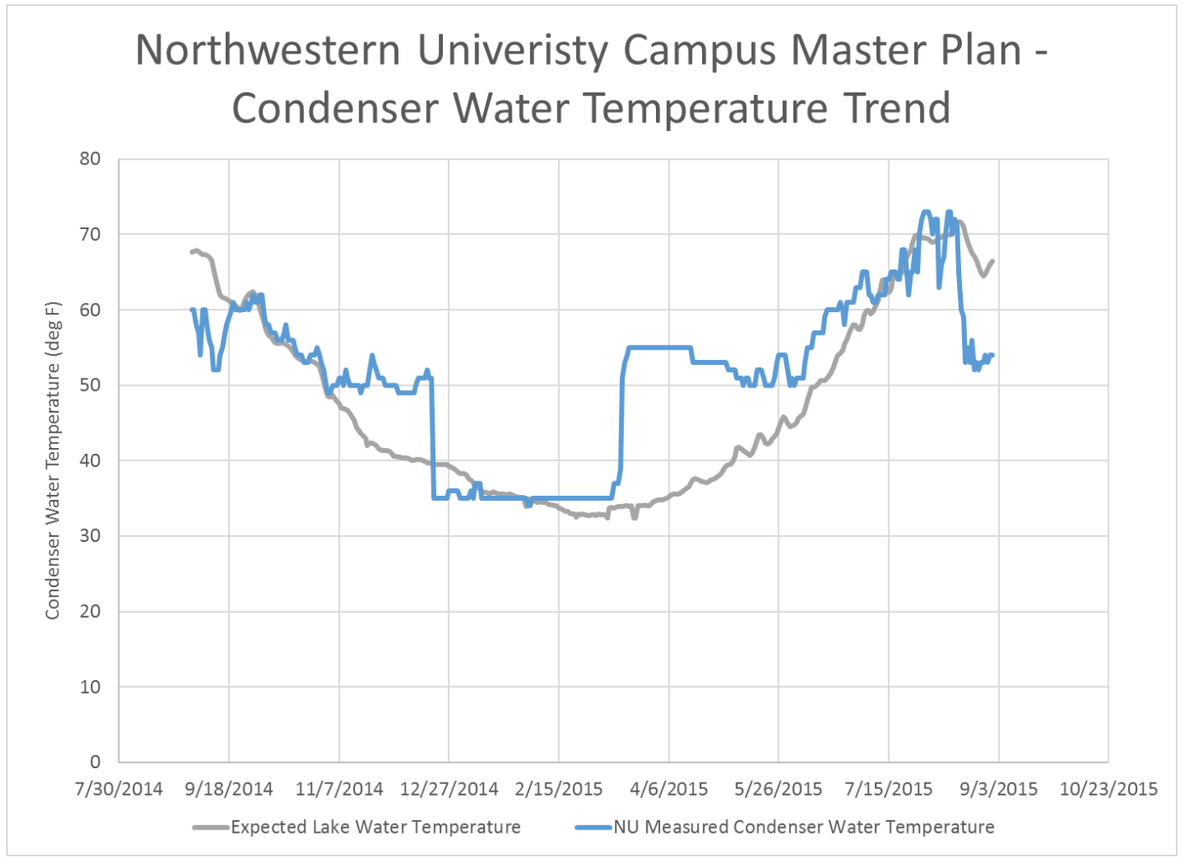
20"CHR

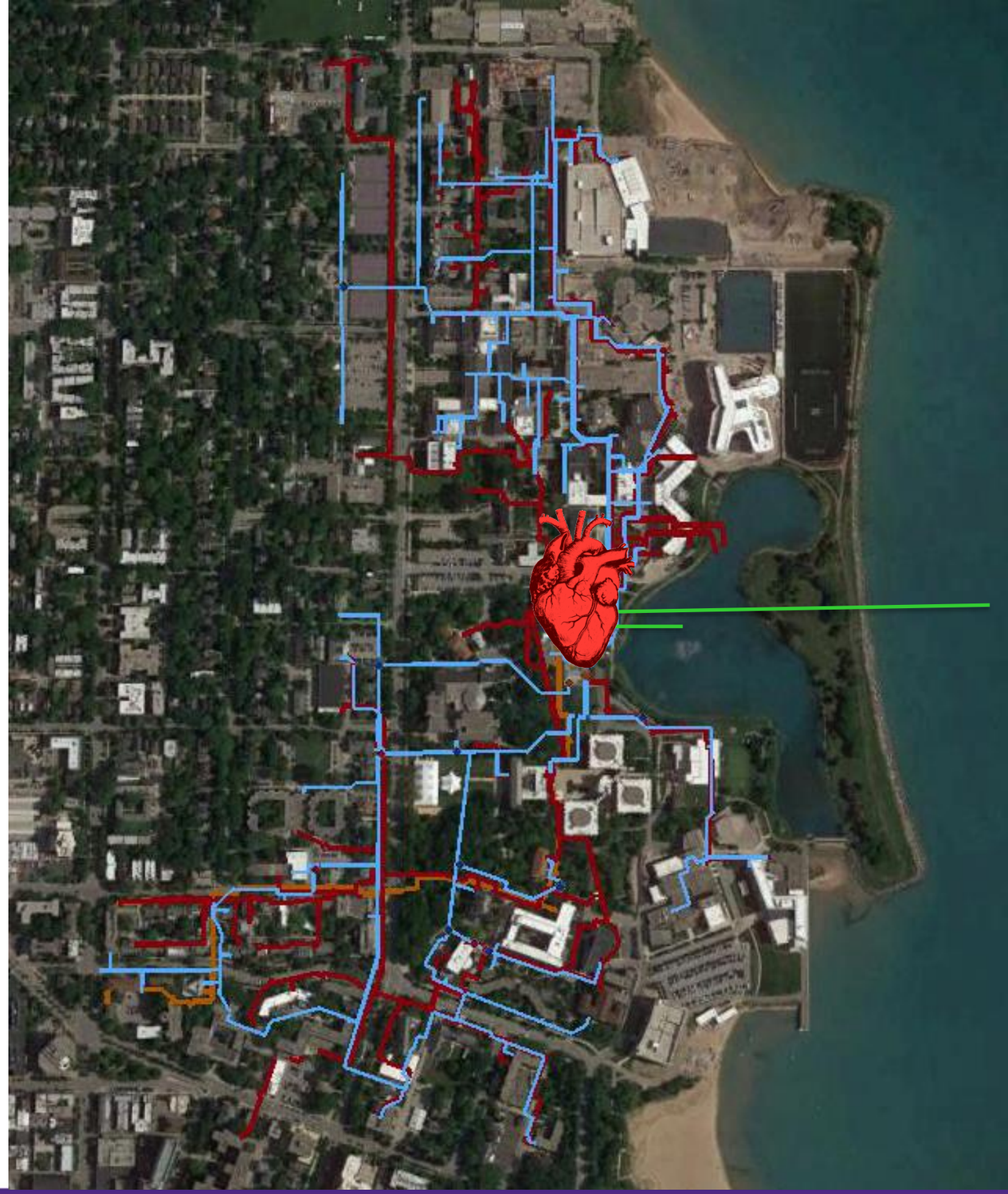
Existing Utility Legend:

- Steam/Condensate
- Heating Hot Water
- Chilled Water
- Condenser Water
- Electric
- Natural Gas
- Storm Sewer
- Sanitary Sewer

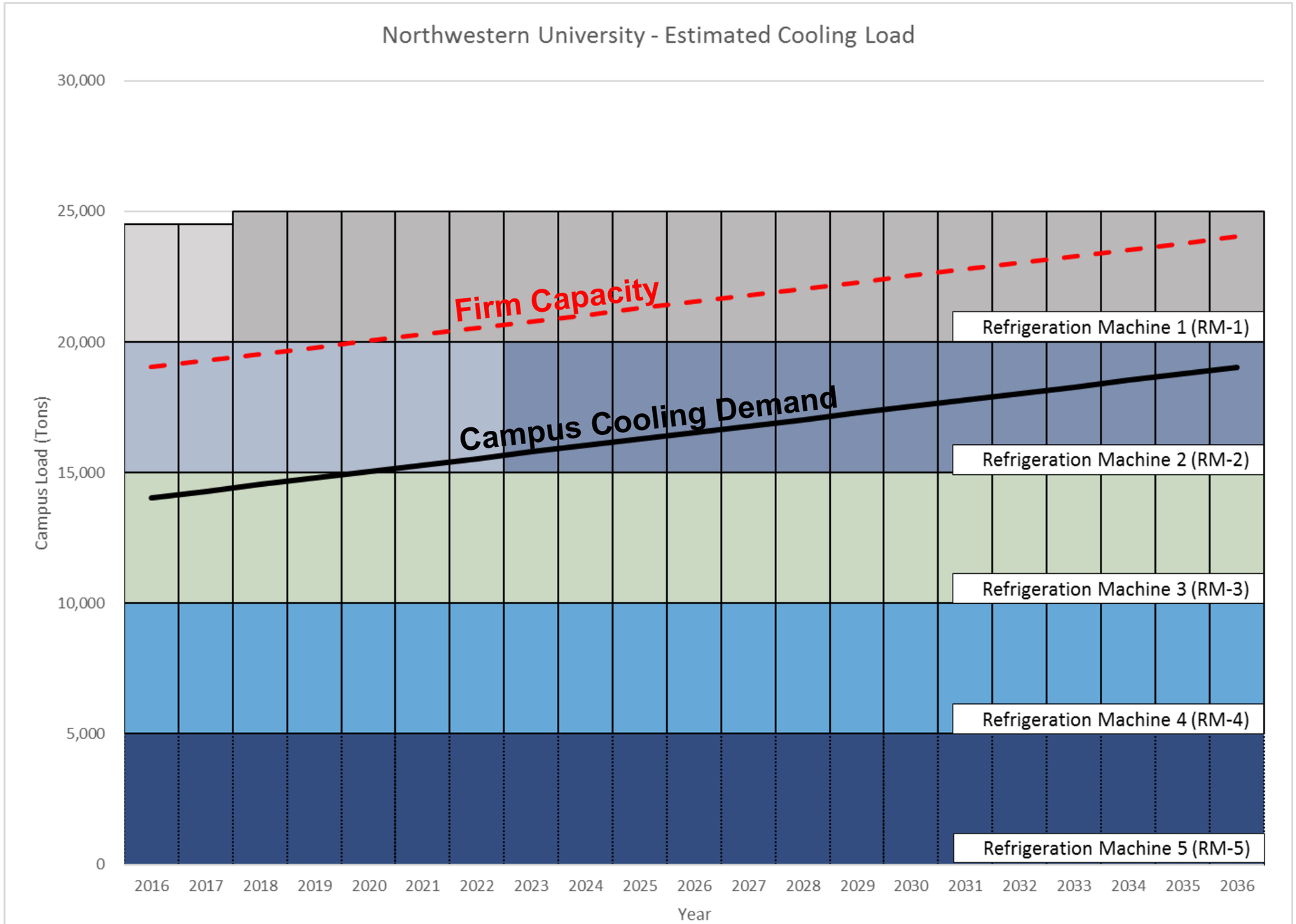
Location

I. Central Utility Plant located in the heart of campus
    I. Hub for utilities
    II. Some radials looped at ends
II. Tied to Lake Michigan





Capacity Compared to Growth Projections



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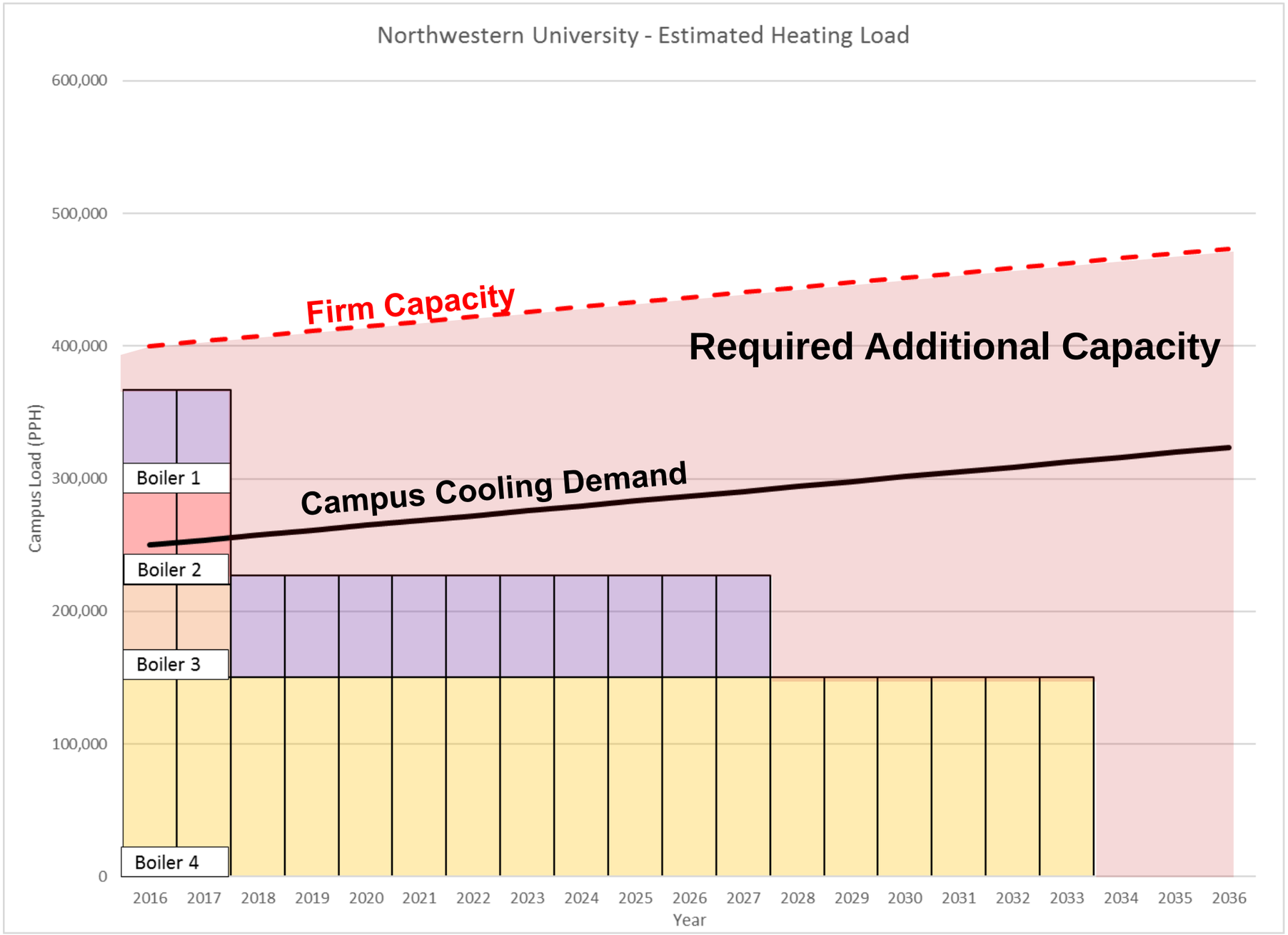


Next Generation Technology Options

I. Considerations of next generation technologies

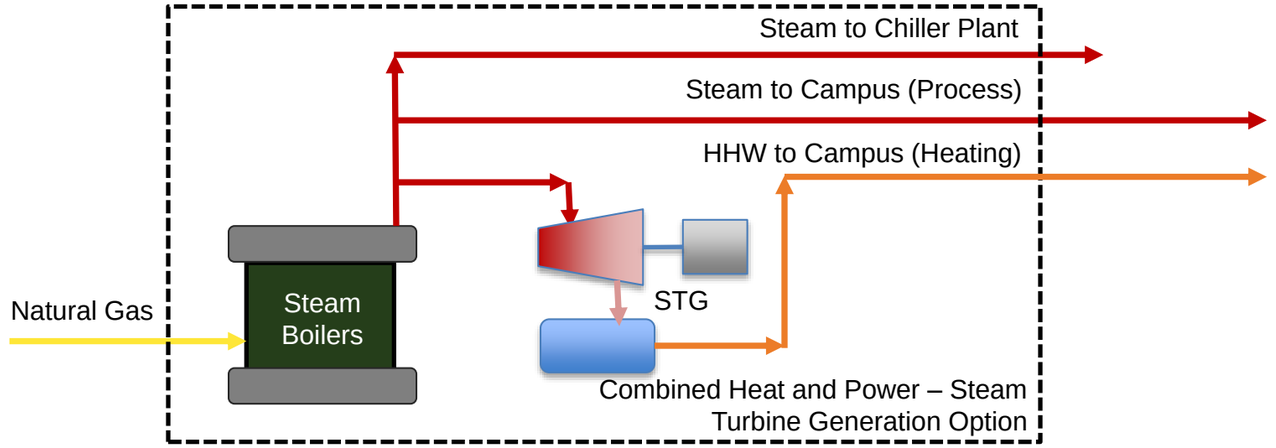
a. Combined Heat and Power

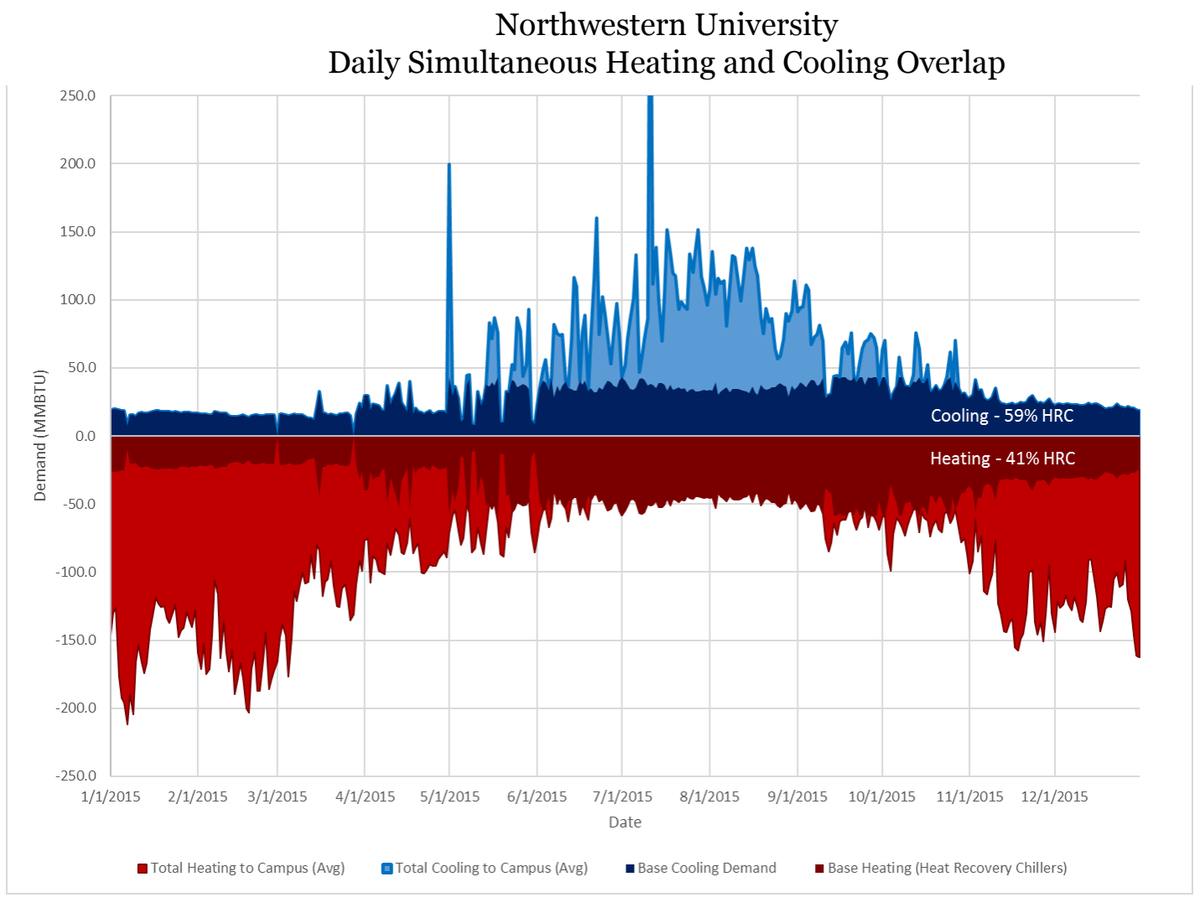
b. Heat Recovery Chillers

c. Thermal Energy Storage

d. Other heating technologies
   a. Geo-Exchange
   b. Fuel Cell Technology
   c. Solar Thermal

e. Integration of LTHW





Site Evaluation

Hypothetical Sites

I. Limited Availability of Sites

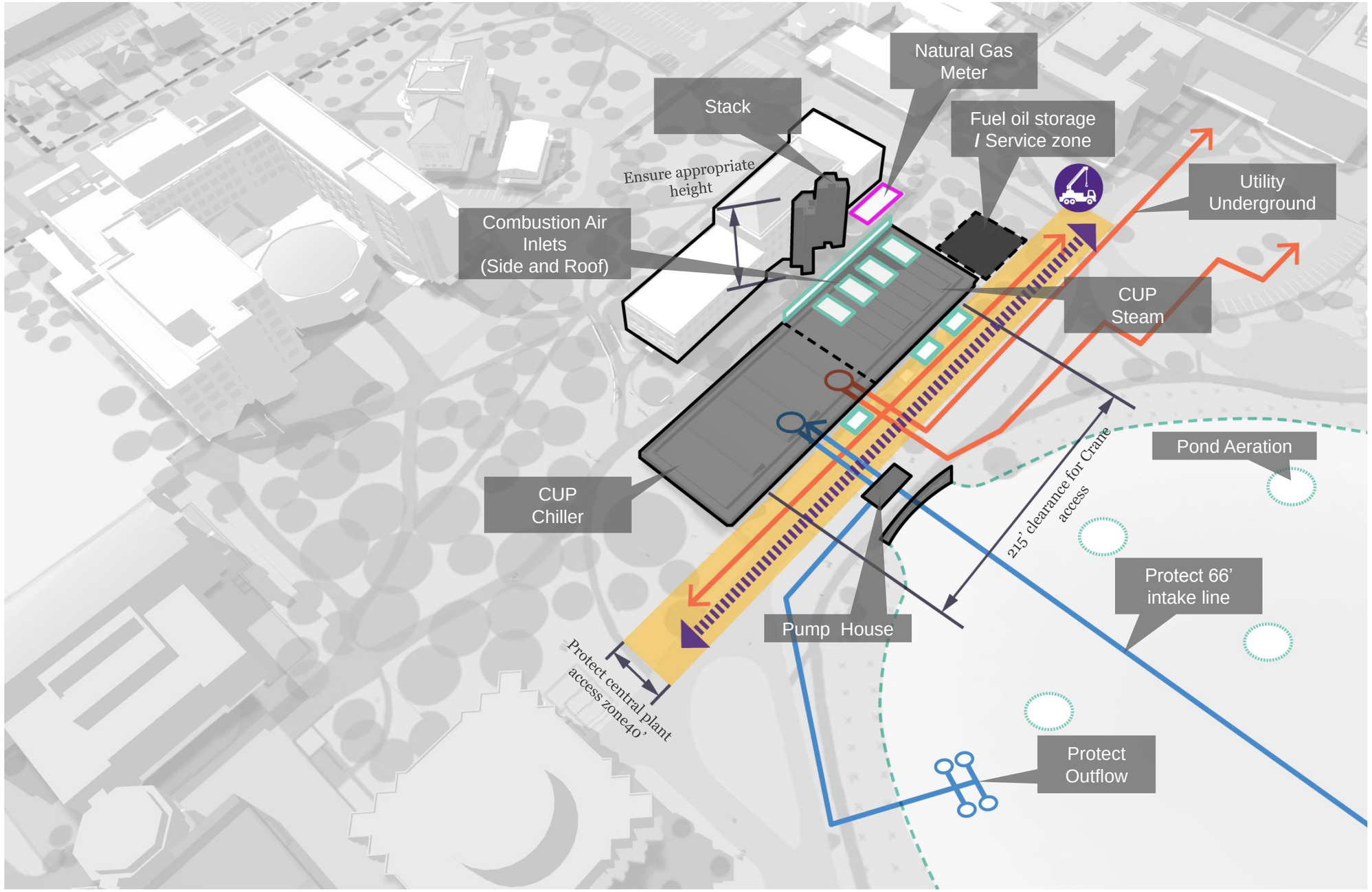
II. Infrastructure Implications

III. Costs

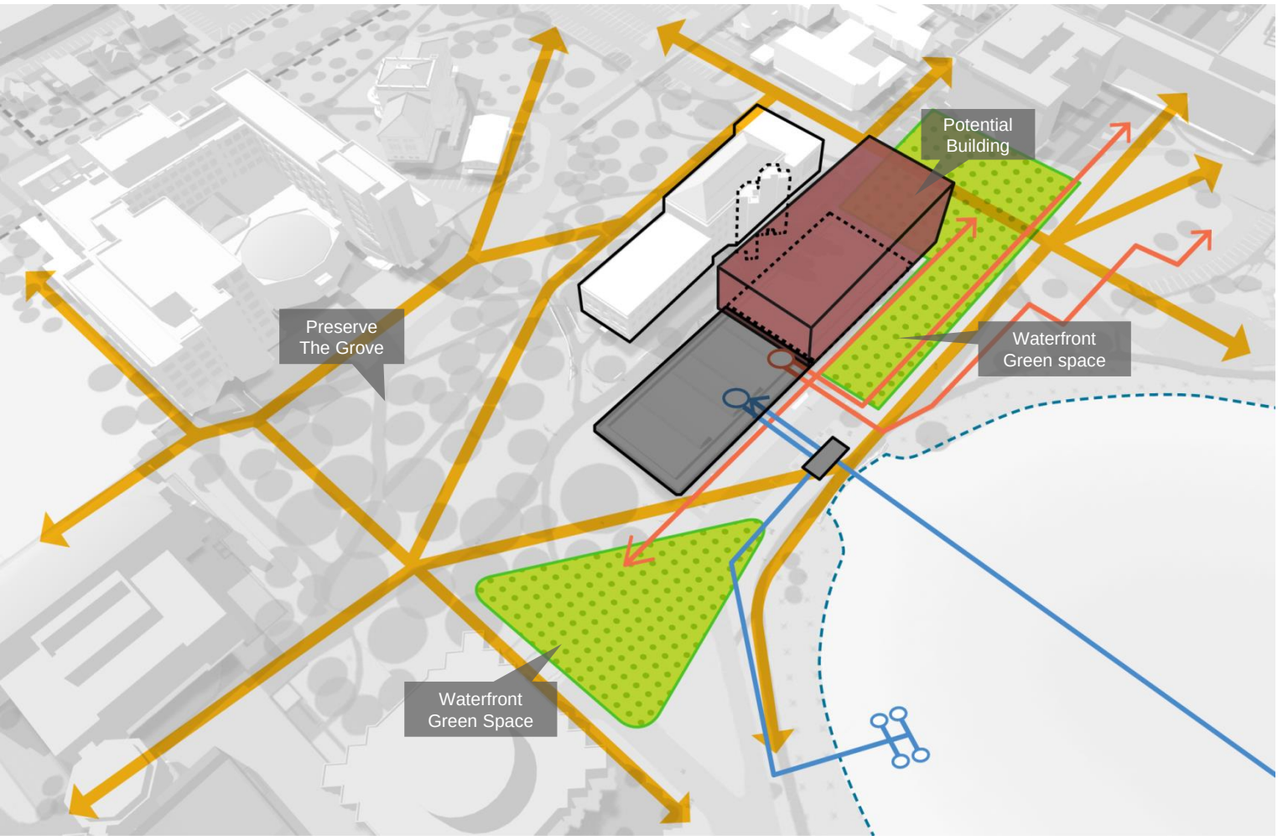
IV. Urban Design Considerations

V. Impact on Community

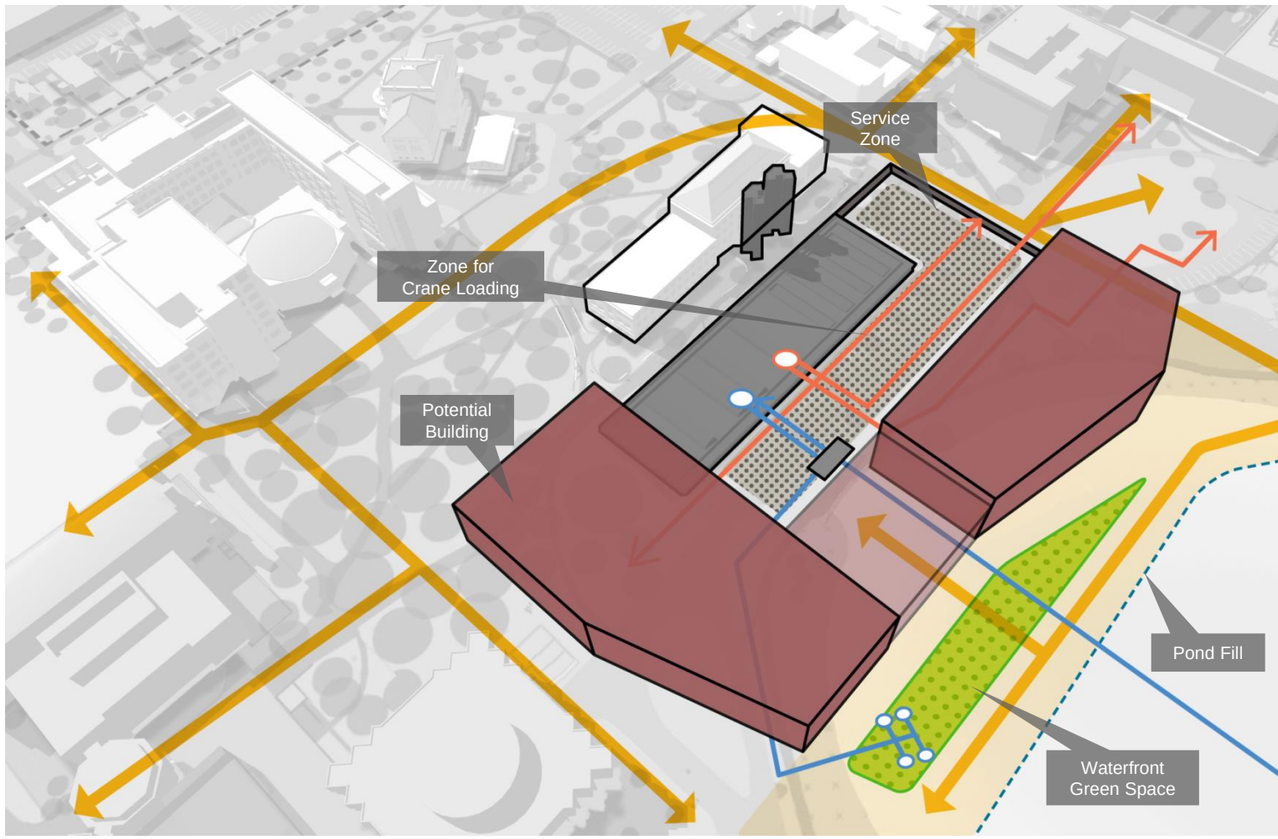
Considerations and Constraints for the Plant



Preliminary Explorations



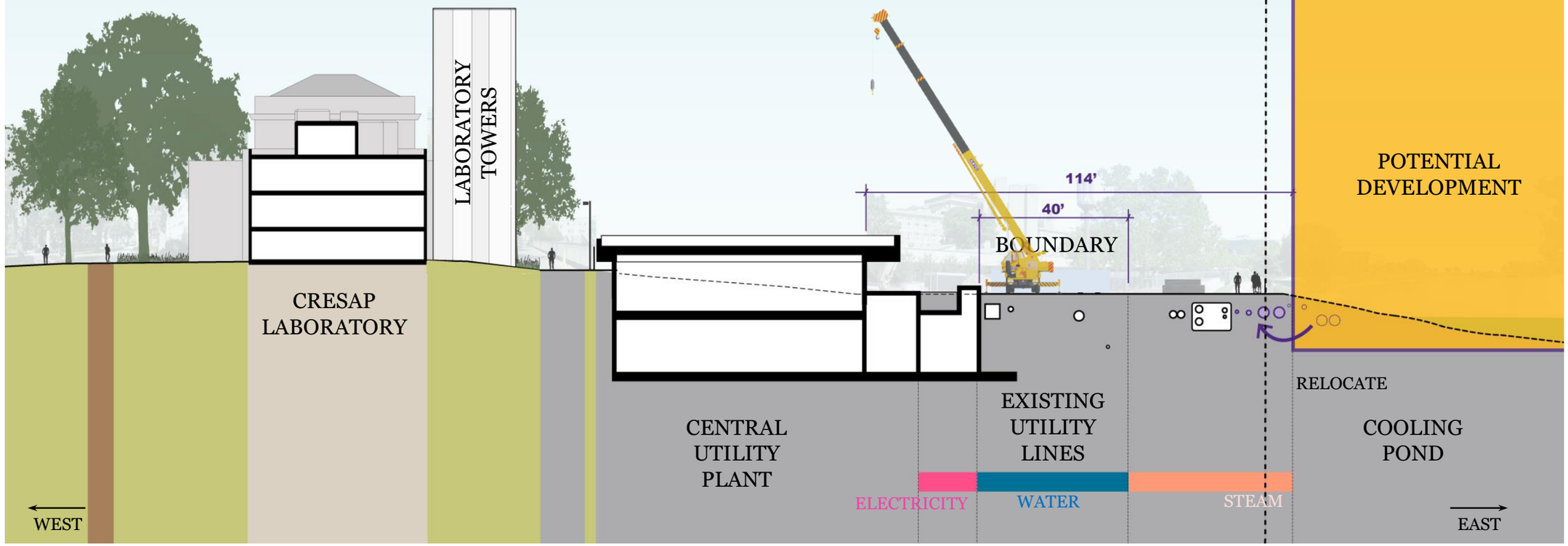
Removes the northern half of the CUP



Maintains the existing location of CUP

Building Near Plant – Pond Fill

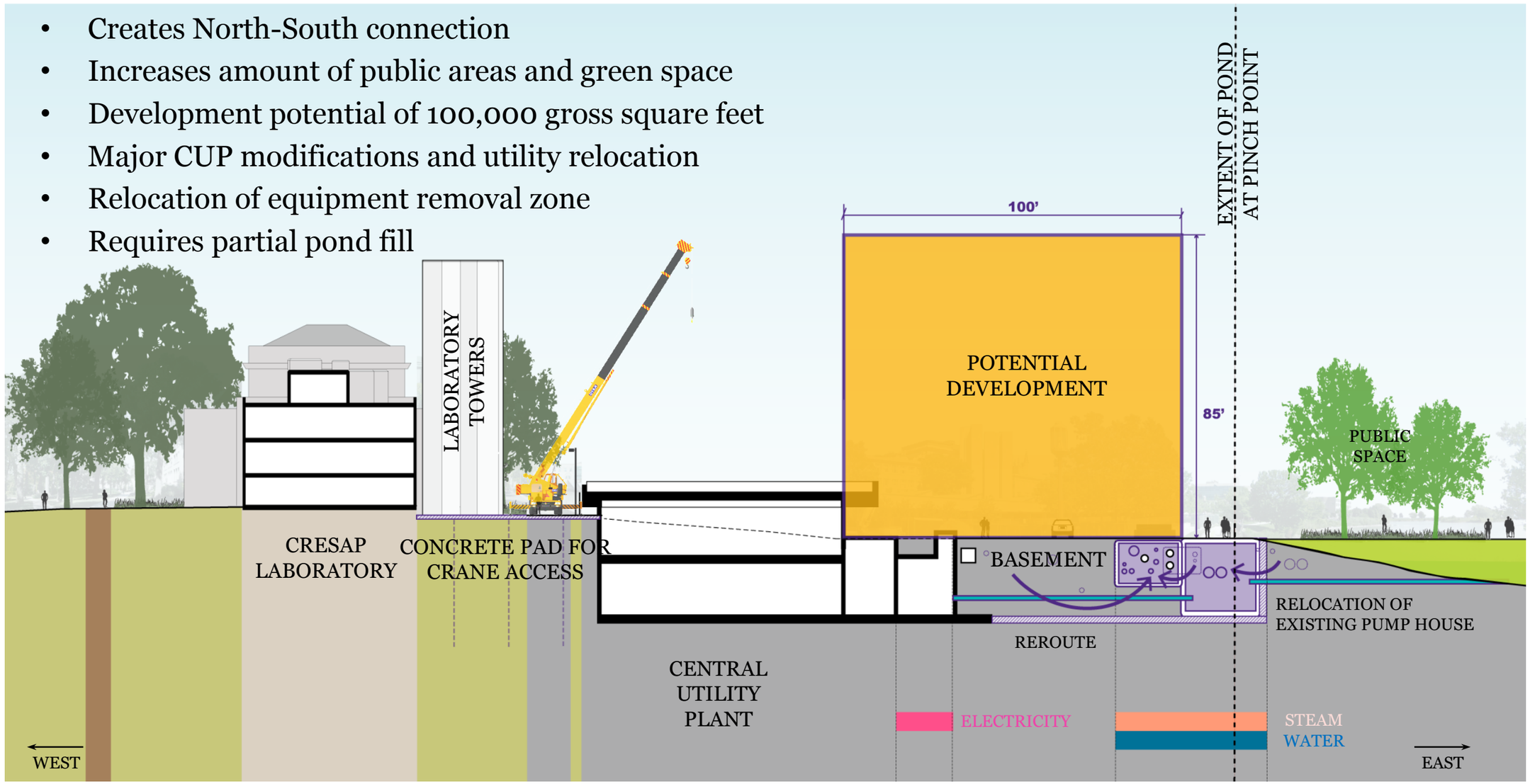
- Leaves pinch point between North and South Campus
- Leaves Central Plant façade in view plane
- Development potential of 100,000 gross square feet
- Minimal relocation of existing utilities
- Requires partial pond fill



- Utility Line
- Utility Vault

Building Adjacent to the Plant

- Creates North-South connection
- Increases amount of public areas and green space
- Development potential of 100,000 gross square feet
- Major CUP modifications and utility relocation
- Relocation of equipment removal zone
- Requires partial pond fill



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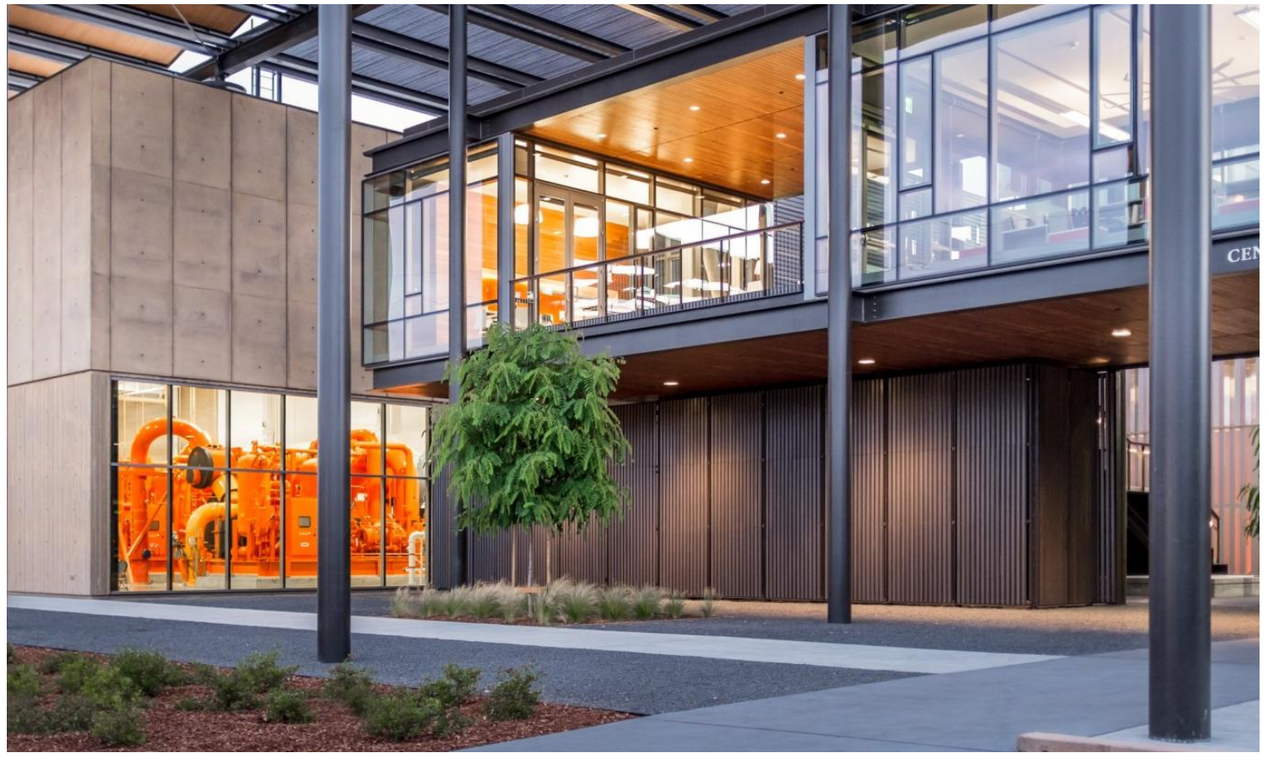

Conclusions

- Moving plant deserves careful analysis
  - Retirement of major equipment
  - Need for plant transition and expansion ideal time to consider moving a plant

- Demands partnership of university, urban designer, master planner, and utilities infrastructure engineer

- Complicated and expensive to move a central plant
  - Requires workable and available alternative sites

- Incorporate the central plant into the design of campus spaces and buildings

- Northwestern's likely alternative: integrate existing plant into campus plan as a complement to future development and programs
  - Opportunity to reshape and activate an important campus location
  - Opportunity as a laboratory for learning