

Preparing the Professional of Tomorrow

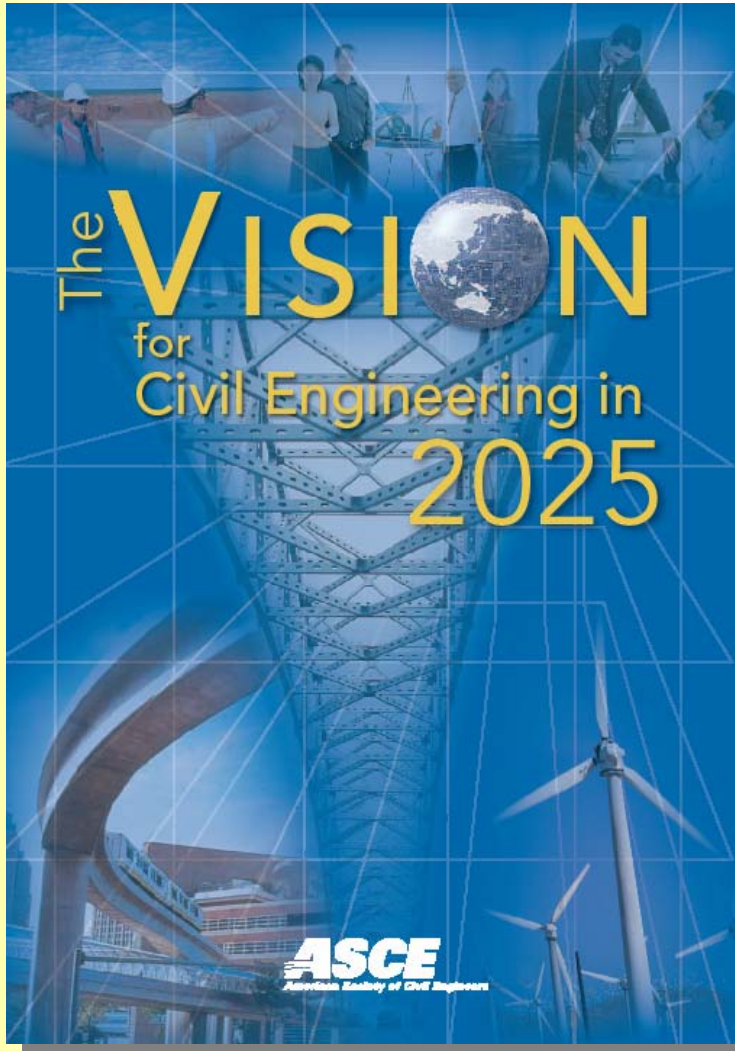
**Presented to:
SHMII-3 Education Workshop
December 16, 2007**

**Richard O. Anderson, P.E, Hon. M. ASCE
BOK-2 Chairman**

**“We need to learn from the past,
live in the moment, and
plan for the future.”**

– Anonymous

Our Profession and Our Vision

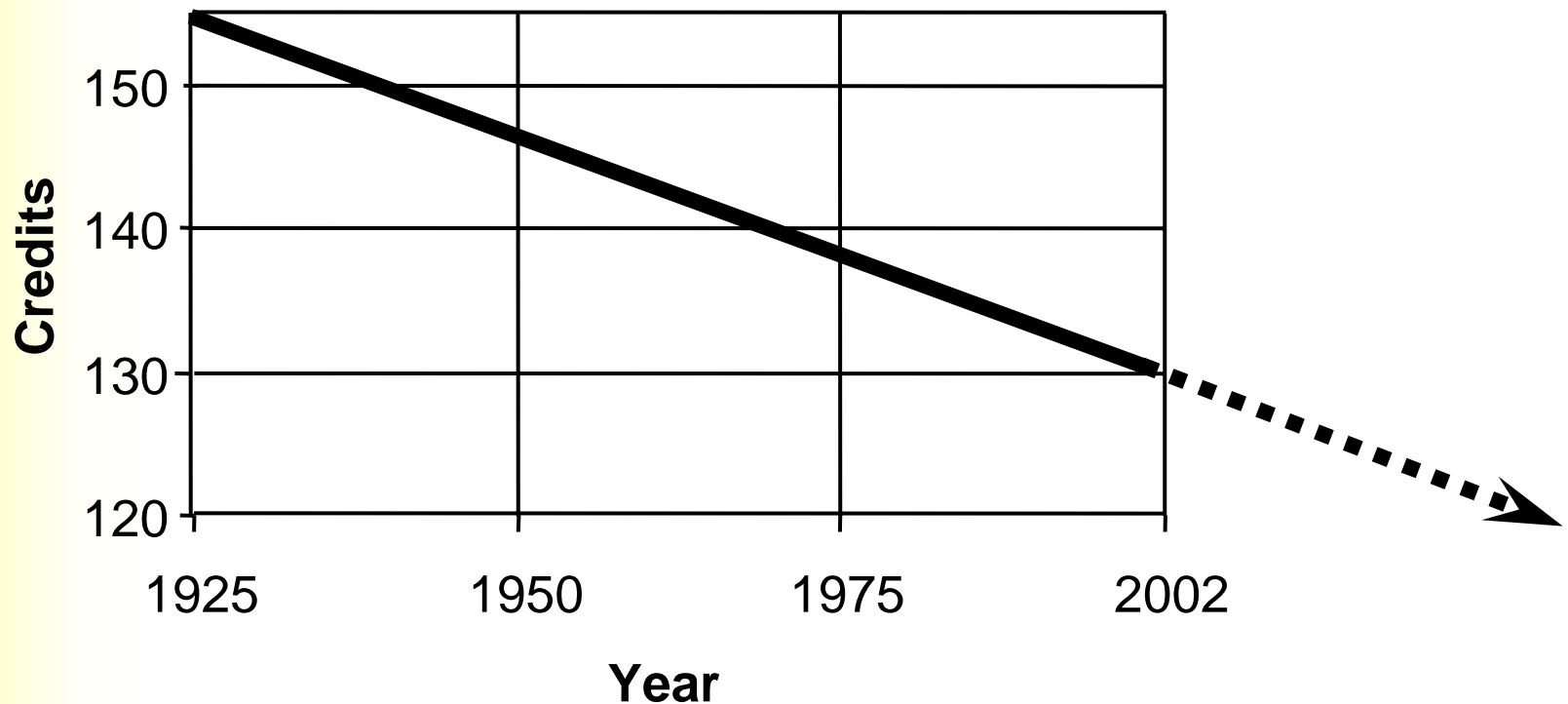


*Entrusted by society to create a sustainable world and enhance the global quality of life, civil engineers serve competently, collaboratively, and ethically as **master**:*

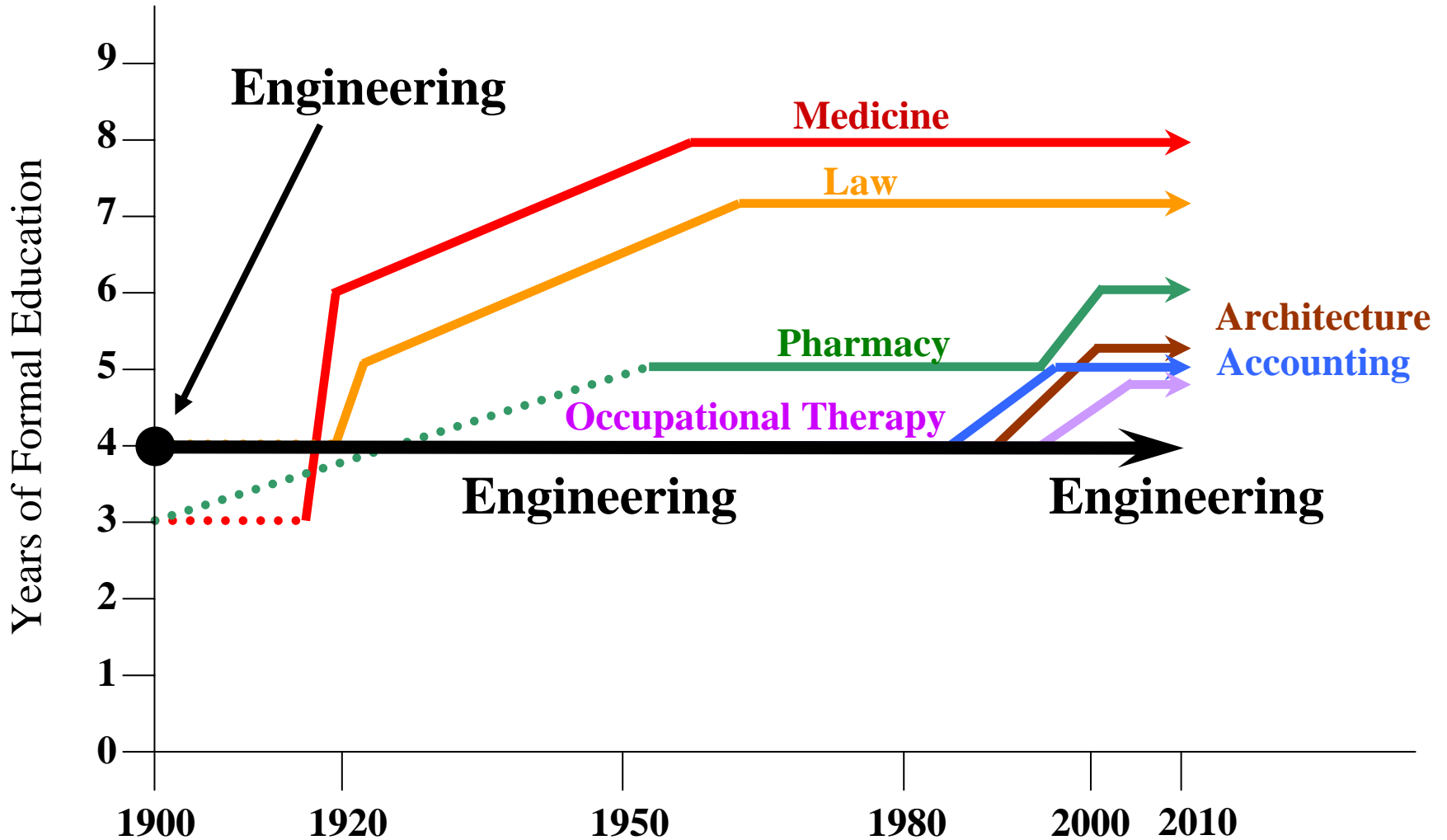
- planners, designers, constructors, and operators of the built environment*
- stewards of the natural environment*
- integrators of ideas and technology*
- managers of risk and uncertainty*
- leaders in shaping policy*

The Concern!

Trend in Reduced Total Credit-Hours



A Leader No Longer



ASCE Policy 465

(Adopted by the BOD on April 25, 2007)

The American Society of Civil Engineers

supports the attainment of a Body of

1. a baccalaureate degree in CE
Knowledge for entry into the practice of
2. a master's degree, or approximately 30
civil engineering at a professional level.
coordinated graduate or upper level . . .
3. appropriate experience . . .

Master Plan

Primary Input →

Key Input →

NCEES Model Rules

Laws/Rules of 56 Licensing Boards

NCEES Model

Aspirational

Comprehensive

B + "M or 30" Guidelines

Accreditation Criteria

Curricula

Experience Guidelines

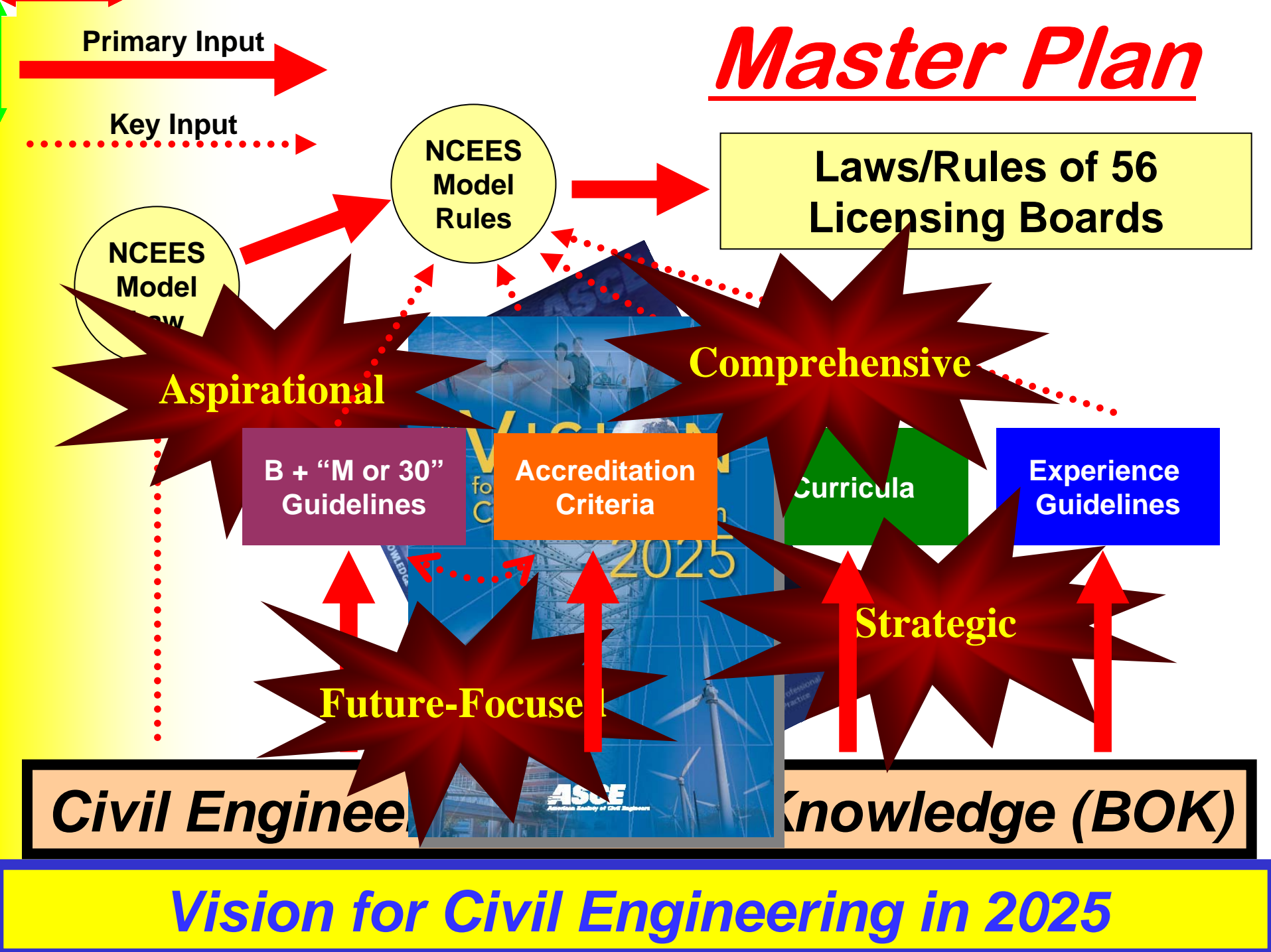
Future-Focused

Strategic

Civil Engineering

Knowledge (BOK)

Vision for Civil Engineering in 2025





Knowledge, skills, & attitudes
necessary to enter into the
practice of civil engineering at
the professional level.

Partners

**“BOK cannot
fit into today’s
BS.”**

**“Redesign
today’s
BS”**

California State - L.A.

**“Specialization
after BS”**

The “Bottom Line” Problem Statement

“It is evident that the exploding body of science and engineering knowledge cannot be accommodated within the context of the traditional four year baccalaureate degree.”

Educating the Engineer of 2020
NAE Report 2005

BOK – The **BIG** Picture

1. Fundamentals -- math, science, and engr science.
2. Technical breadth.
3. Breadth in the humanities & social sciences.
4. Professional practice breadth.
5. Technical depth (specialization).

Civil Engineering Body of Knowledge – 1st Edition

TECHNICAL

- (1) Math & science
- (2) Experimentation
- (3) Design
- (4) Engineering analysis
- (5) Engineering tools
- (6) Specialized area of civil engineering
- (7) Project mgmt., construction and asset management

PROFESSIONAL

- (8) Inter-disciplinary teams
- (9) Professional/ethical standards
- (10) Communication
- (11) Impact of engineering
- (12) Life-long learning
- (13) Contemporary issues
- (14) Business & public policy
- (15) Leadership

ABET 3(a-k)

ASCE

Civil Engineering Body of Knowledge – 2nd Edition

FOUNDATIONAL

(Mathematics, Natural Sciences,
Humanities, Social Science)

TECHNICAL

(Breadth and Depth)

PROFESSIONAL

(Depth)

Civil Engineering Body of Knowledge – 2nd Edition

FOUNDATIONAL

- (1) Mathematics**
- (2) Natural Sciences**
- (3) Humanities**
- (4) Social Sciences**

Civil Engineering Body of Knowledge – 2nd Edition

TECHNICAL

(5) Materials Science

(6) Mechanics

(7) Experiments

**(8) Problem Recognition &
Solving**

(9) Design

(10) Sustainability

**(11) Contemporary Issues
& Historical Perspectives**

(12) Risk & Uncertainty

(13) Project Management

**(14) Breadth in Civil
Engineering Areas**

(15) Technical Specialization

Civil Engineering Body of Knowledge – 2nd Edition

PROFESSIONAL

(16) Communication

(17) Public Policy

**(18) Business & Public
Administration**

(19) Globalization

(20) Leadership

(21) Teamwork

(22) Attitudes

(23) Life-Long Learning

**(24) Professional & Ethical
Responsibility**

Example Rubric

Outcome Title	Bloom's Level of Cognitive Achievement					
	1 Knowledge	2 Comprehension	3 Application	4 Analysis	5 Synthesis	6 Evaluation
<p>To enter the practice of civil engineering at the professional level, an individual must be able to demonstrate this level of achievement</p>						
<p>T e c h n i c a l O u t c o m e s</p>						
15 Technical Specialization	<p>Define key aspects of advanced technical specialization appropriate to civil engineering</p> <p>(B)</p>	<p>Explain key concepts and problem-solving processes in a traditional or emerging specialized technical area appropriate to civil engineering.</p> <p>(M/30)</p>	<p>Apply specialized tools, technology or technologies to solve simple problems in a traditional or emerging specialized technical area of civil engineering.</p> <p>(M/30)</p>	<p>Analyze a complex system or process in a traditional or emerging specialized technical area appropriate to civil engineering.</p> <p>(M/30)</p>	<p>Design a complex system or process or create new knowledge or technologies in a traditional or emerging specialized technical area appropriate to civil engineering.</p> <p>(M/30)</p>	<p>Evaluate the design of a complex system or process or evaluate the validity of newly-created knowledge or technologies in a traditional or emerging advanced specialized technical area appropriate to civil engineering.</p> <p>(E)</p>

Foundational Outcomes

Outcome	Know- ledge	Comp- rehen- sion	Appli- cation	Analy- sis	Synthe- sis	Evalu- ation
1. Mathematics	B	B	B			
2. Natural Sciences	B	B	B			
3. Humanities	B	B	B			
4. Social Sciences	B	B	B			

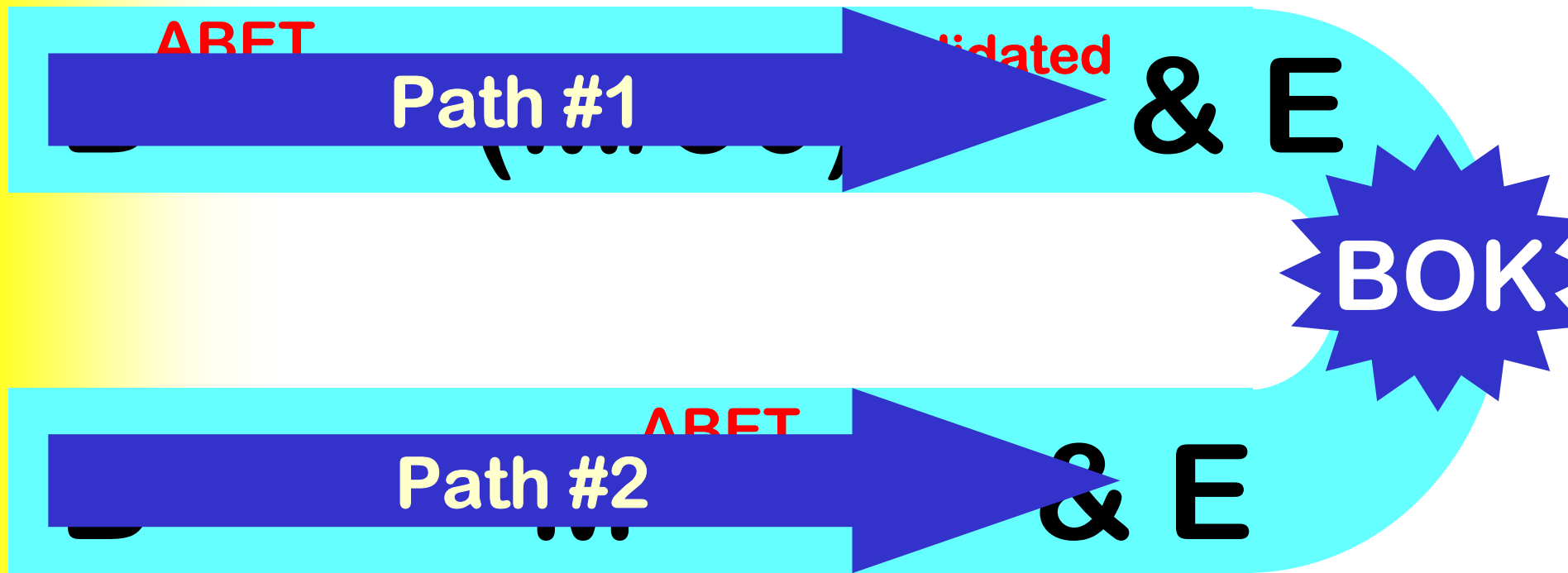
Technical Outcomes

Outcome	Know- ledge	Compre- hension	Appli- cation	Analy- sis	Synthe- sis	Evalu- ation
5. Materials Science	B	B	B			
6. Mechanics	B	B	B	B		
7. Experiments	B	B	B	B	M/30	
8. Problem Recognition & Solving	B	B	B	M/30		
9. Design	B	B	B	B	B	E
10. Sustainability	B	B	B	E		
11. Contemporary Issues & Historical Perspectives	B	B	B	E		
12. Risk & Uncertainty	B	B	B	E		
13. Project Management	B	B	B	E		
14. Breadth in Civil Engineering Areas	B	B	B	B		
15. Technical Specialization	B	M/30	M/30	M/30	M/30	E

Professional Outcomes

Outcome	Know- ledge	Compre- hension	Appli- cation	Analy- sis	Synthe- sis	Evalu- ation
16. Communication	B	B	B	B	E	
17. Public Policy	B	B	E			
18. Business & Public Administration	B	B	E			
19. Globalization	B	B	B	E		
20. Leadership	B	B	B	E		
21. Teamwork	B	B	B	E		
22. Attitudes	B	B	E			
23. Life-Long Learning	B	B	B	E	E	
24. Professional & Ethical Responsibility	B	B	B	B	E	E

Example Paths to BOK Attainment



Acceptable Coursework



- **Equivalent in intellectual rigor and learning assessment to upper level undergraduate or graduate level coursework offered at institutions with ABET/EAC accredited programs**
- **Technical or professional practice topics**
- **NOT “traditional” Continuing Education**

Top Ten Misconceptions

- ~~10. Implementation will occur instantly.~~
- ~~9. Current P.E.'s must obtain a "M or 30."~~
- ~~8. The goal is to eliminate the 4-year degree.~~
- ~~7. Education is more important than Experience.~~
- ~~6. All BSCE graduates need to be licensed.~~
- ~~5. "M/30" should follow directly after "B."~~
- ~~4. Degrees (not knowledge) are the key.~~
- ~~3. "M" means traditional MS degree with thesis.~~
- ~~2. The current BSCE will not be changed.~~
- ~~1. We are working for faculty job security.~~

Summary

- **ASCE Vision**
- **PS-465 & BOK**
- **Change**
- **Time**

Information and Knowledgeable Points of Contact

www.asce.org/raisethebar

If you have questions or comments, please contact

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