

Zero Impact Campus Invasion: Stanford Steam to Hot Water Conversion & Replacement Central Energy Facility

Paul Beckman

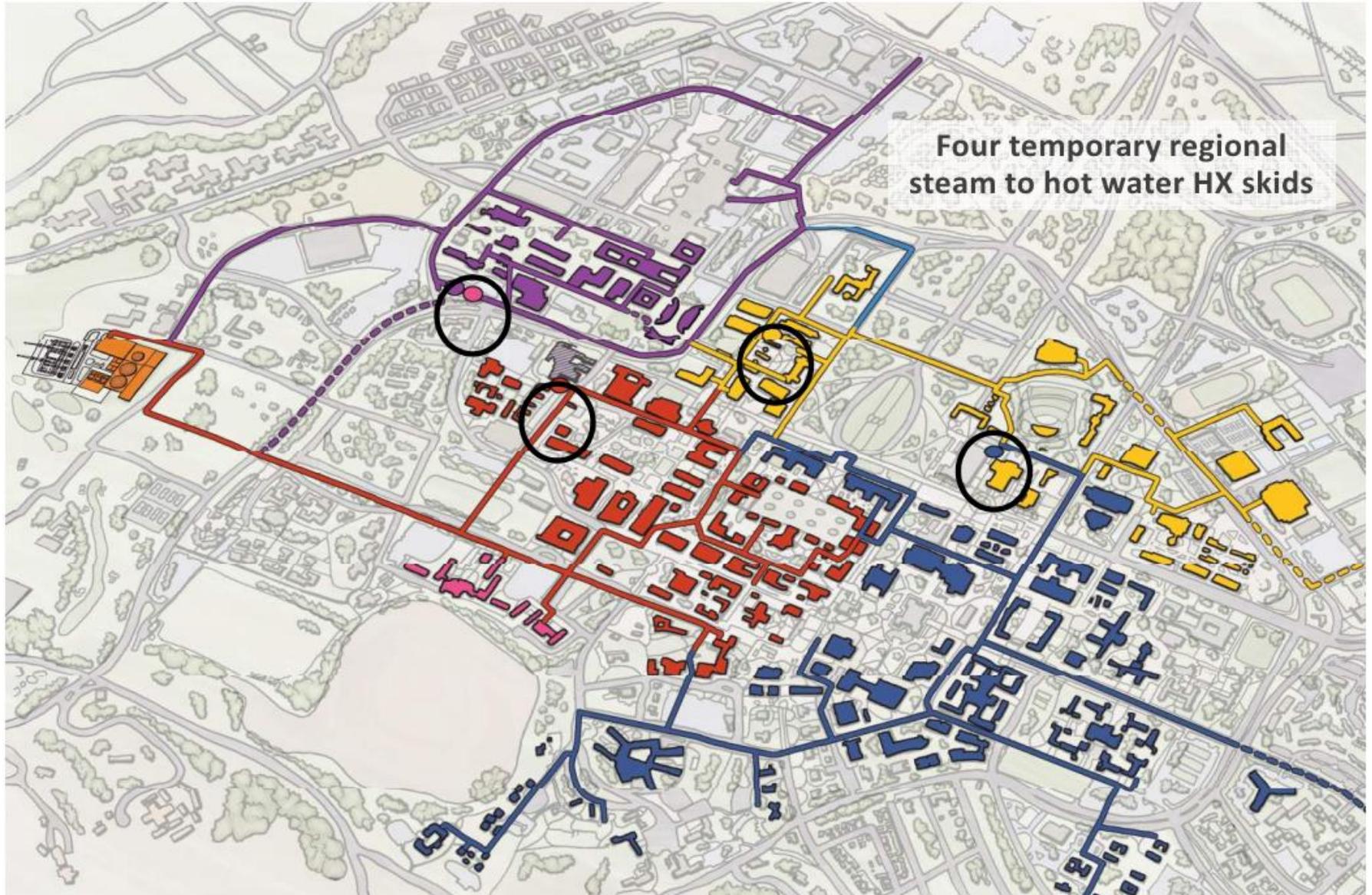
Patrick Kantor



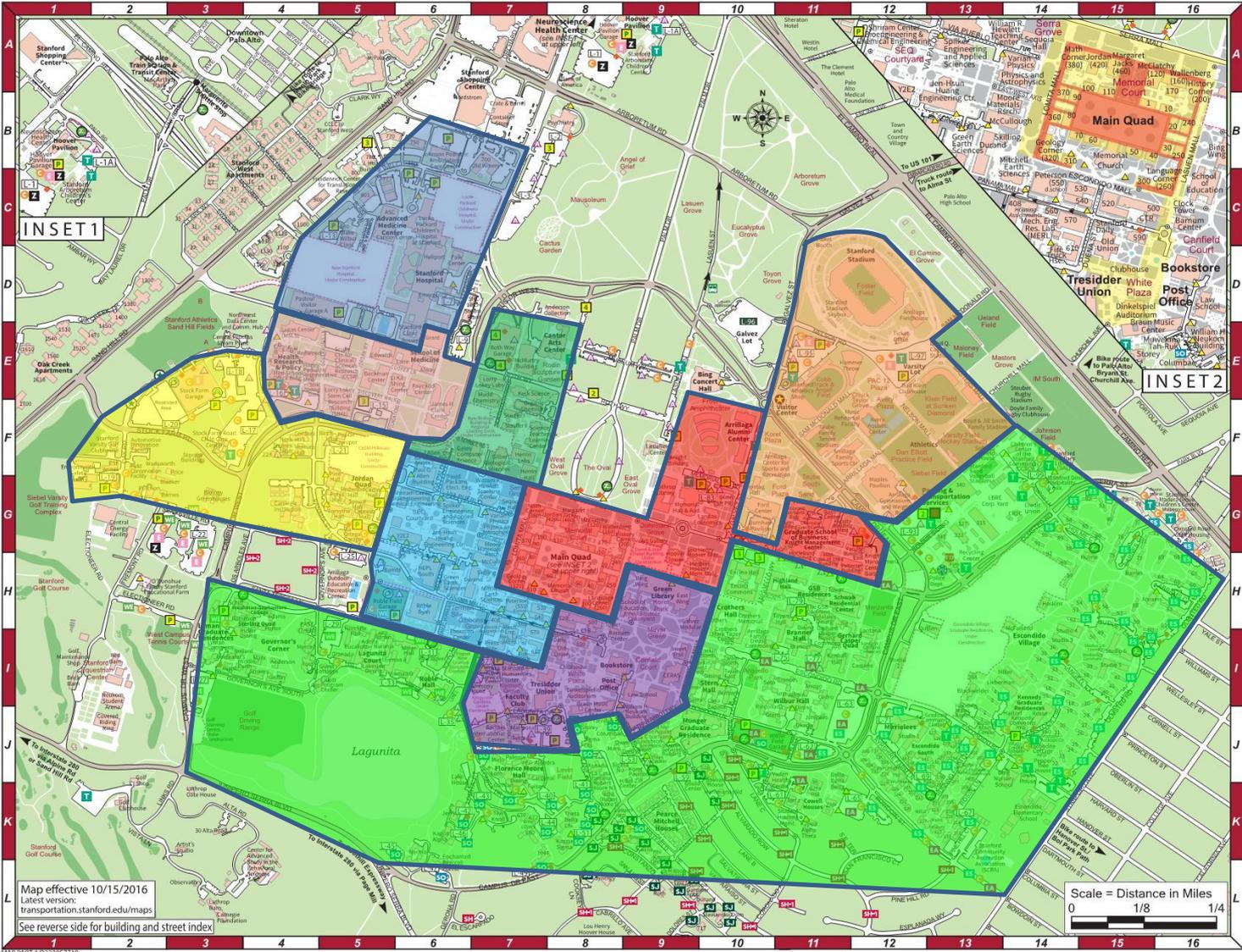
Agenda

- Introduction /Project Overview
- Underground Construction
 - Define Constraints
 - Create Schedule Flexibility
 - Execute the Plan
- Building Conversions
 - Define Constraints
 - Create Schedule Flexibility
 - Execute the Plan
- Central Plant
 - Transition Between Central Plants
 - Transition of Substation
- Q&A

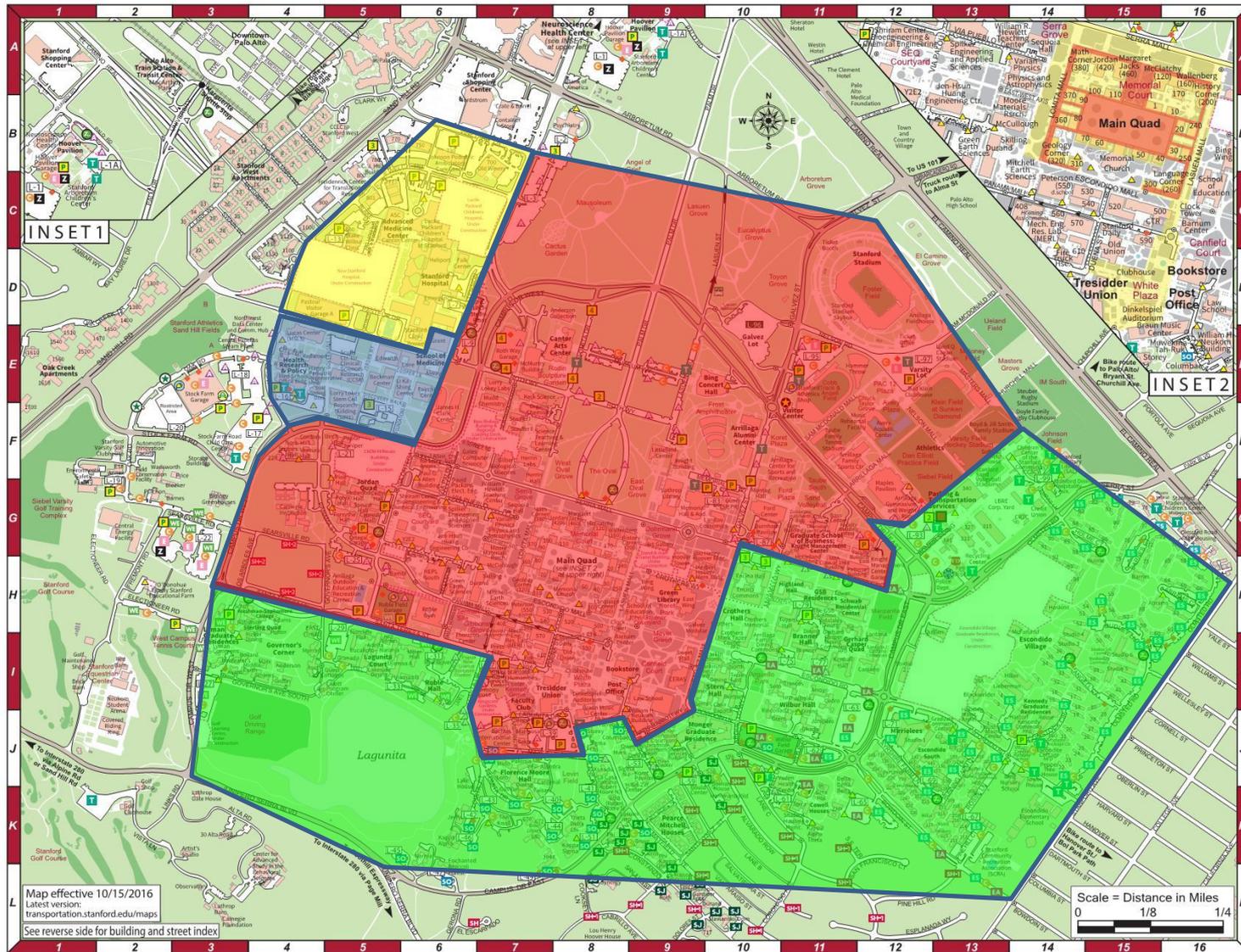
Campus Conversion Overview



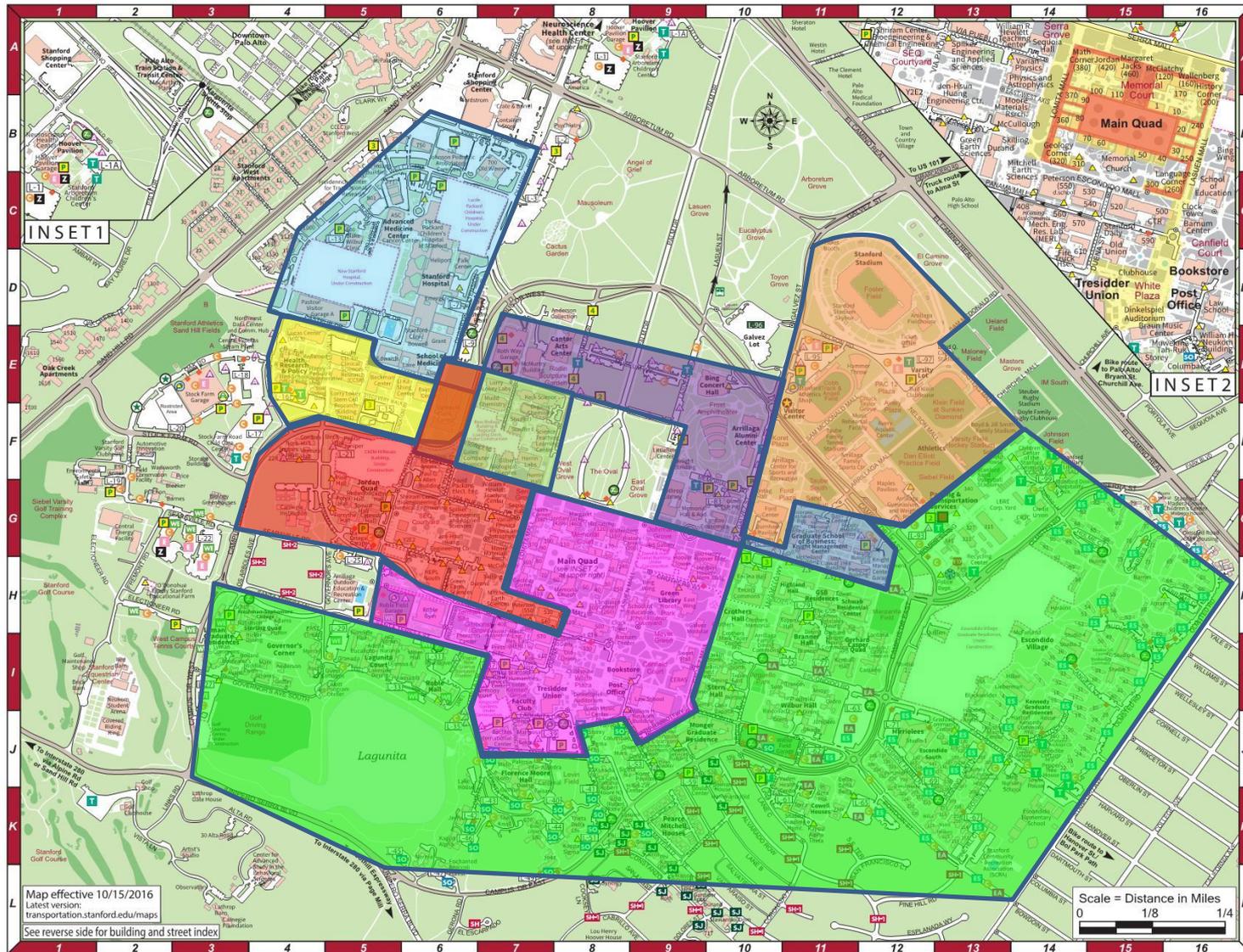
Project Overview - Zones



Project Overview - Maintenance



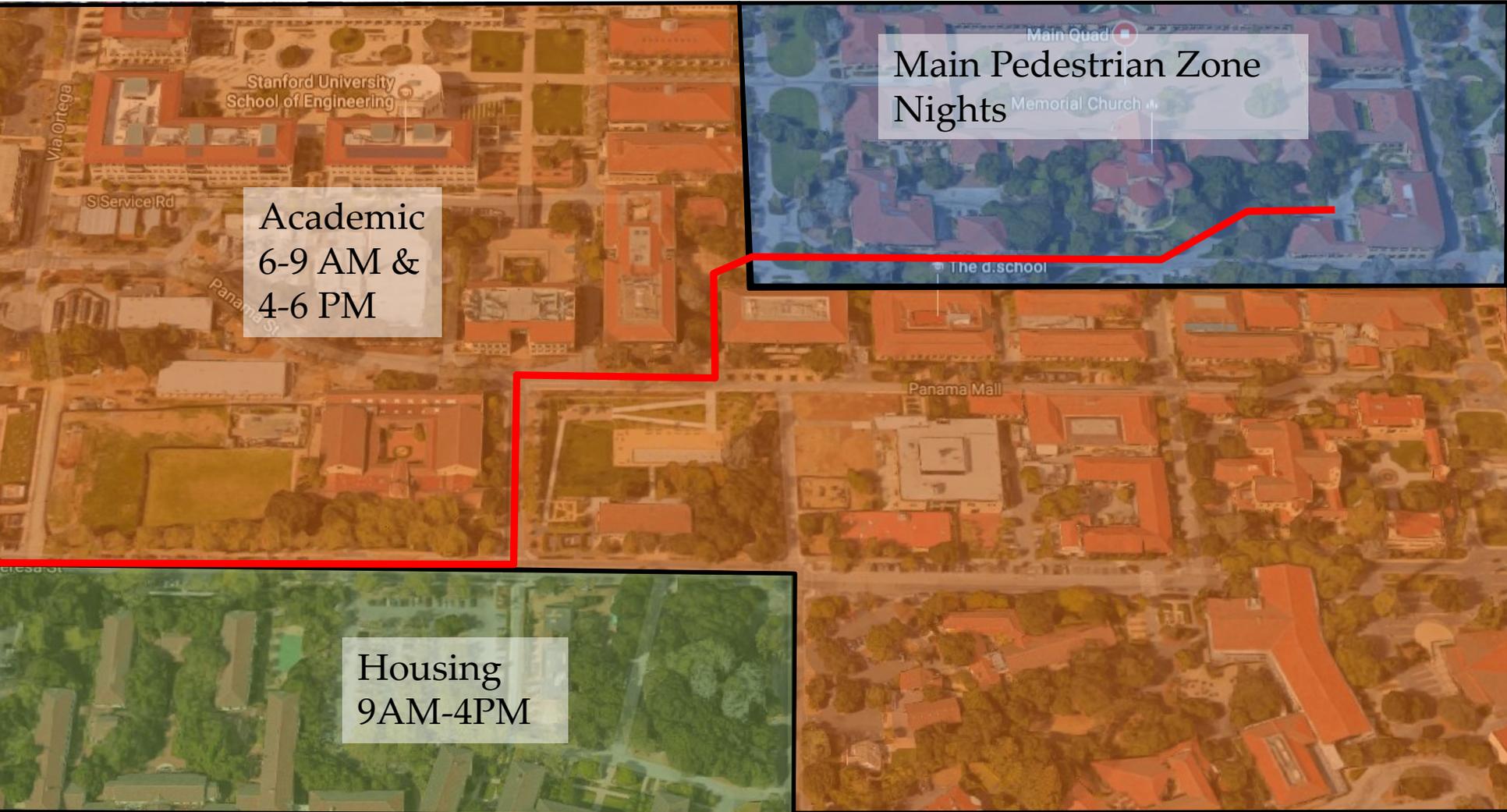
Project Overview - Departments



Clark Center



Define Constraints - Planning Time Frames

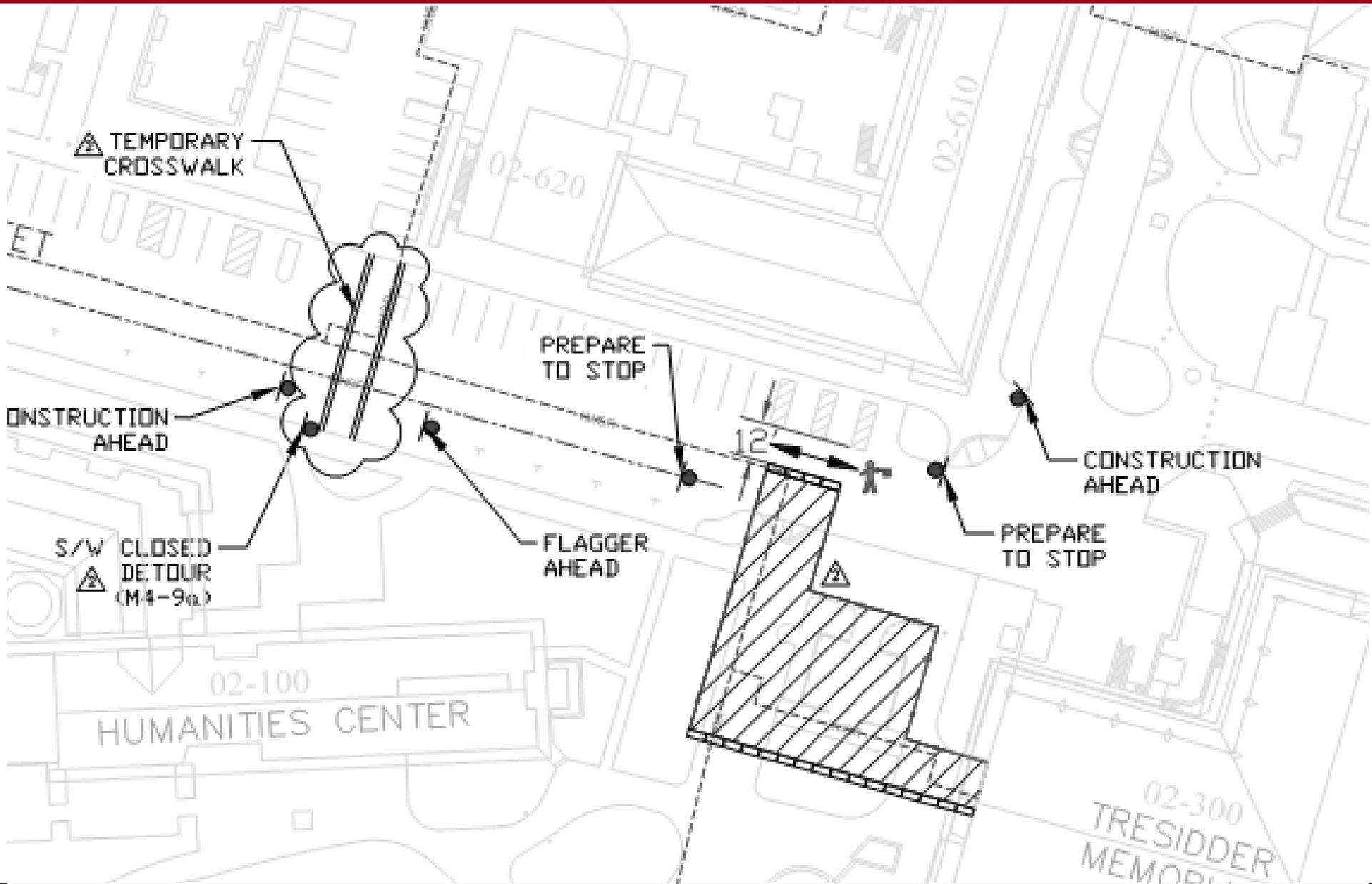


Academic
6-9 AM &
4-6 PM

Main Pedestrian Zone
Nights

Housing
9AM-4PM

Define Constraints - Coordinate Site Logistics



Create Schedule Flexibility – Stockpile Piping

■ Material Availability

- Plan for long lead times
- Stanford bulk ordered with 25% drawings (not recommended)
- Need location for inventory

■ Peak of 15 Underground Installation Crews



Create Schedule Flexibility - Minimize Footprint

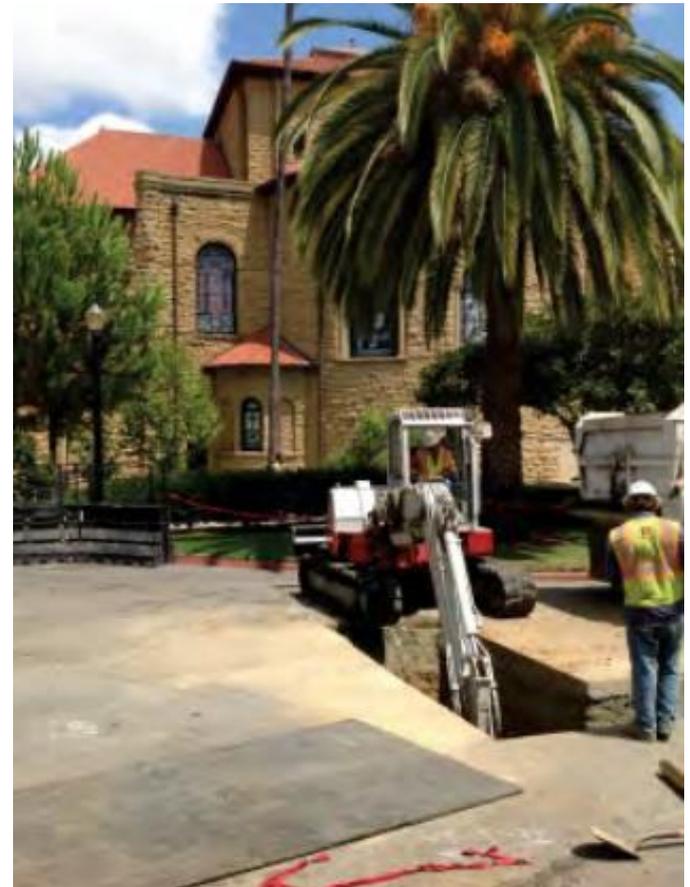
- **Managing Spoils and Bedding**
 - 40,000 SF Material Transfer Station
 - Large Truck Delivery to Transfer Station
 - Small Trucks Through Campus
- **Backfill Before Hydro Test**
 - Stanford had full time inspector
 - Third Party inspector used for all welds, leak detection wiring, and joint kit installation.
 - 6 leaks occurred in 4,400 welds



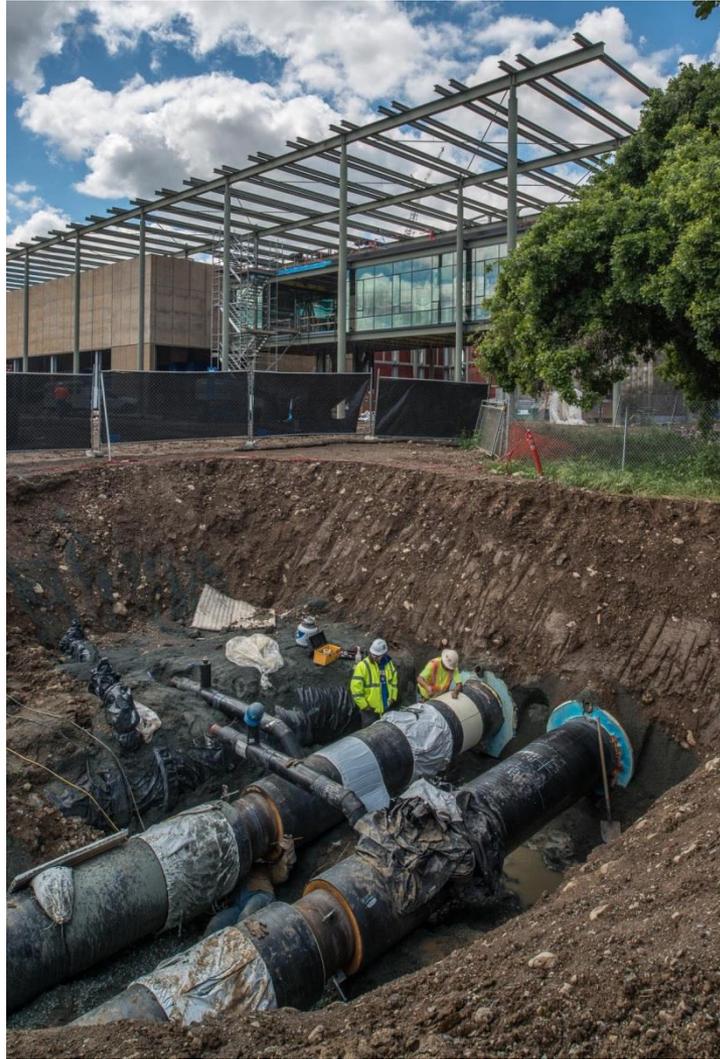
Execution - Minimize Install Time

- **Easier Installation**
 - Shallow Bury
 - Self-Restrained
 - Direct Bury Valves
 - Eliminated Vaults, Anchors & Expansion Joints

LOGSTOR



Execution - LTHW Piping - Installation



24" Dia. LTHW At RCEF
Jack & Bore Under Tree



Joint Trench
LTHW & High Voltage (12KV)

Define Constraints - Planning Time Frames

BY APRIL 2013

Replacement Central Energy Facility

RHX #5

RHX #3

RHX #1

PACKAGE 10

PACKAGE 8

PACKAGE 6

PACKAGE 5B

PACKAGE 4

PACKAGE 3

PACKAGE 2

PACKAGE 1

PACKAGE 12

PACKAGE 11

PACKAGE 9

PACKAGE 7

PACKAGE 5A

PACKAGE 4A

PACKAGE 4B

PACKAGE 3A

PACKAGE 3B

PACKAGE 2A

PACKAGE 2B

PACKAGE 1A

PACKAGE 1B

EXISTING LEGEND

TUNNEL

FUTURE HWS

EXISTING HWS

LAST UPDATED: October 3, 2012

Status	Check...	Author	Date	Color	Comments	Fill Milesto...	Fill #1	SESI Part	WBS	Sub
	<input type="checkbox"/>	pkantor	2/28/2...	█						Preston
	<input type="checkbox"/>	rwenig	2/28/2...	█						Preston
	<input type="checkbox"/>	pkantor	2/28/2...	█			2.2			Preston
	<input type="checkbox"/>	pkantor	2/28/2...	█			4.1			Preston
	<input type="checkbox"/>	pkantor	2/28/2...	█			4.1			Preston
	<input type="checkbox"/>	rwenig	2/28/2...	█						Preston
	<input type="checkbox"/>	SWelch	6/18/2...	█			4.5	Piping		Preston
	<input type="checkbox"/>	rwenig	2/28/2...	█						Preston

Define Constraints - Planning Time Frames

The screenshot displays a software interface for defining constraints in planning time frames. The main view is a map of a facility layout, showing various piping packages (PACKAGE 1 through PACKAGE 12) and replacement central energy facilities. The map includes a legend for existing and future HWS (Hot Water Systems) and a color-coded legend for different piping types. A date stamp indicates 'BY APRIL 2013'.

Below the map is a data table with the following columns: Status, Checkm..., Author, Date, Color, Comments, Fill Milesto..., Fill #1, SESI Part, WBS, Sub, and Fill. The table contains several rows of data, including entries for piping and building conversions.

Status	Checkm...	Author	Date	Color	Comments	Fill Milesto...	Fill #1	SESI Part	WBS	Sub	Fill
	<input type="checkbox"/>	SWelch	5/19/2...	Blue		5.2		Piping	SLP 2-H Glavez ...	Preston	
	<input type="checkbox"/>	pkantor	9/22/2...	Black		5.2		Building Conversi...	06-400D Wilbur ...	ACCO	
	<input type="checkbox"/>	pkantor	9/22/2...	Black		5.2		Building Conversi...	06-400E Wilbur ...	ACCO	
	<input type="checkbox"/>	pkantor	2/28/2...	Green		5.2		Piping	LAT 02-070A	Preston	
	<input type="checkbox"/>	pkantor	5/19/2...	Blue		5.2		Piping	SLP 2-J Bowdoin ...	Preston	
	<input type="checkbox"/>	pkantor	5/19/2...	Blue		5.2		Piping	SLP 2-AR Casa Z...	Preston	
	<input type="checkbox"/>	pkantor	5/19/2...	Blue		5.2		Piping	SLP 2-BM LAT 0...	Preston	
	<input type="checkbox"/>	pkantor	5/19/2...	Blue		5.2		Piping	SLP 2-BN LAT 0...	Preston	

Define Constraints - Planning Time Frames

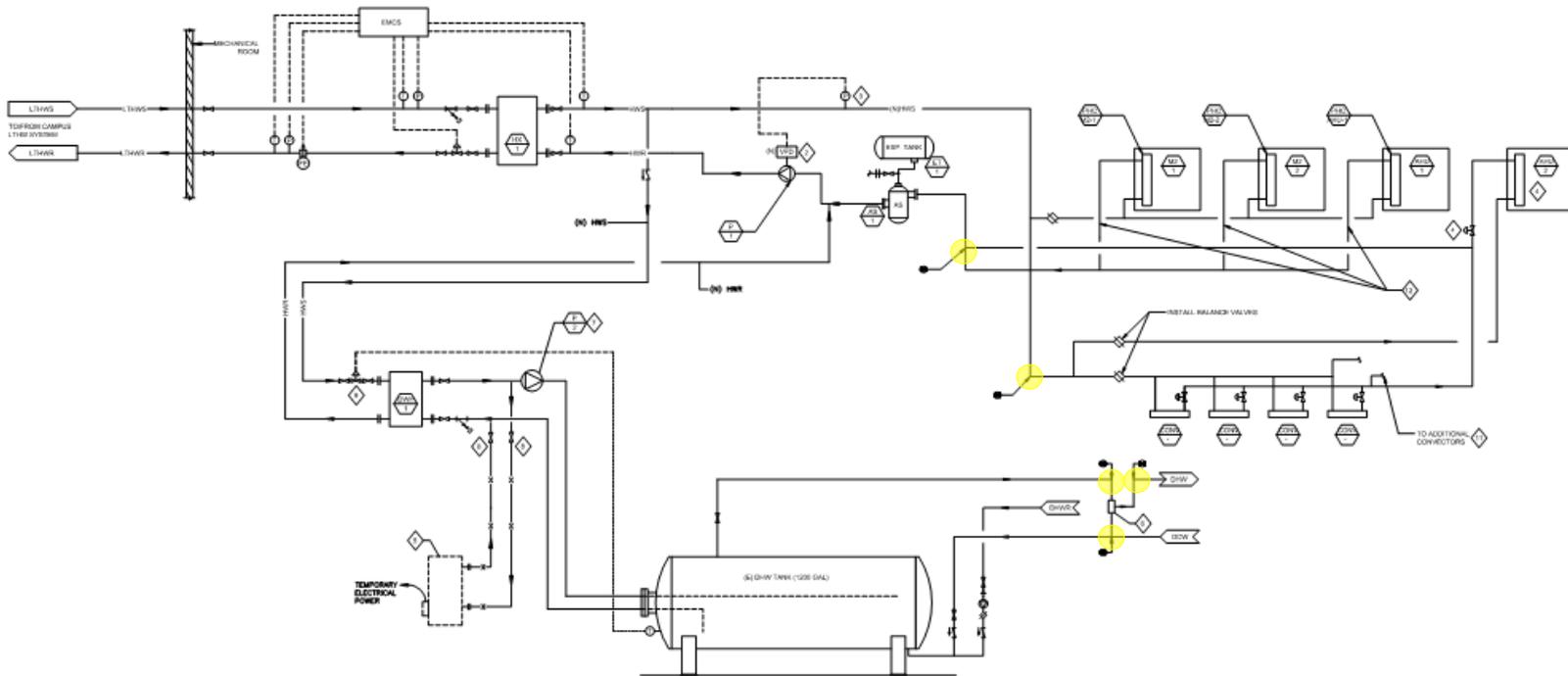


Create Schedule Flexibility – Stockpile Critical Equipment



Create Schedule Flexibility - Minimize Downtime

- Install T's & Valves During Low Heating Demand



2 PARALLEL DOMESTIC HOT WATER/HEATING HOT WATER PIPING DIAGRAM - NEW WORK
SCALE: 1/8" = 1'-0"

Create Schedule Flexibility - Temporary Systems

- Hot Water-Hot Water HX Skid
- Steam-Hot Water HX Skid
- Electric DHW Generator

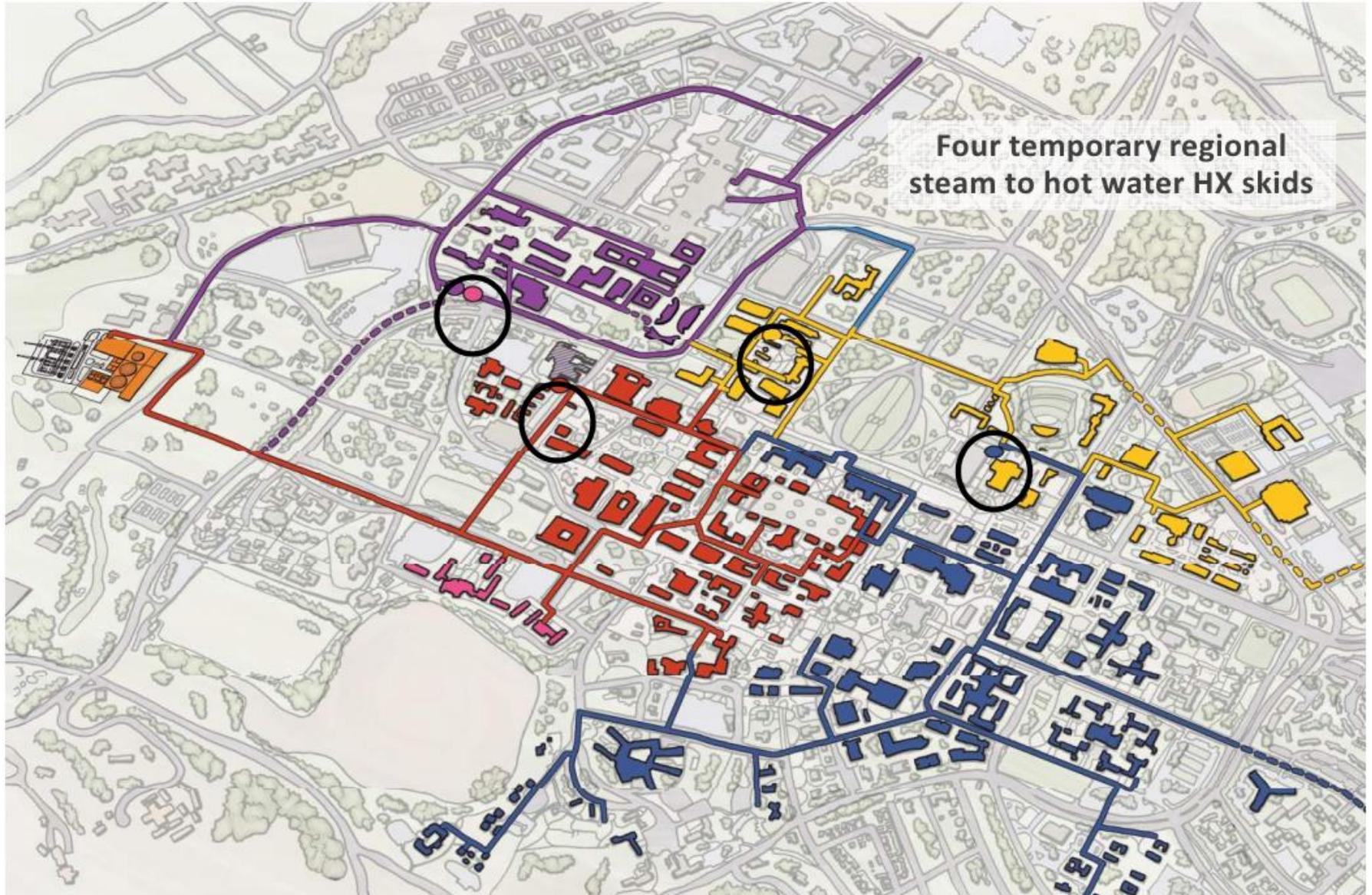


Execute - Minimize Installation Time

- **Pre-Conversion Readings**
- **HX Skids**
 - Less Time to Install
 - Consistent for 8 Different Mechanical Contractors
- **Tech Team**



Transition Central Plants



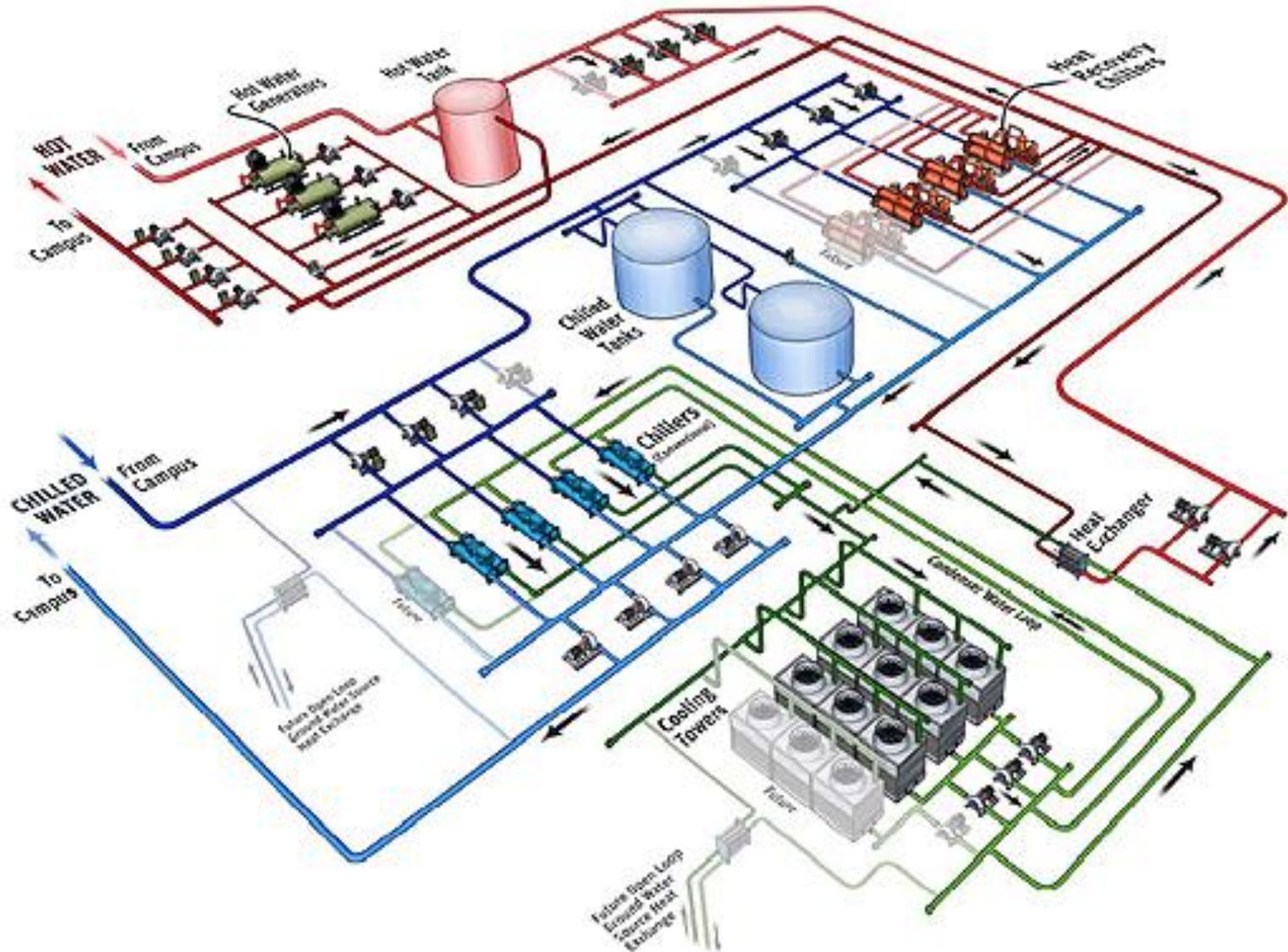
Transition Central Plants



Regional HX Station for School of Medicine Buildings

One of four Regional HX Stations

Transition Central Plants - Heat Recovery with Thermal Storage



Transition Between Substations



Questions?

