



Project Challenges when Extending Chilled Water/Steam Distribution on Multi-Ownership Medical Campus

BOLDT[®]

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CampusEnergy2018 Conference
Thermal Distribution Workshop

AGENDA

- **MRMC Introduction**
- **Project & Design Philosophy**
- **Pre-Construction Activities**
- **Layout & Mobilization**
- **Construction**
- **Unforeseen Conditions and/or Issues**



Introduction – MRMC Members

MILWAUKEE REGIONAL MEDICAL CENTER THERMAL



Blood Center of Wisconsin



Children's Hospital of Wisconsin



Curative Care



Froedtert & the Medical College of Wisconsin



Medical College of Wisconsin



Milwaukee County Behavioral Health

Introduction – MRMC Members

MILWAUKEE REGIONAL
MEDICAL CENTER
THERMAL



Blood Center of Wisconsin



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Medical College of Wisconsin



Milwaukee County Behavioral Health

Introduction – MRMC Members



MILWAUKEE REGIONAL
MEDICAL CENTER
THERMAL

- 7,500,000 square foot of conditioned space
- 22 buildings from 5 customers
- Approximately 2 miles of steam and chilled water lines
- Approximately 2,500 feet of tunnel
- Peak chilled water demand – 18,000 tons
- Peak steam demand - 205,000 lbs/hr.
- Largest chilled water line = 42” HDPE and 36” PCCP
- Largest steam line = 24” 15 psi and 12” 135 psi

Introduction - MRMC Thermal District

Thermal
Plant Site

MRMC Campus
Energy District



Introduction - MRMC Thermal District

MRMC Campus
Energy District



Project & Design Philosophy

Aspirations for a Steam and Chilled Water Future

| | |
|---------------------------------|---|
| Redundancy | A second plant to provide continuous supply of critical thermal service with geographic source diversity and on site alternate fuel backup |
| Reliability | Investment in plant and distribution infrastructure to enhance uninterrupted, consistent source of thermal service |
| Environmental | Reduce noxious emissions through elimination of coal |
| Growth | Creating capacity for growth - including and beyond the new Center for Advanced Care at Froedtert & The Medical College of Wisconsin POB |
| Transparency and Control | Engaging member organizations in decision-making - from the source to the user - to align clinical, economic, & accreditation values in decision making |
| Rate | Reduced rates for steam and chilled water |

Project & Design Philosophy

Redundancy & Reliability

- Geographic production diversity (two sources of steam and chilled water)
- Capable of meeting critical load demand with one plant out of service
- Looped distribution piping (bi-directional supply)
- Addition of critical isolation valves to maintain system delivery
- Addition of looped distribution piping provides future capacity



Pre-Construction Activities

- Easements
 - Milwaukee County Land Ownership
 - MRMC Members Leasing all Land rights

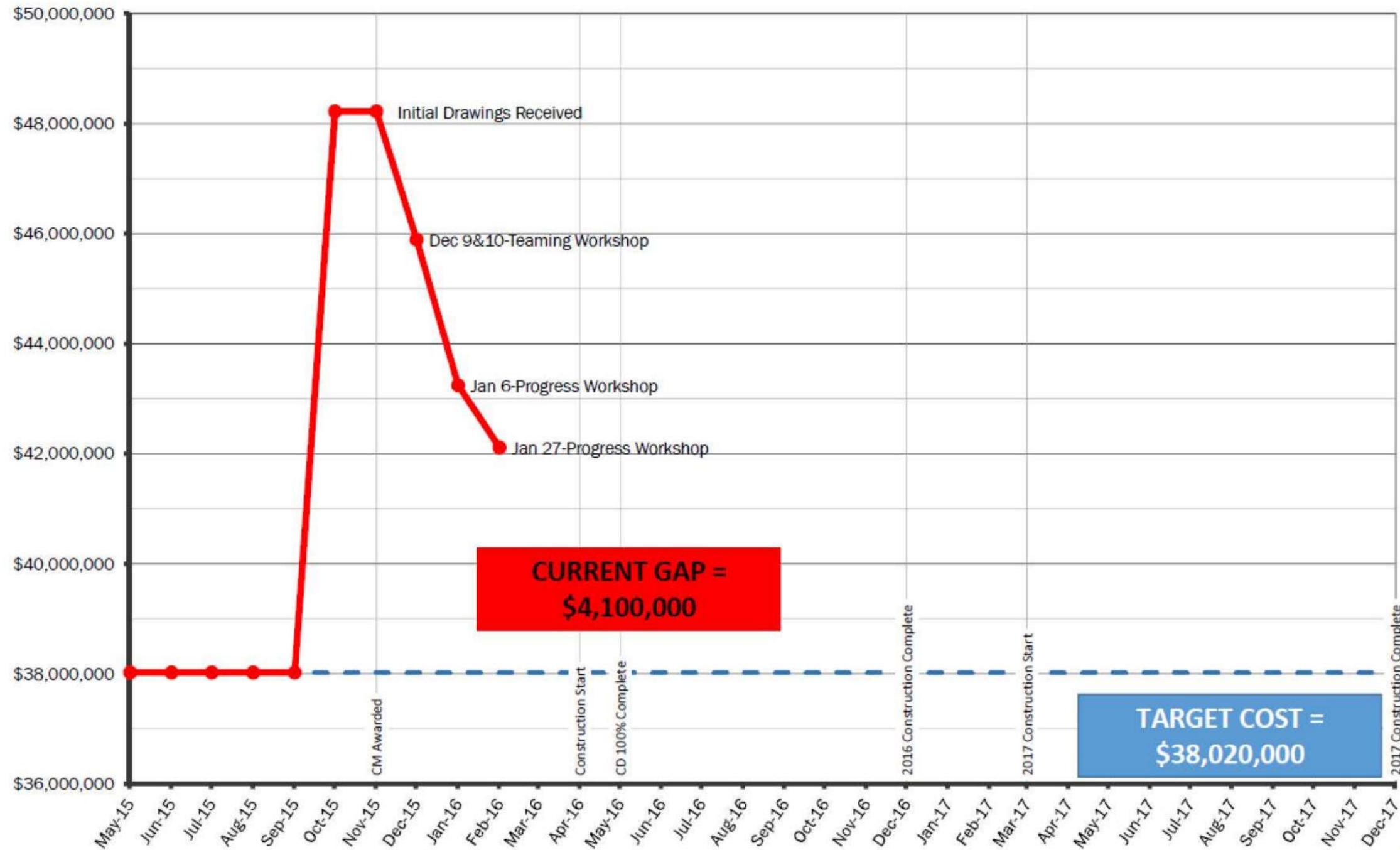
- Right of Entry Permits
 - Duo leases
 - County streets and utilities
 - City streets and utilities

- Site Documentation
 - Preconstruction videos of all surfaces
 - Vibration monitoring for possible affected buildings
 - Tree Survey

- Design Options
 - Open cut verses boring(Chilled Water)
 - Tunnel / Box Conduit / Direct Buried(Seam)

Pre-Construction Activities – Budget

Construction Cost – Distribution



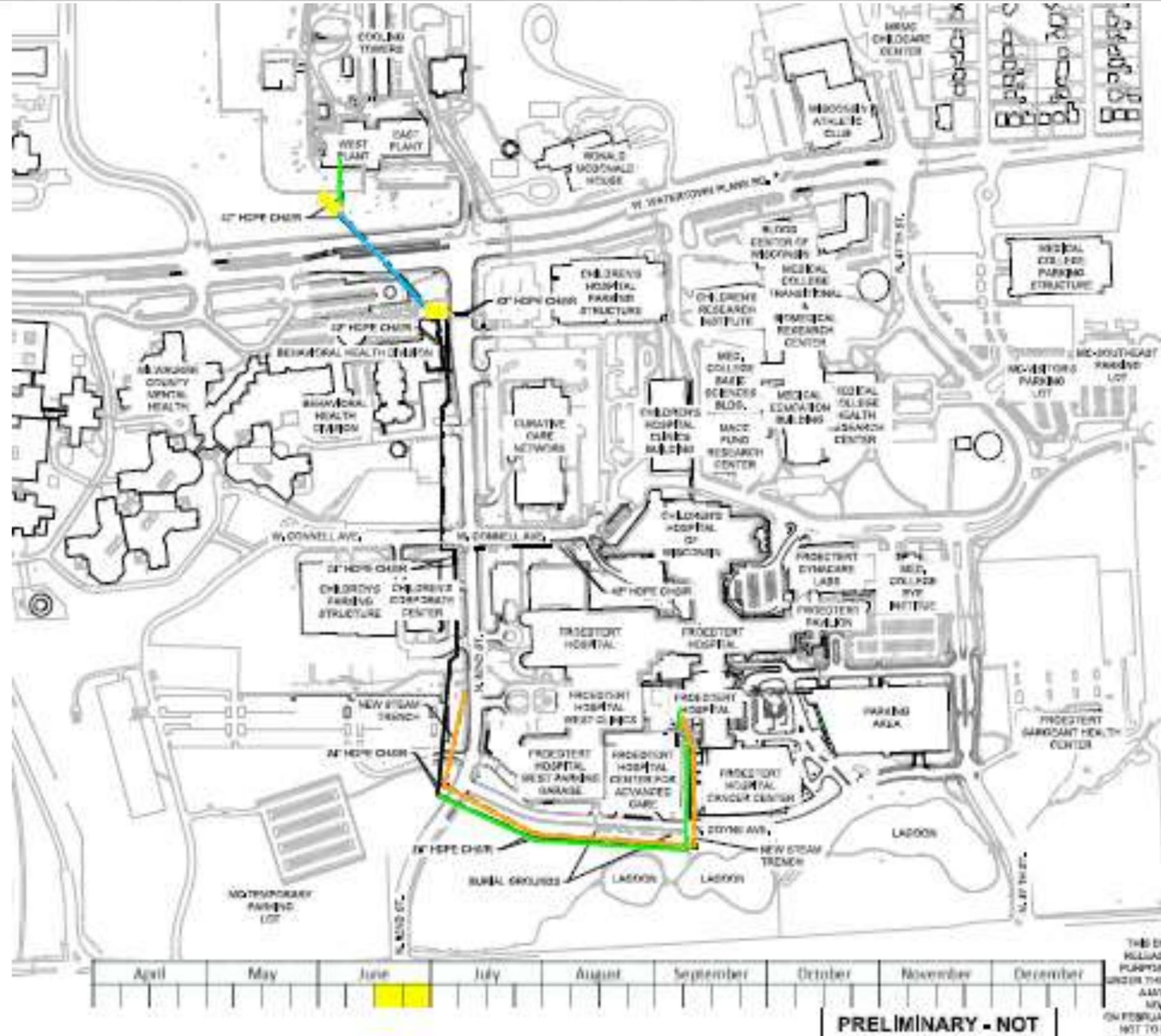
Layout & Mobilization

- Develop segregated laydown and soil areas.
- Understanding of permanent versus temporary easements.
- Disruption avoidance.
- Site and traffic signage.
- Traffic control: 6-9am and 3-6pm.



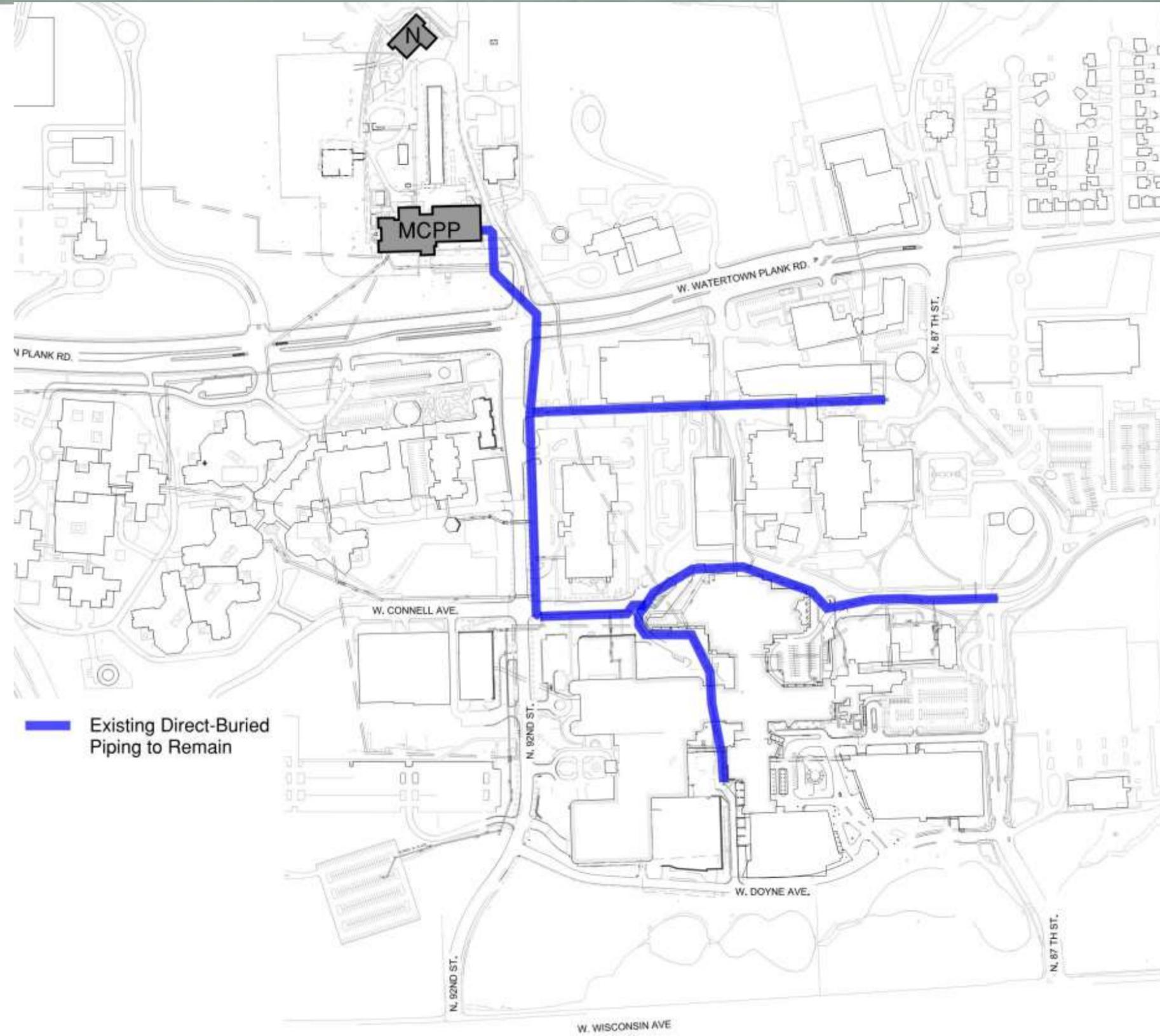
Construction – Distribution Details

- **SCOPE:** Extend steam/condensate and chilled water lines at various locations on campus to increase reliability or create better hydraulic flows. Improvements included:
 - 3,350 feet of chilled water lines
 - 2,300 feet of steam and condensate lines
 - 10 new vaults and 2 vault additions
 - Largest chilled water line = 42"
 - Largest steam line = 12"
- **BUDGET:** \$38,020,000
- **SCHEDULE:** Started summer of 2016 with projected completion summer of 2018



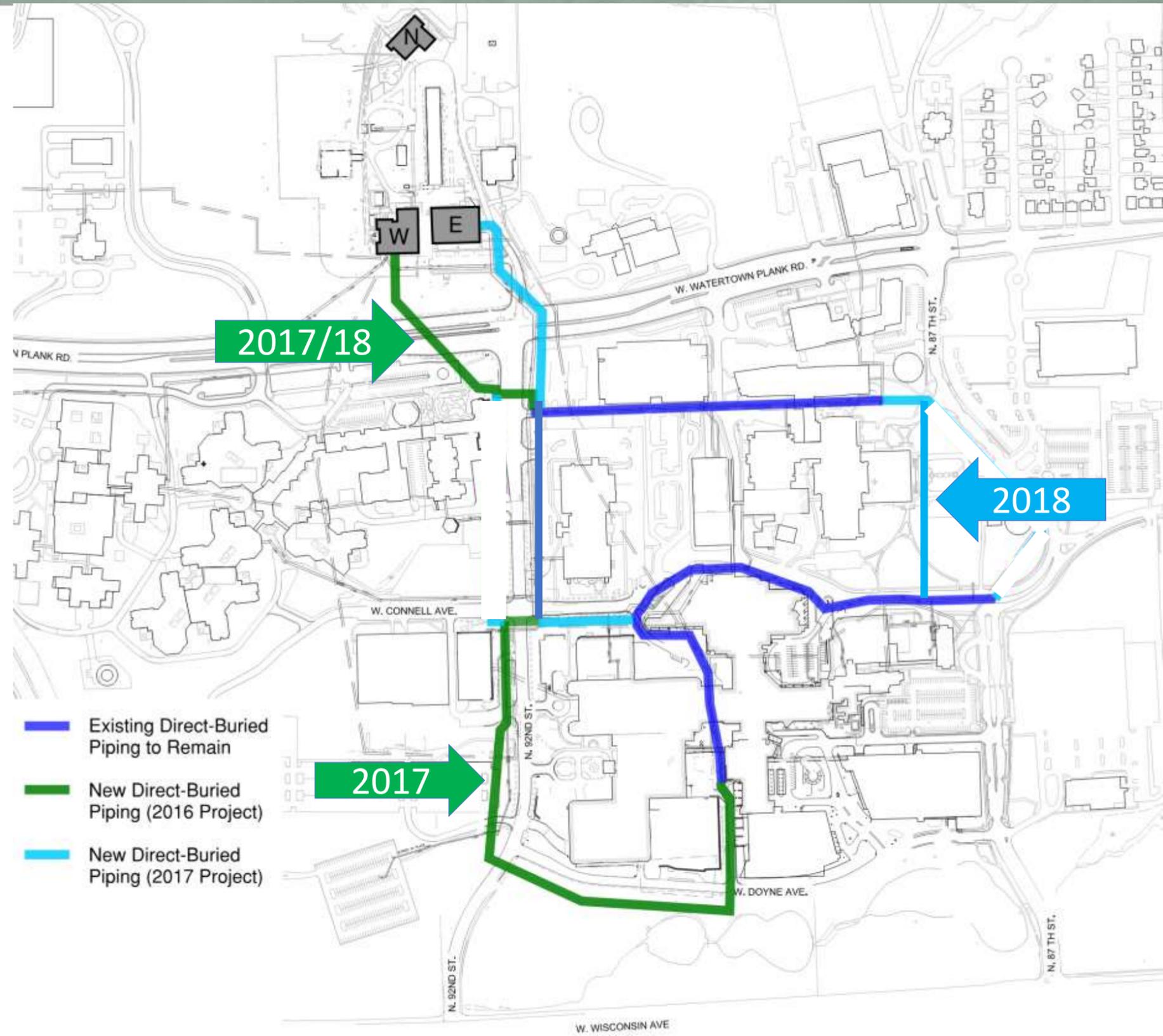
Construction – Chilled Water

Chilled Water Distribution – Pre-Project



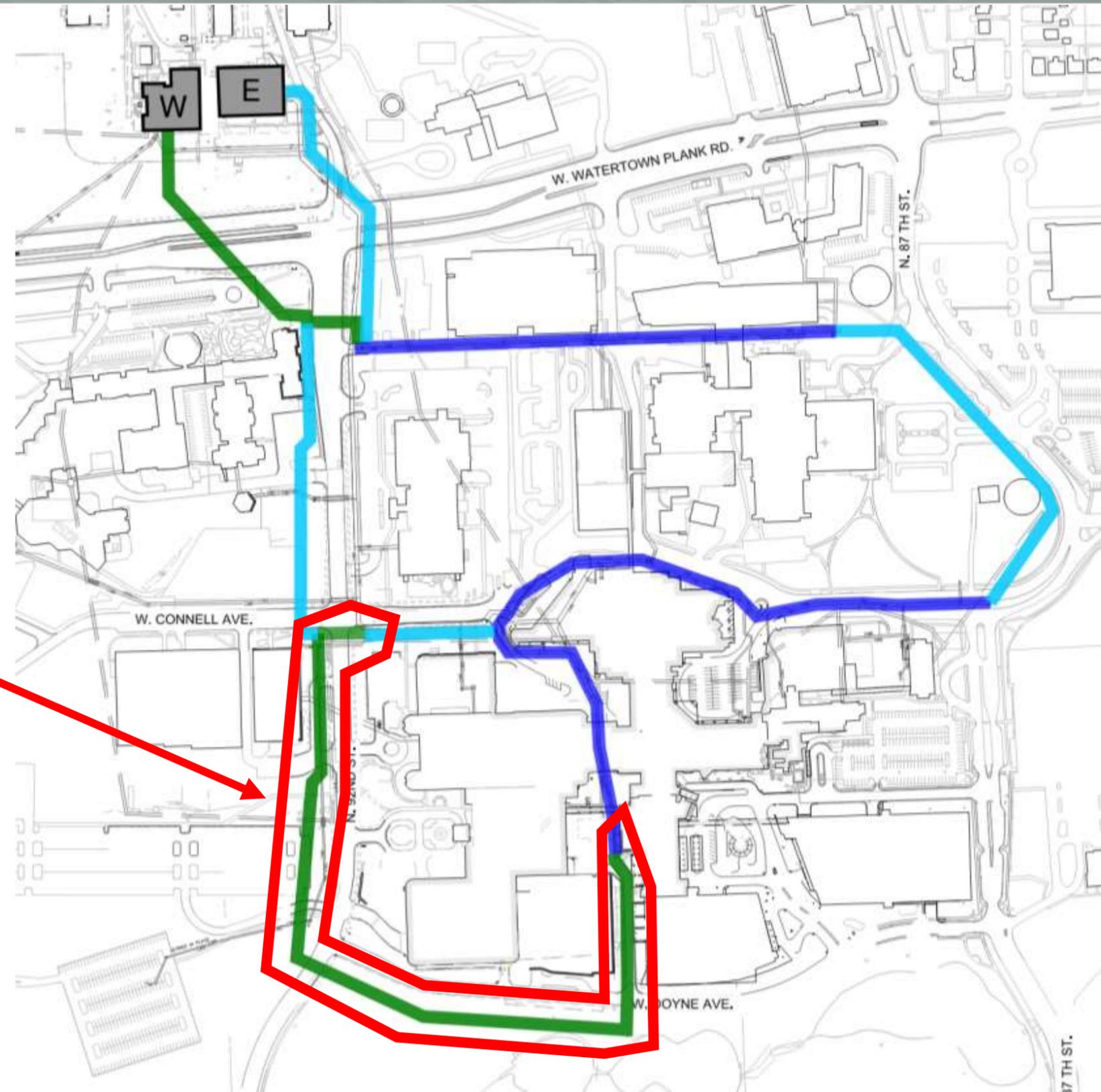
Construction – Chilled Water

Chilled Water Distribution – Post Project



Construction – Chilled Water

Chilled Water Distribution –
Stinger Loop



Construction – Chilled Water – Stinger Loop



Construction – Chilled Water – Stinger Loop



Construction – Chilled Water – Stinger Loop



Construction – Chilled Water – Stinger Loop



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Construction – Chilled Water – Stinger Loop



Construction – Chilled Water – Stinger Loop



Construction – Chilled Water – Stinger Loop

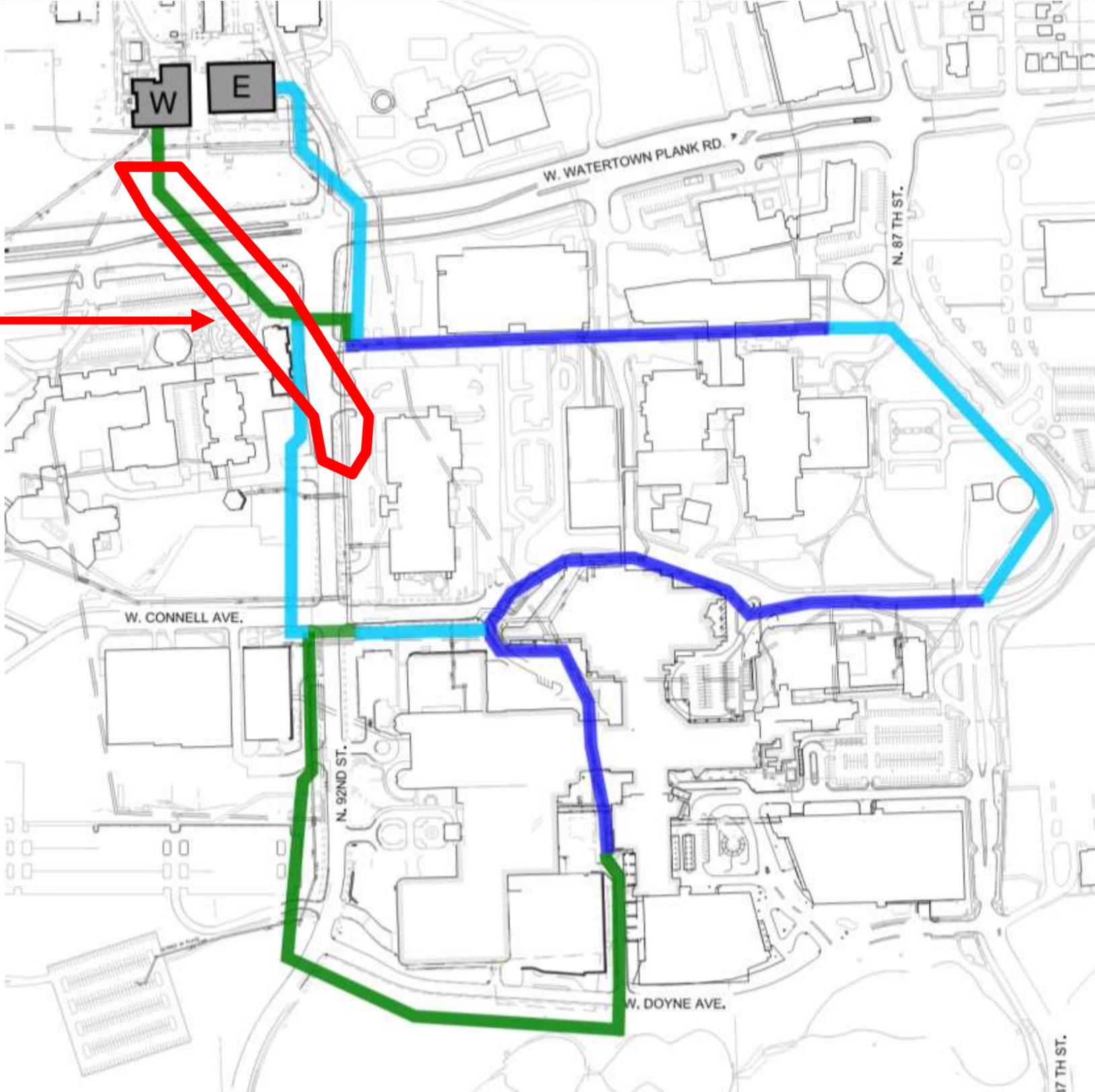


Construction – Chilled Water – Stinger Loop



Construction – Chilled Water – Watertown Plank Crossing

Chilled Water Distribution –
Watertown Plank Crossing



Construction – Chilled Water – Watertown Plank Crossing



Construction – Chilled Water – Watertown Plank Crossing



Construction – Chilled Water – Watertown Plank Crossing



Construction – Chilled Water – Watertown Plank Crossing



Construction – Chilled Water – Watertown Plank Crossing



Construction – Chilled Water – Watertown Plank Crossing

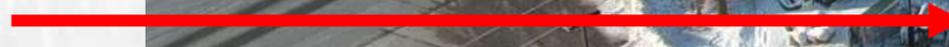


Construction – Chilled Water – Watertown Plank Crossing

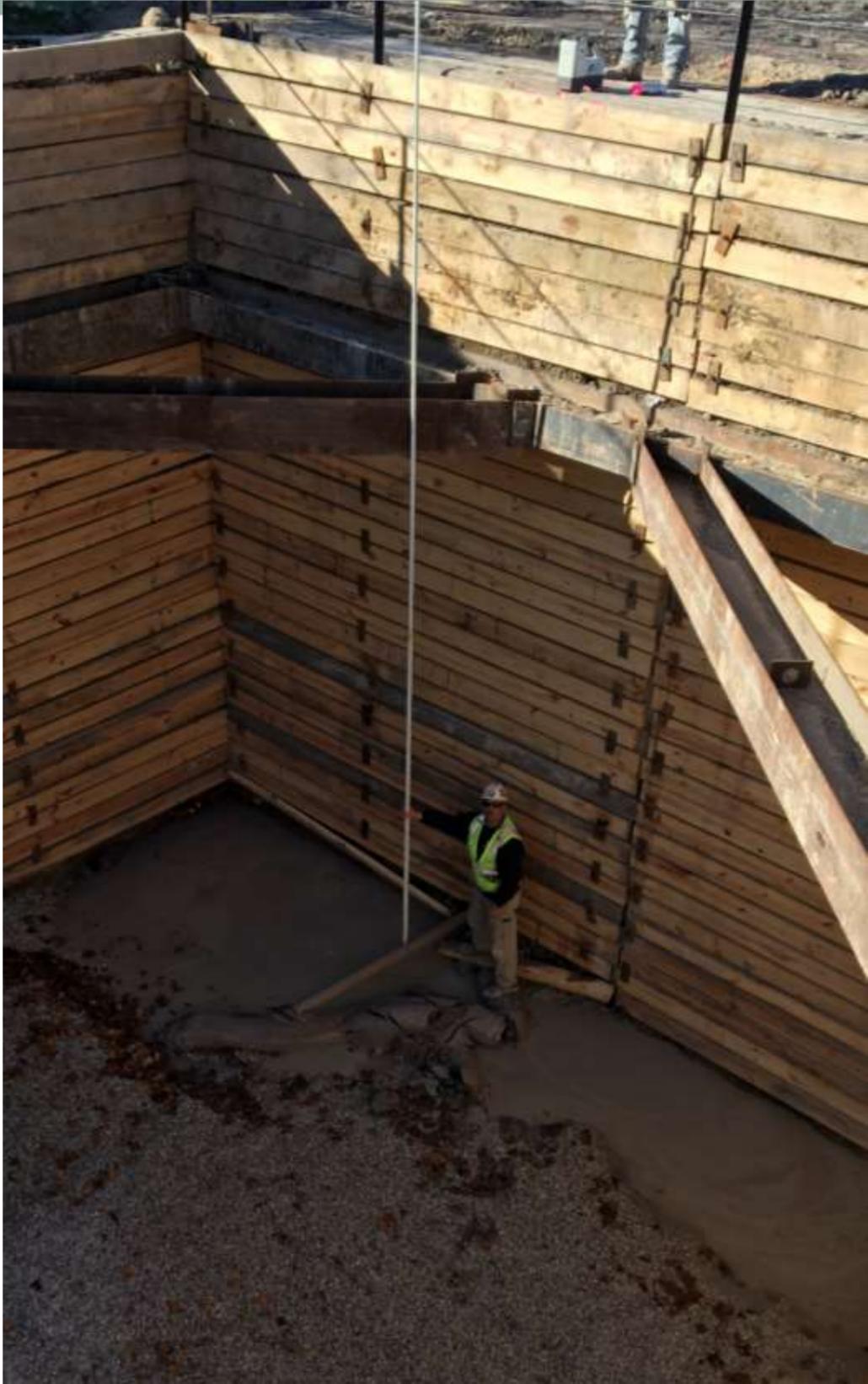
Boring Pit



Receiving Pit



Construction – Chilled Water – Watertown Plank Crossing



Construction – Chilled Water – Watertown Plank Crossing



Construction – Chilled Water – Watertown Plank Crossing



Construction – Chilled Water – Watertown Plank Crossing

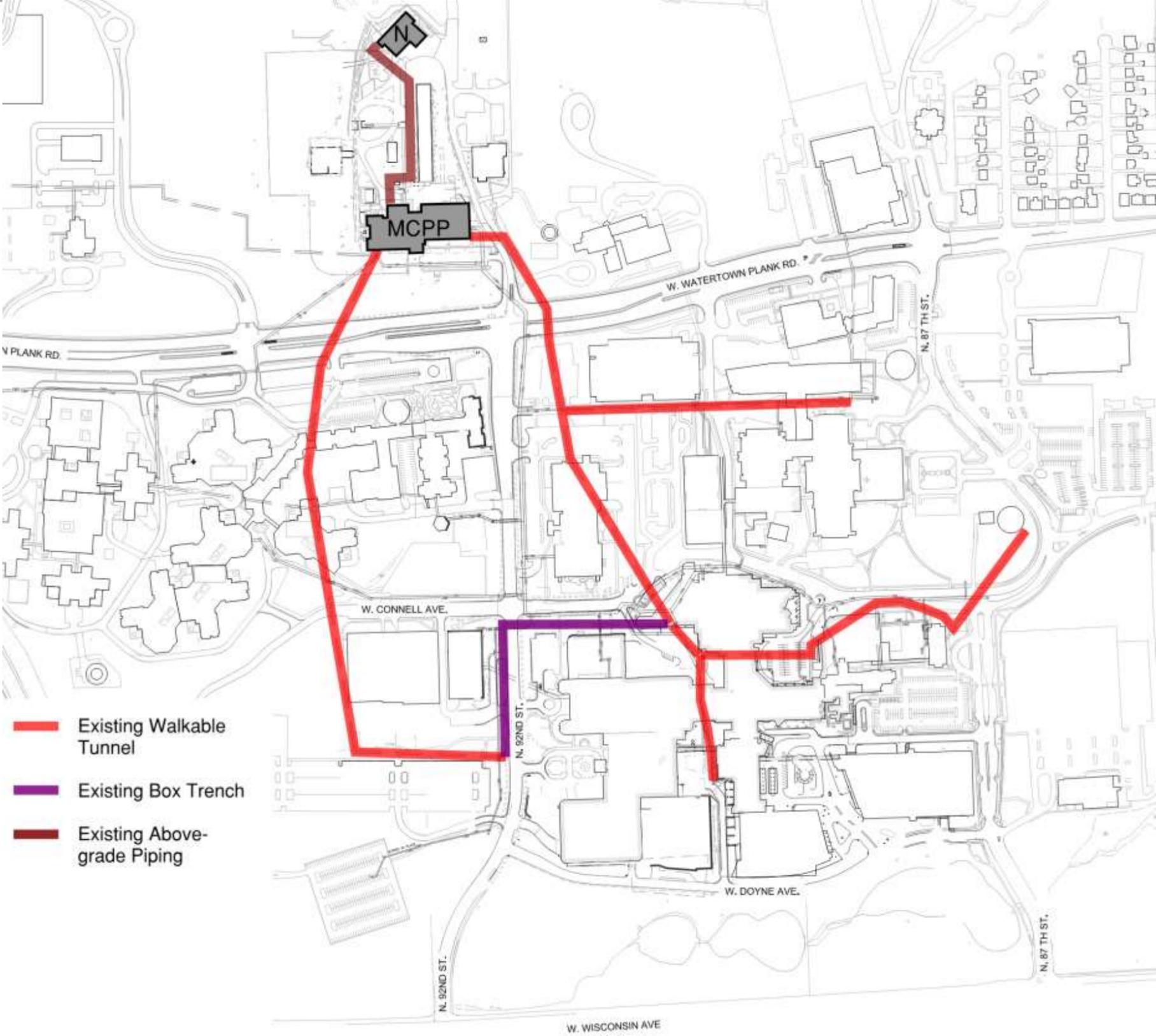


Construction – Chilled Water – Watertown Plank Crossing



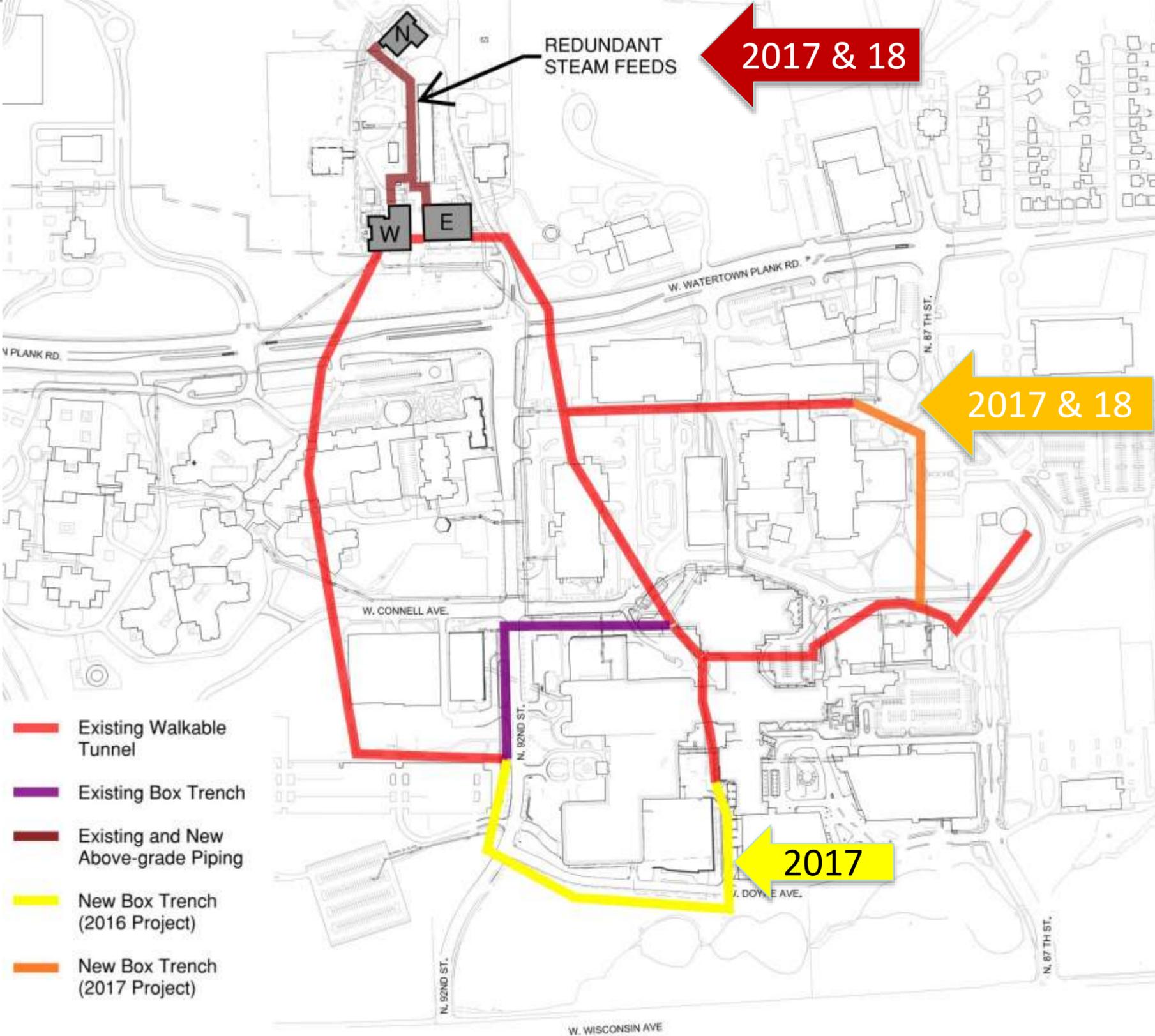
Construction – Steam

Steam Distribution – Pre-Project



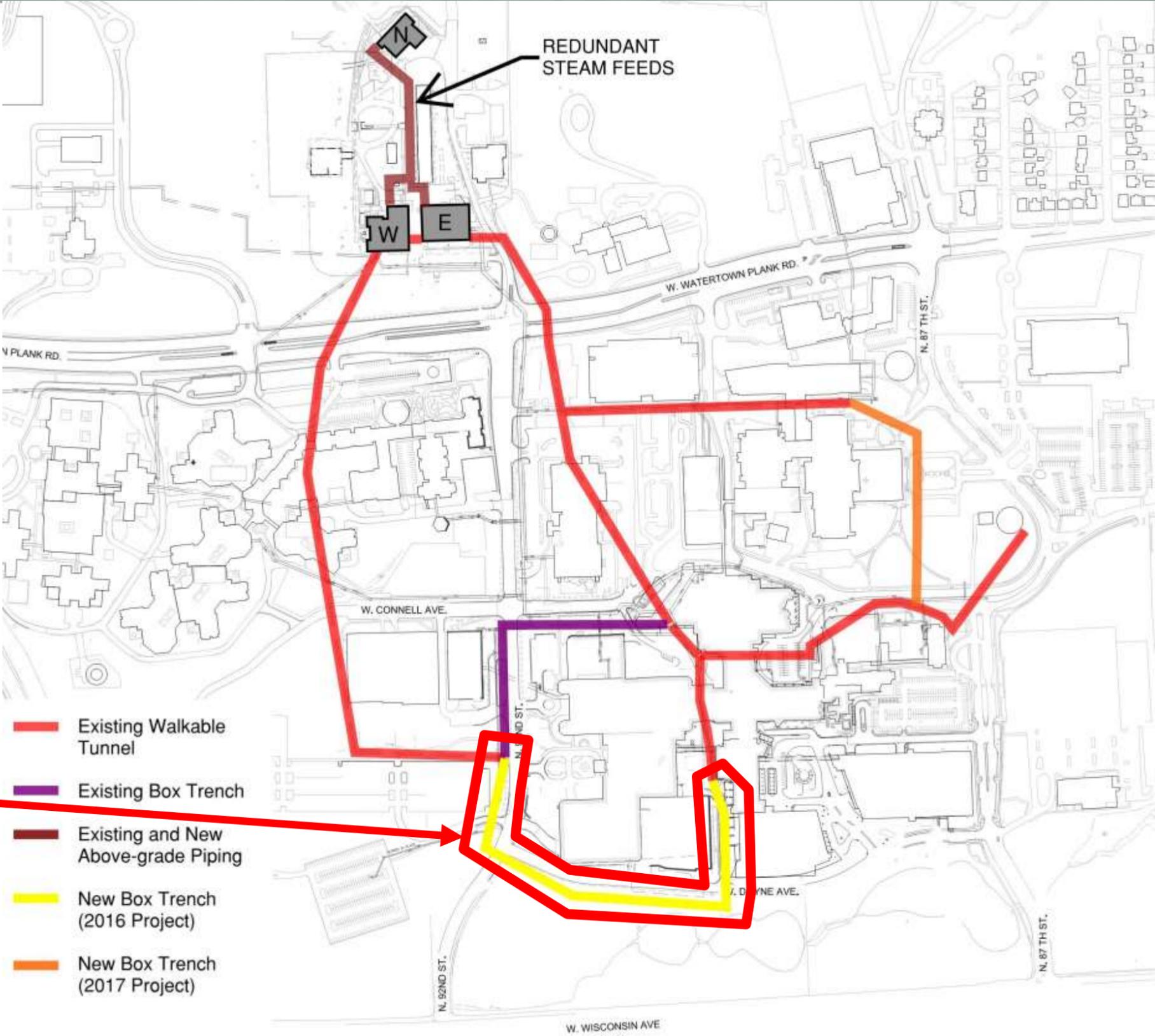
Construction – Steam

Steam Distribution – Post Project



Construction – Steam

Steam Distribution –
Stinger Loop



Construction – Steam – Box Conduit



Construction – Steam – Box Conduit



Construction – Steam – Box Conduit



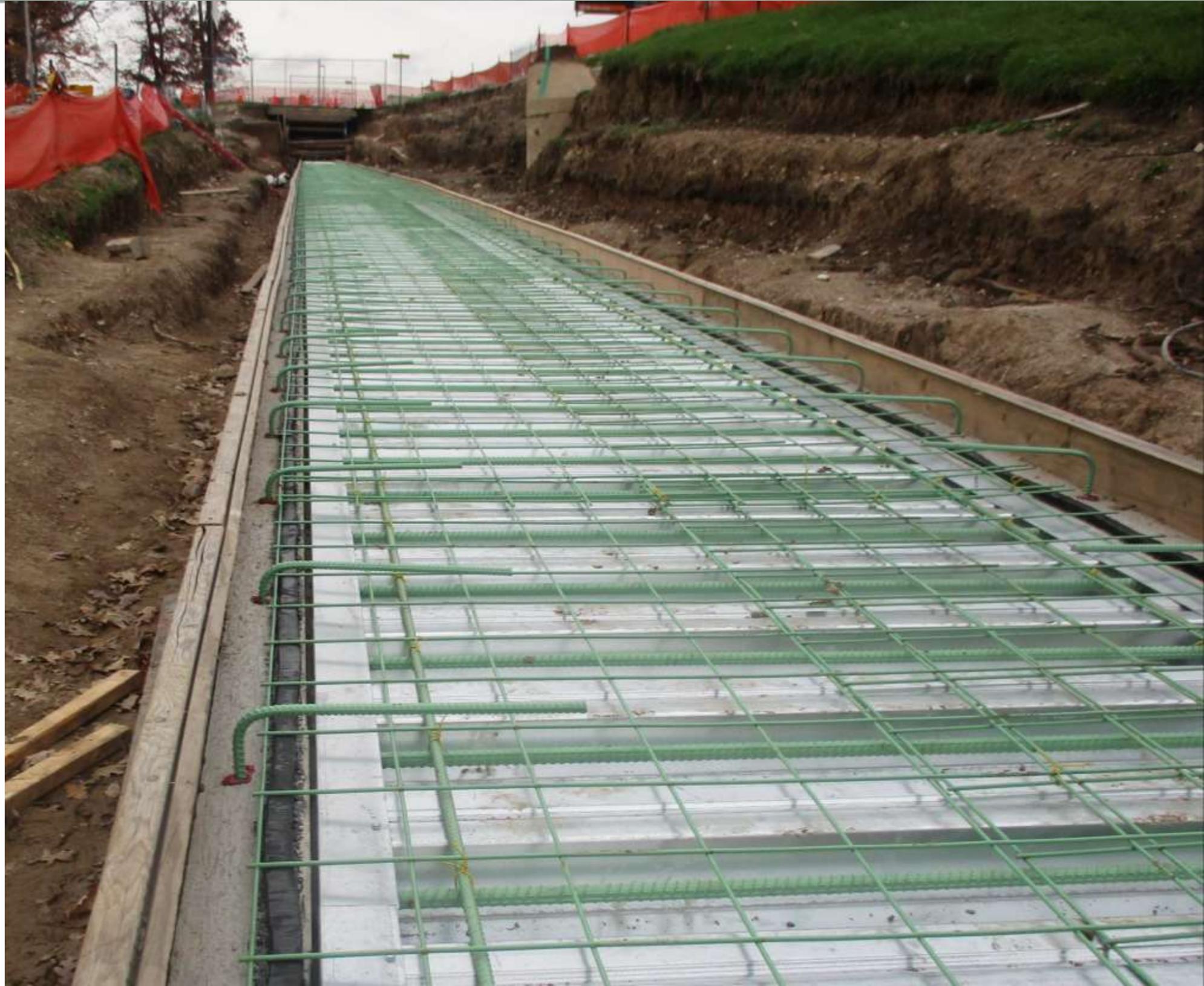
Construction – Steam – Box Conduit



Construction – Steam – Box Conduit



Construction – Steam – Box Conduit



Construction – Steam – Box Conduit



Construction – Steam – Box Conduit



Construction – Steam – Box Conduit



Construction – Steam – Box Conduit



Construction – Steam – Box Conduit



Unforeseen Conditions and/or Issues

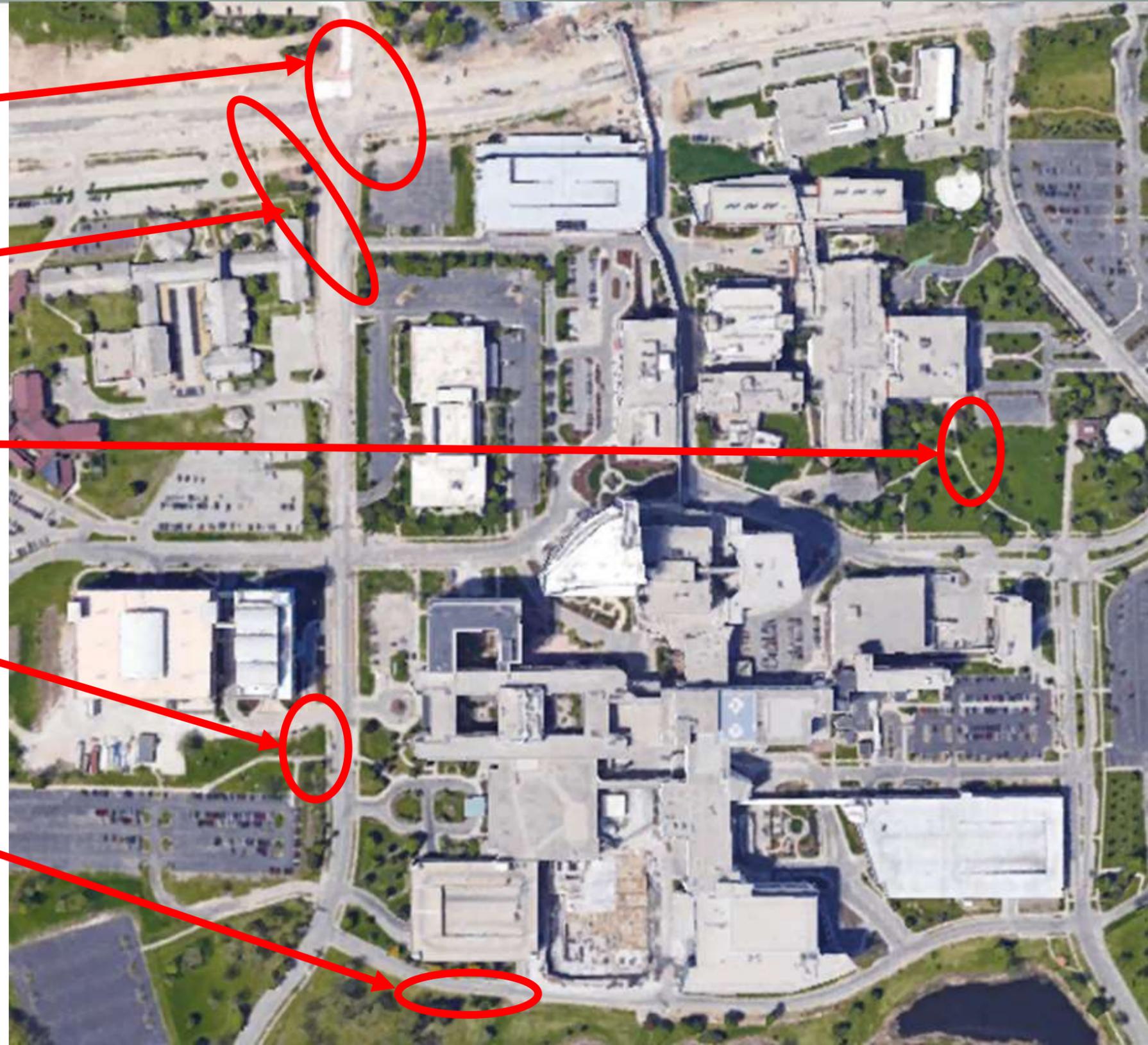
PCCP Pipe

Winter Conditions

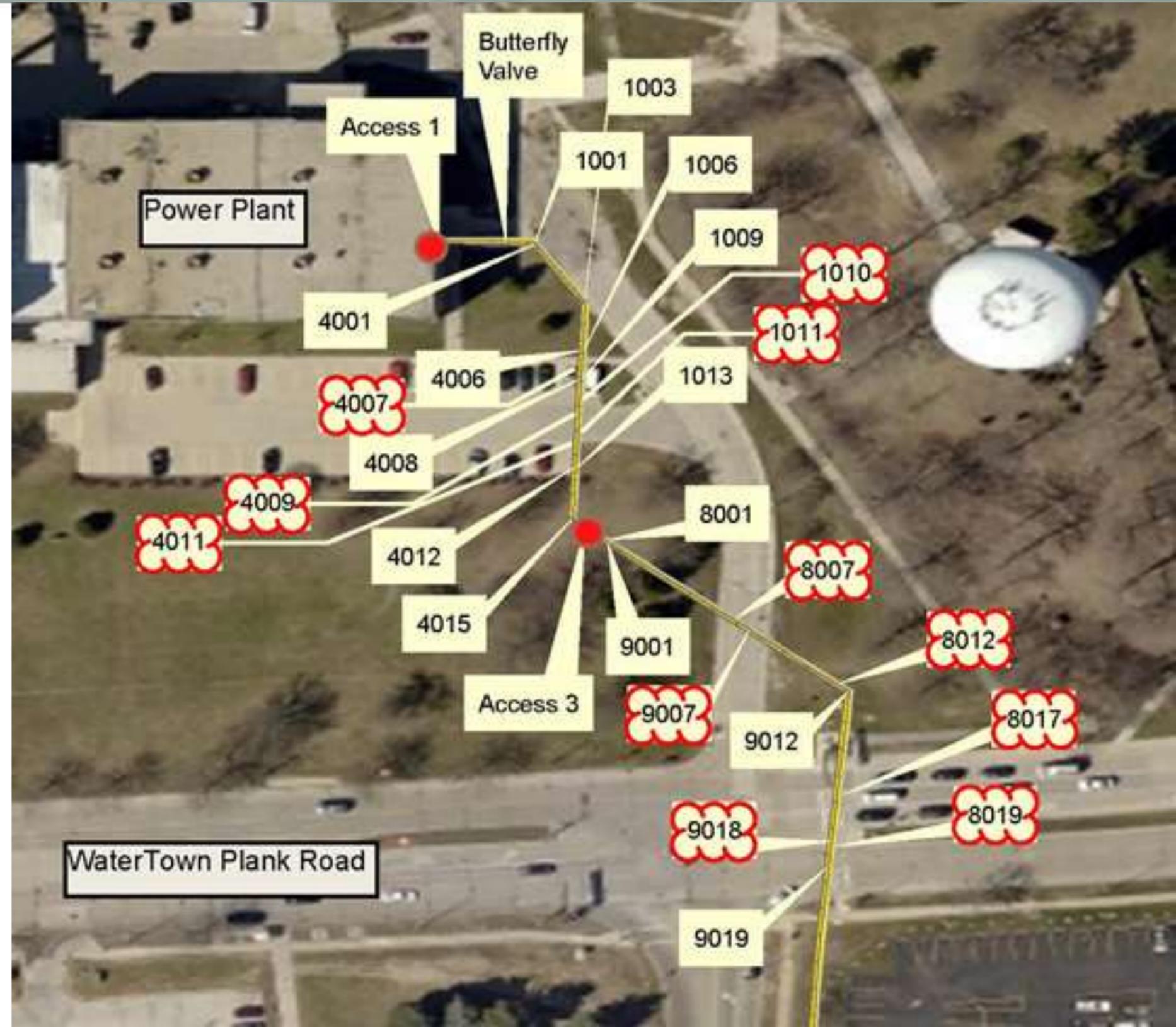
Memorial Gardens

Sink Hole

Potter's Field – Human Remains



Unforeseen Conditions and/or Issues



Unforeseen Conditions and/or Issues



Unforeseen Conditions and/or Issues



Unforeseen Conditions and/or Issues



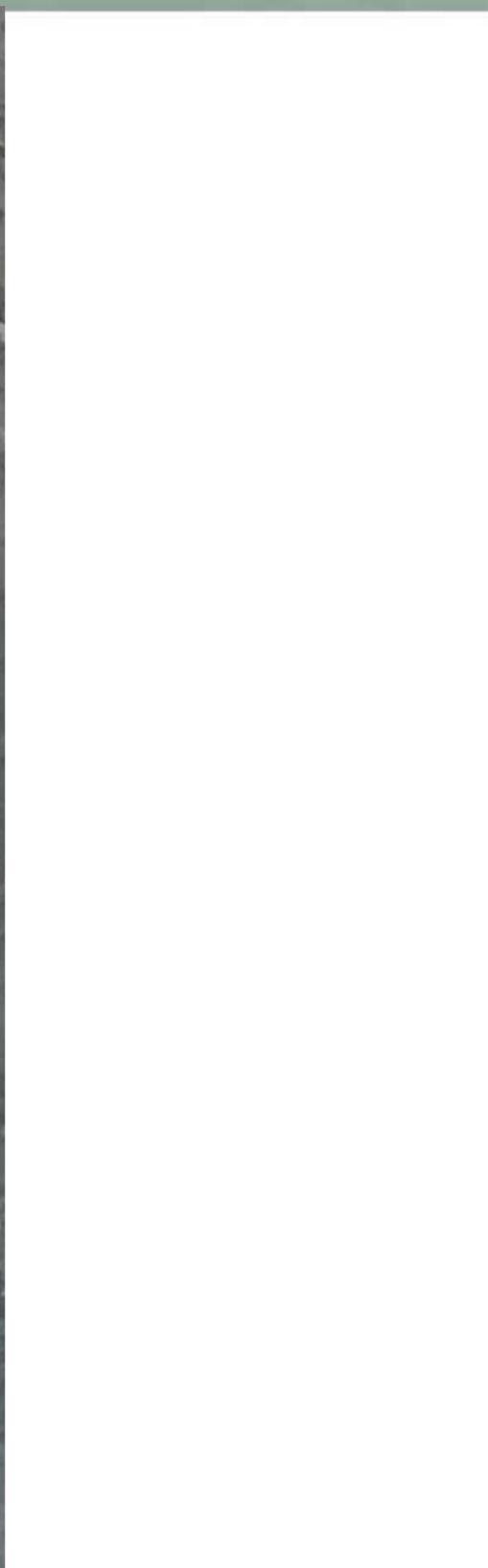
Unforeseen Conditions and/or Issues



Unforeseen Conditions and/or Issues



Unforeseen Conditions and/or Issues



Unforeseen Conditions and/or Issues



Thank You Team

- **OWNER: MRMC Thermal**
- **ENGINEER: Burns & McDonnell**
- **OWNERS ENGINEER: NV5(aka Sebesta)**
- **OWNERS REP: Ric Miller LLC**
- **FACILITY OPERATIONS: Ever-Green**
- **CONSTRUCTION MANAGER: Boldt**
- **MECH TRADE PARTNER: Grunau/Jamar**
- **ELECTRICAL TRADE PARTNER: Staff**
- **CONTROLS TRADE PARTNER: Novaspect**
- **BORING CONTRACTOR: RJ Underground**

Questions



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