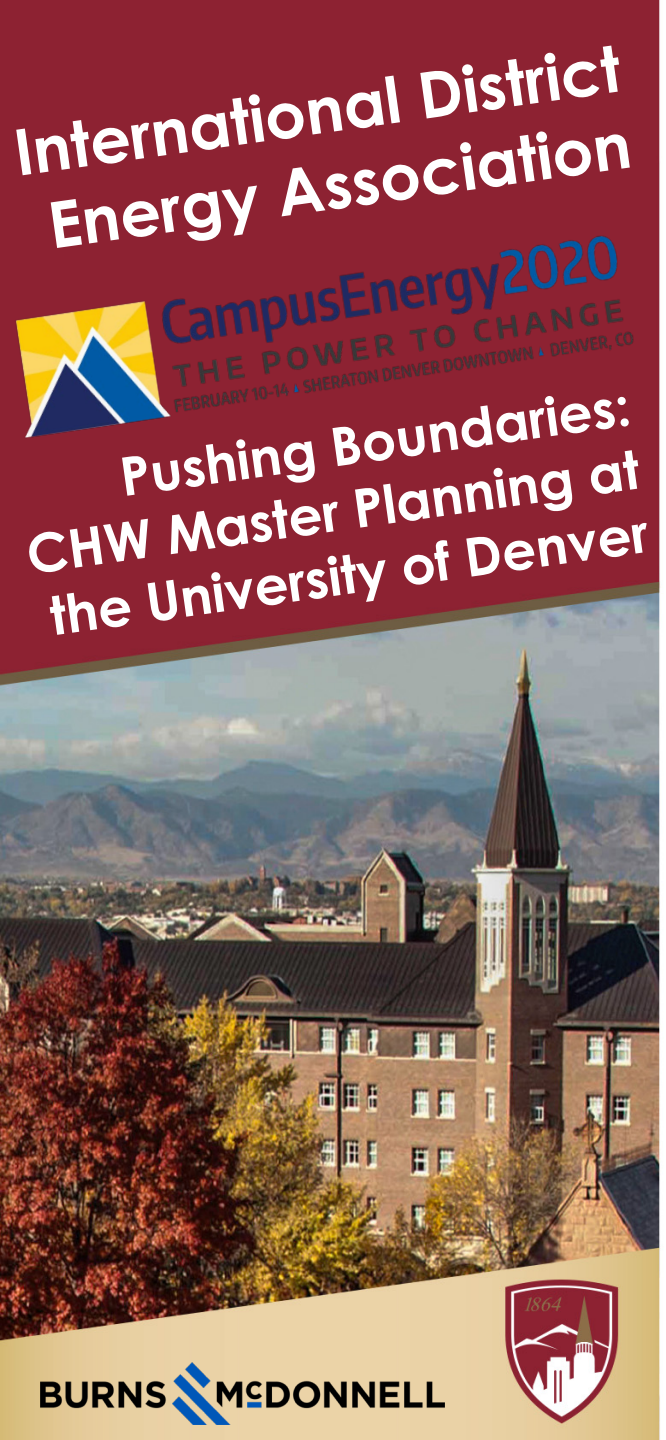
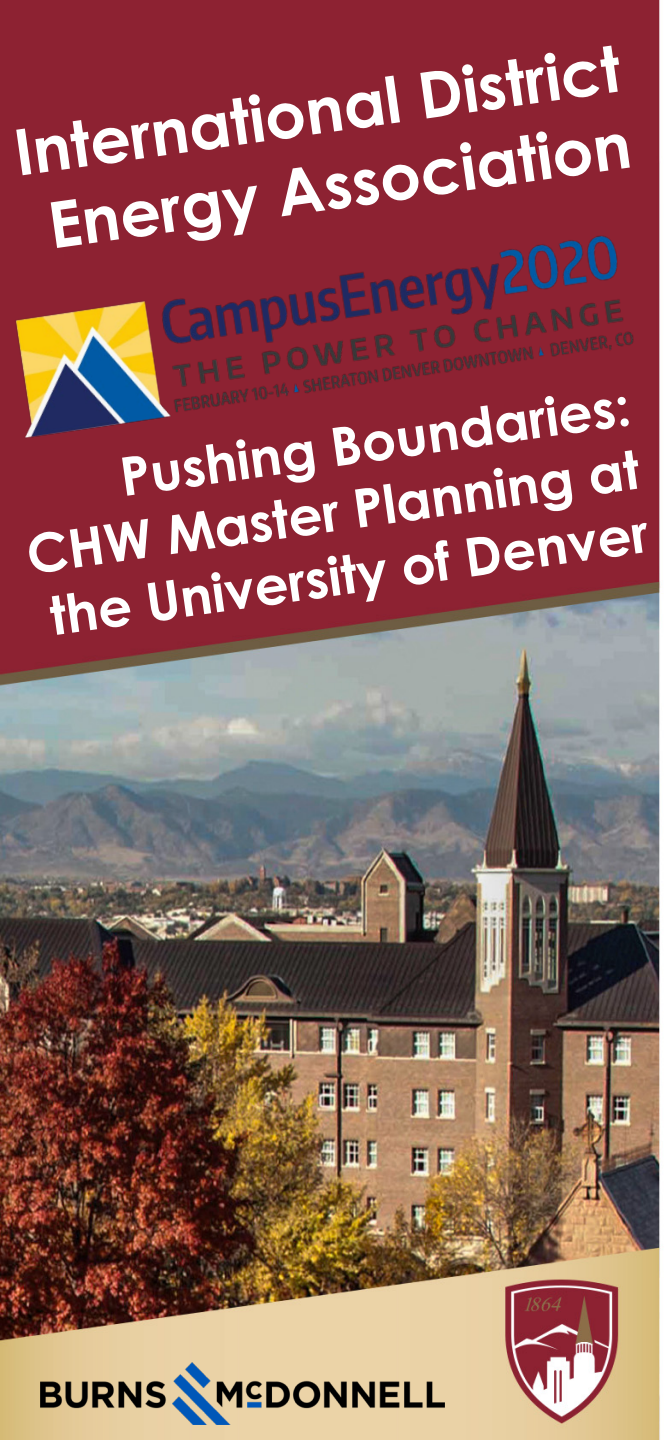


Pushing Boundaries: CHW Master Planning at University of Denver

February 10-14, 2020

Lynn Bailey, P.E.

Jeff Easton, P.E.



Agenda:

- Campus Background
- Existing System
- CHW Analysis
- Recommendations
- Putting into Practice

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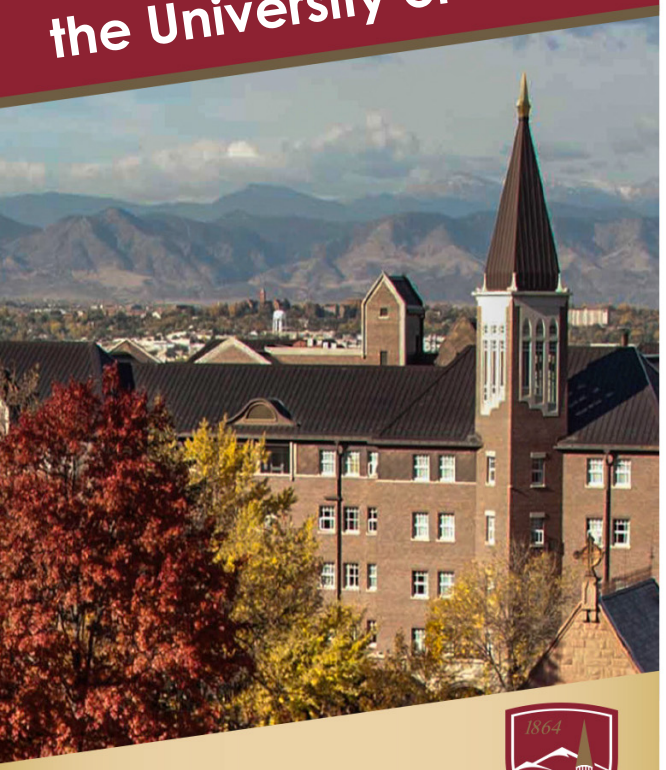

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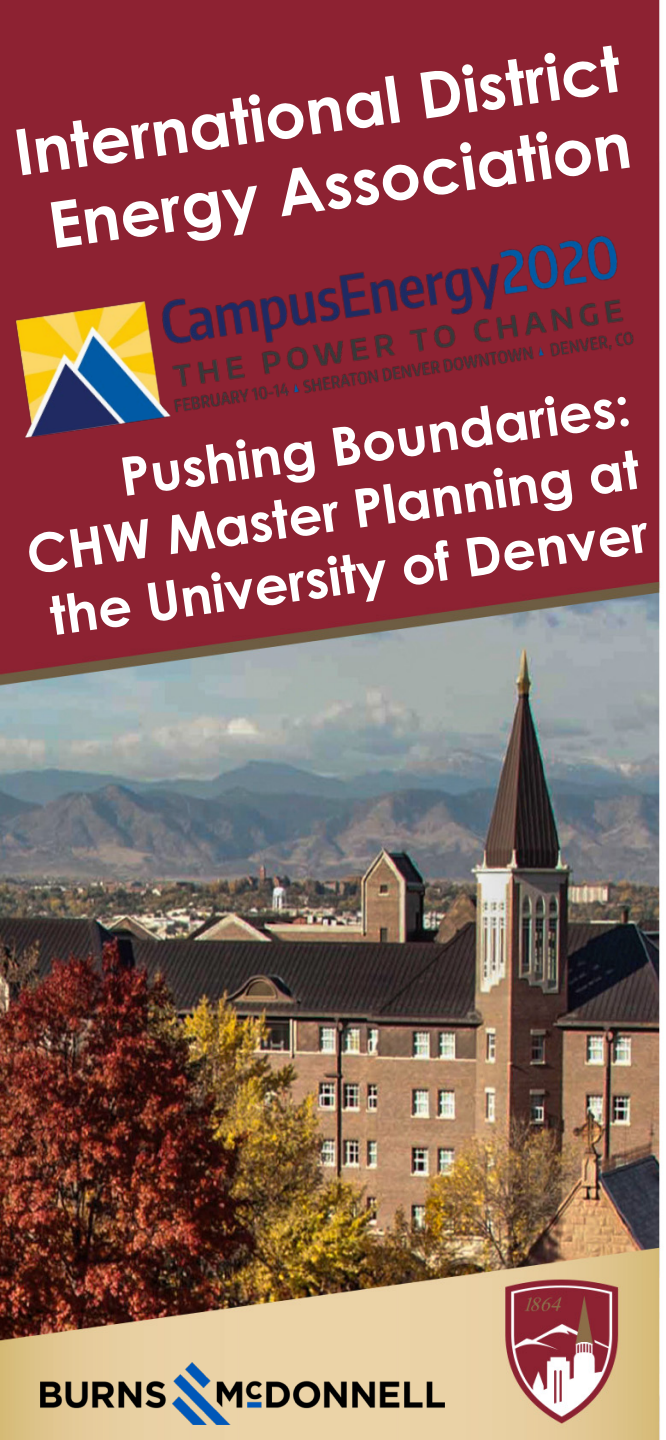
University of Denver (DU)

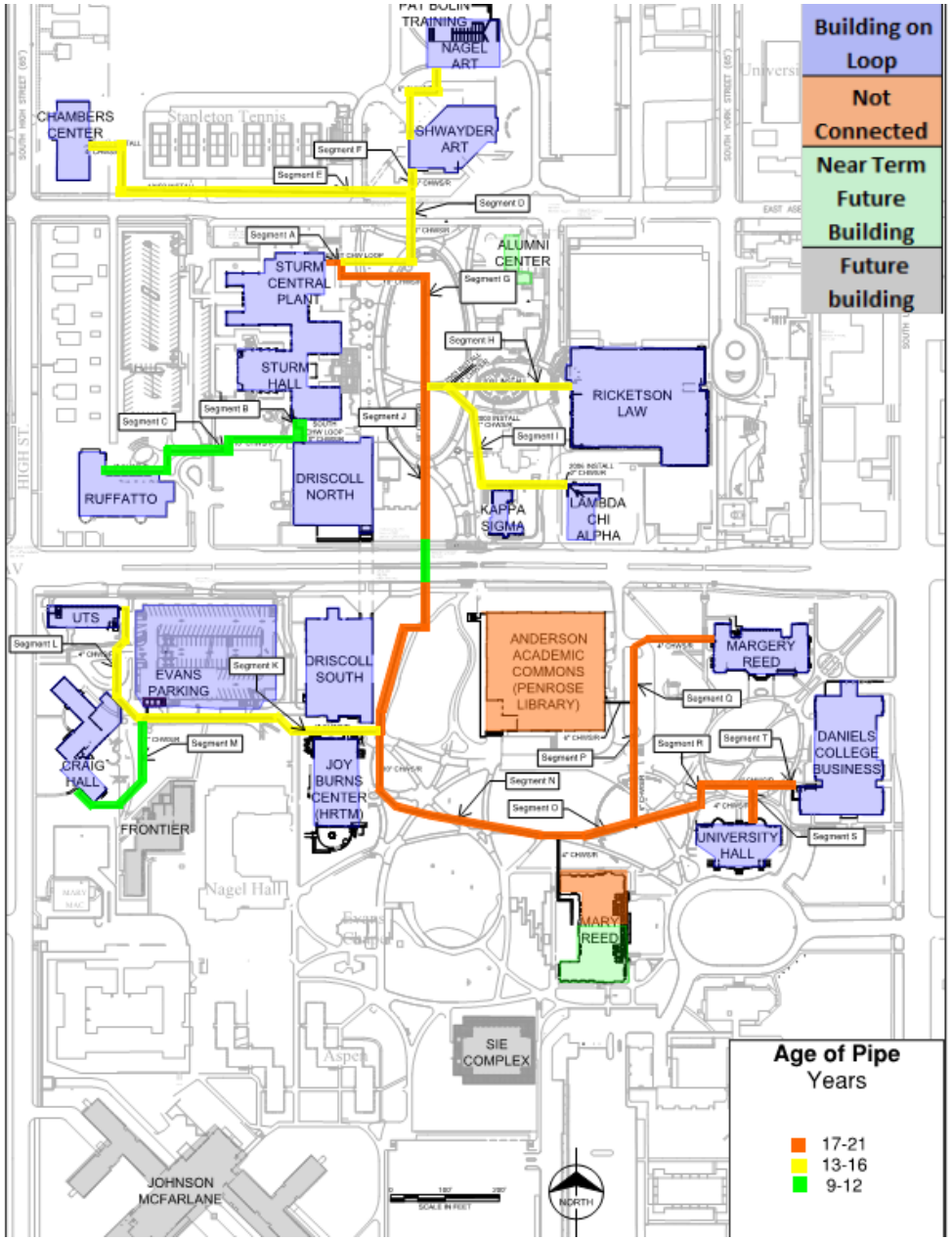
- Founded in 1864 as Colorado Seminary in the Colorado Territory
- 3.8 million square feet over 125 acres in the City of Denver
- 11,500 students & 3,800 staff/faculty
- Campus is a working Arboretum
- Great Private University dedicated to the Public Good
- 18 of 88 Buildings on Central Plant (Sturm Hall)

University Hall: 1864

Engineering/Computer Science: 2017



Existing CHW Distribution



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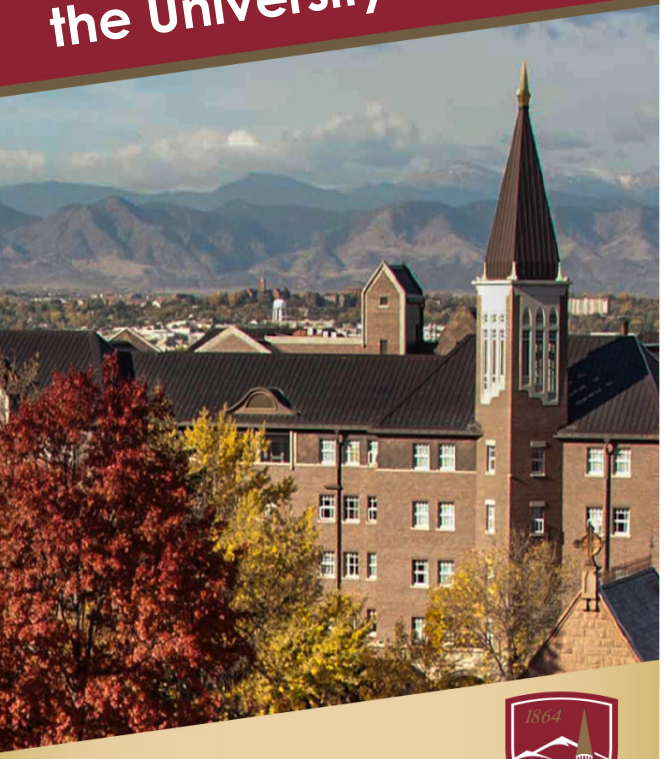

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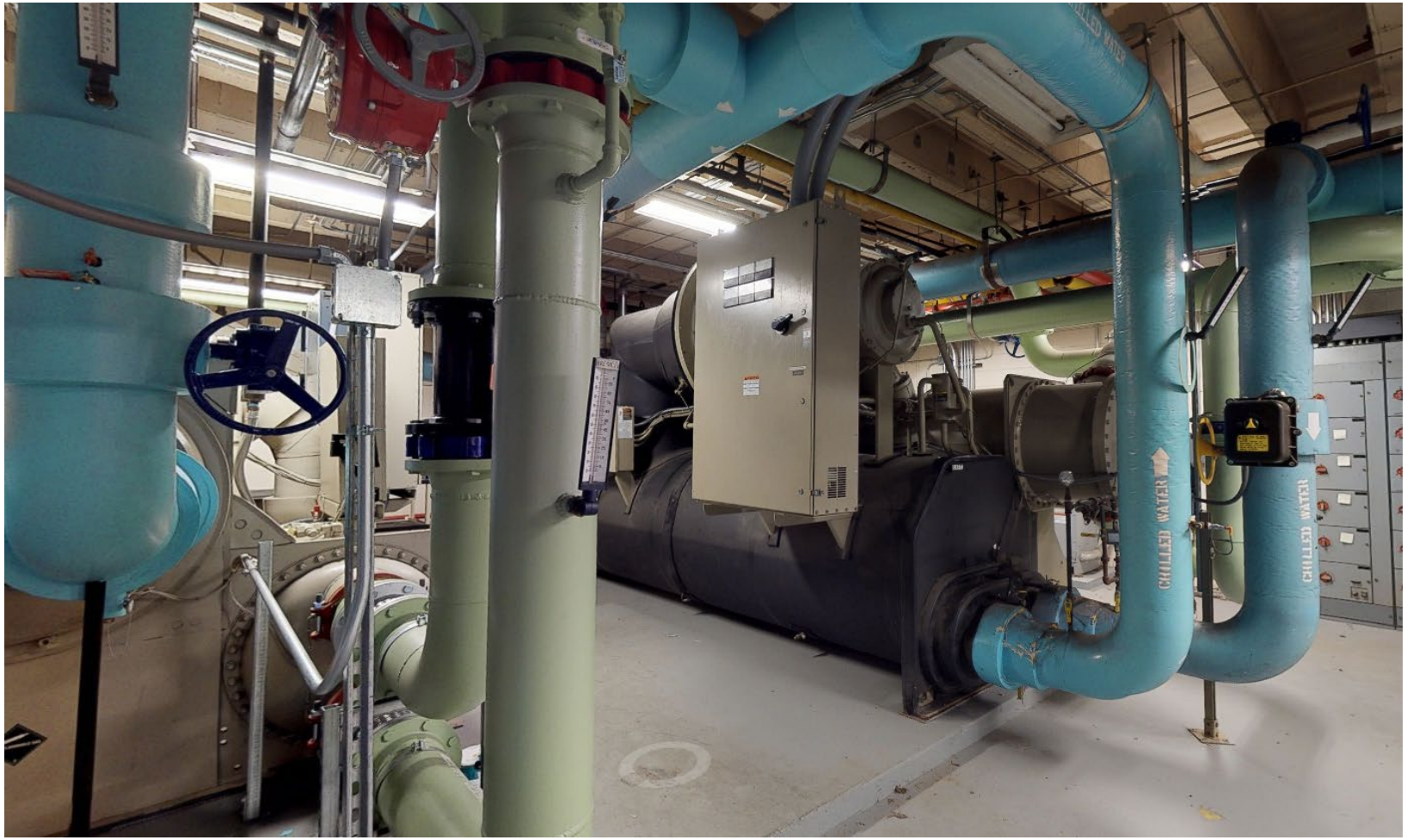
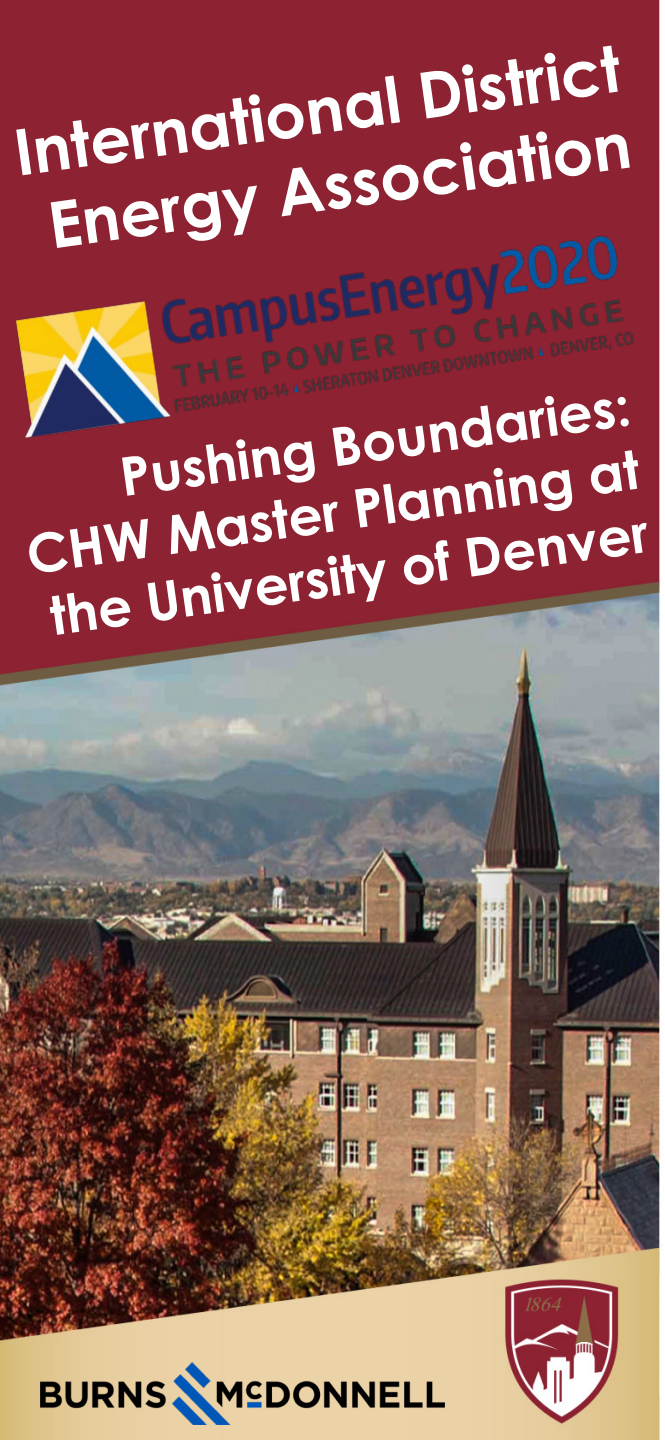
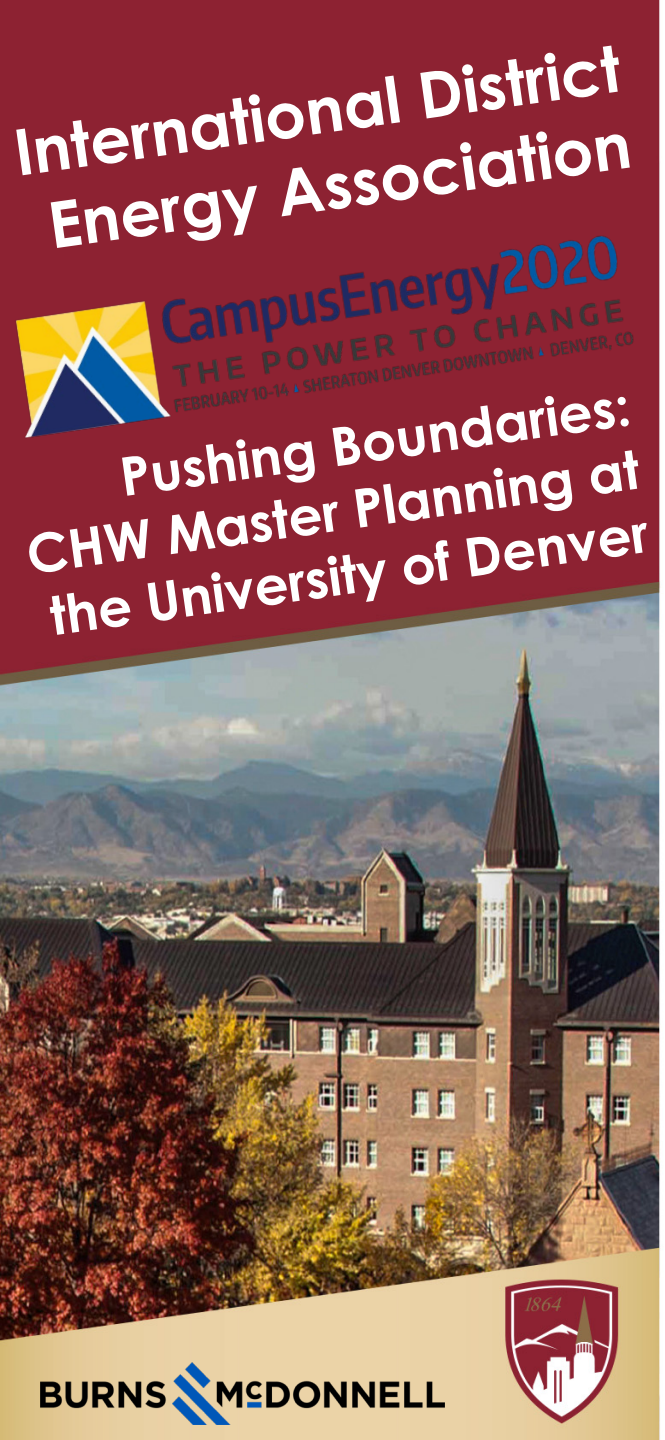
Existing CHW Production





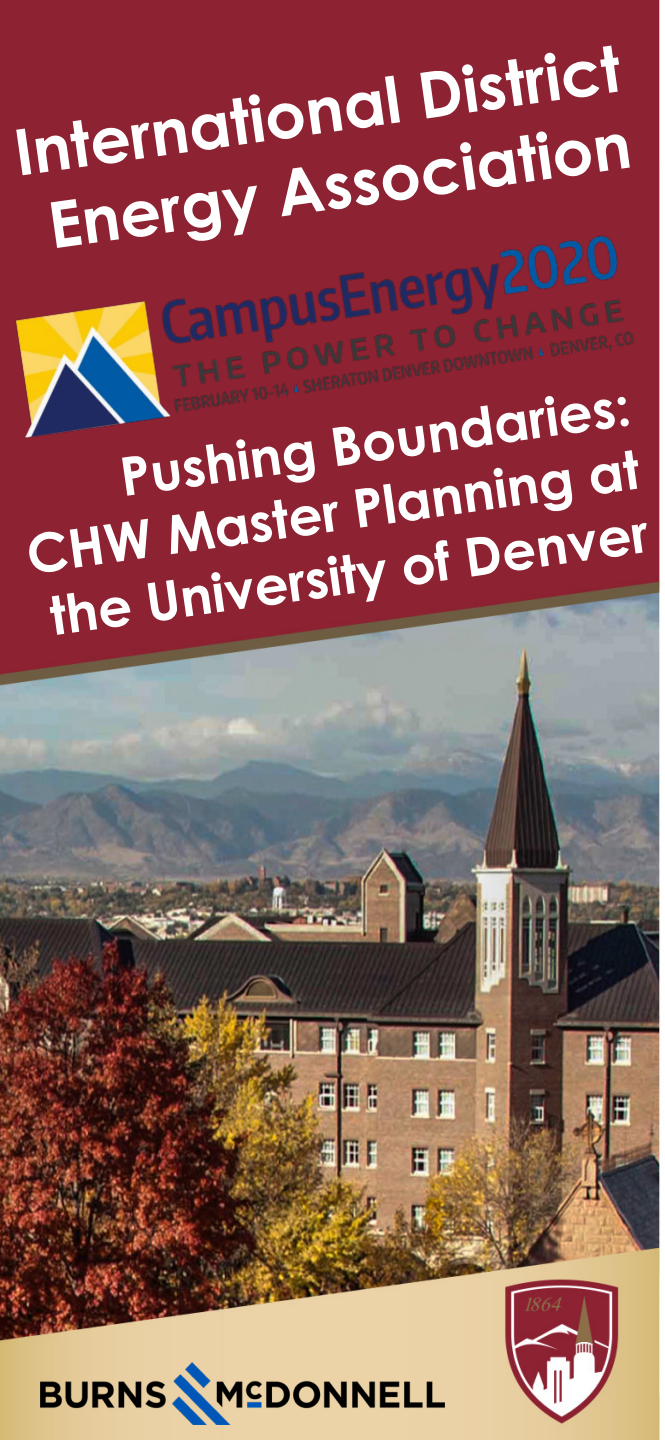
Future Growth



CHW Analysis:

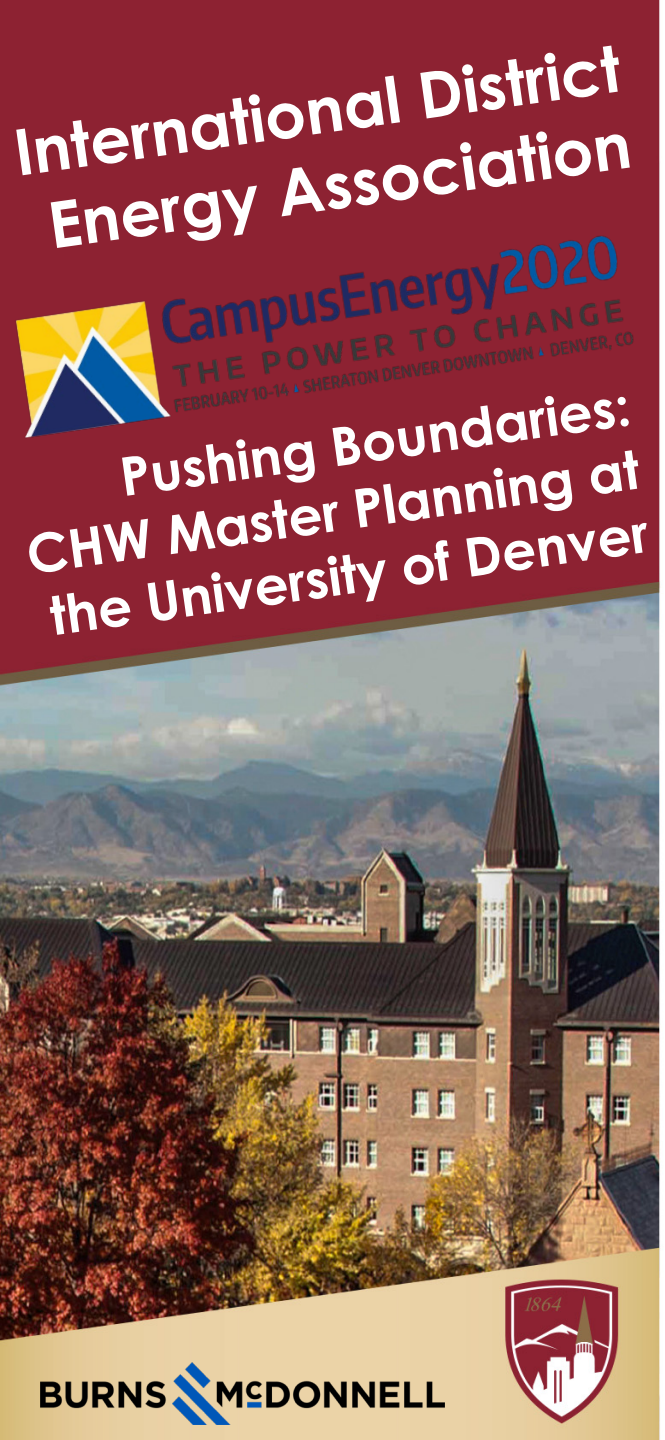
1. Quantify existing situation
2. Forecast load growth
3. Future Recommendations

Goal: Provide reliable CHW service in the future with minimal campus disruption



CHW Analysis:

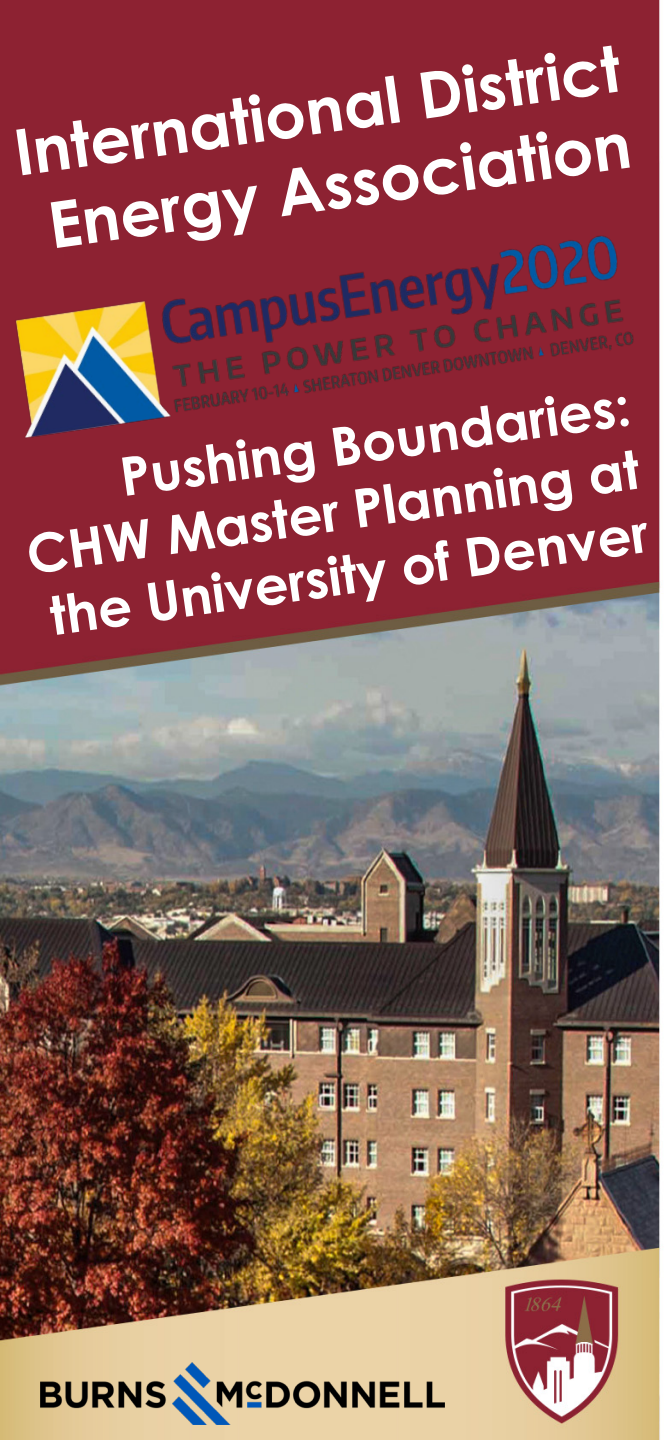
1. Quantify existing situation
   a) As-builts
   b) Existing data
   c) Additional metering



CHW Analysis:

PVC Piping

- Performs differently than steel
- Surge pressure calculations
- Sudden shutdown driving case
- Higher velocities possible
- Approach carefully!



CHW Analysis:

2. Forecast load growth

Campus Framework Phase	Building Name	GFS	Flow (GPM)	Tons
Phase 1B*	Sturm Renovation	47,718	254	149
	Community Commons	132,000	707	413
	Driscoll South Renovation	4,972	24	16
	Mary Reed	77,293	414	414
	Phase 1B Subtotal:	261,983	1,399	992
Phase 2A	Central Campus Academic Facility	130,425	699	408
Phase 3A	Graduate Psychology Clinic	115,200	617	360
Future Buildings	Anderson Academic Commons	142,990	513	299
	Shwayder Art Renovation	62,540	335	195
	Frontier Hall	43,920	275	83
	Future Buildings Subtotal:	249,450	1,123	577
Total:		757,058	3,838	2,337

*Near-term buildings are Phase 1B

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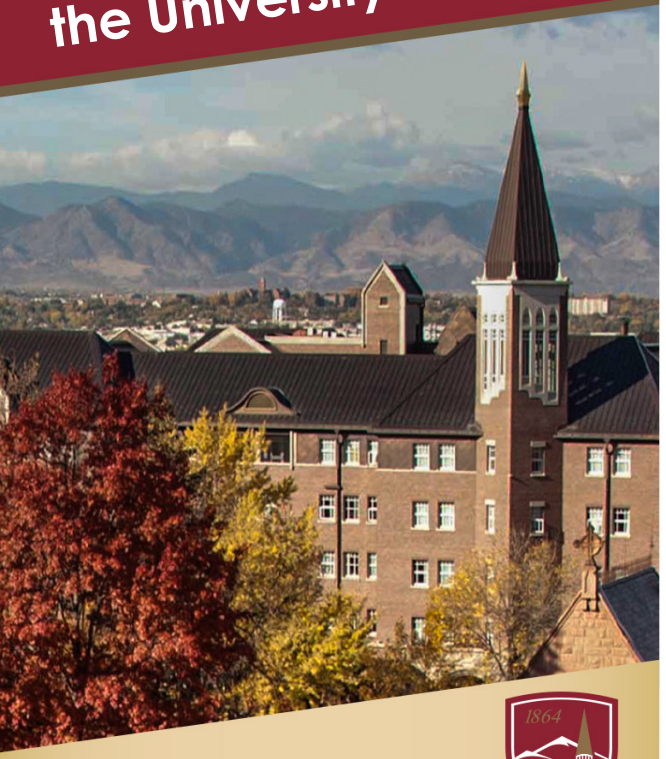

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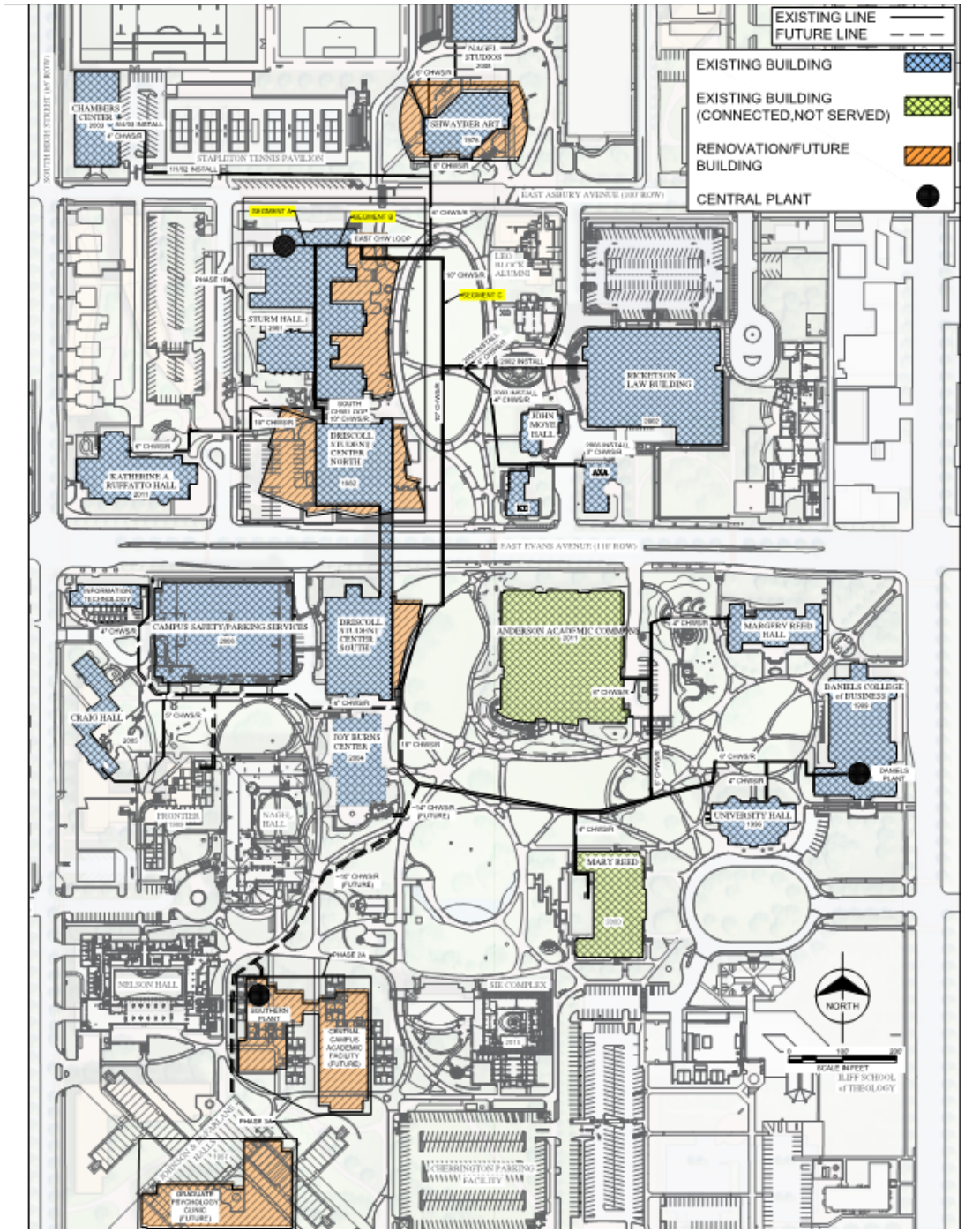

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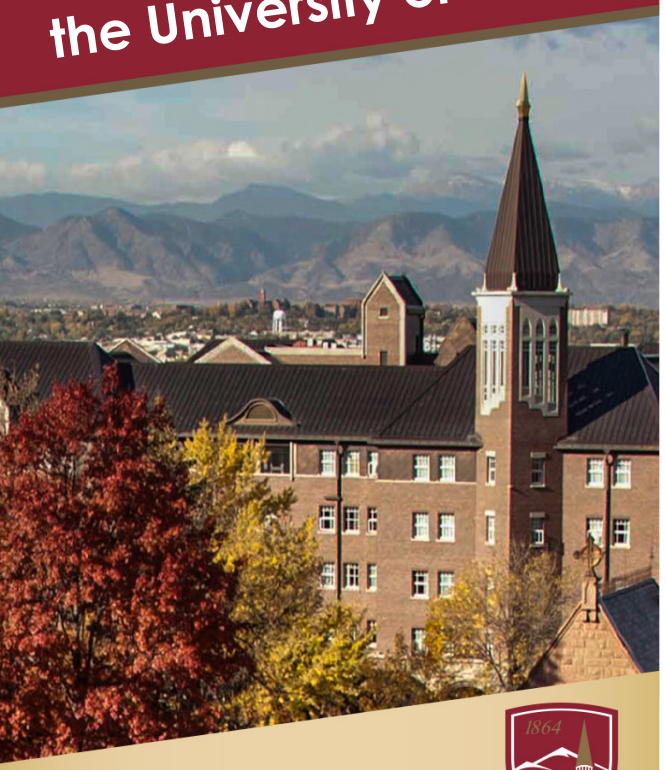

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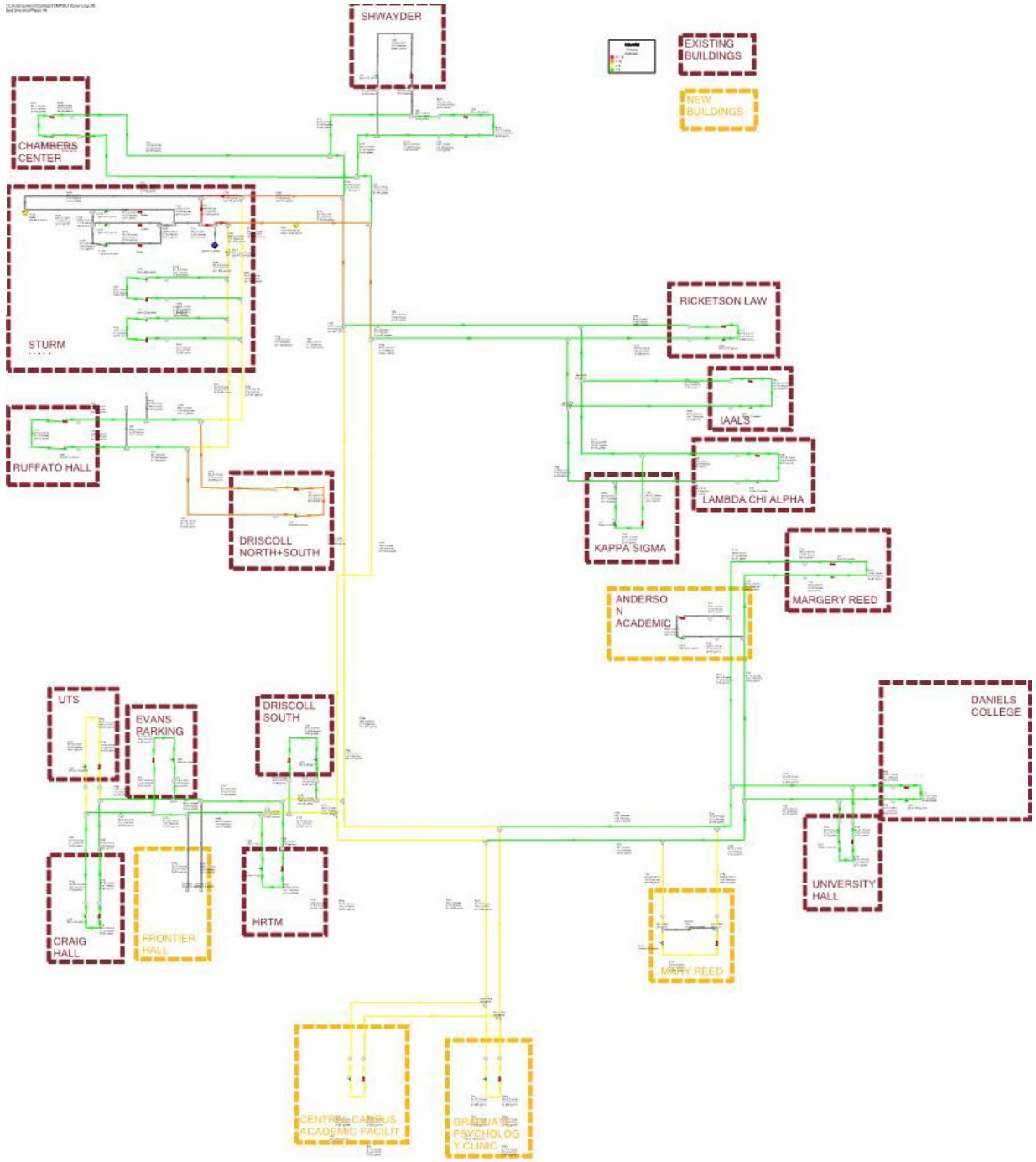
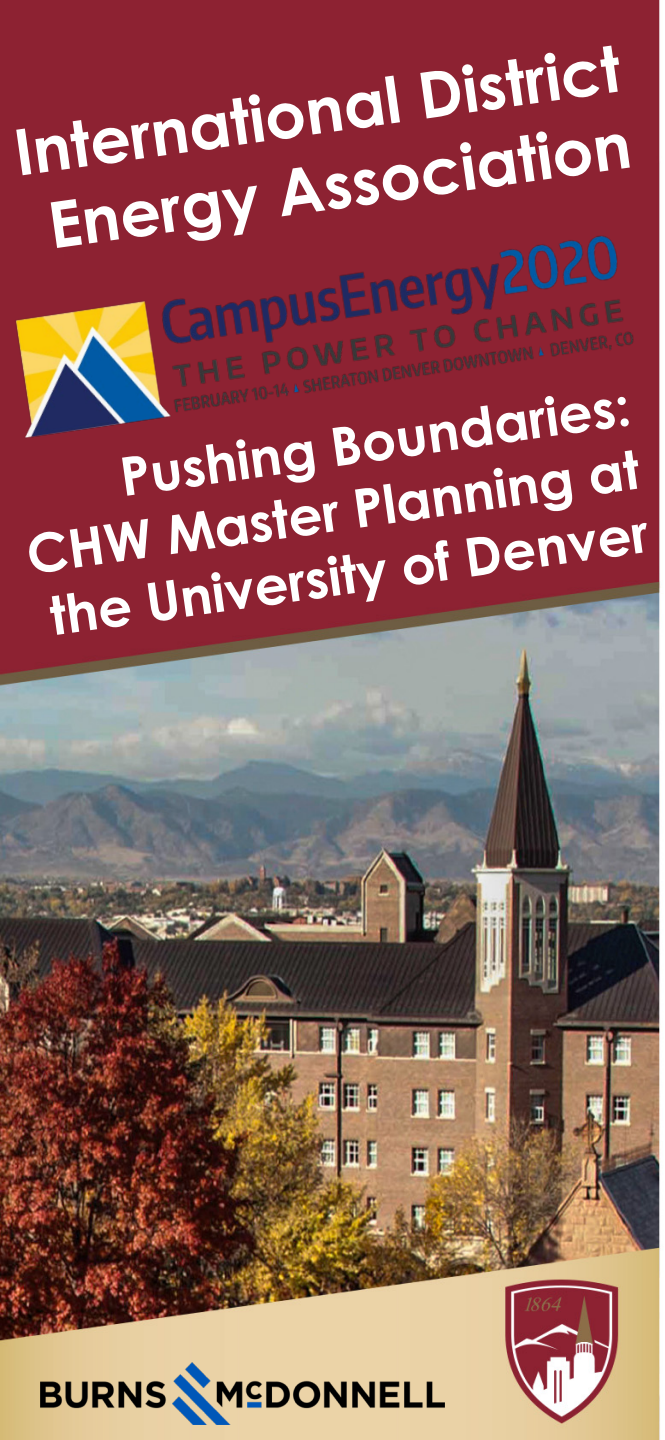
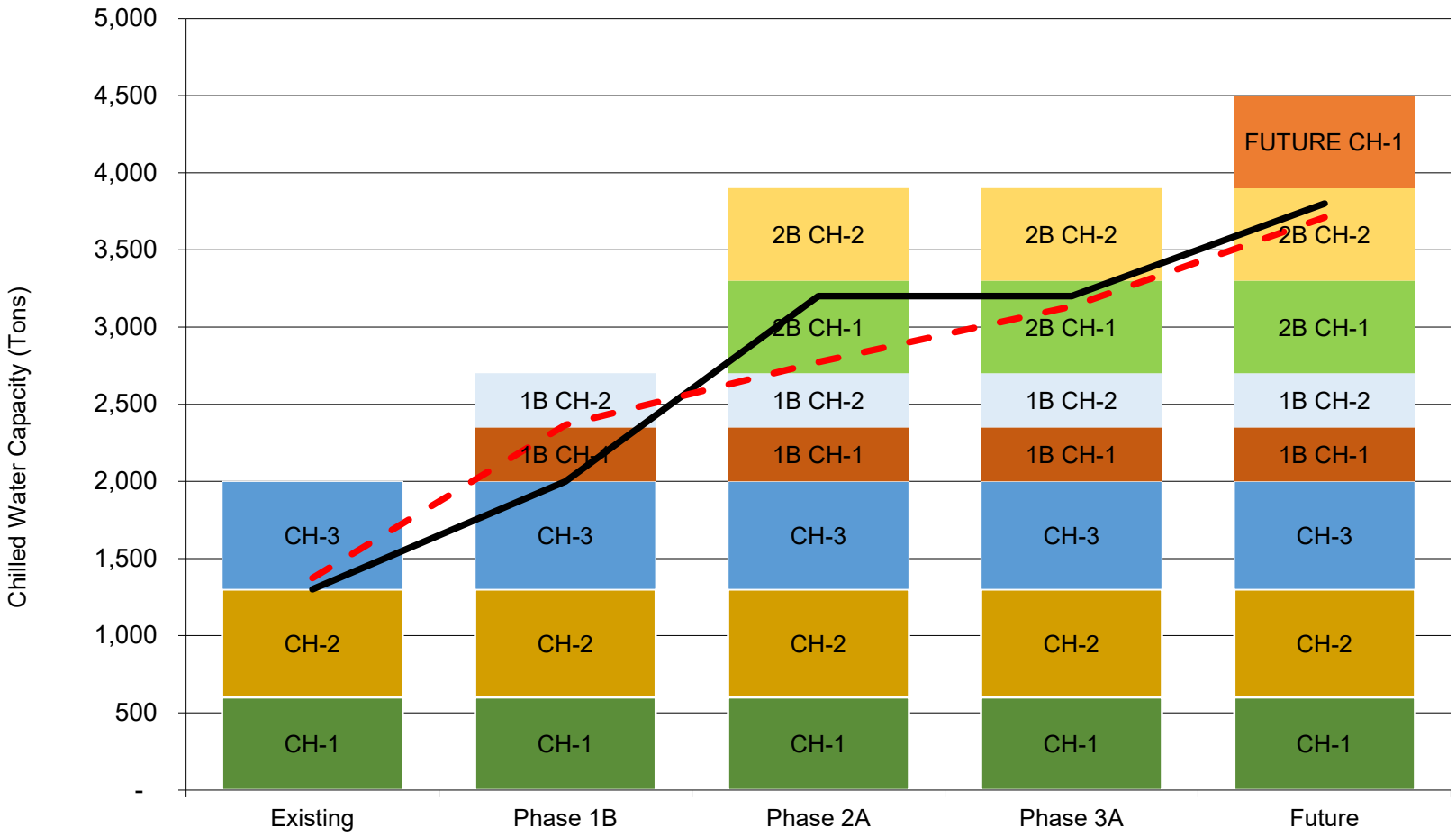
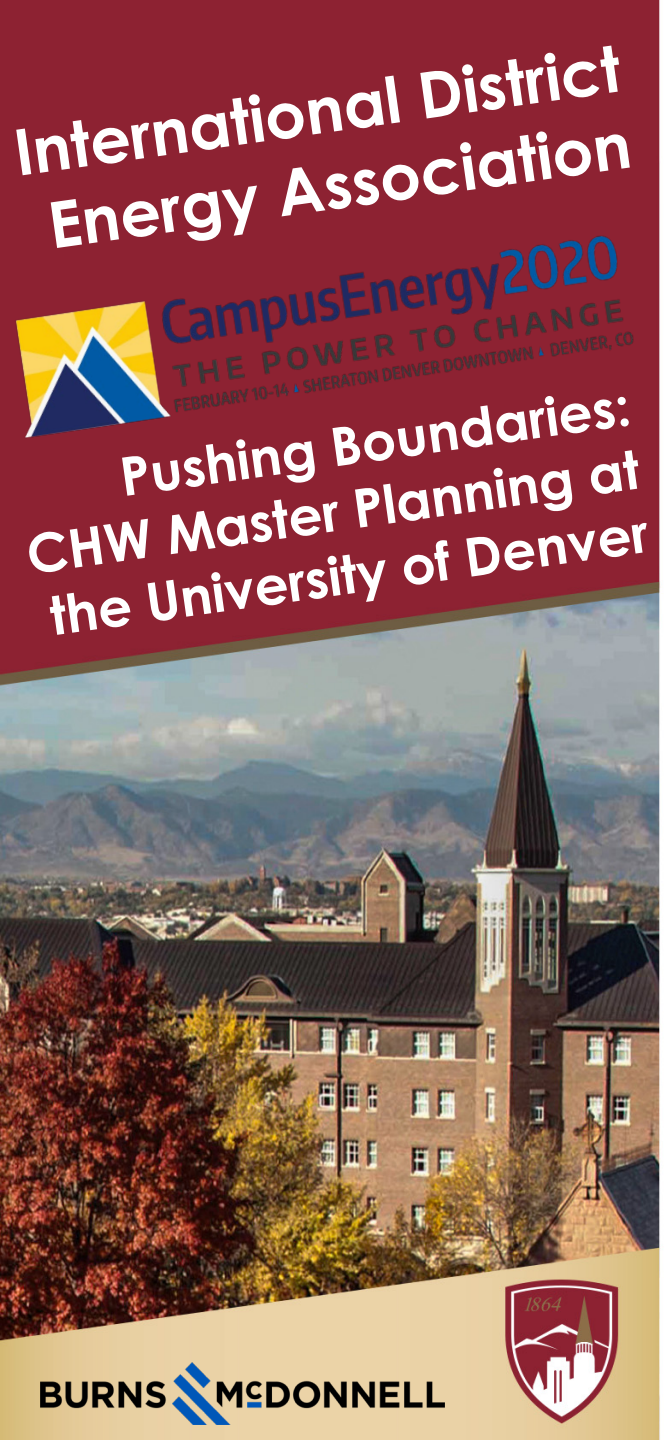
Flow Modeling





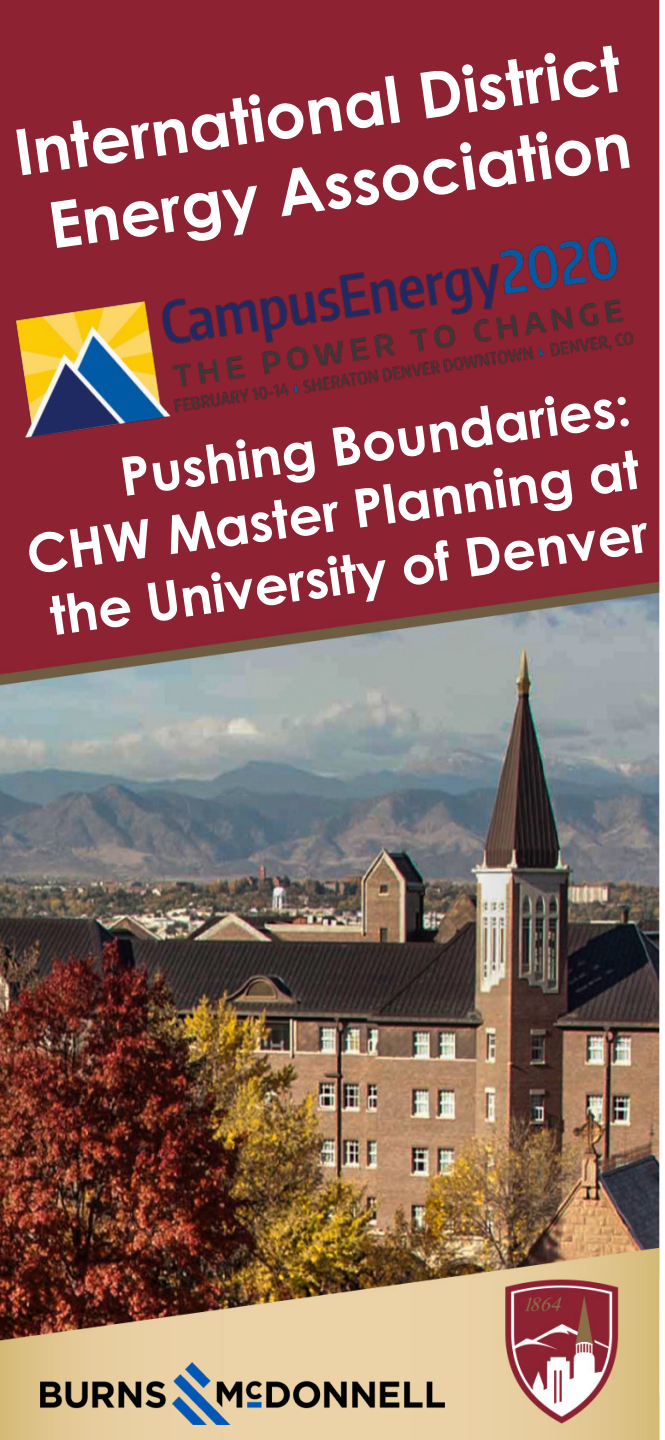
Recommendations





Recommendations

- Short-term chiller additions
- Distribution and Plant additions installed with long-term growth
- Bi-directional pumping
- South Campus Loop



Putting into Practice:

South Loop Summary

BUILDING NAME	GSF	LOAD (TONS)	FLOW (GPM)
Boettcher Center	49,296	74	183
Engineering and Computer Science Building	129,600	405	972
Newman Center for the Performing Arts	181,298	567	1,360
Olin Hall	41,000	128	308
Seeley Mudd Science Building	64,770	202	486
Total:	**465,964**	**1,376**	**3,309**

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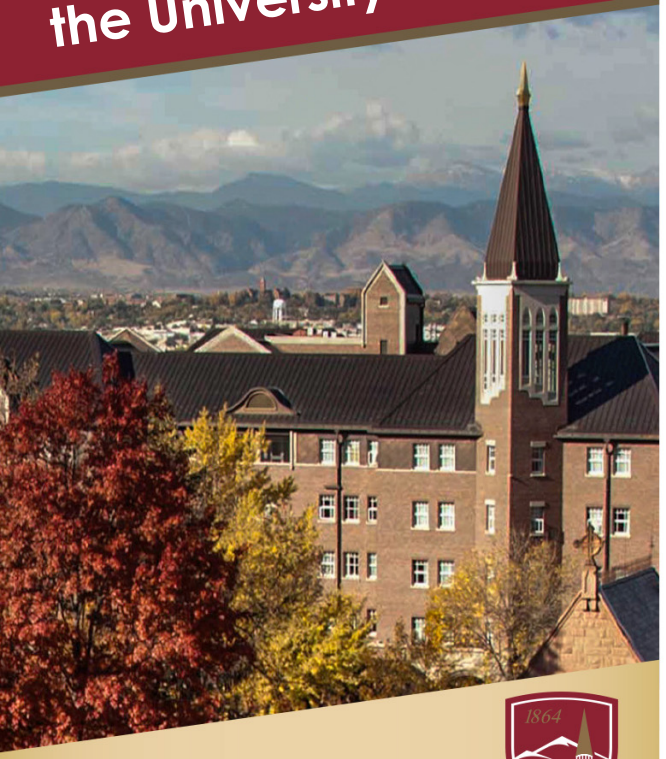

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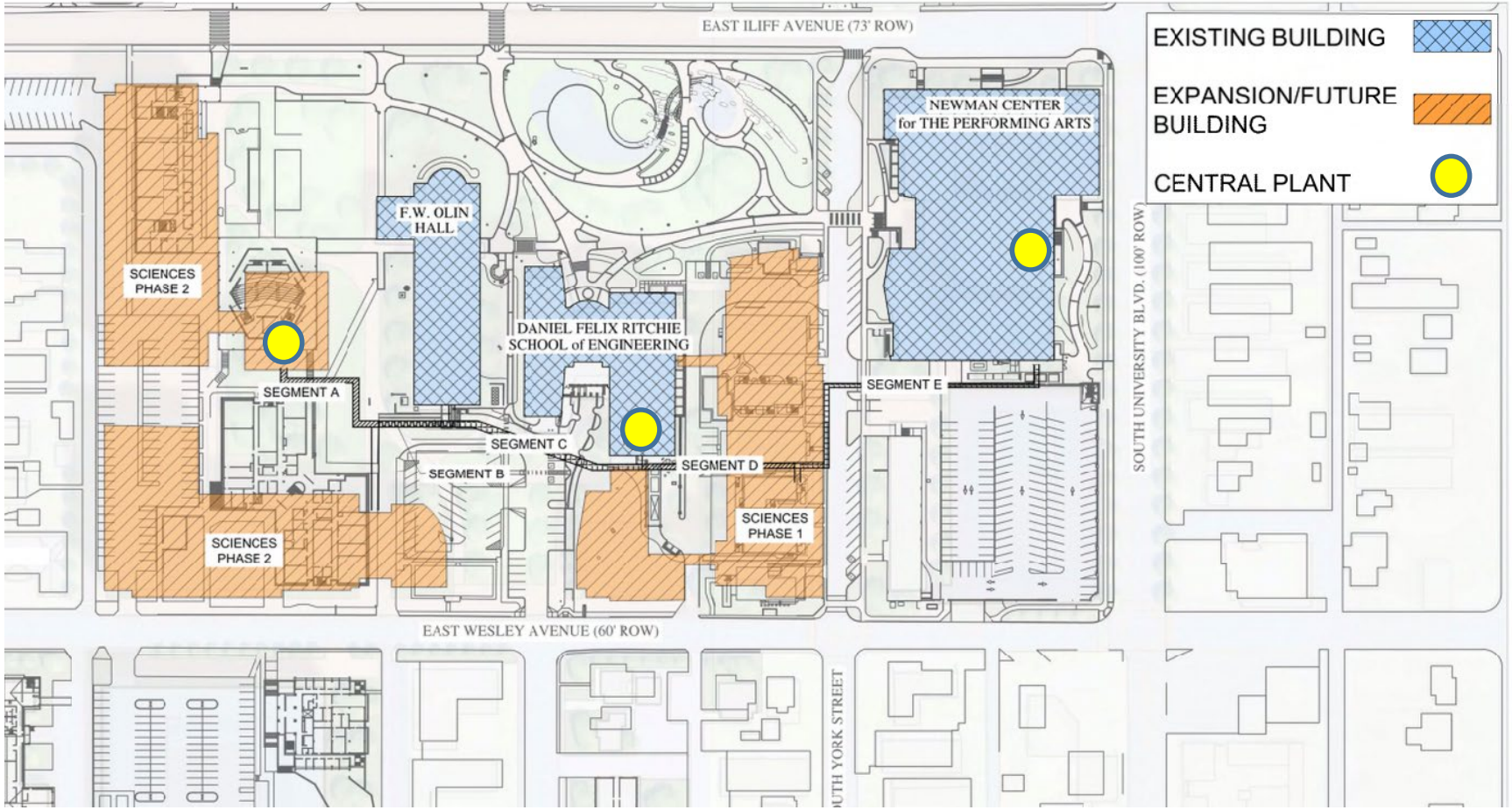
Putting into Practice:

South Loop Summary



Questions?

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