The High Cost of
(a Lack of) Education

Theodore L. Neff, P.E.
Executive Director
Post-Tensioning Institute
The High Cost of (a Lack of) Education

Presentation Outline

- The Problem
- The Impact
- What is PTI doing about it
- Future outlook
The Problem: Shortage of Qualified and Experienced Workers

What are the causes?

- Aging workforce
- Recession cutbacks
- Competition from other industries
- Inadequate or lack of training by universities
- Growing demand
The Problem: Shortage of Qualified and Experienced Workers

- Youth labor force — workers ages 16 to 24 — is expected to decrease from 13.6 % in 2010 to 11.2 % in 2020

- Primary working age group — those between 25 and 54 — is projected to decline from 66.9 % of the labor force in 2010 to 63.7 % in 2020

- Workers ages 55 years and older is anticipated to leap from 19.5 % to 25.2 % of the labor force during the same period

The Problem:

Shortage of Qualified and Experienced Workers

- Estimated that of the 224 U.S. universities with civil engineering programs, only 10% teach a course in prestressed concrete.

- About 1% of structural engineering firms have expertise in post-tensioned concrete.

- With over 45,000 practicing structural engineers in the U.S., it is clear that a significant number do not have PT expertise.

Ken Bondy, “The State of Post-Tensioned Concrete Education”, Concrete International, October 2014
The Problem: Shortage of Qualified and Experienced Workers

Who is affected?

- Designers/ specifiers
- Detailers
- Contractors/installers
- Industry suppliers
- Inspectors
- Code officials
The Impact: Efficiency & Effectiveness

- **Work output**
  - Unnecessary and extra work
  - Repairs
  - Redo’s
- **Speed**
  - Work delays
  - Time penalties/ loss of incentives
The Impact: Constructability

- Inefficient details
- Conflicts with other trades
- Extra time and labor
- More material
The Impact: Constructability

Photo courtesy of Walter P Moore
The Impact: Constructability

Photo courtesy of Magnusson Klemencic Associates
The Impact: Quality & Reliability

- **Performance**
  - Strength/ load carrying capacity
  - Structural integrity
  - Extreme events
  - Functionality

- **Durability**
  - Corrosion
  - Cracking
The Impact: Quality & Reliability
Workers
- Installation crews
- Inspectors
- Other trades

Public
- During construction
- During service
The Impact: Safety
The Impact:

Safety
Customer Satisfaction

Perceived risk

Design of choice

Reputation is “everything”
The Impact: Image & Reputation
Buying a Condo with Post Tension Cables

Particularly in the 1970s and 1980s, many buildings in Calgary were built with post-tension cable construction in one or more of the horizontal concrete slabs. Some buildings being constructed today use this method as well.

This construction method uses steel strands inside a plastic tubing with grease or oil as a corrosion retardant. There are many strands in both directions cast within a concrete slab, with the strands tensioned against the concrete at the ends of the slab. Sometimes you can see the plugs on the end of a slab that conceal the tensioned end of a cable. The purpose is to create a slab that can support more weight without additional columns that consume space, and also to minimize cracking in the slab.

The concern about a post-tension system relates to the potential for corrosion and deterioration of the steel cables if water and oxygen has entered through a crack...if sufficient cables have deteriorated and lost tension, they may have reduced the slab's ability to support weight, and may require costly replacement. Post-tensioned slabs also require a certain amount of preventative maintenance in the form of waterproofing any portions of the slab that are exposed to the elements. The waterproofing is another maintenance expense to the Corporation.

If the Corporation has been regularly having their post-tension system monitored by an engineering firm, and have been performing the maintenance as recommended by that firm, the building is no riskier than any other form of construction. However, the Corporation does need to set aside some funds in their reserve account to accommodate the possibility of a future expense.

Check your documents for a recent post-tension report.

The document package you receive from the seller of the unit should include a recent post-tension report if the building has used that construction method. The engineer’s comments will give you some insight into the condition of the system, and the likelihood of future problems. Many engineering firms also give a recommendation for what funding the Corporation may require in the future.

The financials will show whether the Corporation is setting aside money for post-tension work.

The operating budget shows if they are allotting an amount for annual post-tension inspections. You may find mention of post-tension work having been done recently in the audited financial statements. Their reserve fund study will reveal if any funding for post-tension work was recommended to the Corporation. And their reserve fund study plan will state if some of the funding is earmarked for possible post-tension work.

Researched from “Are post-tension buildings too scary?” by Phyllis Fykes, Calgary Real Estate News, Vol. 21 No. 50 | December 11, 2003
 Errors and omissions
 Miscommunications
 Claims and backcharges
 Insurance premiums
 Disputes
 Lawsuits
Design Errors and Omissions:

- Estimated design error costs (139 projects)
  - Mean direct 6.85% of contract value
  - Indirect costs 7.36% of contract value

Obstacles to use

Higher costs

Increased competition
The Impact:
Profitability

- Less work
- Lower margins
- Reduced return on investment
What to do about it?
**PTI Strategic Plan 2016 - 2018**

**Our Business | Mission**
PTI advocates the quality use of post-tensioning by providing education, certification, and codes & standards, as well as promoting the industry and supporting research.

**Our Impact | Vision**
The world-class work of PTI results in post-tensioning becoming a part of every designer's and contractor's arsenal to deliver long-lasting, quality construction.

**Strategic Framework 2016 - 2018**

**Organization Performance**

**Fuel Success**

**Target Audiences**
1. Company-level members
2. Designers/Engineers
   a. Non members
   b. Professional members
3. Contractors
   a. Non members
   b. Members
4. Owners & Developers

**Ongoing Operations**
- Certification
- Publications
- Codes and standards
- Membership
- Meetings/conferences/seminars
- Administration
- Committee work
- Industry affiliations
- Education
- Marketing

**Strategic Drivers**
- Technical Excellence
- Marketing
- Organization Strength
- Education

**Our Beliefs | Values**
Integrity | Proactive | Quality | Safety
1. Technical Excellence
   a. Goals:
      - 1. Improve in-place Quality
      - 2. Enhance PTI Knowledge Base

2. Marketing
   a. Goals:
      - 1. Increase Credibility of Post-Tensioning
      - 2. Promote PTI

3. Organization Strength
   a. Goals:
      - 1. Strengthen Member Engagement
      - 2. Strengthen Governance
      - 3. Increase Resources

4. Education
   a. Goals:
      - 1. Expand Education Offerings and Audiences
      - 2. Increase Education Partnerships
Train and certify:

- Installers
- Inspectors
- Repair personnel
PTI Response

Technical Support

Enhance knowledge base

- Library of webinars, videos and FAQs
- Update all PTI technical information on 4-6 year cycle
- Enhance website
E-learning

- Webinars

Continuing Education for Practitioners

- Distance Learning Certificate Program

University Programs

- Curriculums for engineers, architects, construction mgt.
- Establish relationships with key universities
“A society grows great when old men plant trees whose shade they know they shall never sit in.” Greek Proverb
Developing Our Future Workforce

Keys to Success – Think Long Term

For longer & broader effects, focus outwards

Long term prospects

Immediate prospects

Customer base

Narrower effects, smaller paybacks

Long term

Short term

Broad effects, big paybacks
If you're not part of the solution, you're part of the problem.

~African Proverb (Unknown African source)
TEAMWORK

Overcoming differences to work towards a common goal.
Developing Our Future Workforce

more education = more opportunity
Thank you for your attention!