

PRECAST
CONCRETE
UNDERGROUND
UTILITY VAULTS

OUTLINE

- **Purpose**
- **Precast Advantage**
- **Purpose of Utility Vaults**
- **Uses of Utility Vaults**
- **Applicable Standards**
- **Structural Design**
- **Materials**
- **Production**
- **Installation**
- **NPCA Plant Certification**

PURPOSE

- **Provide current and accurate technical information as it relates to the design, production and installation of precast concrete utility vaults.**

PRECAST ADVANTAGE

- Available nationwide
- Environmentally friendly
- Non-combustible
- Long life span and durability
- Delivered and set by manufacturer
- Less maintenance than CMU
- Easily designed to withstand traffic or aircraft loading
- Mass
- Faster installation – large structures easily designed
- Produced in a controlled environment
- Cost effective

PURPOSE

- Provide easy access to equipment for maintenance.
- Provide structurally sound enclosure.
- Provide a secure enclosure for costly equipment.



PURPOSE of UTILITY VAULT

- Protect vital underground connections and controls for utility distribution.



APPLICATION



APPLICATION



APPLICATION



APPLICATION



USES of UTILITY VAULTS

- Communications
- Electricity
- Gas
- Steam

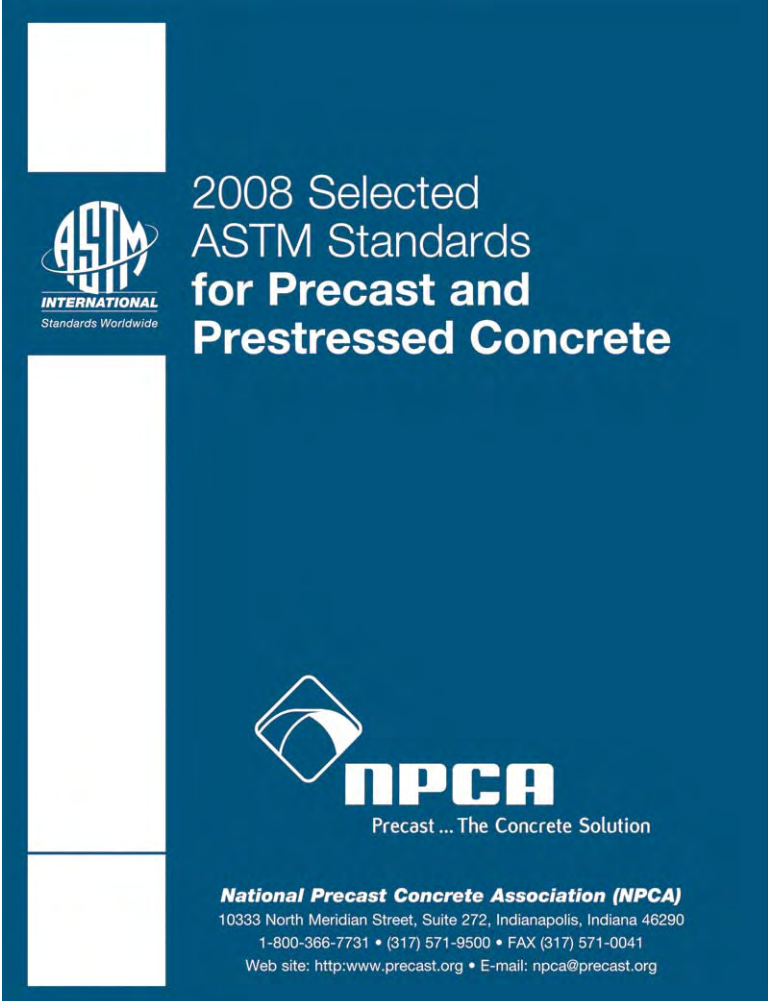


APPLICABLE STANDARDS


- **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



2008 Selected
ASTM Standards
**for Precast and
Prestressed Concrete**


INTERNATIONAL
Standards Worldwide

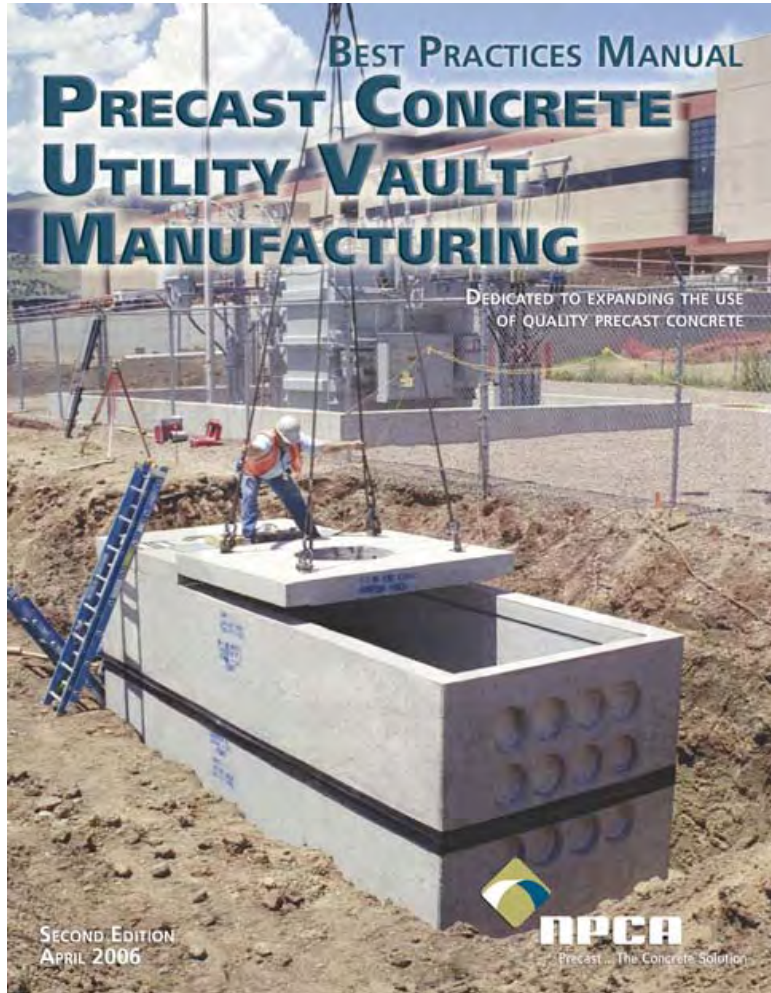
 **NPCA**
Precast ... The Concrete Solution

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APPLICABLE STANDARDS

- **ACI 318**
 - Building Code Requirements for Structural Concrete
- **AASHTO**
 - Specification for Highway Bridges
- **Project Specific Requirements**

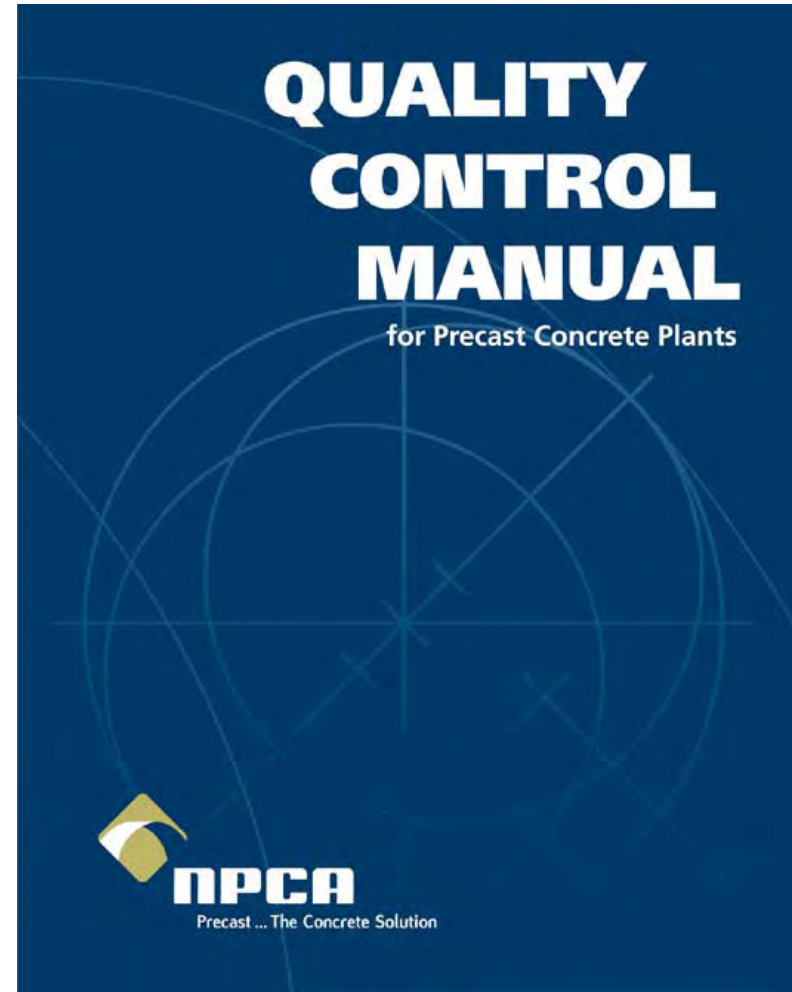
REFERENCES



- NPCA Best Practices Manual – Precast Concrete Utility Vault Manufacturing

REFERENCES

- NPCA Quality Control Manual for Precast Plants
- Local Codes and Regulations



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**
 - Concrete Compressive Strength – Minimum 4,000 psi strength at 28 days.
 - $w/c < .45$ (water/cementitious ratio).
 - Quality materials using well-graded aggregates.
 - Air entrained in accordance with ACI 318.
- **Reinforcement**
 - Reinforcement design by structural calculations as required by code or as proven by testing.

MATERIALS

- **Cement**

The majority of cement used in the manufactured concrete products industry is governed by ASTM C 150 “Standard Specification for Portland Cement.”



MATERIALS

- **Aggregates**

Well-graded, sound, nonporous aggregate conforming to ASTM C 33, “Standard Specification for Concrete Aggregates,” is essential in the production of high-quality precast concrete.



MATERIALS

- **Water**

Water for mixing high-quality precast concrete shall meet ASTM C1602, “Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.”



MATERIALS

- **Admixtures & 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.

- **Today, precast concrete is the high-tech material of choice.**

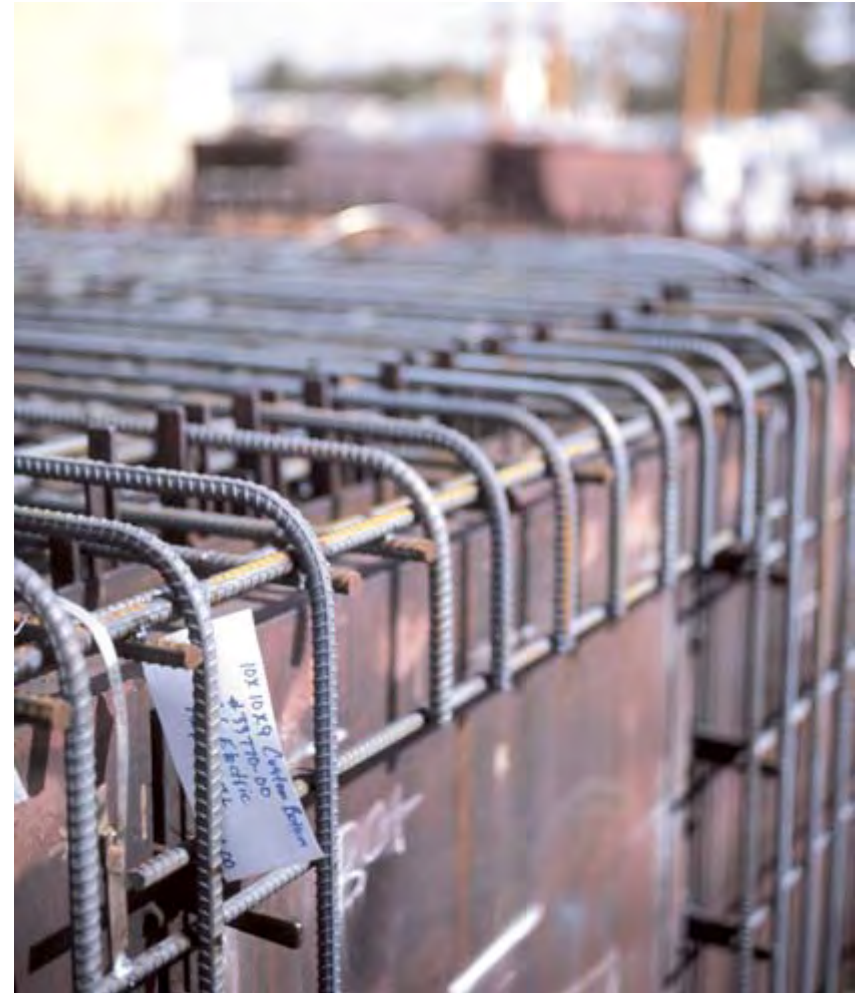
MATERIALS

- **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 WWM to conventional rebar to fibers – all reinforcement must comply with applicable standards.



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.

PRODUCTION

- **Final Inspection**
 - Validation of Quality



INSTALLATION

- **Proper installation is absolutely critical for maintaining the inherent quality of plant-manufactured 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

NPCA PLANT CERTIFICATION

- Quality Control Manual to ensure the production of quality precast products
- Plant Inspections conducted by third-party consultants

