UTILITY VAULTS: THE PRECAST ADVANTAGE
OUTLINE

• Purpose of utility vaults
• Uses of utility vaults
• Materials
• Production
• Installation
• Applicable standards
• NPCA plant certification
PRECAST ADVANTAGE

• Available nationwide
• Non-combustible
• Long life span and durability
• Easily designed to withstand traffic or aircraft loading
• Produced in a controlled environment
• Delivered and set by manufacturer
• Faster installation
• Cost effective
AVAILABLE NATIONWIDE
DURABILITY

• Buoyant forces can cause underground tanks to rise.

• The weight of precast concrete tanks protects against these buoyant forces and keeps the tanks underground.
PRECAST ADVANTAGE

• Provides easy access to equipment for maintenance.
• Provides structurally sound enclosure.
• Provides a secure enclosure for costly equipment.
PRECAST ADVANTAGE

- Protects vital underground connections and controls for utility distribution.
USES FOR UTILITY VAULTS

• Communications
• Electricity
• Gas
• Steam
• Cable/Data
MATERIALS

Cement


Aggregates


Water

Admixtures and Supplementary Cementitious Materials (SCMs)

Admixtures and SCMs allow the manufacturer to fine-tune and enhance the properties of the concrete mix.
Air entraining admixtures per ASTM C 260 improve freeze-thaw properties while SCMs per ASTM C595 and C618 have impacts upon the water content and can lead to significant improvements in the physical properties of the concrete.
Reinforcement

Reinforcement of concrete is required and must be provided and designed to meet structural loading and handling conditions of the structure.
Reinforcement

Reinforcement types can vary from welded-wire mesh to conventional rebar to fibers – all reinforcement must comply with applicable standards.
STRUCTURAL DESIGN

Loading Conditions

- Surface surcharge
- Concentrated wheel loads
- Lateral Loads
- Presumptive soil bearing capacity
- Buoyant forces
- Connections and penetrations
- Point loads
- Live loads
- Dead loads
Concrete Thickness
• Sufficient to meet minimum reinforcement cover and withstand design loading conditions.

Concrete Mix Design
• Minimum 4,000 psi 28-day concrete compressive strength
• Water/cementitious ratio < 0.45
• Quality materials using well-graded aggregates
• Air-entrained in accordance with ACI 318
• Potable water usage

Reinforcement
• Reinforcement design by structural calculations.
PRODUCTION

Pre-pour Inspection
• Trained and qualified plant personnel perform inspection before each pour to verify form cleanliness, proper amount of release agent, and reinforcing steel placement and configuration.

Post-pour Inspection
• As an essential part of the production process, the post-pour inspection verifies product conformance to project specifications.

Final Inspection
• Provides validation to quality of products.
Proper installation is absolutely critical for maintaining the inherent quality of plant-produced concrete utility structures, and considerations include:

- Proper connections
- Planning for site conditions
- Excavation and bedding
installation

• Vault placement
• Proper sealing methods
• Installation of access risers and entry
• Penetrations
• Backfilling procedures
APPLICABLE STANDARDS

ASTM C 857

• Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures

ASTM C 858

• Specification for Underground Precast Concrete Utility Structures

ASTM C 891

• Practice for Installation of Underground Precast Concrete Utility Structures
APPLICABLE STANDARDS

ASTM C 1037

• Practice for Inspection of Underground Precast Concrete Utility Structures
APPLICABLE STANDARDS

ACI 318
- Building Code Requirements for Structural Concrete

AASHTO
- Specification for Highway Bridges

Project-Specific Requirements
REFERENCES

REFERENCES

• NPCA Quality Control Manual for Precast Plants

• Local Codes and Regulations
NPCA PLANT CERTIFICATION

• Quality Control Manual to ensure the production of quality precast products

• Plant Inspections conducted by third-party consultants

• Accredited by ANSI