

Unearthed

Digging Into UMass Boston's Transformational Utility, Landscape, & Roadway Project



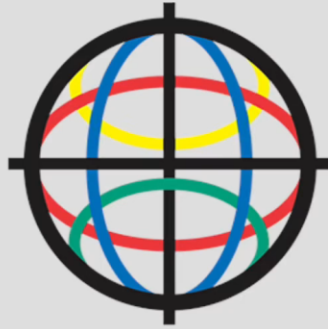
SCUP 2019



A vertical photograph of a field with tall grasses and a tree in the background. The grasses are in the foreground, some with purple seed heads. A tree is visible in the background, slightly out of focus. The sky is bright and overcast.

Learning Outcomes

1. Explain the pre-work that must be done before a major utility infrastructure project, including soil analysis, selecting appropriate materials, and geo-environmental engineering to maintain safety during soil disturbance.
2. Describe methods to introduce plant life, add stormwater treatment, and create outdoor spaces for campus users on a campus filled with regulated soils.
3. List ways to physically connect an urban campus to the broader community.
4. Summarize lessons learned from the implementation of a massive campus utility and landscape project.



BVH
*i*ntegrated
services

SINCE 1958

History

Utilities

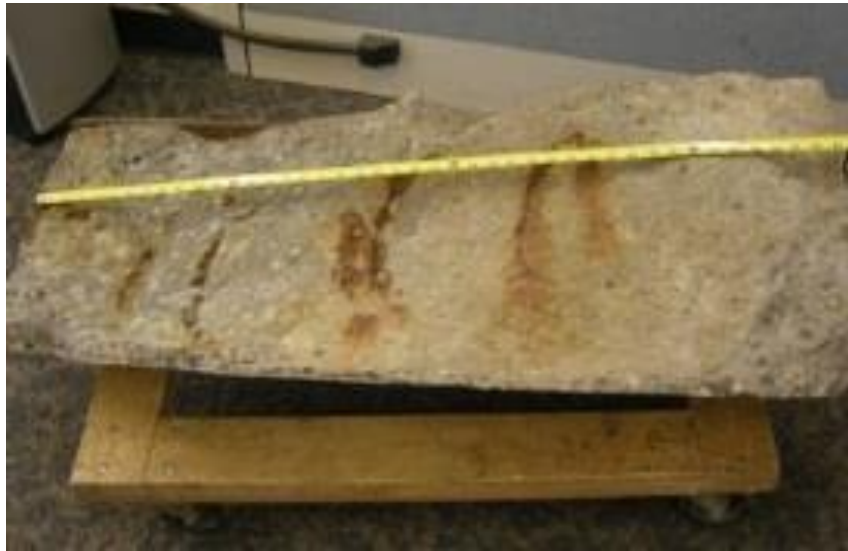
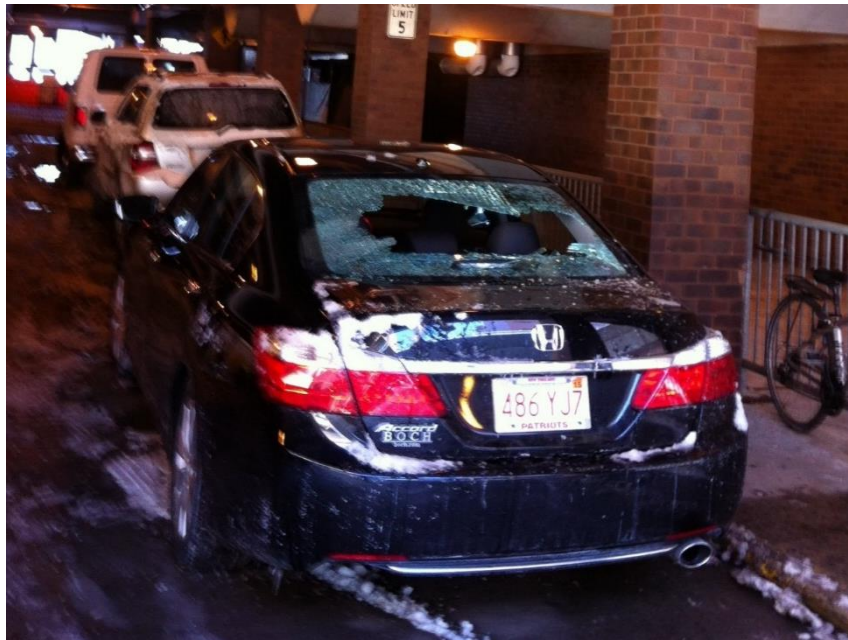
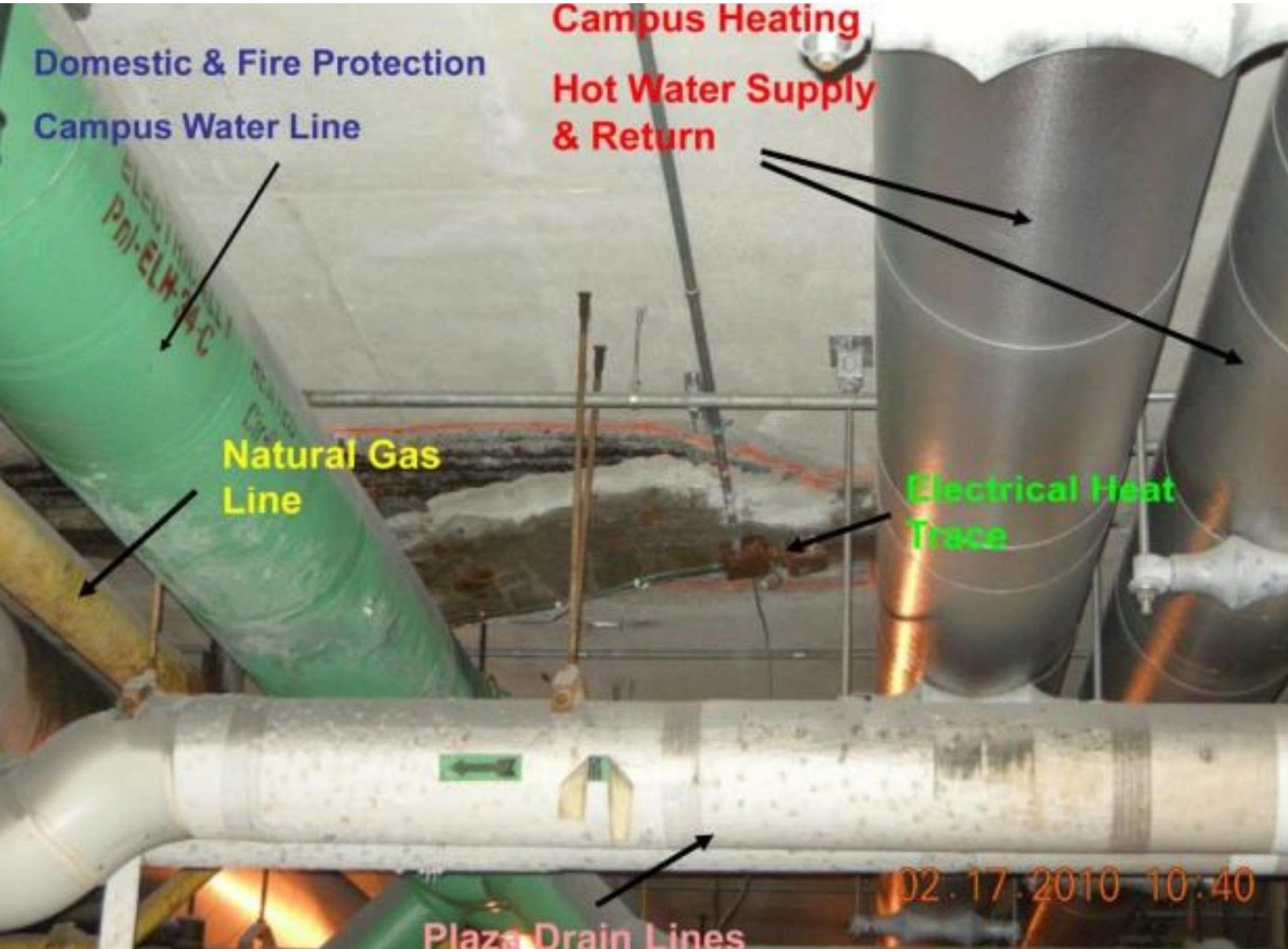
Landscape

Community

Dorothy Renaghan

Assistant Vice Chancellor for
Facilities Management
UMass Boston

How This Project Began: Unsafe Conditions in the Substructure



How This Project Began: Unsafe Conditions in the Substructure



Interim Stabilization

Lateral Bracing, Vertical Supports, and Concrete Repairs

116 steel braced frames

36 shoring platforms

Repair of corrosion damage on
Upper Level joist beams and
columns




Interim Stabilization

Safe Access/Egress for Operations



Living Documents



June 27, 2007
Final Task Force Report

University of Massachusetts Boston
June 27, 2007

A. Overview	Table of Contents
<p>The Chancellor's Strategic Planning Task Force (CSPTF) Charge:</p> <p>“To receive input from throughout our internal and external constituencies and develop a comprehensive report recommending strategic directions for the University of Massachusetts Boston over a three year period beginning in 2008.”</p> <p>Recommended Strategic Goals</p> <ol style="list-style-type: none"> 1. Increase Student Access, Engagement, and Success 2. Attract, Develop, and Sustain Highly Effective Faculty 3. Create a Physical Environment that Supports Teaching, Learning, and Research 4. Enhance Campus-Community Engagement through Improved Organizational Structures 	<p>A. Overview</p> <p>B. CSPTF Recommendations</p> <ul style="list-style-type: none"> ▪ Recommended Strategic Goals ▪ Matrix of Sub-committee recommendations <p>C. Appendices</p> <ol style="list-style-type: none"> 1. Sub-committee Final Reports 2. UMass Boston's Mission, Vision, and Value Proposition 3. Planning, Organization, and Schedule 4. Analyses Supporting Recommendations 5. Summary of Proceedings of Strategic Planning Retreats


1

Strategic Plan

UMB0501 ST1
Campus Master Plan for

University of Massachusetts Boston

December 2009




Prepared for:
COMMONWEALTH OF MASSACHUSETTS
DIVISION OF CAPITAL ASSET MANAGEMENT
DAVID B. PERINI, COMMISSIONER

Prepared by:
CHAN KRIEGER SIENIEWICZ

In association with:

- Hargreaves Associates
- Howard/Stein-Hudson Associates, Inc.
- LeMessurier Consultants
- Nitsch Engineering Inc.
- RDK Engineers, Inc.
- Rickes Associates, Inc.
- VAV International, Inc.



ARCHITECTURE & URBAN DESIGN

Master Plan

DCAM

University of Massachusetts, Boston

Energy and Utility Master Plan

December 2009

ARUP

DCAM Project #: UMB0501HS1

Arup USA, Inc
955 Massachusetts Avenue, 4th floor, Cambridge, MA 02139
Tel +1 617 864-2987 Fax +1 617 864-6178
www.arup.com

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 207571

Energy/Utility Master Plan

Strategic Plan Goals

Goal 1:

Increase student access, engagement, and success

Goal 2:

Attract, develop, and sustain highly effective faculty

Goal 3:

Create a physical environment that supports teaching, learning, and research

Goal 4:

Enhance campus-community engagement through improved organizational structures

Master Plan Vision of a Transformed Campus

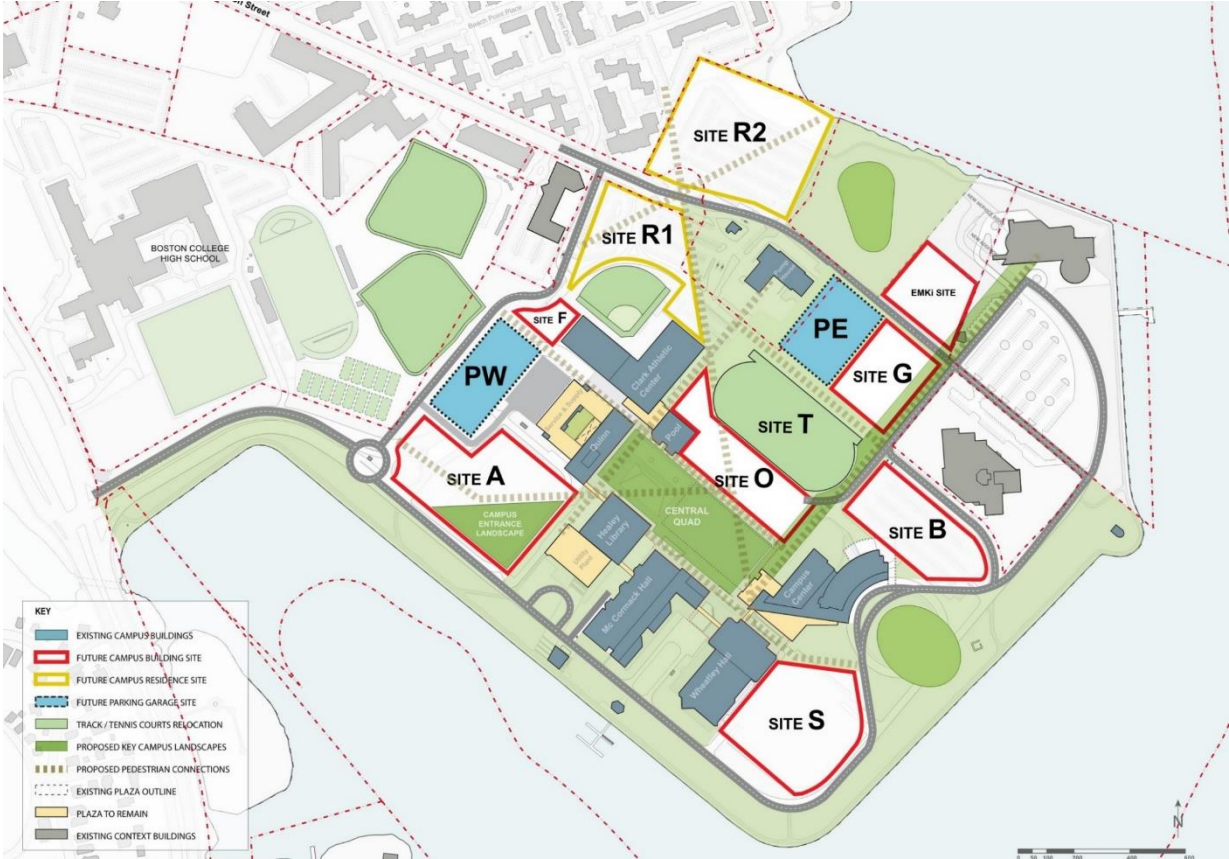
“The opportunity to demolish the Substructure and bring the campus open space down to the ground ...will allow Umass Boston to transform itself...”

“maximize opportunities to circulate through the campus – for campus constituents, neighbors, and visitors – to connect to all areas of the waterfront...”

A 25 Year Master Plan Framework

Phase 1 = 1st 10 years (Environmental remediation, creating connections, dorms, academic buildings)

Phase 2 = Next 15 years



Implementing the Master Plan

2010-2019



Dorms

Harborwalk

Garage

Utility
Corridor,
Roadway,
and
Landscape

EMKI

Research
Building

Academic
Building

History

Utilities

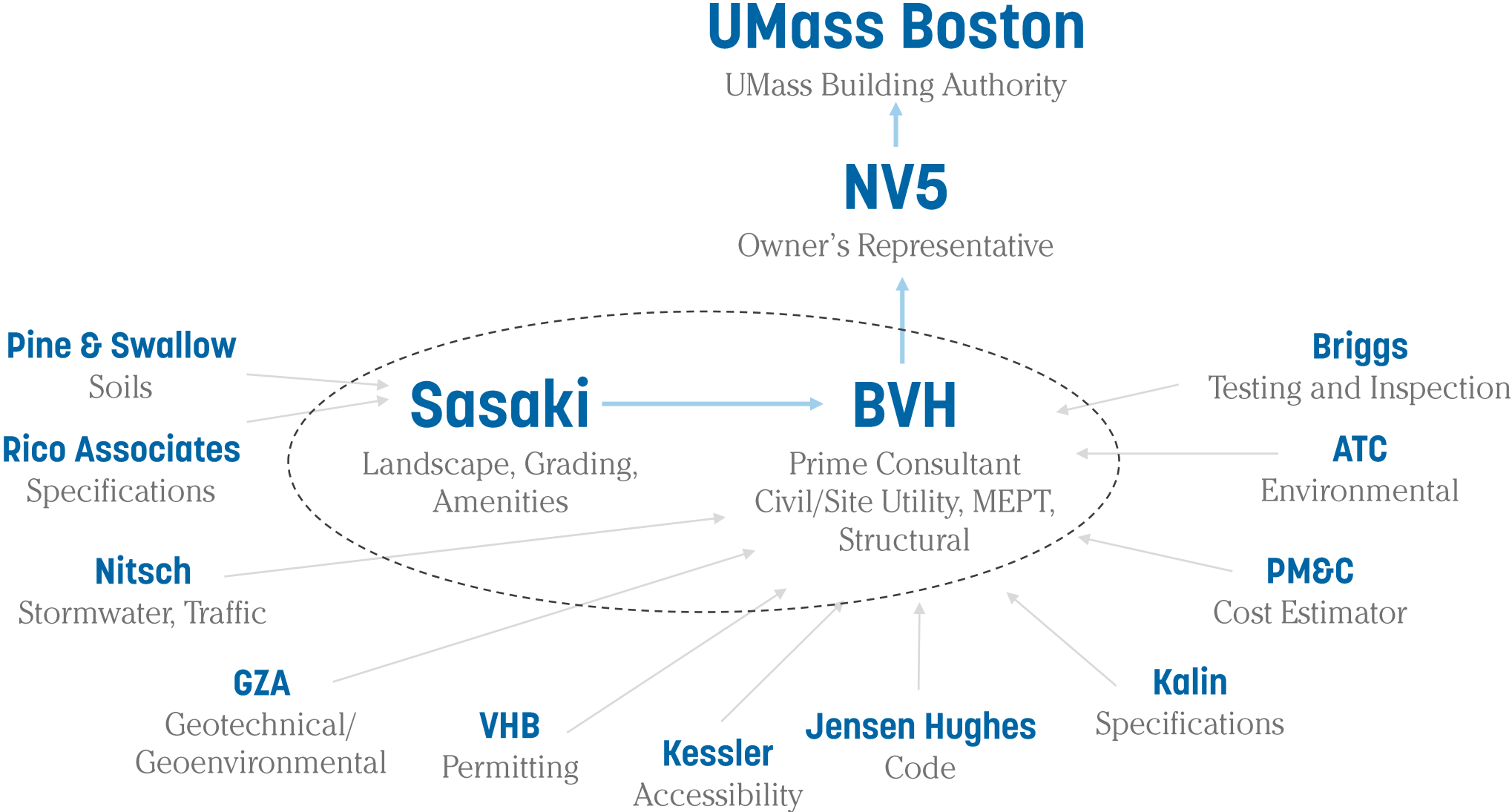
Landscape

Community

James Velleman P.E., LEED AP

Associate Principal
BVH Integrated Services

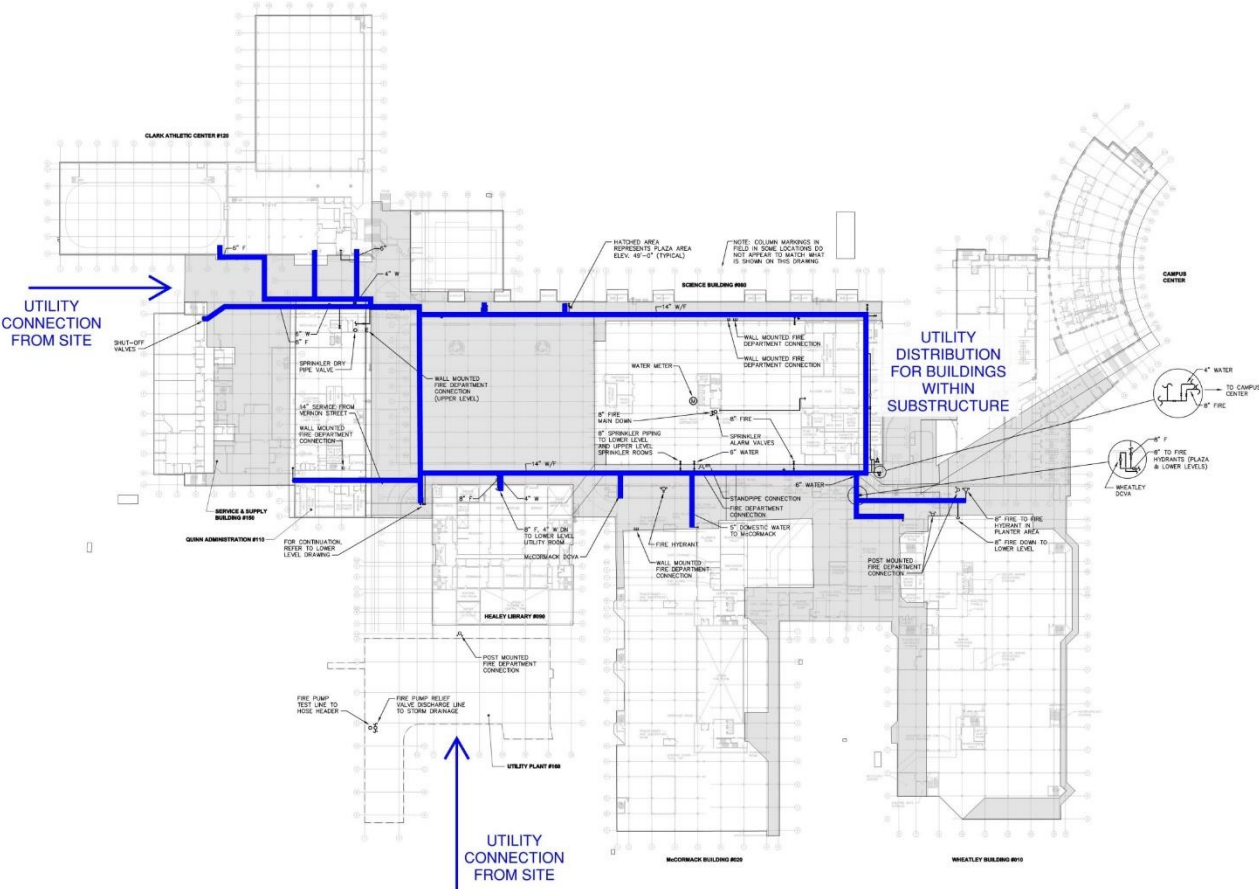
Design Team Structure



A 77-Acre Construction Site



2010



Substructure Utility Distribution

Planning for the Future

Capacity analysis of Utility Plant

Load projection of the master plan

Planning Utility Plant upgrades and sizing of distribution system

Continue use of seawater for cooling via the Saltwater Pump House

Umass Boston Chilled Water Requirements

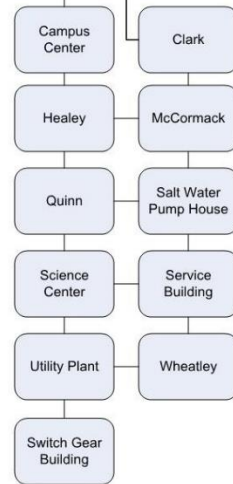
* Existing Utility Plant – 25 Year Master Plan*

Legend:
○ Existing ○ New

September 2011 – September 2013
Existing Utility Plant

* Salt Water Pump House condenser water
 $\Delta T = 6.5^\circ \text{ F}$ rejects 3,000 Tons

Total Plant Capacity = 3,000 Tons



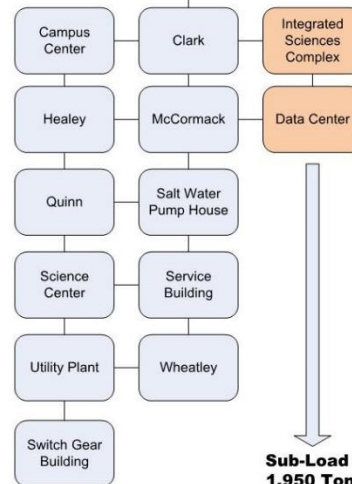
Total Plant Load = 3,000 Tons

September 2013 – July 2014

Existing Utility Plant with Modifications and New Cooling Tower

* Salt Water Pump House condenser water
 $\Delta T = 10^\circ \text{ F}$ rejects 4,221 Tons

(1) – 2,000 Ton Cooling Tower (Rejects 2,000 Tons)
Total Plant Capacity = 6,221 Tons



Sub-Load = 3,000 Tons

Sub-Load = 1,950 Tons

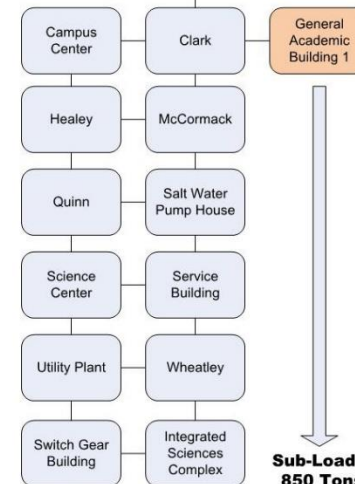
Total Plant Load = 4,950 Tons

July 2014 – January 2015

Existing Utility Plant with Modifications and New Cooling Tower

* Salt Water Pump House condenser water
 $\Delta T = 10^\circ \text{ F}$ rejects 4,221 Tons

(1) – 2,000 Ton Cooling Tower (Rejects 2,000 Tons)
Total Plant Capacity = 6,221 Tons



Sub-Load = 4,950 Tons

Sub-Load = 850 Tons

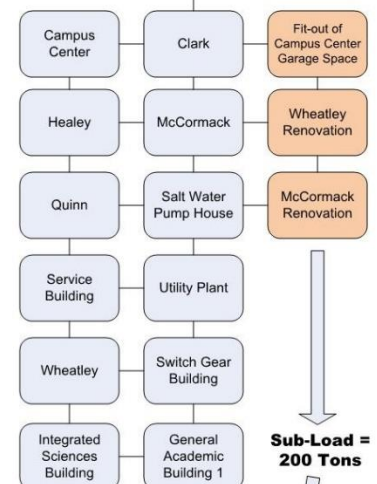
Total Plant Load = 5,800 Tons

January 2015 and Beyond

Existing Utility Plant with Modifications and New Cooling Tower

* Salt Water Pump House condenser water
 $\Delta T = 10^\circ \text{ F}$ rejects 4,221 Tons

(1) – 2,000 Ton Cooling Tower (Rejects 2,000 Tons)
Total Plant Capacity = 6,221 Tons



Sub-Load = 200 Tons

Total Plant Load = 6,000 Tons

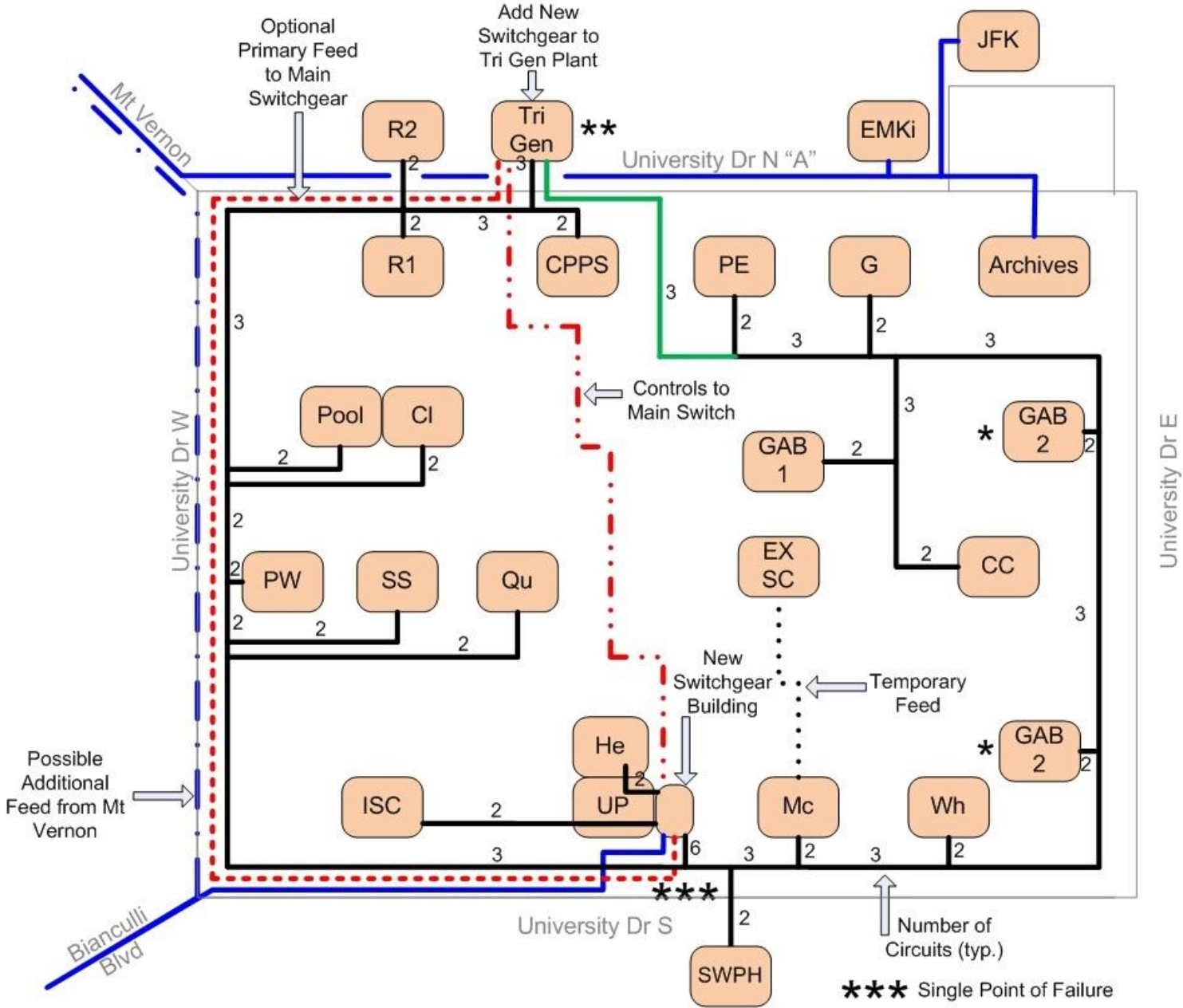
September 15, 2011

Planning for the Future

Connecting existing and future buildings to the new utility distribution network

Maintaining campus operations

Construction phasing



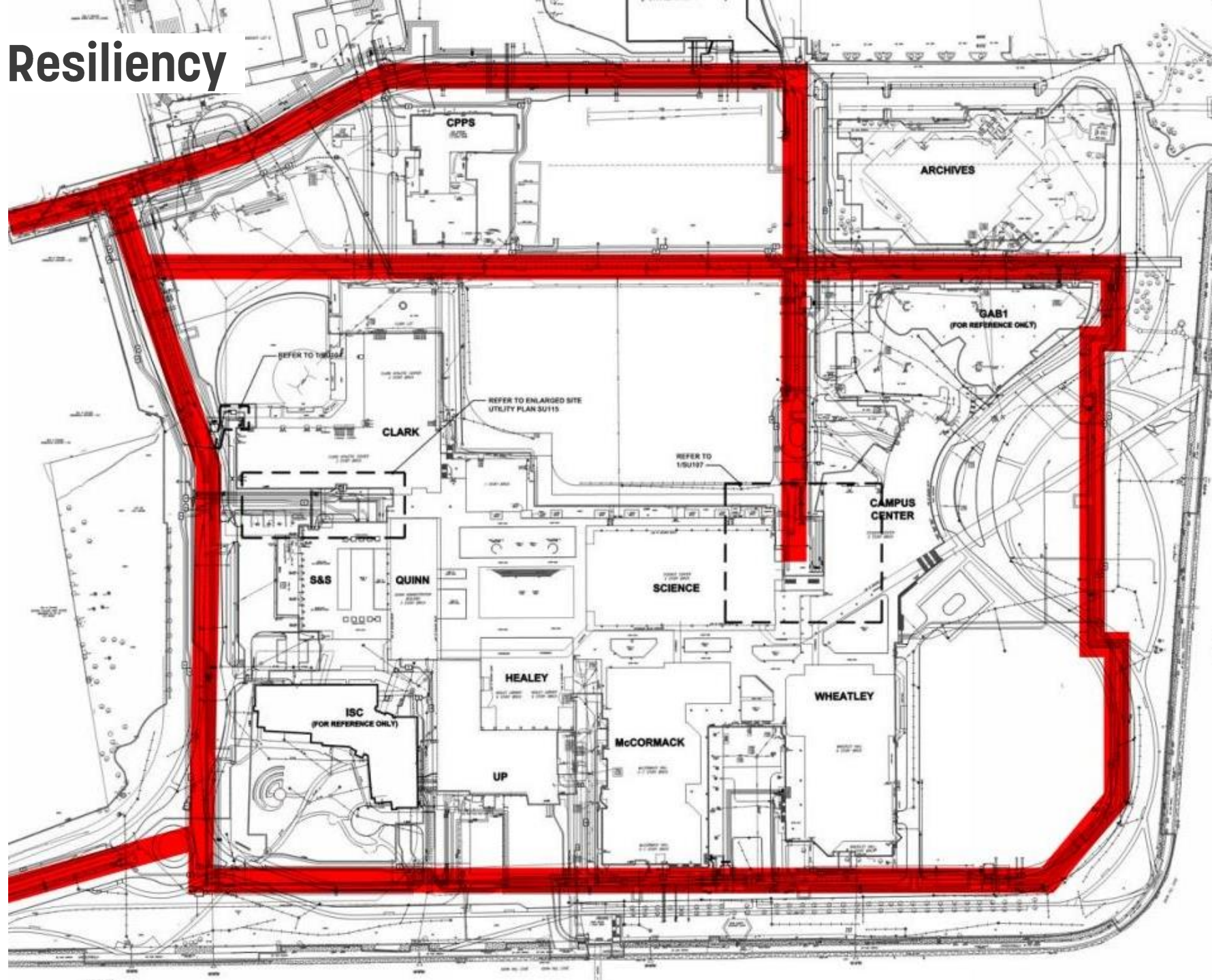
Utility Distribution and Resiliency

24+ miles of new utilities

Hot water, chilled water, domestic water, fire protection, sanitary sewer, electric, communications, gas, and storm sewer

Automated control system between Utility Plant, Saltwater Pumphouse, and buildings

Strategic valve placements and planned connection for future buildings



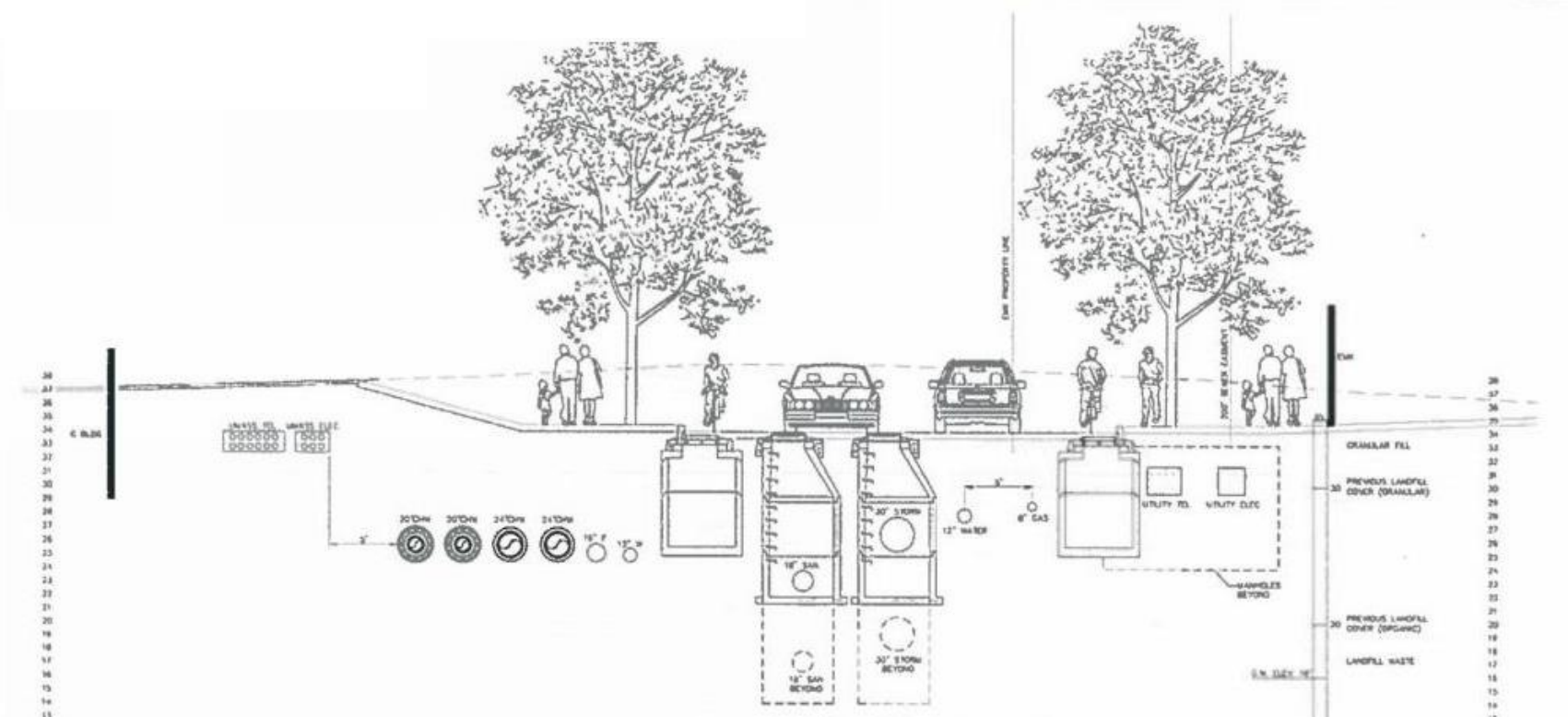
Interdependence of Utilities and Public Realm

Planning of utilities below grade with above grade amenities

70 ft. wide utility cross section

Disturbance to all campus roadways and creation of new roadways

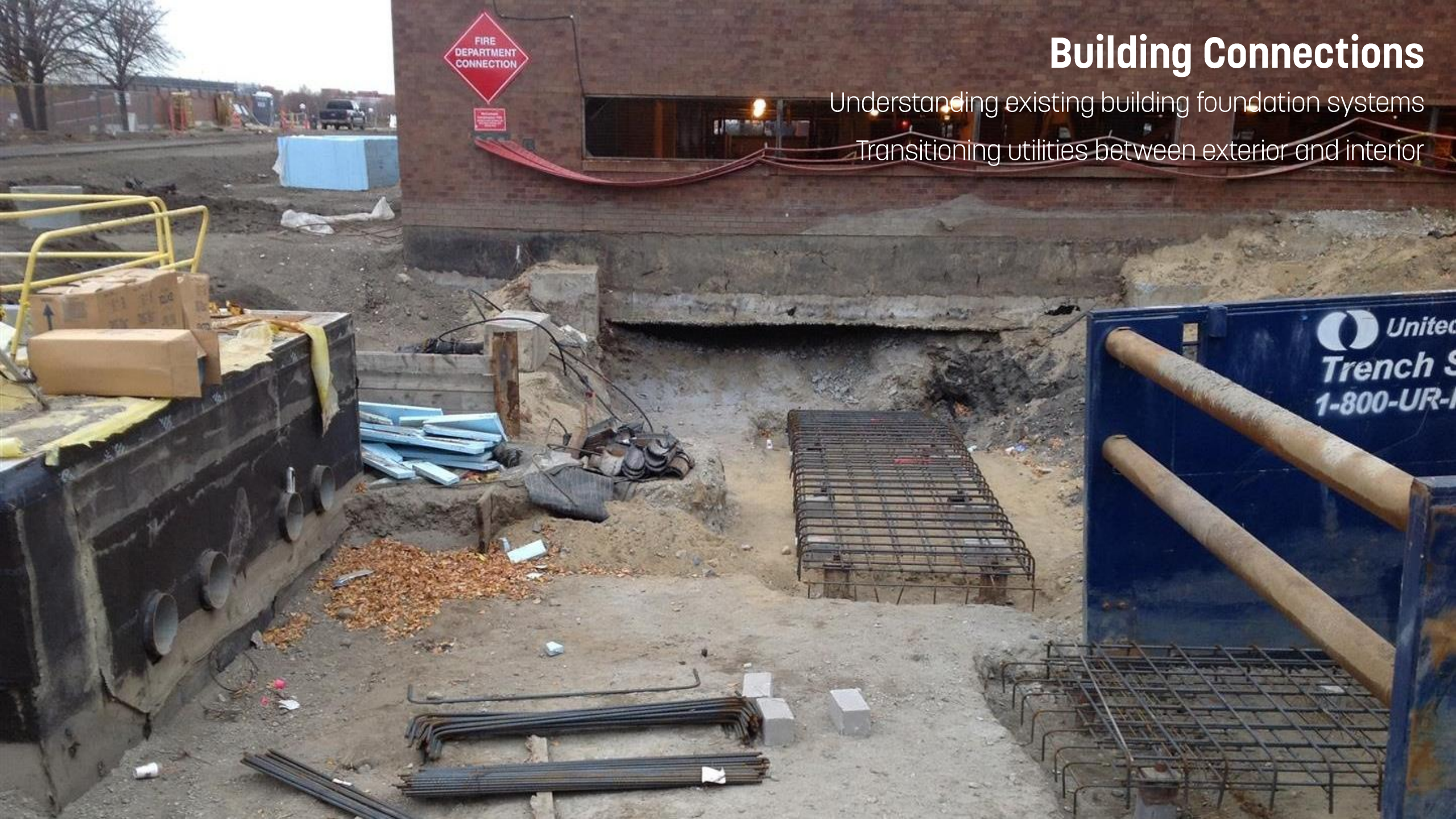
Removal of non-campus buildings from campus distribution system



Building Connections

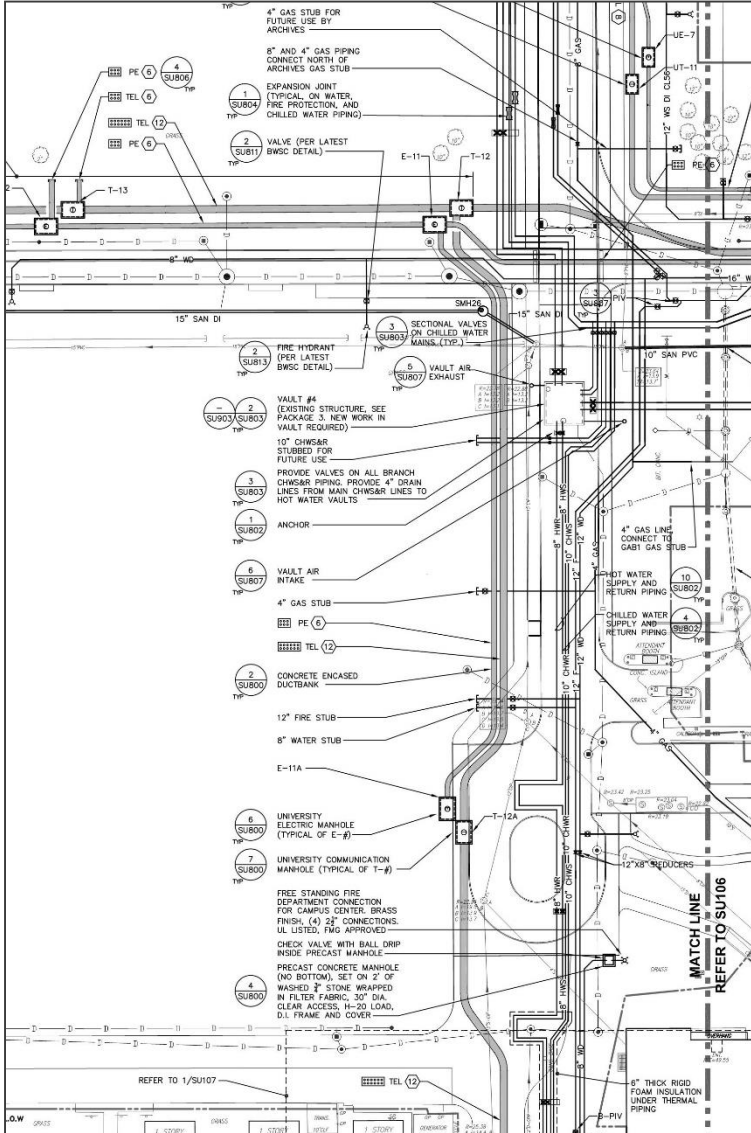
Understanding existing building foundation systems

Transitioning utilities between exterior and interior



Planning for Future Maintenance Access

Intricacies of the Critical Points in the Distribution Network; Vault Access for Personnel and Equipment



Maintaining Heritage Landscapes While Designing and Constructing the Utility Loop

Proximity of excavation to tree root systems

Accounting for supportive excavation measures

Working with a certified arborist



Scale and Logistics of Construction



Campus Logistics

- Maintaining campus vehicular circulation
- Temporary roadways and walkways
- Temporary transit hubs
- Coordination with other campus projects



Construction Logistics: Soils Testing and Handling

Division of Soils, Stockpile Coverings, Environmental Protection Measures



Environmental Issues: Disposal and Reuse

Soil Disposal vs. Reuse; Techniques, Barrier Layer, Clean Cap

80,000 cy of soil disposed of offsite

SITE TONS REUSED

1	36,677
2	44,000
3	3,160
4	19,035
5	48,445
6	n/a *
7	40,165
8	8,425
	199,907

(1 cy = 1.45 ton)

1,252 potential parking spaces displaced

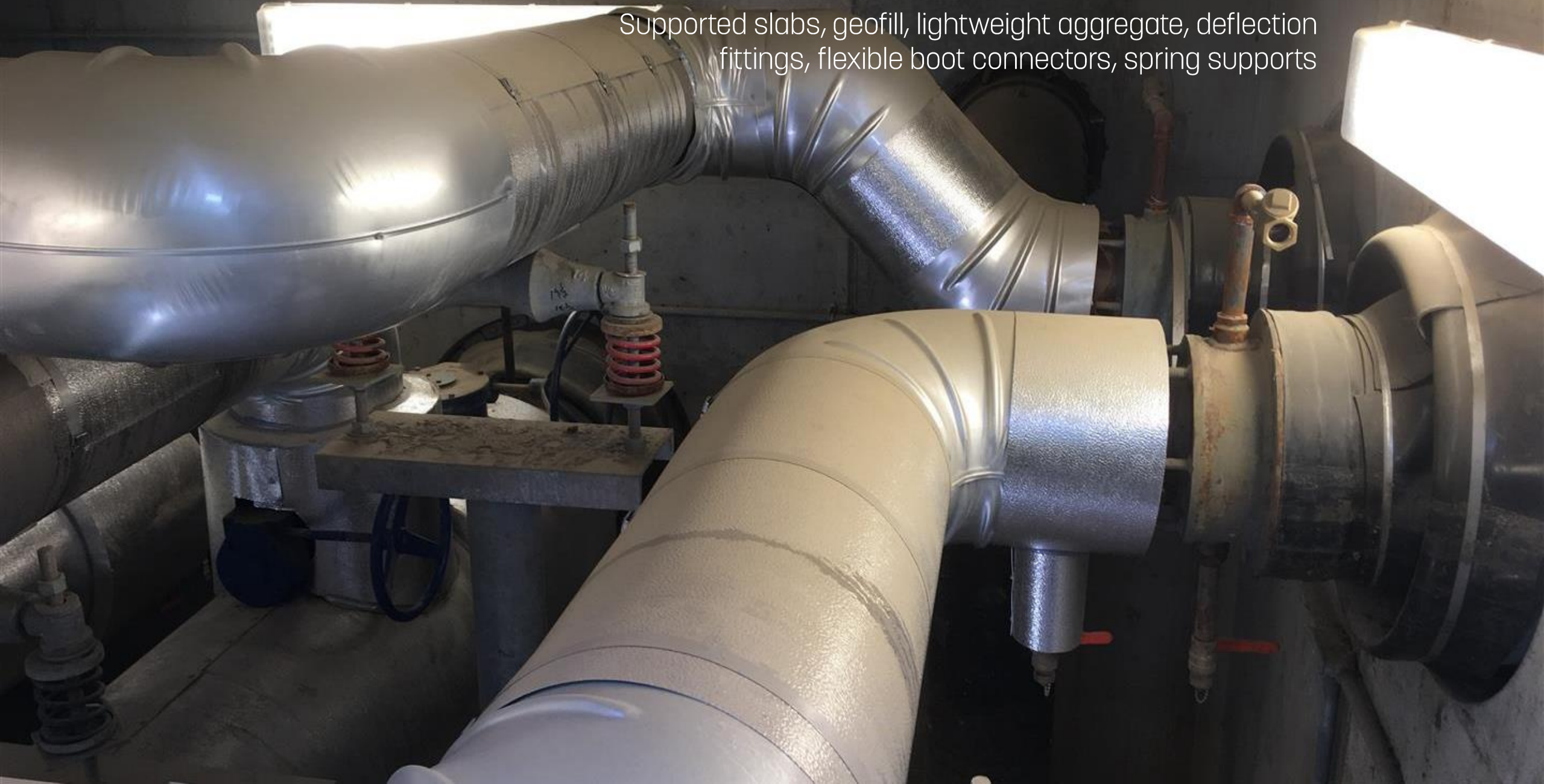
* See area enlargement

NOTE: Site ton reuse quantities based on BOND 12/7/2012 studies



Multiple Lightweight Utility Support Systems Employed

Supported slabs, geofill, lightweight aggregate, deflection fittings, flexible boot connectors, spring supports



Lessons Learned

Utilities

Dig Before You Design

Understand soil characteristics up front and pre-characterize soils

Geotechnical and Geoenvironmental Engineering are Vital

Especially when disturbing suspected or known regulated soils

Campus Logistics

Understand campus operations and maintain regular communication

Consider How Underground Utilities Are Supported

Utilities have different settlement tolerances; it is important for the design to respond to the utility and bearing soil

Incorporating Utility Phasing is Crucial

To keep buildings up and running during construction

Stay Flexible

Plan for future “what if” scenarios



History

Utilities

Landscape

Community

Ian Scherling P.L.A., ASLA
Senior Associate
Sasaki

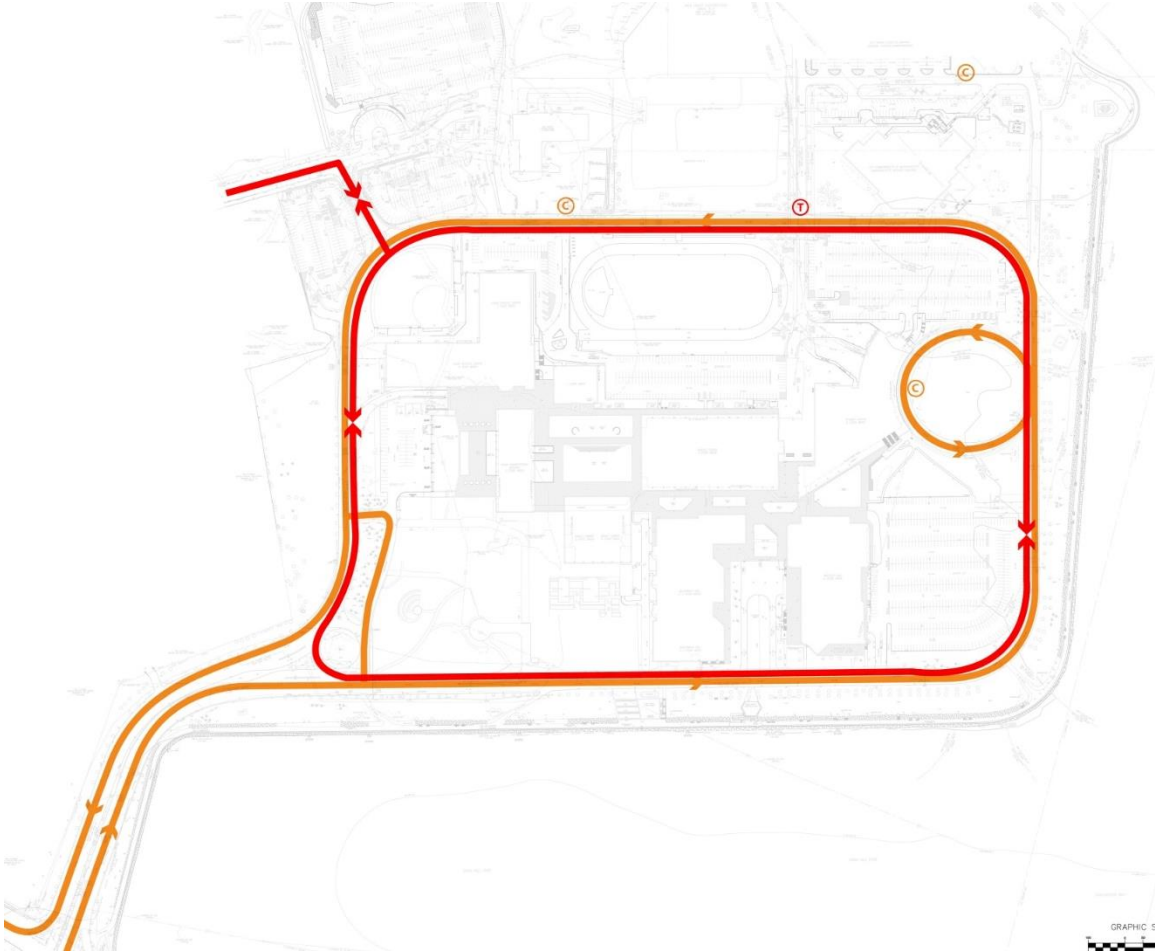
Ensuring the Successful Implementation of the Master Plan

A Multi-Faced Landscape Approach to Create Connections

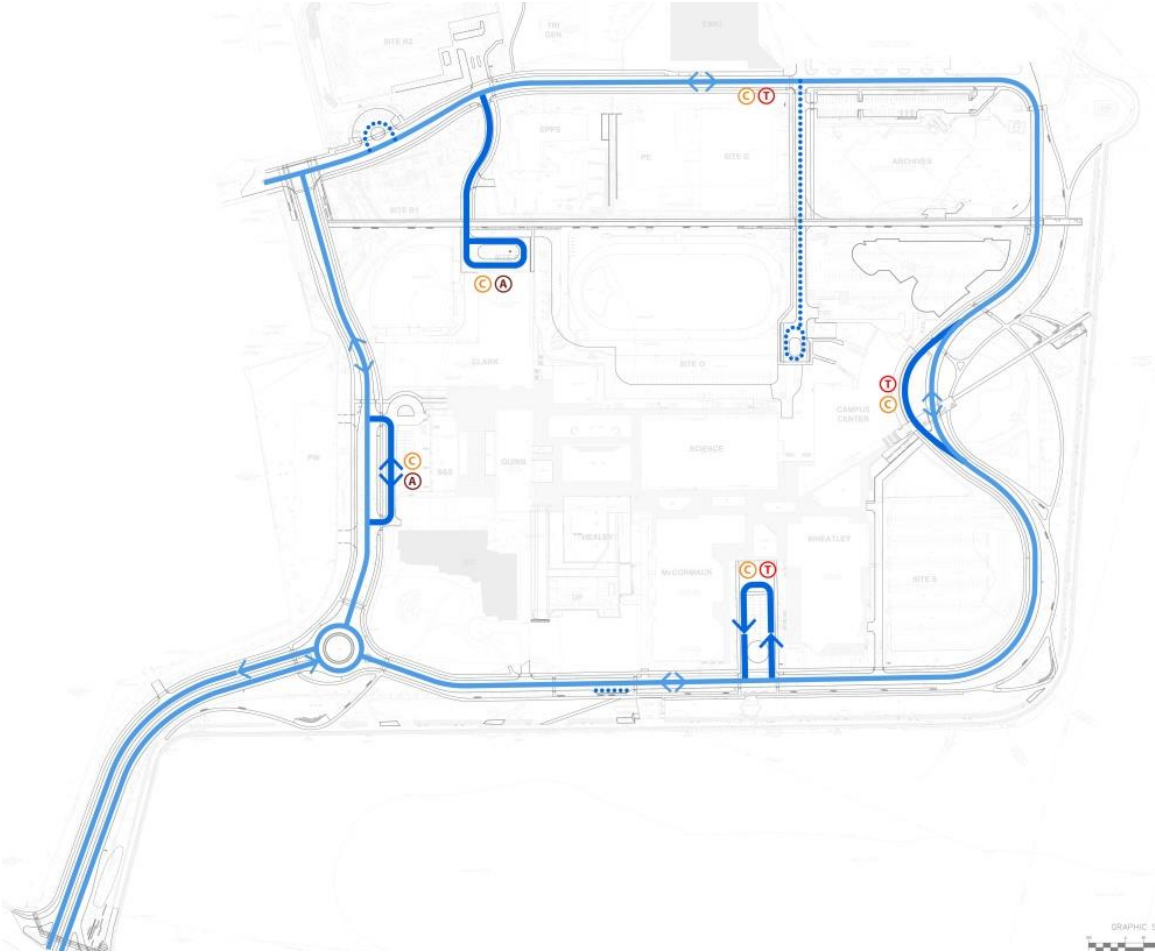


A Redesigned Perimeter Street

Creates a New Experience and a Designated Zone for Utilities



Existing One-Way Street



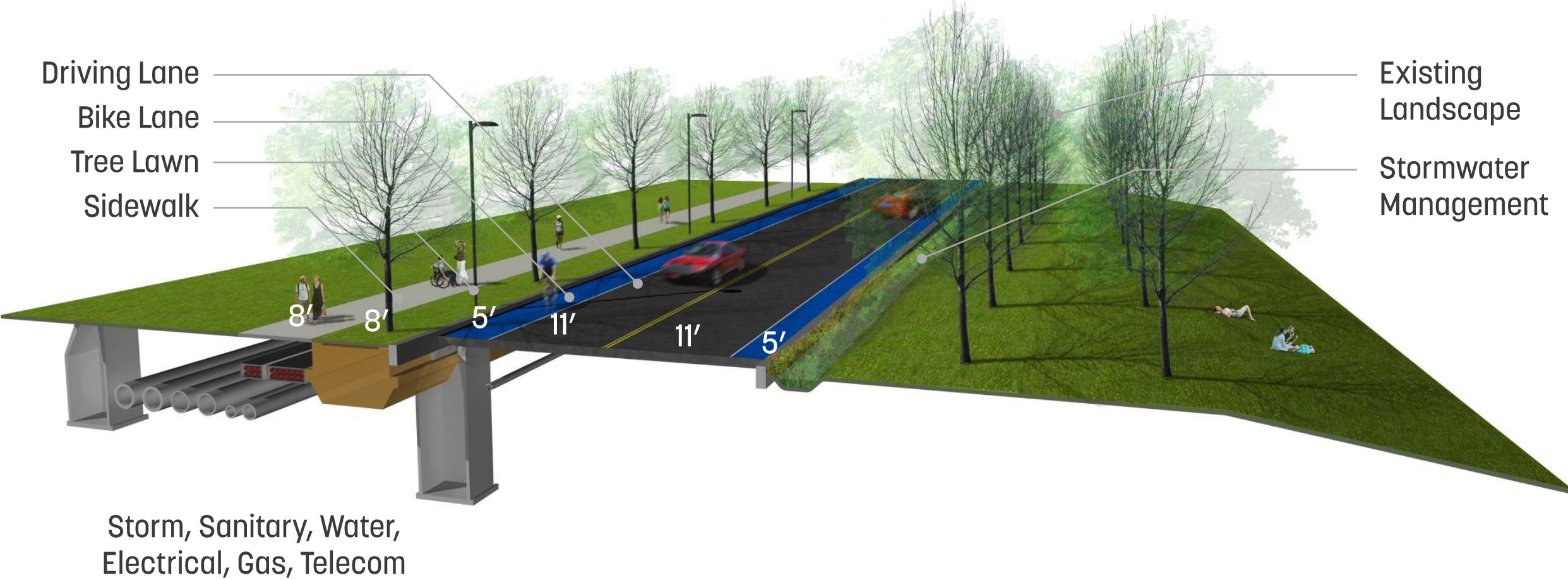
Proposed Two-Way Street w/ Integrated Bike, Transit, and Car Amenities

Existing One-Way Street Typified a True Commuter Campus



Complete Streets for a Residential Campus

2013 Boston Complete Streets Manual as a Guide



Ensuring the Success of Complete Streets

Combating Low Soil Volume – a Leading Cause of Urban Tree Mortality



RELATIONSHIP BETWEEN URBAN TREE GROWTH AND SOIL VOLUME

Based on citation: James, "Stronging Order in the Technical Cyclebook: Within the Urban Forest," Journal of Arboriculture, 2022 (2020): 80-86.
 Sasaki Studio
 12345 Garden & Roadway Rehabilitation
 SA 16514-00
 SCALE: 1"=10'

Other Determinants Affecting Tree Growth:
 Microclimate
 Project Maintenance
 Site History
 Soil Profile
 Soil Texture
 Species

Ensuring the Success of Complete Streets

Combating Low Soil Volume – a Leading Cause of Urban Tree Mortality



Continuous Wide Tree
Trenches Throughout the
Project

Additional Soil Volume
Under Sidewalks

Give the Core to Pedestrians: Move the Street

Sets up Long-Term Development Sites



Beacon Walk: Connecting Residences, Student Life, and Academics



A Multi-Use
Pedestrian Path
with a Distinctive
Identity

Giving UMass Boston's Neighbors a New Address



Giving UMass Boston's Neighbors a New Address



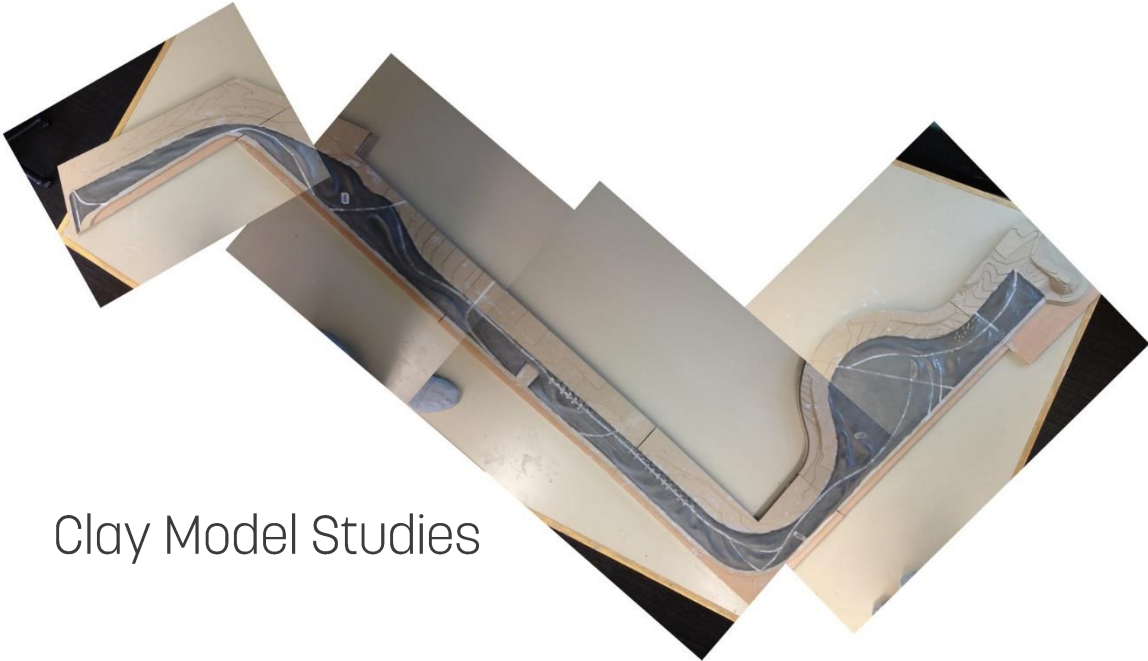
Physically and Visually Connecting Across the Street and to the Harborwalk



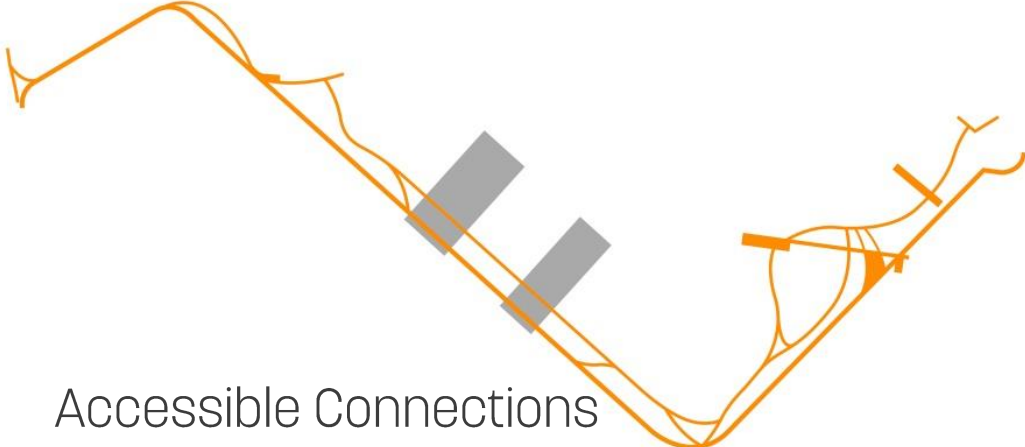
Raised Crossings
Favor Pedestrians

Creating a Unified Landscape Edge

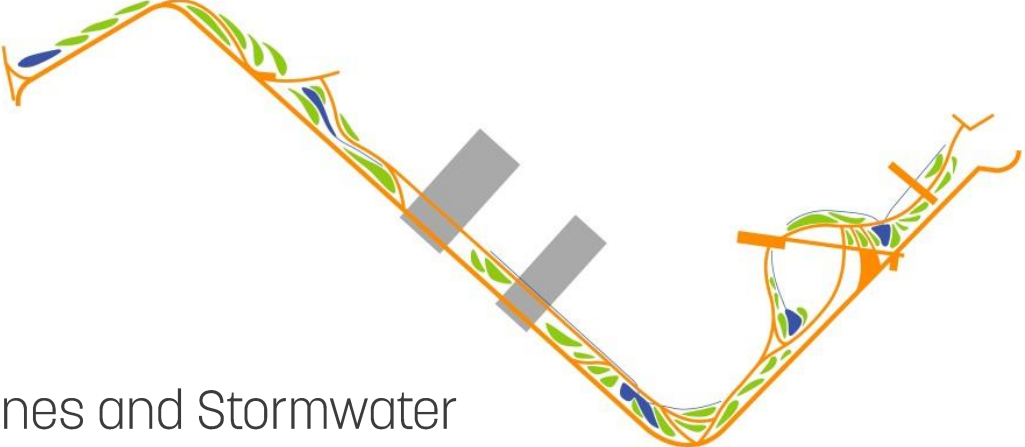
Integrating Accessibility, Stormwater, and Open Space



Clay Model Studies



Accessible Connections



Dunes and Stormwater



Unified Landscape Edge

Connecting the Core Campus to the Harborwalk

Eliminating Barriers for the Campus and the Community



Universal Accessibility as a Design Driver

Exceed ADA Standards to Ensure Equity in Landscape Design

"Flat"



Steep

0 - 5%	Walkways
5 - 8.32%	Walkways with Handrails
8.33%	Ramps with Handrails
10:1	Occupiable
5:1	Occupiable
3:1	Occupiable; Mowable Limit
1.5:1	Emergency Egress Stairs



ADA Accessible

Creating a Unified Landscape Edge

Integrating Accessibility, Low-Impact Stormwater Basins, and Open Space



Before: A Continuous Lawn with Few Pedestrian Connections



Vision: A Connected Coastal Landscape with Stormwater Amenities and Pocket Lawns

Working Within State Regulations



A Comprehensive Approach to Stormwater Management

Capturing and Filtering Water from all Campus Watersheds



A Comprehensive Daylighting Approach to Stormwater



All Roads Drain to
Basins: 13 in Total

A Sustainable Maintenance Ideal: 14 Ac of Meadows

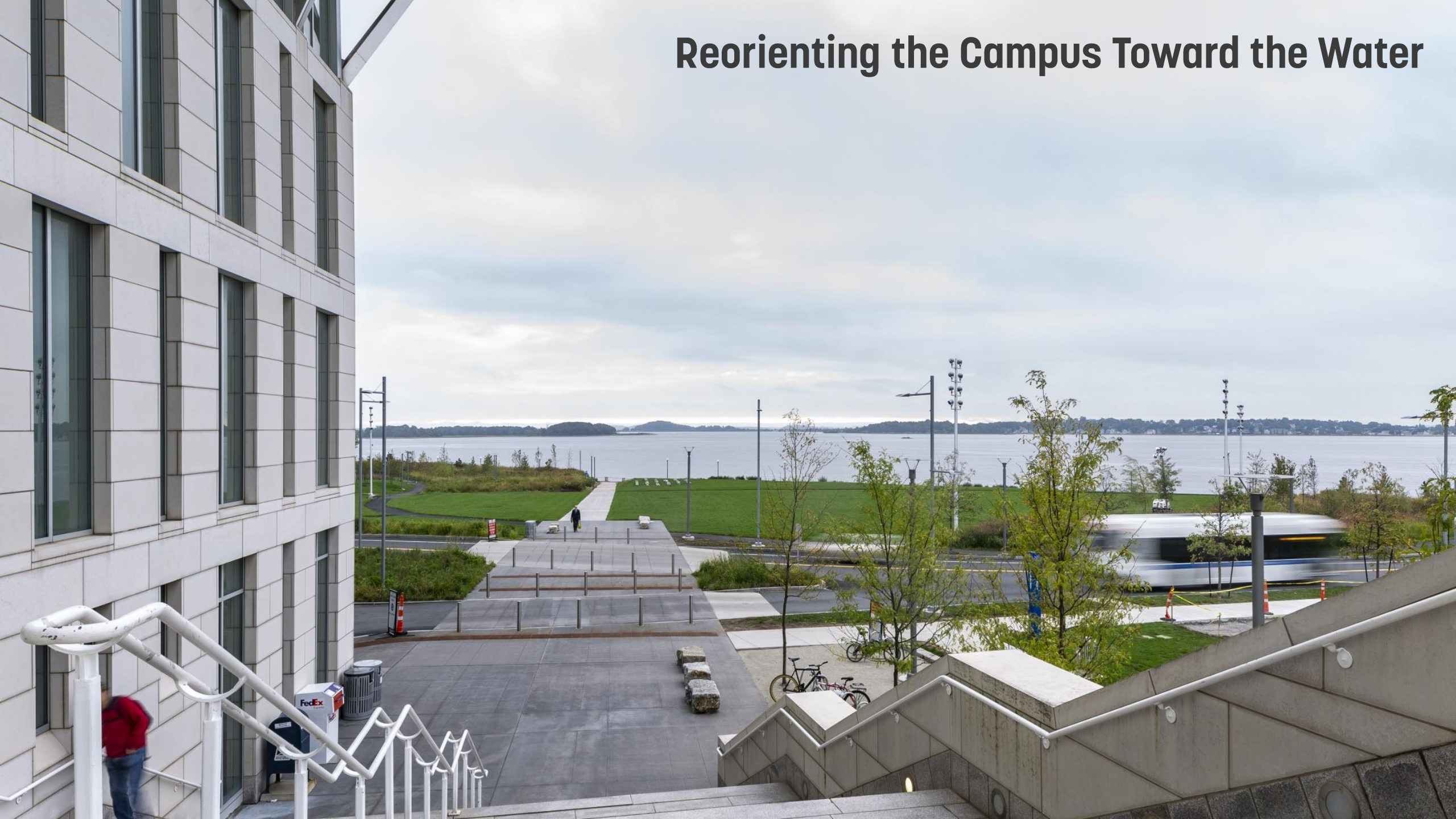
A Cultural Shift in Reimagining the Traditional Campus Lawn



A Former Traffic Circle with Limited Views and Access



Reorienting the Campus Toward the Water



A New Centerpiece for the Campus and Community



An Urban Campus Interacting with Nature



A Place to See and Been Seen

Embracing the Culture Shift



z_zhanhe • Follow

z_zhanhe What y'all looking at #graduation#umassboston
sensen1219 看咋没银儿呢
brzucas 🍷🍷

27 likes
JUNE 1

Add a comment...



umb2022 • Follow

umb2022 View of the front lawn is coming together nicely!

#umassboston #umb2022

bwscott22 Looks at UMass shirt. Gasps and shouts, "Hey, that's me!" (on the train)

umb2022 @bwscott22 yes! Right in the middle

thefirstnoel01 This is so cool!

umbdining My head is spinning from excitement! 🤩🤩🤩

151 likes
2 DAYS AGO

Add a comment...



umassjanet • Follow
• Campus Center at UMass Boston

umassjanet Join @umbsaec at Lawn on B tonight. Campus Center Front Lawn 7pm-11pm. I wish my lawn looked this good!

21 likes
15 MINUTES AGO

Add a comment...



internationalumb • Follow

internationalumb Another beautiful morning at UMass Boston. #umassboston #studyabroad #internationalumb

38 likes
JULY 19

Add a comment...

Lessons Learned

Landscape

Landscape + Utilities: the Entire Campus is Your Canvas

Avoids a project-to-project mindset

Invest in Landscapes

Always transformational: comparatively inexpensive

Understand State and Local Regulations

Implementation depends on it

Transfer Ownership Early On

Engage the campus community as a partner in promoting and using new or underused open spaces on campus

Stimulate the Community's Interest

Provide interpretive signage or other educational materials to increase the campus community's interest and understanding

History

Utilities

Landscape

Community

“Communicate: Three Times for the Average Mind”

Construction Impact Planning Committee

Construction Impact and Awareness Advisory Committee

“Building Connections” newsletter

Construction updates on website and via email

Campus-wide email messages of highly impactful work

Lunch and Learn sessions with students, faculty, and staff (PIZZA!)

construction@umb.edu email address to gather construction-related queries

Soil management and safety updates on Office of Environmental Health and Safety website

Construction webcams

Building Connections

A UNIVERSITY OF MASSACHUSETTS BOSTON CONSTRUCTION NEWSLETTER
WINTER 2013

Utility and Roadway Work Begins

2 Chancellor's Letter

3 Professor Looks Forward to ISC

4 On the Drawing Board

6 Detouring Pedestrians on HarborWalk

7 Academic Building to Rise

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A copy of this publication is available in alternative format upon request. Please visit www.ada.umb.edu.

UMASS BOSTON

14-232-00

A new campus gateway will be created where the new University Drive north aligns with Mt. Vernon Street.

Neighbors and visitors to the UMass Boston campus have likely noticed an influx of workers in hard hats and neon vests, installing miles of new pipes and operating a fleet of digging machines.

The Utility Corridor and Roadway Relocation project, critical to the renewal of the UMass Boston campus, began in late summer. The project is creating roadway, parking lot and pedestrian changes that will continue throughout the next two years. Tucked behind fences on several campus sites, crews are currently installing a new drainage system and seven mechanical vaults that will serve as underground utility hubs.

“We are witnessing a physical enhancement to match the natural beauty that surrounds us,” said Ellen O’Connor, vice chancellor for administration and finance

continued on page 2

Collaboration, Coordination, and Authorization

Institutional Neighbors

- John F. Kennedy Presidential Library and Museum
- Massachusetts State Archives and Commonwealth Museum
- Edward M. Kennedy Institute for the United States Senate
- Boston College High School

Federal Government

- Environmental Protection Agency
- Army Corps of Engineers

Commonwealth of Massachusetts

- Department of Transportation
- Department of Environmental Protection
- Department of Conservation and Recreation
- Office of Public Safety and Inspections (Building Inspector and Plumbing Inspector)
- Massachusetts Environmental Policy Act Office
- Office of Coastal Zone Management
- Department of Fisheries and Wildlife
- Massachusetts Historical Commission

City of Boston

- Boston Planning and Development Agency
- Boston Conservation Commission
- Boston Public Improvement Commission
- Boston Transportation Department
- Boston Public Works Department
- Boston Fire Department (via State Building Inspector)

Neighborhood and Civic Associations

- Meetings with neighborhood and civic associations

Public Utilities

- Eversource
- National Grid
- Boston Water and Sewer Commission
- Verizon
- Comcast (cable)

Elected Officials

- Members of Federal, State, and Local delegations

An Ethos of Goodwill: Acknowledging Support and Sacrifice

Harborwalk completion

New and separate utility connections for institutional neighbors

Update Massachusetts Archives entrance and parking

Create monumental sign that includes institutional neighbors

Design and install Zamboni pit for the Department of Athletics and Recreation



Q&A

