APPA Utilities

WATER AND WASTEWATER

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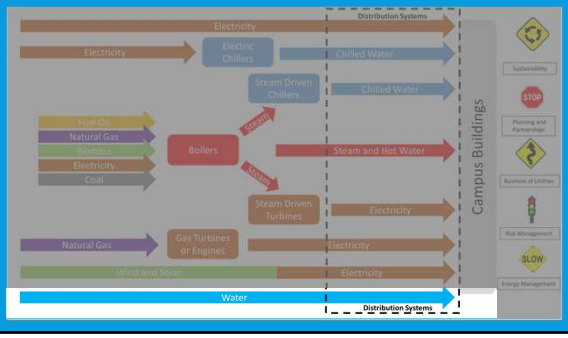
FOCUS ON WATER



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COURSE DESCRIPTION

Overview of water and wastewater terms and concepts

- Urban water cycle
- Energy and water interdependence
- U.S. water use, energy use intensity, and cost
- Safe Drinking Water Act
- Drinking water quality
- Campus water
  - Supply, storage, and distribution
  - Cross-connection control
  - Fire Protection
  - Stormwater
  - Sewage

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LEARNING OBJECTIVES

Basic understanding of:

- Energy and water interdependence
- Safe Drinking Water Act and drinking water quality
- Common campus water systems and considerations

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WATER IS LIFE

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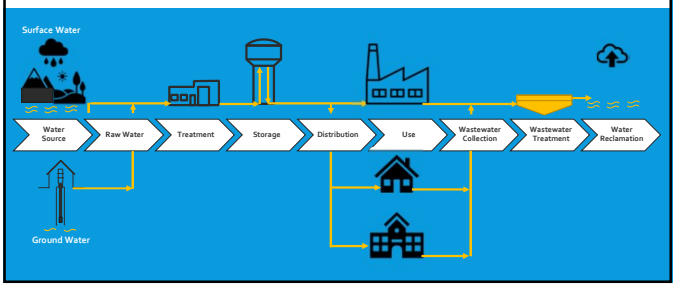
THE URBAN WATER CYCLE



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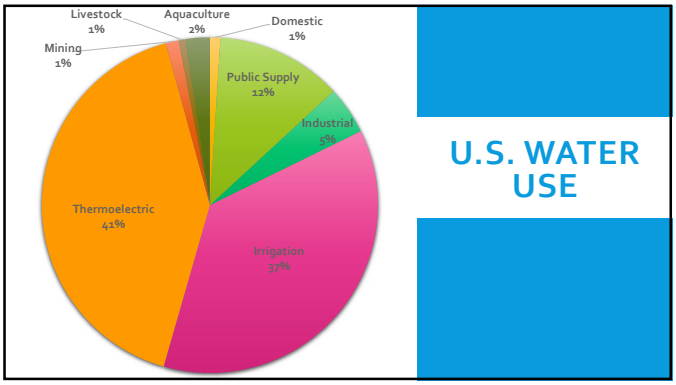

U.S. WATER USE

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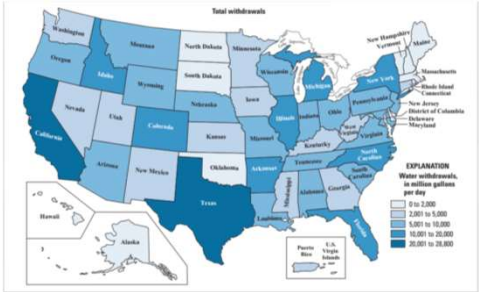

ESTIMATED U.S. WATER USE

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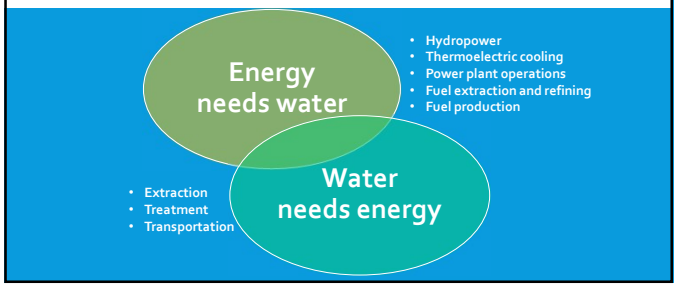
ENERGY & WATER INTERDEPENDENCE



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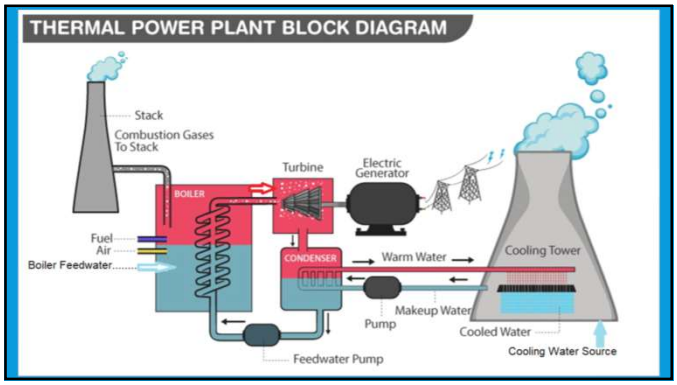

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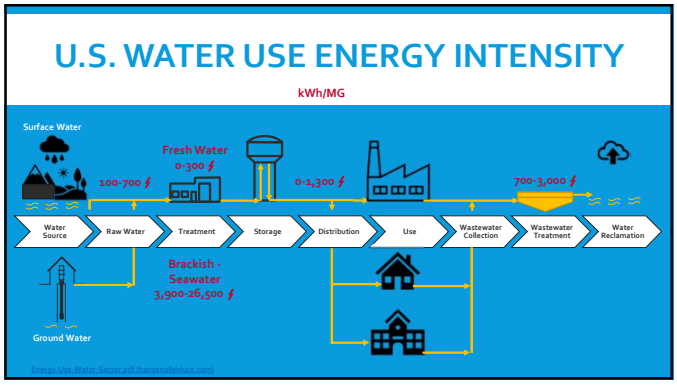
U.S. WATER USE ENERGY INTENSITY



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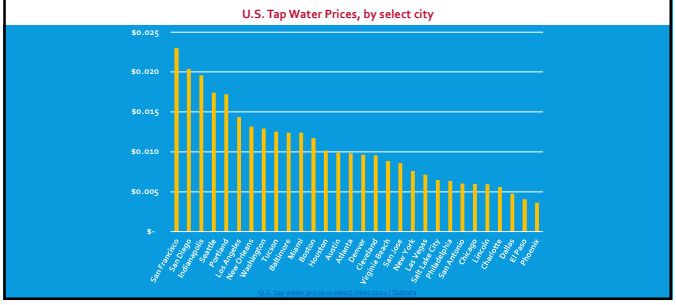
COST OF WATER



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DOES YOUR CAMPUS…

…produce, treat, & distribute Drinking Water?

…collect & treat wastewater?

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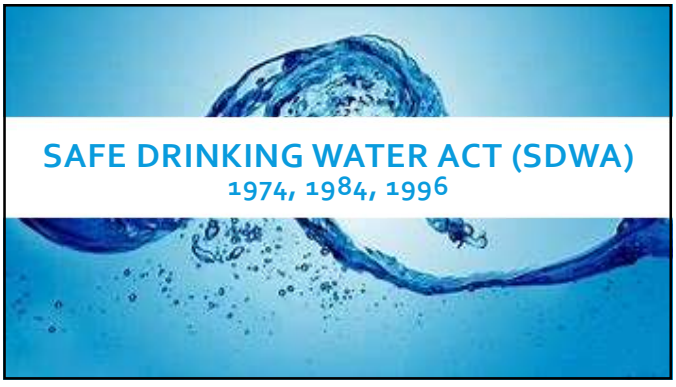

SAFE DRINKING WATER ACT (SDWA)

1974, 1984, 1996

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SAFE DRINKING WATER ACT
WATER QUALITY & CERTIFIED OPERATORS

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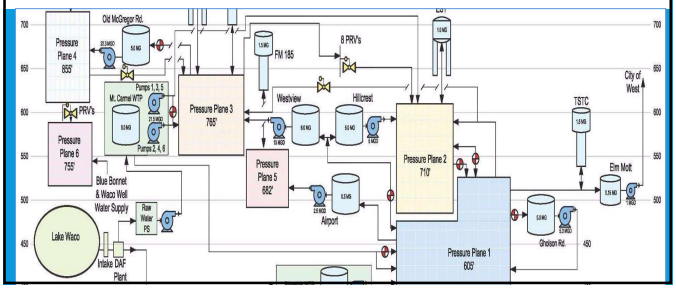
OPERATIONS AND MAINTENANCE



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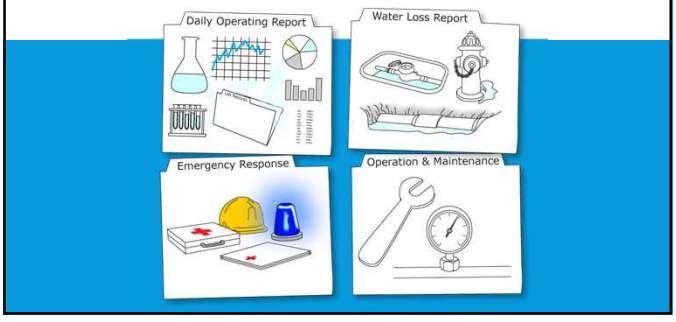
PUBLIC WATER SYSTEM RECORDS & REPORTING



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SAFE DRINKING WATER ACT
ANNUAL WATER QUALITY REPORT (CCR)

Regulated Contaminants	Likely Sources
Biological	
Coliform	Naturally present in the environment
Inorganic	
Copper	Corrosion of building plumbing; erosion of natural deposits
Lead	Lead service lines; corrosion of building plumbing including fittings and fixtures; erosion of natural deposits
Fluoride	Naturally occurring hydrofluorosilicic acid
Barium	Discharge of drilling wastes; discharge from metals refineries; erosion of natural deposits
Disinfectants & Disinfectant By-products	
Chlorine	Water additive to control microbes
Trihalomethanes	By-product of disinfection
Haloacetic	By-product of disinfection
Radionuclides	
Gross Alpha	Erosion of natural deposits
Radium	Erosion of natural deposits
Unregulated	
Sodium	Erosion of natural deposits and runoff

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SAFE DRINKING WATER ACT
ANNUAL WATER QUALITY REPORT (CCR)

Water Quality Parameters (average and range, no limits):

- Chloride
- Hardness
- Iron
- Nitrate
- Nitrite
- Sodium
- Sulfate

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SAFE DRINKING WATER ACT
ANNUAL WATER QUALITY REPORT (CCR)

Unregulated Contaminates Monitoring Rule:

- Unregulated substances for which EPA has not established drinking water standards
- Sampling and testing for certain contaminants to assist the EPA in determining the occurrence of unregulated substances in drinking water and whether future regulation is warranted.

Small Systems[1] (fewer than 3,300)	Nationally representative sample
Small Systems[1] (3,300-10,000)	All systems, if confirmed by EPA
Large Systems (10,001 and over)	All systems

- UCMR5: PFAS, lithium

Water Source	Timeframe	Sampling Frequency
Surface water, ground water under the direct influence of surface water, or mixed sources systems	Year-Round	Systems must monitor 4 times during a consecutive 12-month monitoring period. Sample events must occur 3 months apart.
Ground water systems	Year-Round	Systems must monitor 2 times during a consecutive 12-month monitoring period. Sample events must occur 5-7 months apart.

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DRINKING WATER QUALITY

These ALL tested to meet Federal and State safe drinking water standards!
Looks can be deceiving!

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DRINKING WATER QUALITY

Flint, Michigan Declares State of Emergency Amid Lead in Drinking Water Scare

by Dean Reynolds / October 6,2015

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DRINKING WATER QUALITY

Detroit schools to use bottled water due to lead, copper concerns

by Dennis Romero / August 29,2018

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LESSONS LEARNED
Drinking Water System Operators
Must be on your game
Perception is reality
Lead & Copper
Lead mains
Corrosion control
Building plumbing

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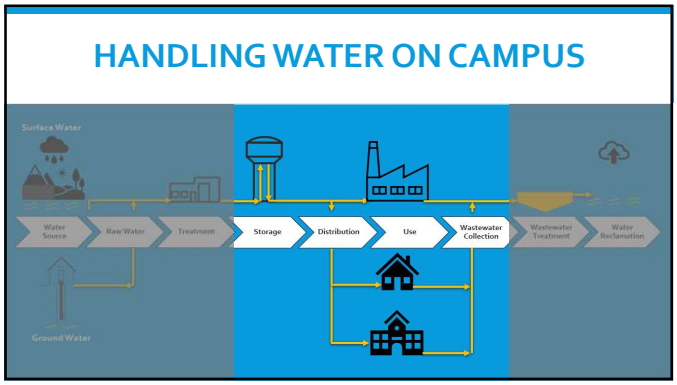
HANDLING WATER ON CAMPUS
Surface Water
Water Source
Raw Water
Treatment
Storage
Distribution
Use
Wastewater Collection
Wastewater Treatment
Water Reclamation
Ground Water

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MICHIGAN STATE UNIVERSITY
STORAGE SYSTEMS

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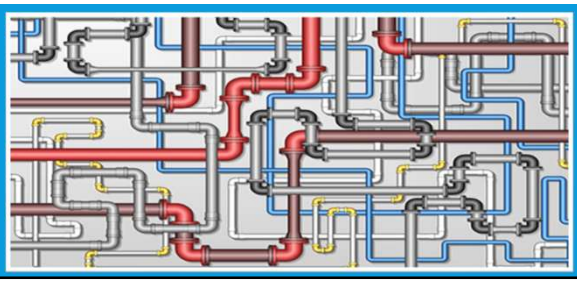
DISTRIBUTION SYSTEMS



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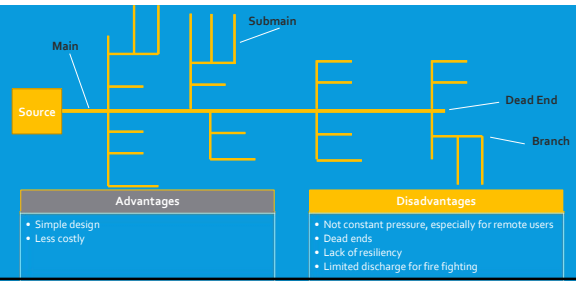
BRANCHING DISTRIBUTION SYSTEMS



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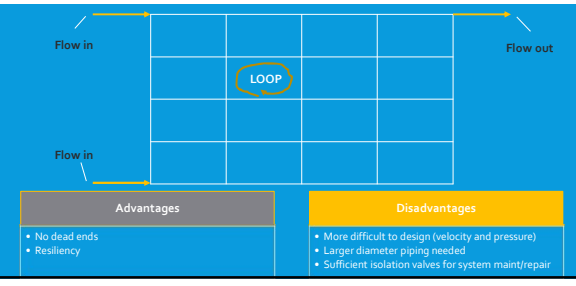
GRID (LOOPED) DISTRIBUTION SYSTEMS



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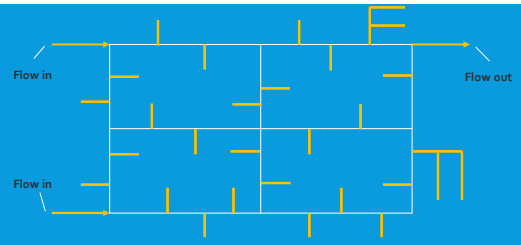
HYBRID DISTRIBUTION SYSTEMS



- Most systems are hybrid loops and branches to remote or less critical users.
- Dead legs are created when there is a long radial feed to a seldom-used load.

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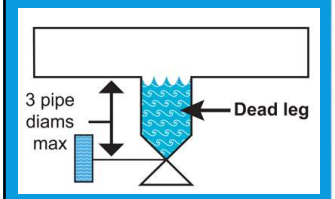
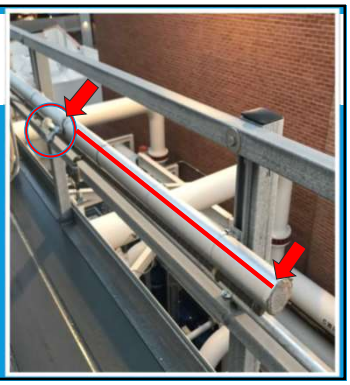
DEAD-LEGS





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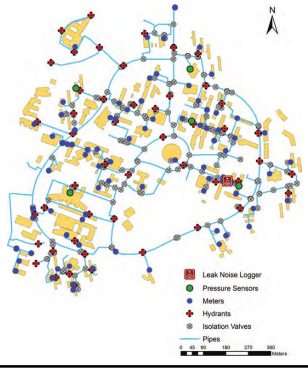

SYSTEM MAPPING

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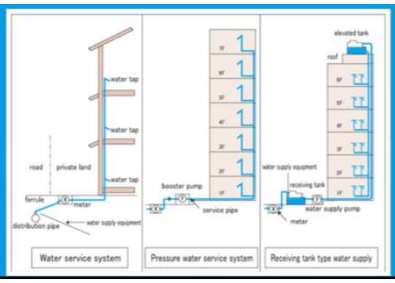
BUILDING WATER SERVICE



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CROSS-CONNECTION CONTROL

Controlling cross-connections and preventing backflow in potable water systems is critical to ensuring drinking water safety.

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CROSS-CONNECTION CONTROL

Terms & Definitions

Cross-Connection	Any actual or potential connection between the public water supply and a source of contamination
Backflow	The flow of water or other liquids, mixtures, or substances into the distributing pipes of a potable supply of water from any source other than its intended source.
Backpressure	Backflow that occurs when the pressure in an unprotected downstream piping system exceeds the pressure in the supply piping.
Back-siphonage	Resulting from negative pressures in the distributing pips of a potable water supply.

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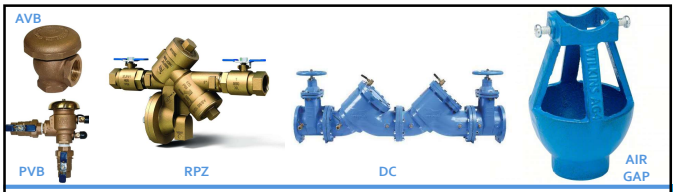

BACKFLOW PREVENTION DEVICES

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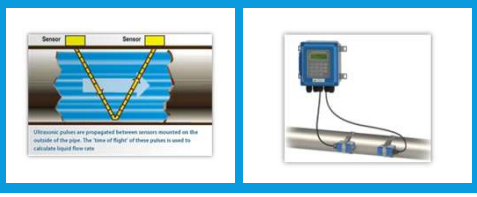

METERING

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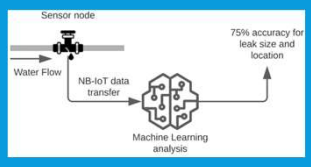
LEAK DETECTION



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FIRE PROTECTION

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SEWER SYSTEM MANAGEMENT PLAN

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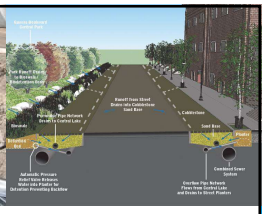

STORM WATER MANAGEMENT

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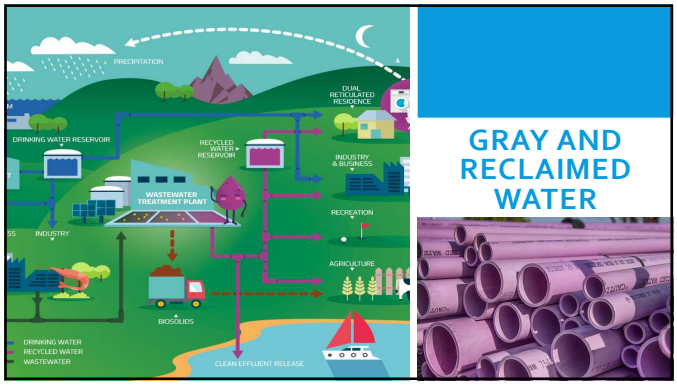

GRAY AND RECLAIMED WATER

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- Boiler Water
- Irrigation Water
- Laboratory Water
- Domestic Water
- Fire Protection
- Other

CAMPUS WATER USE & STEWARDSHIP

Resource Expense Conservation

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DOES YOUR CAMPUS…

…have a water stewardship or conservation program?

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KEY TAKEAWAYS

- Water and energy are interdependent
- Drinking water is regulated under the SDWA; standards are set by EPA and enforced by state agencies
- Be a good steward of water resources
- Be prepared for emergencies

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This concludes The American Institute of Architects Continuing Education Systems Course

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QUESTIONS / COMMENTS

- Sign-in Sheet
- Evaluation Form

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