

# **UTILITY VAULTS: THE PRECAST ADVANTAGE**

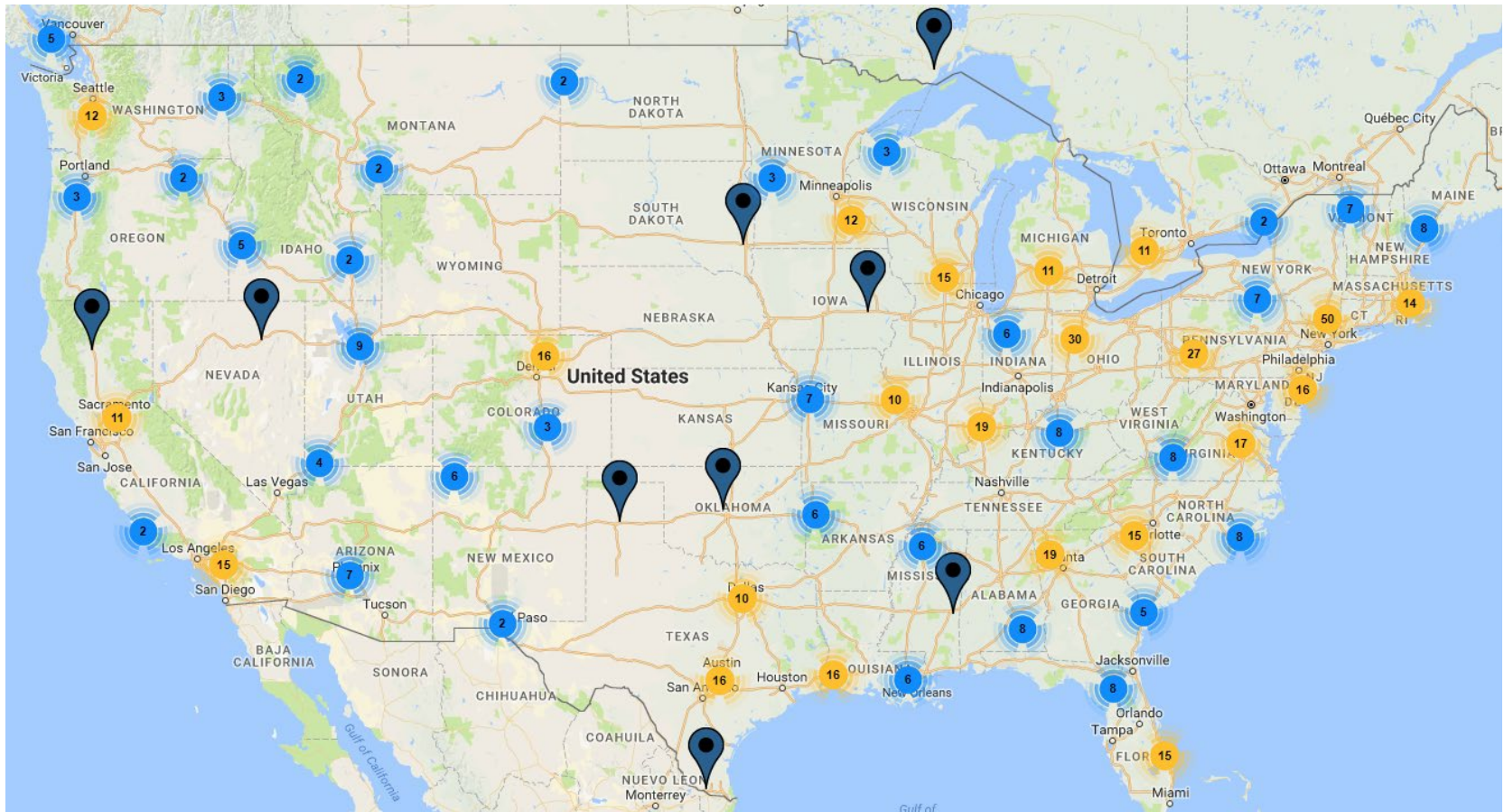
# OUTLINE

- Purpose of utility vaults
- Uses of utility vaults
- Materials
- Production
- Installation
- Applicable standards
- NPCA plant certification

# PRECAST ADVANTAGE

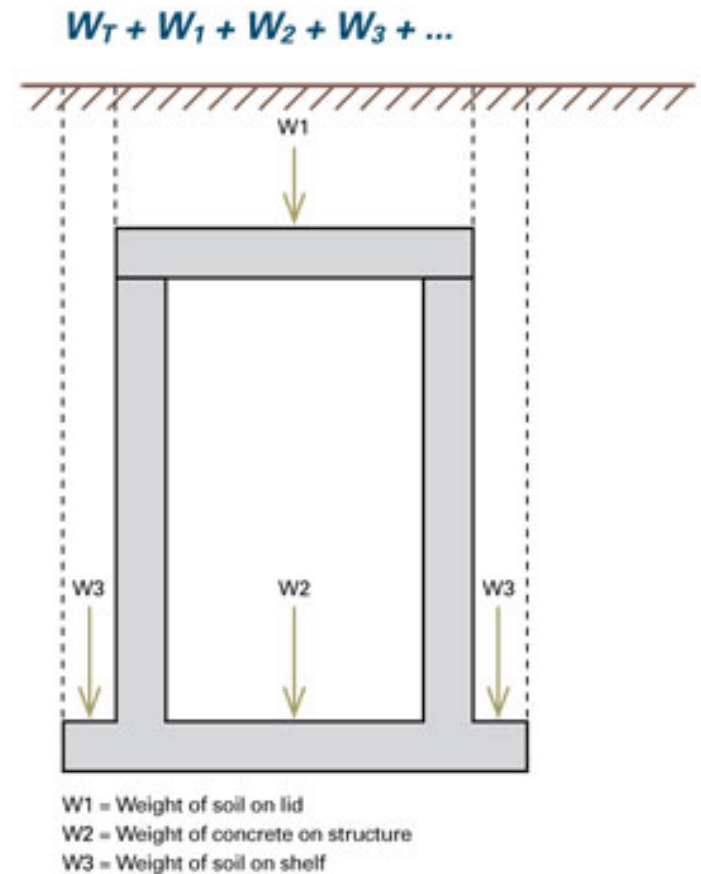
- Available nationwide
- Non-combustible
- Long life span and durability
- Easily designed to withstand traffic or aircraft loading
- Produced in a controlled environment
- Delivered and set by manufacturer
- Faster installation
- Cost effective

# 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

- Governed by ASTM C150, “Standard Specification for Portland Cement”

## Aggregates

- Well-graded, sound, nonporous aggregate conforming to ASTM C33, “Standard Specification for Concrete Aggregates.”

## Water

- ASTM C1602, “Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.”



# MATERIALS

## **Admixtures and Supplementary Cementitious Materials (SCMs)**

Admixtures and SCMs allow the manufacturer to fine-tune and enhance the properties of the concrete mix.

# MATERIALS

## Admixtures and Supplementary Cementitious Materials (SCMs)

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.

# MATERIALS

## Reinforcement

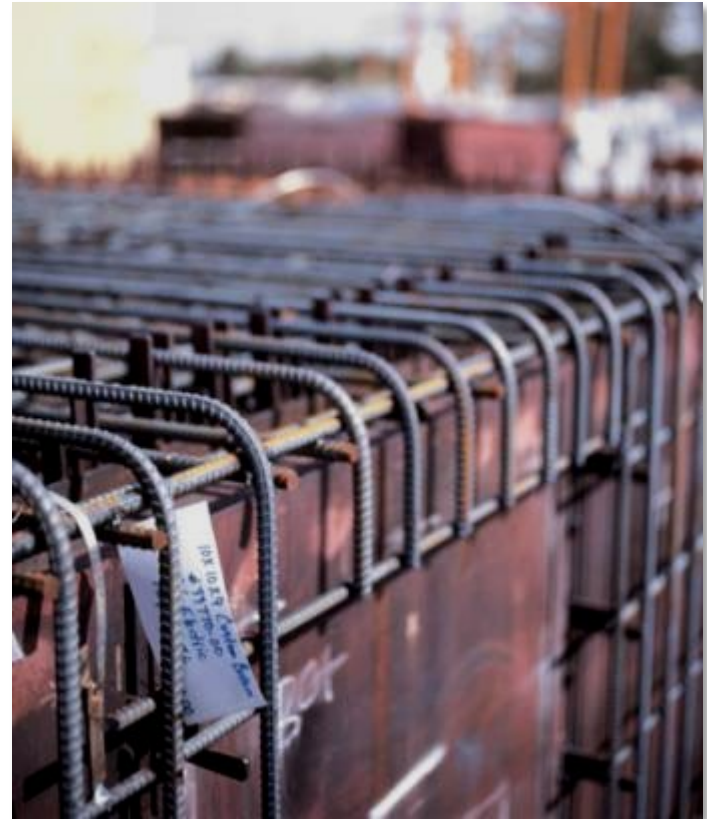
Reinforcement of concrete is required and must be provided and designed to meet structural loading and handling conditions of the structure.



# MATERIALS

## 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

# STRUCTURAL DESIGN

## 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.



# INSTALLATION

**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

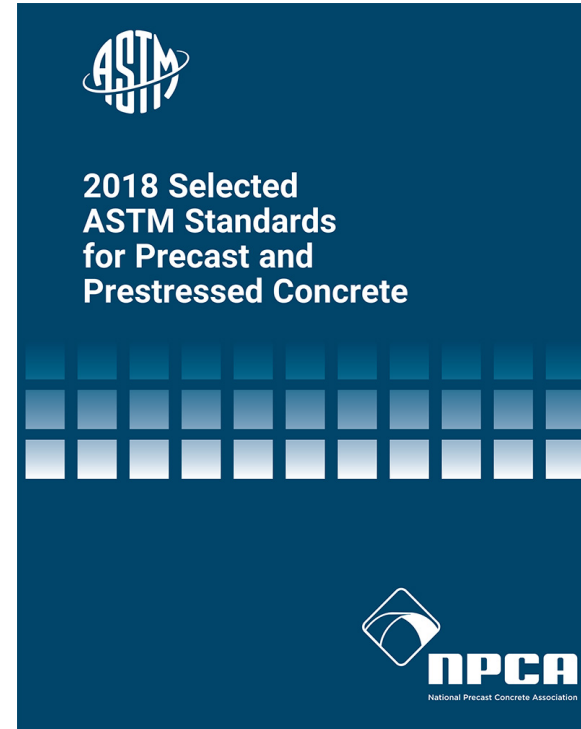
## **ASTM C 891**

- 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

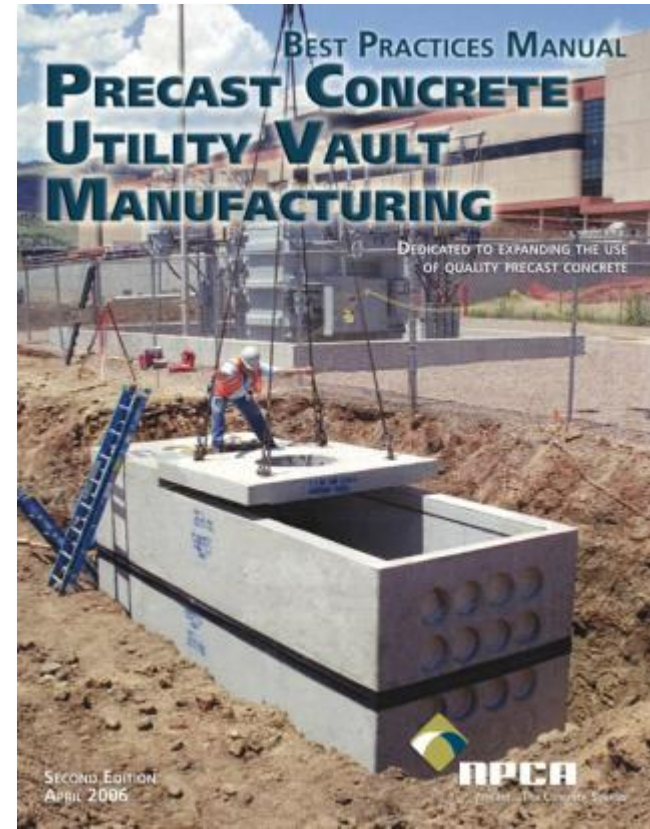
## **AASHTO**

- Specification for Highway Bridges

## **Project-Specific Requirements**

# REFERENCES

- NPCA Best Practices Manual – Precast Concrete Utility Vault Manufacturing



# 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

