Contractor Quality and Contractor Buy In in Minnesota?

National Concrete Consortium

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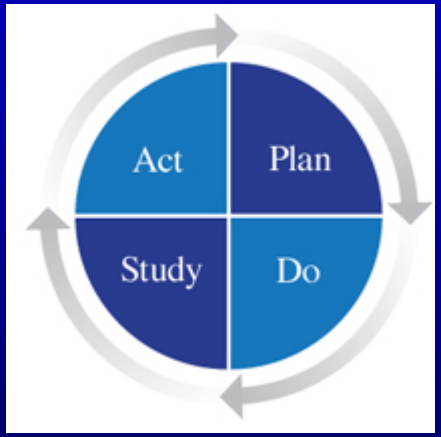
A Little About Quality

- Several definitions of quality
- Varies depending on business
- Many traits agreed upon
- One general definition

  "Quality is the systematic pursuit of excellence."

The W. Edwards Deming Institute PDSA Cycle

The cycle begins with the **Plan** step. This involves identifying a goal or purpose, formulating a theory, defining success metrics and putting a plan into action. These activities are followed by the **Do** step, in which the components of the plan are implemented, such as making a product. Next comes the **Study** step, where outcomes are monitored to test the validity of the plan for signs of progress and success, or problems and areas for improvement. The **Act** step closes the cycle, integrating the learning generated by the entire process, which can be used to **adjust the goal, change methods or even reformulate a theory altogether. These four steps are repeated over and over as part of a never-ending cycle of continual improvement**.



Contractors Are Businesses

- There are several common traits of successful businesses.
  - The most common is profit

Agencies Represent the Taxpayers

- Agencies should expect the best product possible for a fair price while balancing risk and cost.

What Makes This Work Best?

- Owner needs to realize and understand that the contractors need to make money.
- Contractor needs to provide a product that meets or exceeds the owners expectations.

Minnesota Paving Specifications

Pre 1995

- Typical w/c ratio – 0.46
- Min Cement – 450 lb
- Min Cementitious – 530 lb
- Air Content – 5.5% +/- 1.5%
- 15% fly ash allowed
- No admixtures allowed

Post 1995

- w/c ratio $\leq$ 0.40
- Min Cement – 400 lb
- Min Cementitious – 530 lb
- Max Cementitious – 600 lb
- Air Content – 7.0% +/- 1.5% ($\geq$ 5.0 behind paver)
- 30% max fly ash allowed
- Admixtures allowed

Why Did We Change Specifications

- Durability/pavement life

W/C Ratio Pilot Projects - 1995

- Different Variations Were Tried
  - Bought Water Reducer for Contractor
  - MnDOT Designed Mixes
  - Well-Graded Aggregate Variations
  - ??
  - ??

How Do We Get Contractor Buy In To These Ideas?

- Reward excellence
- Reward innovation
- Encourage new ideas
- Allow for mistakes and failure

How Did The Transition Go?

How Did The Transition Go?

- Water reducers
- Cement
- Fly ash
- Sand
- Aggregate gradation
- Recycled aggregates
- Finishing
- It’s a “system”

How Did We Work Through The Changes And Get Contractor Buy In?

- Communication!!!
  - Contractors need to know what the objectives are
  - Contractors need to know what has worked and what hasn’t
  - Contractors need to given leeway/opportunity to learn
- Shared risk
- More carrot than stick


CARROT
STICK

Where Are We Now?

- Contractors believe in and buy into the incentive system.
- Quality has increased
  - Ride
  - Durability/permeability
  - Aggregate options
- Agencies do not believe incentives are just an add on

Minnesota's Initiatives

Performance Based Specifications For Concrete Pavement

- w/cm
- Aggregate quality
- Aggregate gradation
- Ride

Implementation Of w/c Ratio

Year	Maximum w/c ratio	Minimum w/c ratio for incentive	Target Air Content (+/- 1.5%)	Admixtures Allowed
1996	0.40	0.35	6.5%	Type A Water Reducers
				Type A and Type A Mid Range Water Reducers
2006	0.40	0.35	7.0%	
2010				VMA and Hydration Stabilizers
2011	0.40	0.37		

Optimize Aggregate Gradations To Enhance Concrete Properties

Well-Graded Aggregate

Year	Optional8 – 18 % Retained	Optional 7 – 18 % Retained	Required HPC 8 – 18% Retained	Alternate Bid 6 – 18% Retained	Workability and Coarseness Factor – ZONE II-A
1996	$0.50	NA	NA	NA	NA
1998	$2.00	NA	NA	NA	NA
2000	$2.00	$0.50	-$5.00	NA	NA
2010	$2.00	$0.50	NA**	-$2.00	$2.00
**ELIMINATED HPC PAVING SPECIFICATIONS					

Goals Of Aggregate Quality Incentives

Reduce life cycle costs by increasing pavement life by enhancing aggregate durability

Aggregate Quality Enhancement

- Incentive/disincentive
  - –Maximum incentive $2.00/cy, $1.00/cy for two most prevalent coarse aggregates, partial incentive also available

Concrete Ride Specification

Table 2399-5 Smoothness Pay Adjustments and Corrective Work for Concrete Pavements		
Equation	**Smoothness in/mi [m/km]**	**Pay Adjustment $/0.1 mi [0.16 km/**
PCC-A	< 50.0 [0.79]	890.00
	50.0 – 90.0 [0.79 – 1.42]	2940.00 − 41.000 × Smoothness [2940.00 − 2597.800 × Smoothness]
	> 90.0 [1.42]	Corrective Work to ≤ 71.7 in/mi [1.13 m/km]

Concrete Curing

- Probably the most ignored process of concrete paving
- Mn/DOT Specs require blanket cure or membrane cure
- Membrane cure requires poly-alpha-methyl styrene (AMS)

Concrete Curing

- AMS (PAMS) has:
  - ***5 to 10 TIMES (not %) less water loss*** at 1 and 3 days according to MnDOT lab tests


7/1/2002

Some Questions Regarding Incentives

- How much do incentives cost?
- How much of the risk is bid in by the contractor?
- How much additional life is gained by increasing the quality attributes (life cycle costs)?

Contractors Will Reduce Their Bids Partially To Account For Some Of The Expected Incentive To Assure Being The Low Bidder

Intent Of Specification Is To Allow Contractor To Optimize Costs And Materials To Maximize Benefits And Reduce Risks.

- Incentives will be bid in as contractors become accustomed.
- All but impossible to measure how much incentives are bid into project.

Concrete Mix Design

- Contractor Mix Design
  - Typical mix design consists of:
    - Average w/c = 0.38
    - Aggregate Quality incentive averages $1.00/cy (50% of available incentive)
    - Typically do not meet well graded incentive but intermediate aggregates often used to reduce segregation of mix and increase workability
    - Ride incentive on highways (high production projects) – typically earn 50% or better of incentive

What Is Our Future?

- We are evaluating our pavements to see if the specifications are giving us the results we are looking for
- We have been reviewing our specifications to see if we are heading in the right direction
- We will continue to review/evaluate/update (PDSA)

CPAM Goals & Objectives

- To provide assistance in the design and planning of roads, streets and airfields;
- To encourage and promote the use of concrete in the paving and construction of highways, streets and airfields;
- To advance the use of concrete road materials by identifying and disseminating literature and research findings related to the advantages of concrete;
- To provide cooperation and aid to local, state and federal authorities in establishing standards for highway, street and airfield construction; and
- ***To maintain a high standard of workmanship and product quality by concrete paving contractors***.

CPAM Bylaws

… To maintain a high standard of workmanship and product by concrete paving contractors and to encourage sound, lawful business practices in the trade for the benefit of the public and contracting authorities;

Git-R-Done

"Don't find fault, find a remedy; anybody can complain"

– Henry Ford

Partner (Synonyms)

- Collaboration
- Ally
- Alignment
- Consortium
- Support
- Work together

Questions?

Thank You!