

# **The High Cost of (a Lack of) Education**

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# The High Cost of (a Lack of) Education

## *Presentation Outline*

- The Problem
- The Impact
- What is PTI doing about it
- Future outlook

- **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

# The Problem: *Shortage of Qualified and Experienced Workers*

- Who is affected?
  - ❖ Designers/ specifiers
  - ❖ Detailers
  - ❖ Contractors/installers
  - ❖ Industry suppliers
  - ❖ Inspectors
  - ❖ Code officials





Cost Effectiveness



Quality Assurance



Timely Delivery



Reliability



Customer Relationship



- **Work output**
  - ❖ Unnecessary and extra work
  - ❖ Repairs
  - ❖ Redo's
- **Speed**
  - ❖ Work delays
  - ❖ Time penalties/ loss of incentives



**Efficiency**



**Effectiveness**



- Inefficient details
- Conflicts with other trades
- Extra time and labor
- More material



*Photo courtesy of Walter P Moore*





*Photo courtesy of Magnusson Klemencic Associates*



## ■ Performance

- ❖ Strength/ load carrying capacity
- ❖ Structural integrity
- ❖ Extreme events
- ❖ Functionality

## ■ Durability

- ❖ Corrosion
- ❖ Cracking







- **Workers**
  - ❖ Installation crews
  - ❖ Inspectors
  - ❖ Other trades
  
- **Public**
  - ❖ During construction
  - ❖ During service








- Customer Satisfaction
- Perceived risk
- Design of choice











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- Contact Information
- Contact Rob

### 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 Fyckes, Calgary Real Estate News, Vol. 21 No. 50 | December 11, 2003*

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- **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

*Lopez, R. and Love, P. (2012). "Design Error Costs in Construction Projects." J. Constr. Eng. Manage., 10.1061/(ASCE)CO.1943-7862.0000454, 585-593*

- **Obstacles to use**
- **Higher costs**
- **Increased competition**

- Less work
- Lower margins
- Reduced return on investment



**What to do about it?**



### ■ 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

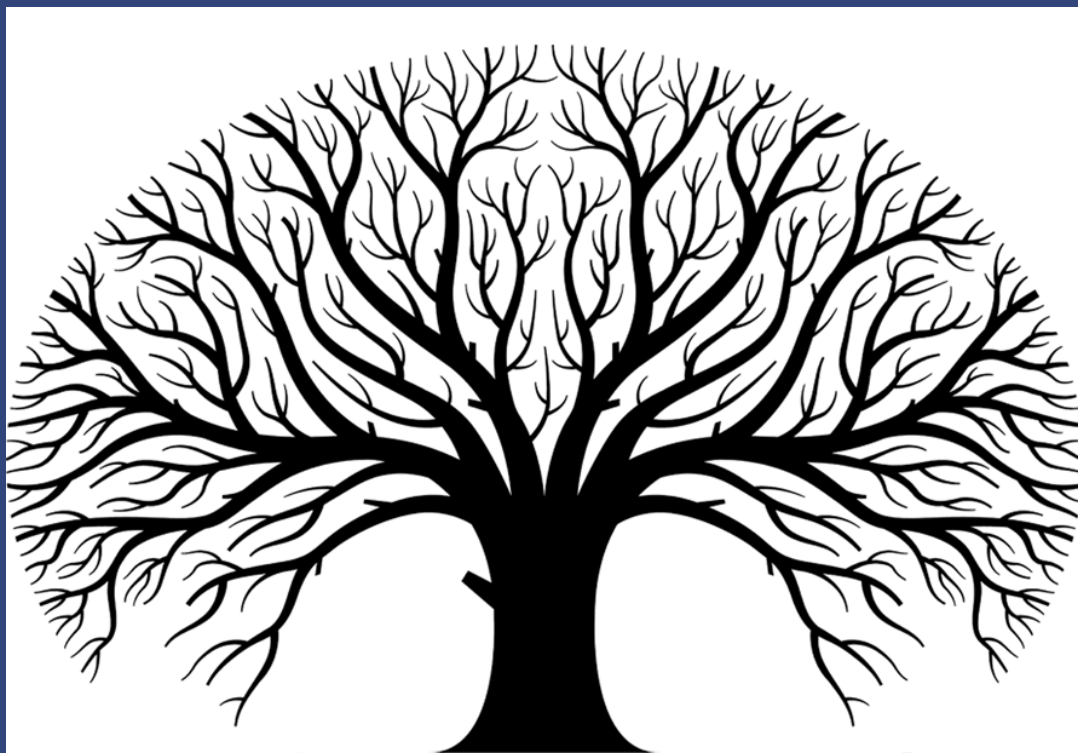
## ■ Enhance knowledge base

- ❖ 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**

# Developing Our Future Workforce

## *Keys to Success*



**"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**

Broad effects, big paybacks

Long term prospects

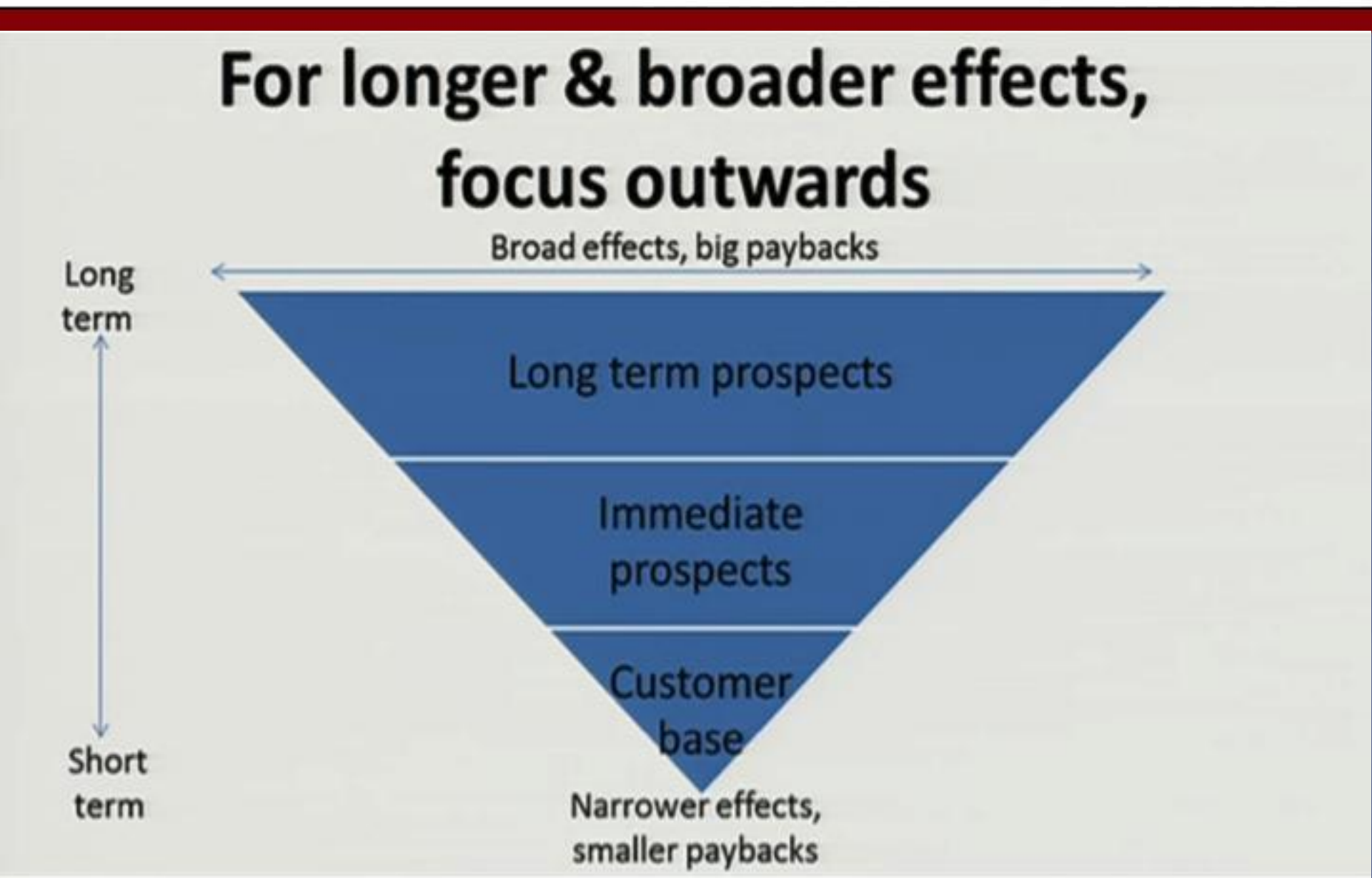
Immediate prospects

Customer base

Narrower effects,  
smaller paybacks

Long  
term

Short  
term



**If you're not part of  
the solution, you're  
part of the problem.**

**~African Proverb (Unknown African  
source)**



# Developing Our Future Workforce

## *Keys to Success - Teamwork*



# TEAMWORK

Overcoming differences to work towards a common goal.

# Developing Our Future Workforce

more more  
**education = opportunity**



*Thank you for your attention!*