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Utility Infrastructure Master Planning for Arizona State University Campuses

IDEA -27th Annual Campus Energy Conference
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Rick Pretzman, PE – Arizona State University



Introduction



ASU – One University in Many Places



Master Planning History

- Master Plan must be updated every five years
- Aligned with Arizona Board of Regents goals
- 2020 plan:
 - Promote student learning and success
 - Advance educational attainment
 - Expand research



2020 Goals Include:

- Increase enrollment by approximately 20%
- Increase recruitment and retention efforts
- Double research expenditures by 2020
- Increase community engagement
- **All of these require a robust infrastructure**

Campus Master Plan



Campus Master Plan Overview

- Existing conditions
- Projected growth
- Planning challenges
- Key elements

Tempe, Downtown, Polytechnic, West

Downtown Phoenix Campus

	Existing	Plan Capacity
Headcount	10,296	15,000
Beds	1,225 (12%)	3,750 (25%)
Total GSF	1.6 mil.	3.8 mil.
Acad/Rsrch GSF	1.2 mil.	2.4 mil.
Parking Spaces	1,040	TBD
Total Acreage	20	20

Polytechnic Campus

	Existing	Plan Capacity
Headcount	4,877	15,000
Beds	1,306 (26%)	3,750 (25%)
Total GSF	2.1 mil.	4.8 mil.
Acad/Rsrch GSF	1.1 mil.	2.6 mil.
Parking Spaces	3,167	TBD
Academic/Research/Support Acres	-	295
Development Acres	-	318
Total Acreage	613	613

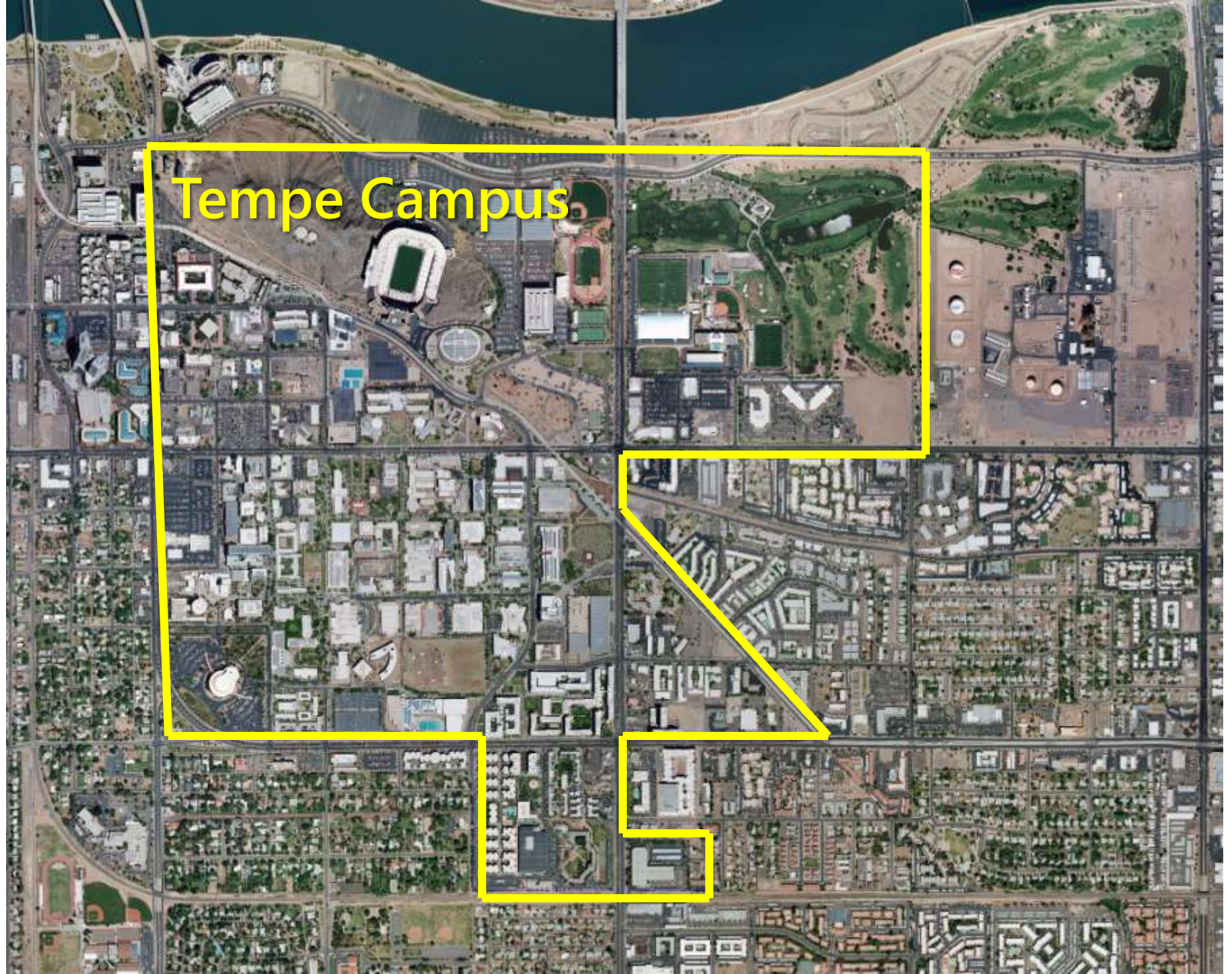
West Phoenix Campus

	Existing	Plan Capacity
Headcount	5,916	15,000
Beds	337 (6%)	3,000 (20%)
Total GSF	0.86 mil.	2.9 mil.
Acad/Rsrch GSF	0.75 mil.	1.8 mil.
Parking Spaces	2,811	TBD
Academic/Research/Support Acres	-	208
Development Acres	-	70
Total Acreage	278	278

Tempe Campus

	Existing	Plan Capacity
Headcount	51,469	60,000
Beds	10,432 (20%)	15,000 (25%)
Total GSF	15.9 mil.	19.3 mil.
Acad/Rsrch GSF	8.9 mil.	10.6 mil.
Parking Spaces	18,118	18,118
Academic/Research/Support Acres	-	498
Development Acres	-	136
Total Acreage	634	634

Tempe Campus



Tempe Campus Master Plan



key elements:

- 1 Research expansion
- 2 Density and infill in campus core
- 3 Engineering expansion
- 4 Business School expansion
- 5 Student Recreation Center expansion
- 6 Strengthen "heart" of campus
- 7 Hayden Library activation
- 8 Orange Mall as "Main Street"
- 9 Housing redevelopment, increase density
- 10 Mixed-use transit oriented development
- 11 Extension of Tyler Mall
- 12 Gateway mixed-use
- 13 University Athletic Facilities District

LEGEND

- PROPOSED ASU DEVELOPMENT
- PROJECTS IN PLANNING, DESIGN OR CONSTRUCTION
- PROPOSED PARKING STRUCTURE
- EXISTING CAMPUS BUILDING
- LIGHT RAIL STOPS
- FUTURE DEVELOPMENT OPPORTUNITY

Tempe Campus Growth

existing conditions



- EXISTING BUILDINGS
- PROPOSED ACADEMIC
- PROPOSED RESIDENTIAL/STUDENT LIFE
- PROPOSED MIXED USE
- PROPOSED COMMERCIAL
- PROPOSED PARKING STRUCTURE
- FUTURE DEVELOPMENT OPPORTUNITIES

West Campus



West Campus Master Plan



West Campus Master Plan

key elements:

- ① Academic expansion
- ② Future residential development
- ③ Future development opportunity
- ④ Phase I residential, dining, student recreation center

LEGEND

- PROPOSED ASU DEVELOPMENT
- PROJECTS IN PLANNING, DESIGN, AND CONSTRUCTION
- PROPOSED PARKING STRUCTURE
- EXISTING CAMPUS BUILDING
- FUTURE DEVELOPMENT OPPORTUNITIES

West Campus Growth



EXISTING BUILDINGS

existing conditions



PROPOSED ACADEMIC

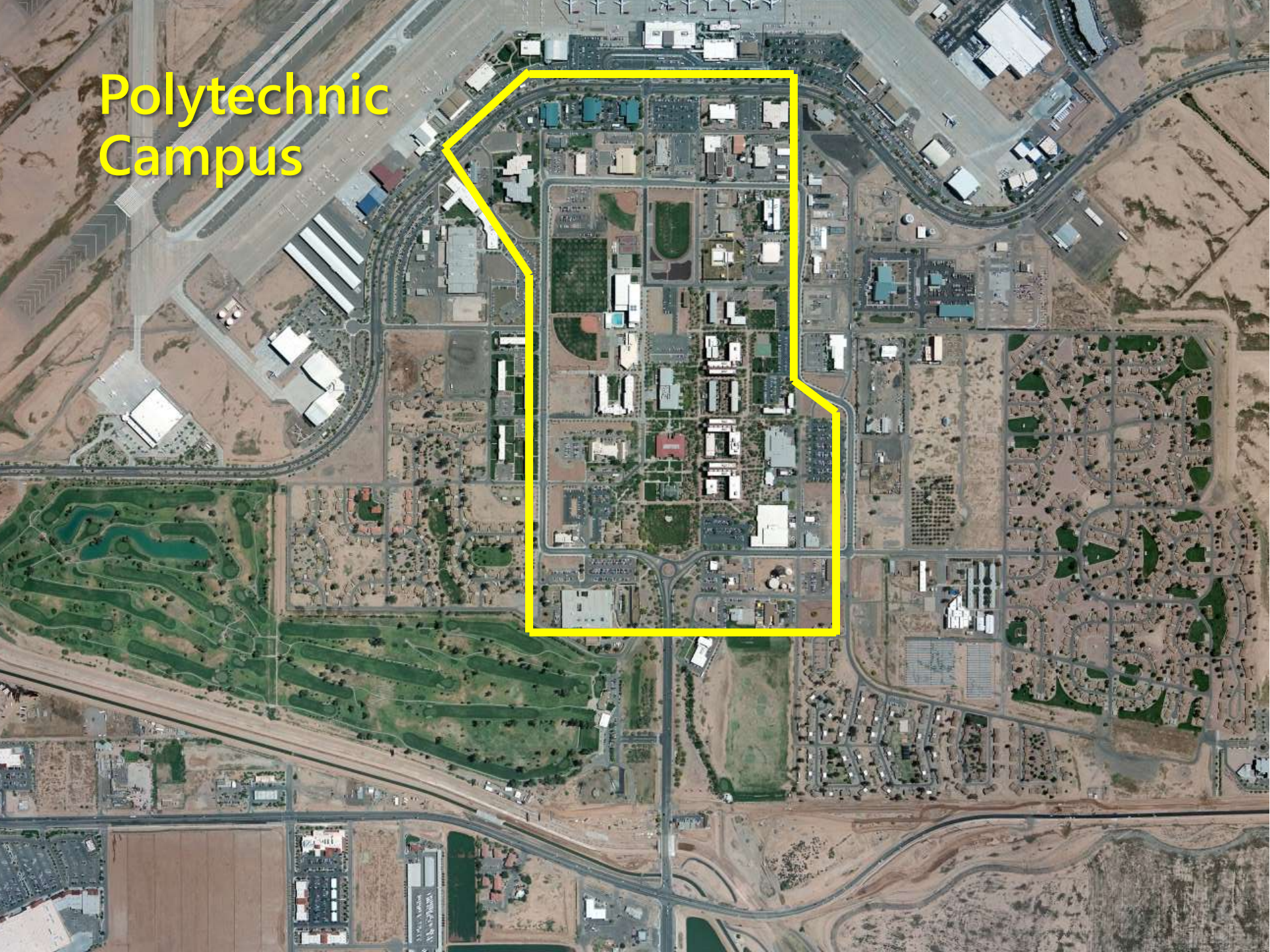
PROPOSED PARKING STRUCTURE

PROPOSED RESIDENTIAL/STUDENT LIFE

FUTURE DEVELOPMENT OPPORTUNITIES

recommendations

Polytechnic
Campus





Polytechnic Campus Master Plan

key elements:

- ① Academic and research expansion
- ② Future residential development
- ③ Gateway sites, signature architecture
- ④ Phase I residential, dining, student recreation center
- ⑤ Campus Green



LEGEND

- PROPOSED ASU DEVELOPMENT
- PROJECTS IN PLANNING, DESIGN, AND CONSTRUCTION
- PROPOSED PARKING STRUCTURE
- EXISTING CAMPUS BUILDING
- FUTURE DEVELOPMENT OPPORTUNITIES





Existing Conditions Model

Polytechnic Campus Growth



Proposed Conditions Model

- EXISTING BUILDINGS
- PROPOSED ACADEMIC
- PROPOSED PARKING STRUCTURE
- PROPOSED RESIDENTIAL/STUDENT LIFE

Downtown Phoenix Campus



Downtown Phoenix Campus Master Plan



Downtown Phoenix Campus Master Plan

key elements:

- ① Academic expansion
- ② Future residential development
- ③ Student Recreation Center



LEGEND

- PROPOSED ASU DEVELOPMENT
- PROJECTS IN PLANNING, DESIGN AND CONSTRUCTION
- PROPOSED PARKING STRUCTURE
- EXISTING CAMPUS BUILDING
- LIGHT RAIL STOPS

Downtown Phoenix Campus Growth



- | | |
|--|---|
|  EXISTING BUILDINGS |  PROPOSED PARKING STRUCTURE |
|  PROPOSED ACADEMIC |  PROPOSED RESIDENTIAL/STUDENT LIFE |
| |  LIGHT RAIL STOP |



Utility Infrastructure Master Plan

Utility Expansion Considerations

- Building construction schedule
- Energy programs
- Sustainability
- Reliability
- Redundancy
- Space constraints & expandability
- Cost effective approach
- Campus environment impact

Utility Systems

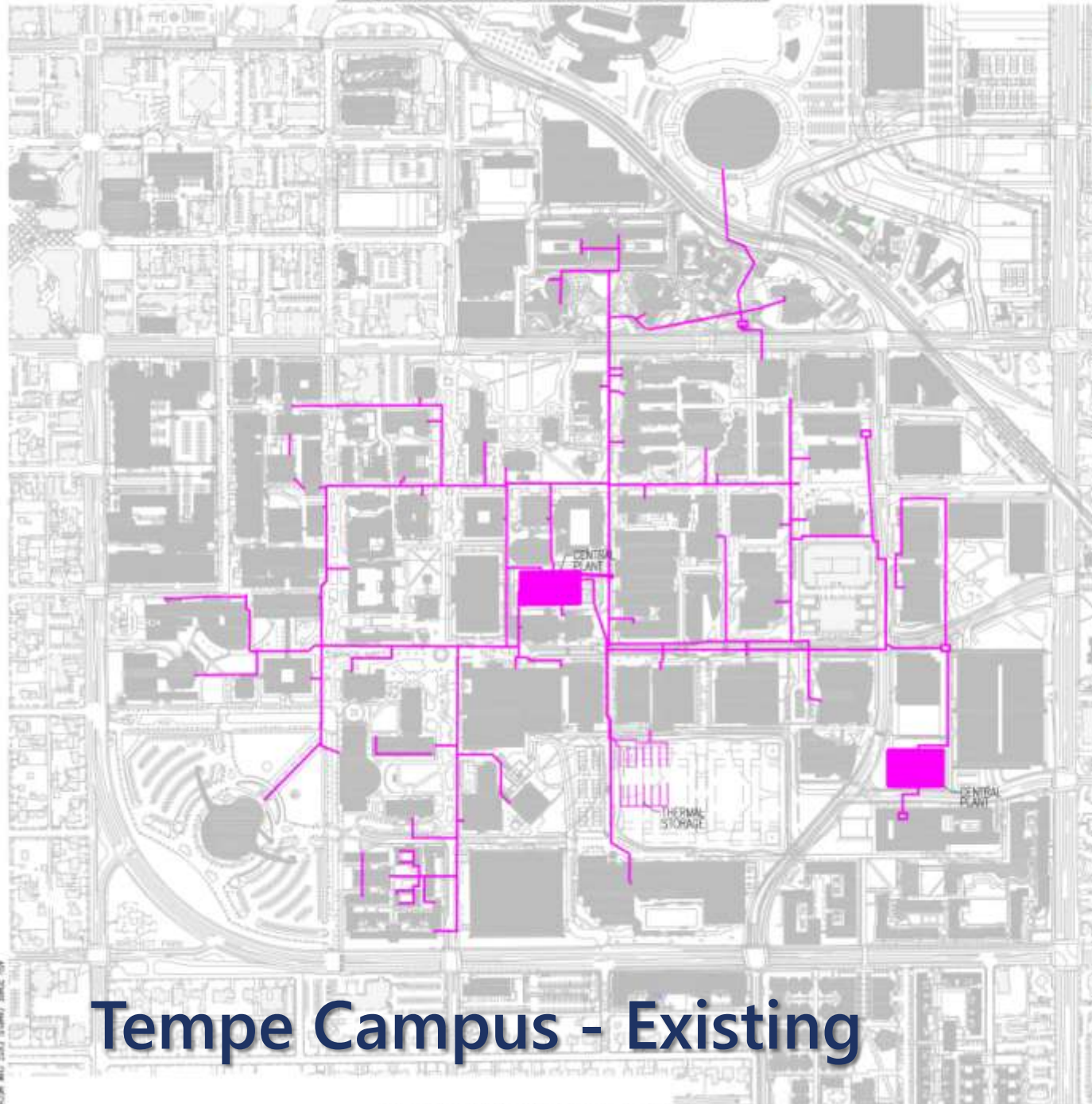
- Electrical primary power
- Electrical emergency power
- Chilled water
- Steam
- Natural gas
- Communications
- Water
- Storm drainage
- Sanitary sewer

Phasing Plan Principles

- Phasing term (short, mid, long)
- Maximum use of existing utilities on campus
- Eliminate duplication costs
- Installation of utilities to serve full development



Existing Conditions & Expansion



DISTRIBUTION LEGEND

EXISTING CHILLED WATER

BUILDING LEGEND

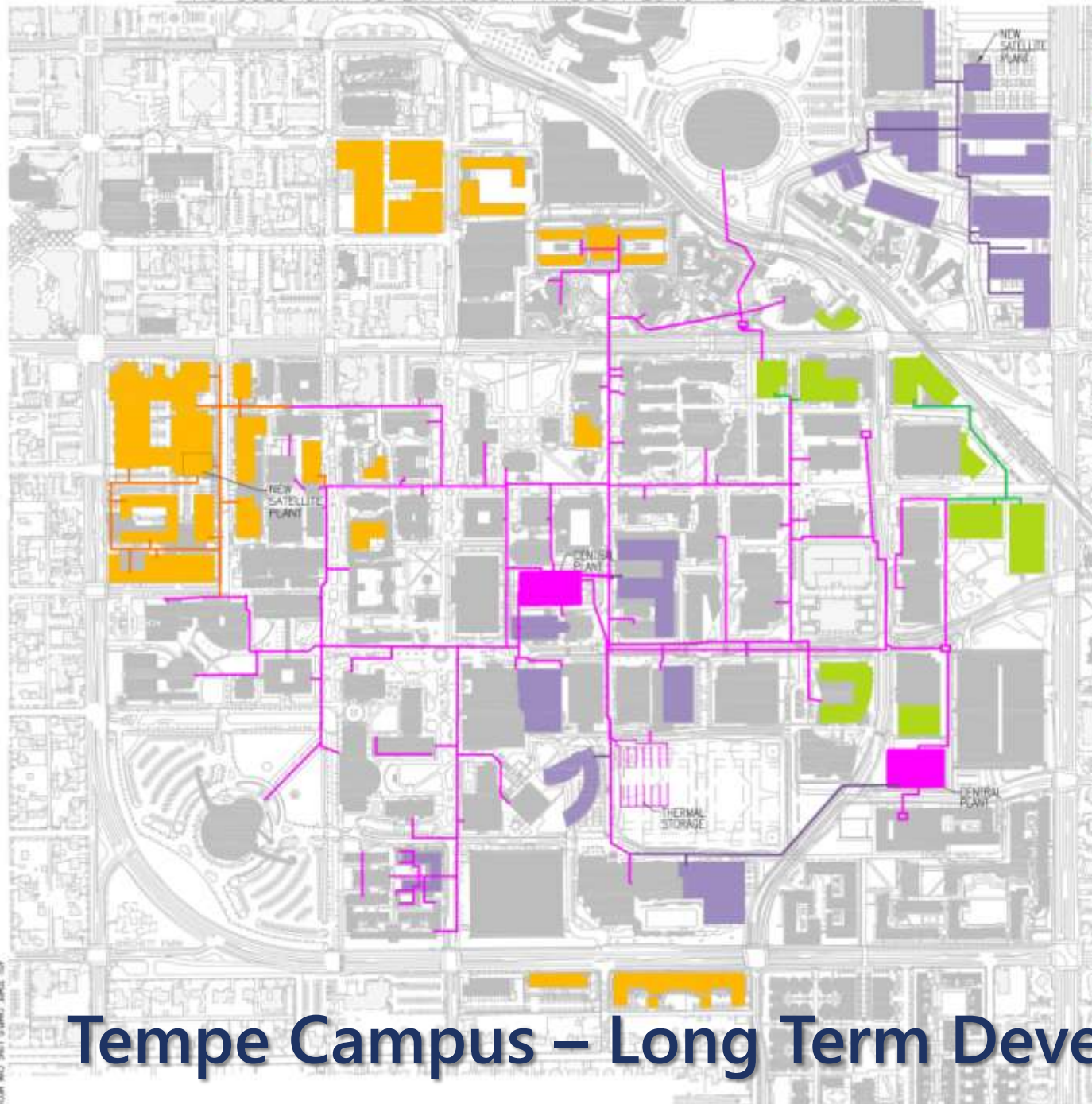
EXISTING

Tempe Campus - Existing

CHILLED WATER DISTRIBUTION

TEMPE CAMPUS
SCALE: 1" = 600'-0"





DISTRIBUTION LEGEND

- LONG TERM CHILLED WATER
- MID TERM CHILLED WATER
- SHORT TERM CHILLED WATER
- EXISTING CHILLED WATER

BUILDING LEGEND

- LONG TERM
- MID TERM
- SHORT TERM
- EXISTING

Tempe Campus – Long Term Development

CHILLED WATER DISTRIBUTION

SCALE: 1" = 600'-0"



DISTRIBUTION LEGEND

EXISTING ELECTRICAL DISTRIBUTION

EXISTING CAMPUS AND INFASTRUCTURE

BUILDING LEGEND

EXISTING

CENTRAL
PLANT

West Campus – Existing

PRIMARY ELECTRICAL DISTRIBUTION

WEST CAMPUS
SCALE: 1" = 400'-0"



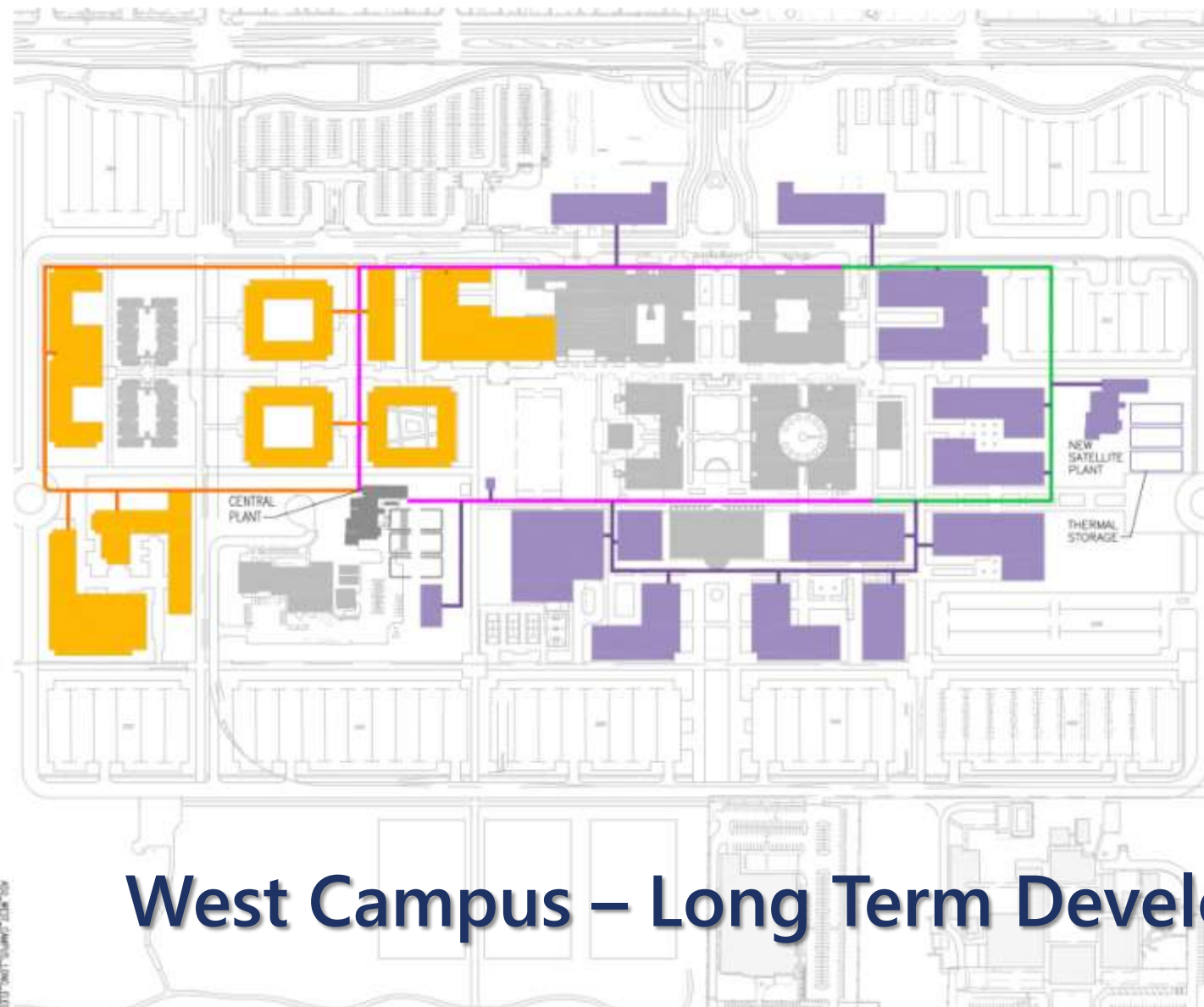
DISTRIBUTION LEGEND

- LONG TERM ELECTRICAL DISTRIBUTION
- MID TERM ELECTRICAL DISTRIBUTION
- SHORT TERM ELECTRICAL DISTRIBUTION
- EXISTING ELECTRICAL DISTRIBUTION

PROPOSED CAMPUS EXPANSION THROUGH LONG-TERM DEVELOPMENT

BUILDING LEGEND

- LONG TERM
- MID TERM
- SHORT TERM
- EXISTING



West Campus – Long Term Development

PRIMARY ELECTRICAL DISTRIBUTION

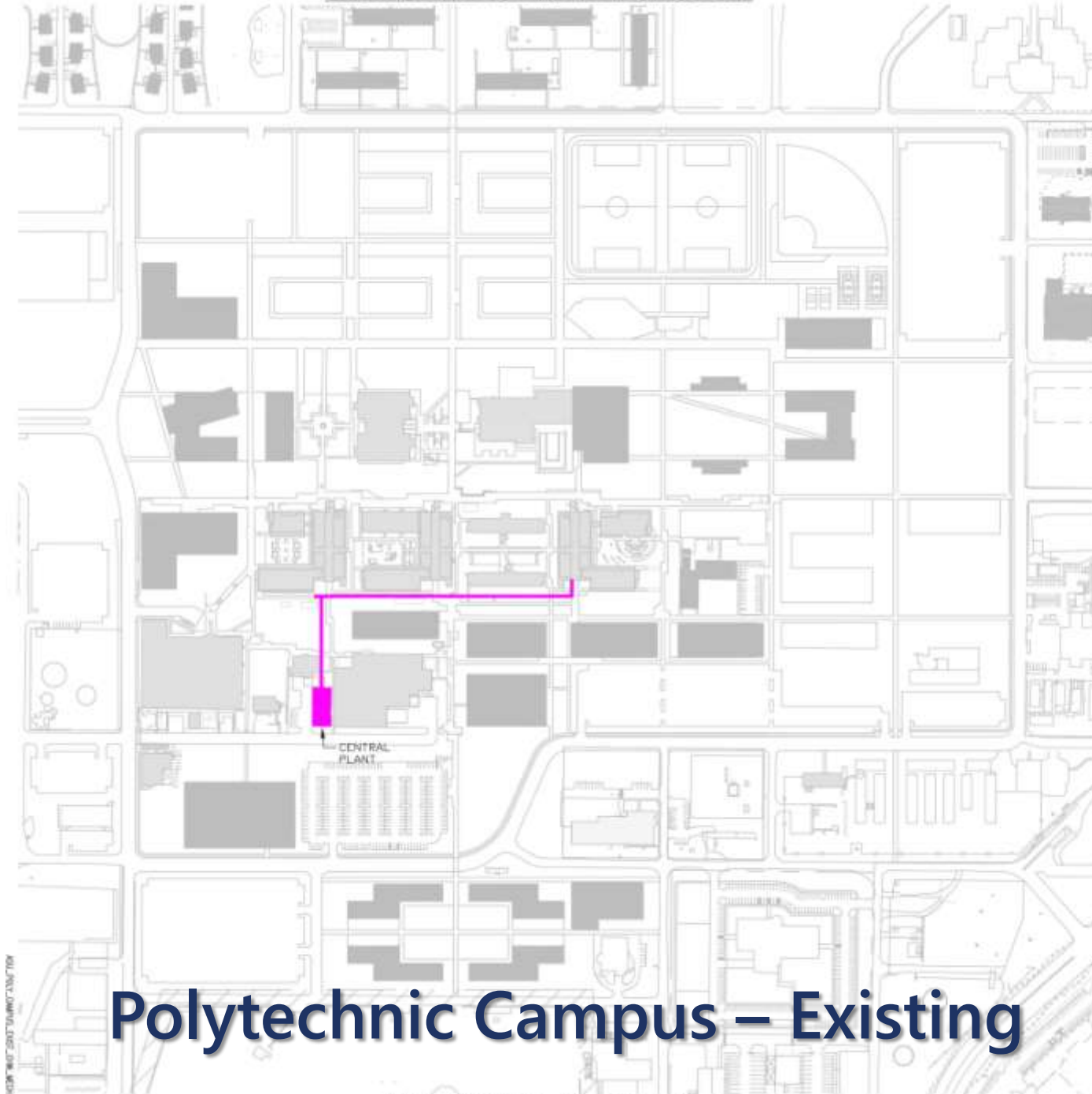
WEST CAMPUS
SCALE: 1" = 400'-0"



DISTRIBUTION LEGEND



BUILDING LEGEND



Polytechnic Campus – Existing

POLY CAMPUS
SCALE: 1" = 400'-0"

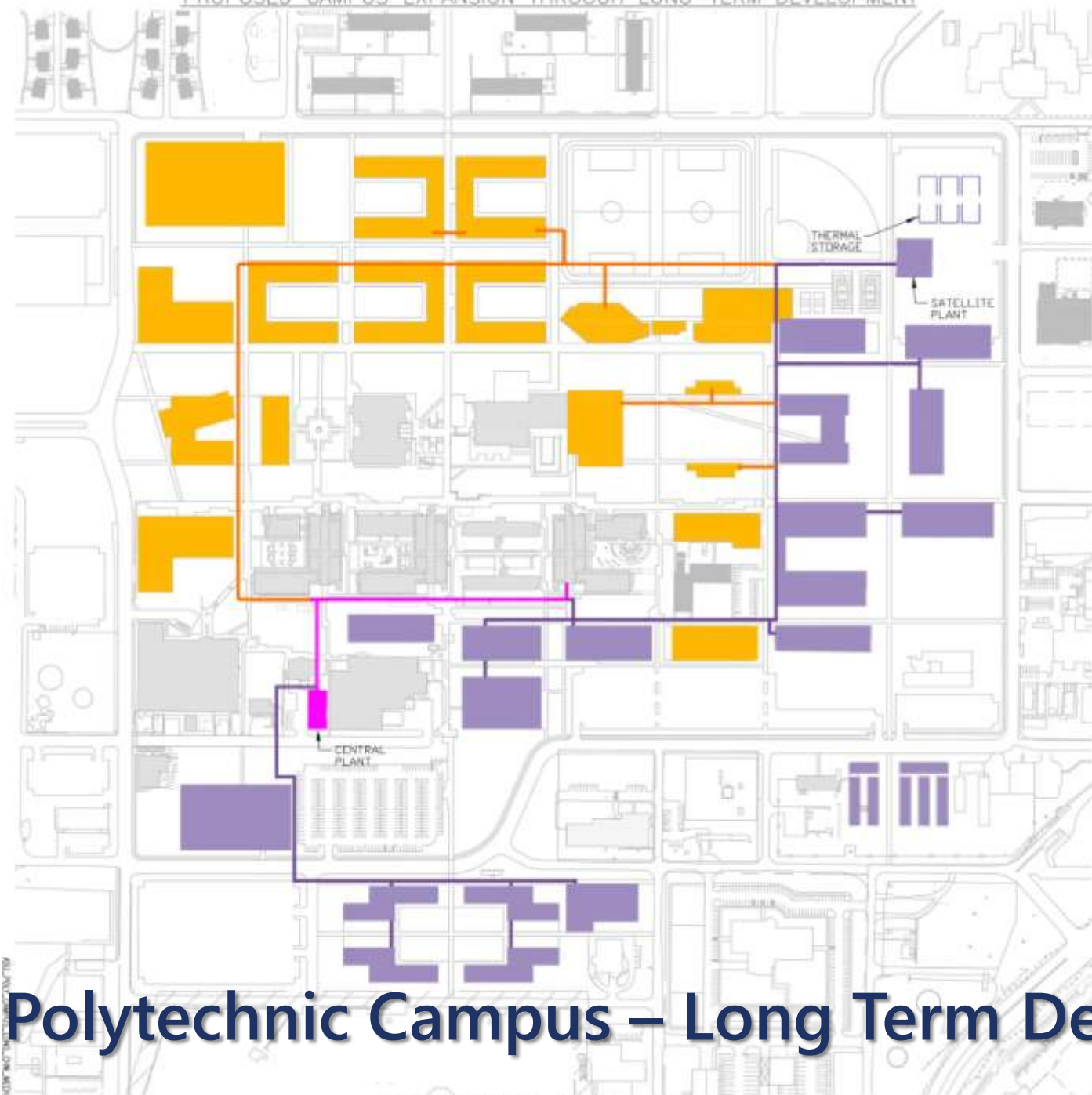


DISTRIBUTION LEGEND

- LONG TERM CHILLED WATER
- MID TERM CHILLED WATER
- SHORT TERM CHILLED WATER
- EXISTING CHILLED WATER

BUILDING LEGEND

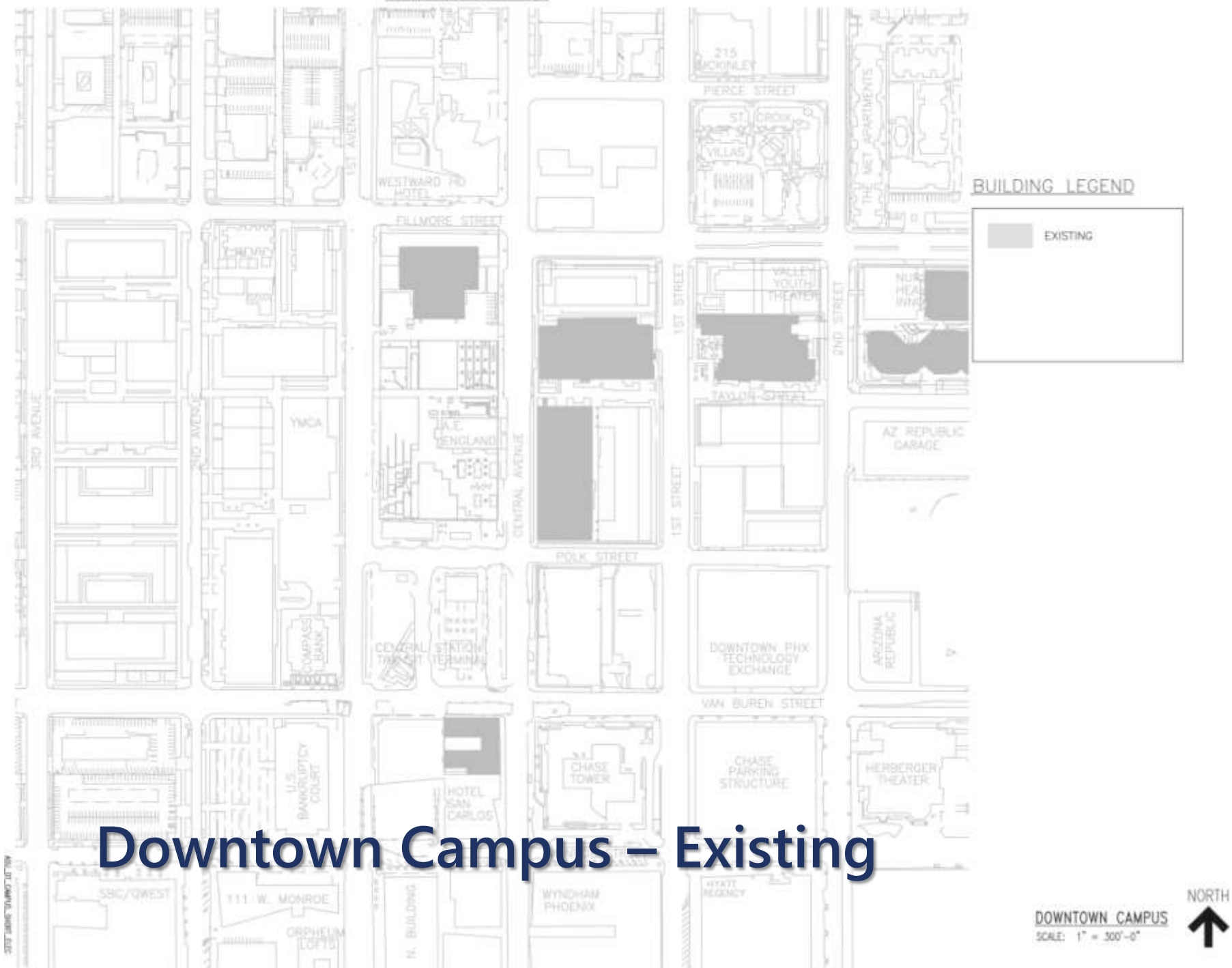
- LONG TERM
- MID TERM
- SHORT TERM
- EXISTING

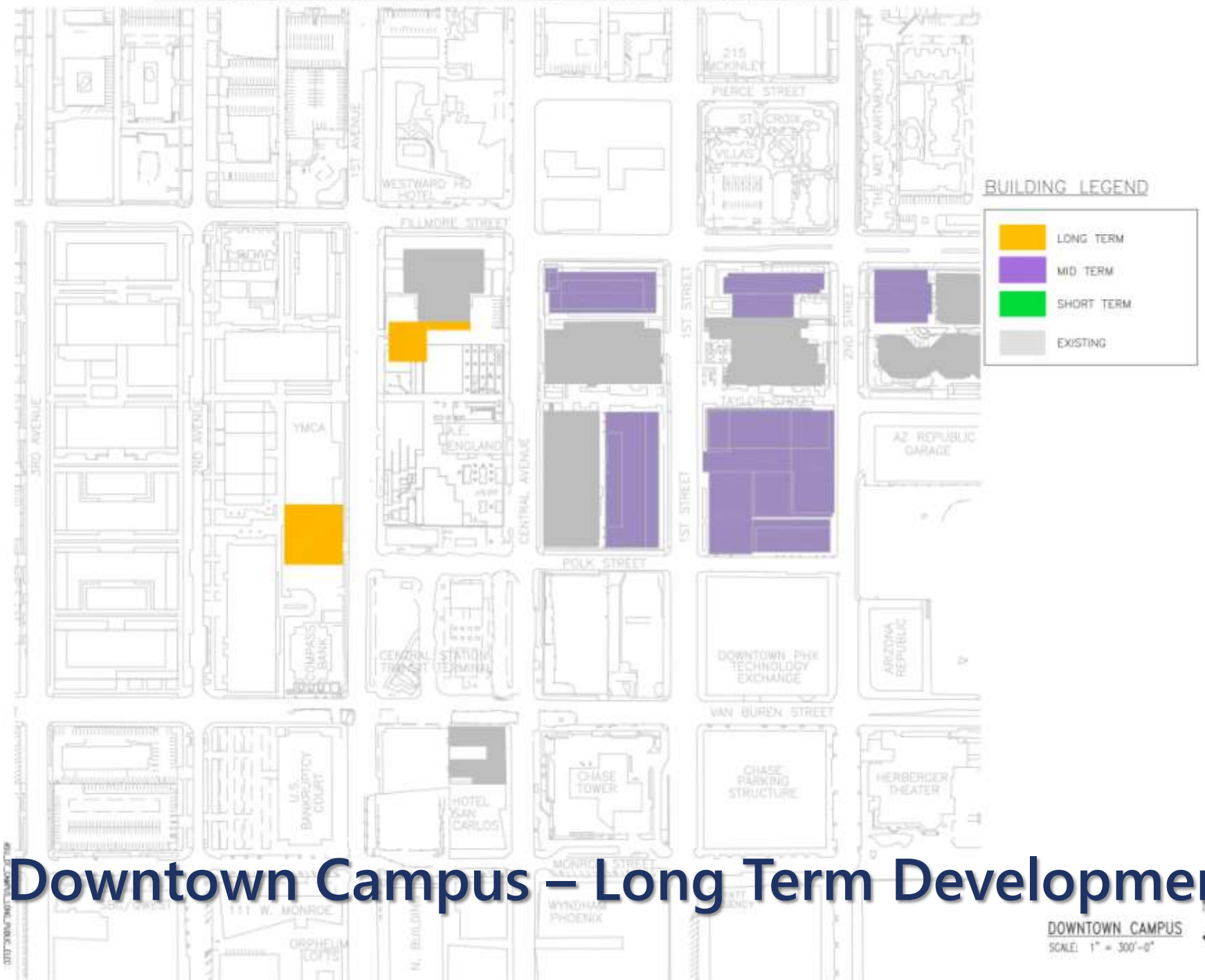


Polytechnic Campus – Long Term Development

POLY CAMPUS
SCALE: 1" = 400'-0"









Campus & Utility Infrastructure Synchronization











COLLABORATE. **CONNECT.** COMPLETE.

Summary



COLLABORATE. **CONNECT.** COMPLETE.

Questions

