February 16, 2009

Curriculum Vita for David P. Billington
Gordon Y.S. Wu Professor of Engineering
Department of Civil & Environmental Engineering, Princeton University

Born June 1, 1927, Bryn Mawr, PA
Married Phyllis Bergquist, 1951, six children

45 Hodge Road
Princeton, NJ 08540

Education
Princeton University, BSE, 1950
Fulbright Fellowship, Louvain, Belgium, 1950-51 and Renewal of Fellowship, Ghent, Belgium, 1951-52: to study post-war innovations in bridge construction, structural design theory, and prestressed concrete

Design & Consulting
Professional Engineer, State of New Jersey
Structural Designer, Roberts & Schaefer Co., New York, 1952-1960 for bridges and buildings including aircraft hangers, piers, thin-shell tanks, and missile-launch facilities
Member, Delegation to observe Concrete Construction in the Soviet Union, 1958
Consulting engineer, 1970-date on Thin Shell Concrete Cooling Towers, Highway Accident Analyses, Thin-Shell Silos, Bridge Design, on France's Largest Overland Bridge and for a study of Federal Dams

Educational & Professional Activities
Assoc. Professor, Princeton University, 1960-1964, Professor, Princeton University, 1964-date
Visiting Professor, Technical University Delft, 1966-67
Chairman, ACI-ASCE Joint Committee on Concrete Shell Design & Construction, 1973-79
Visitor, Institute for Advanced Study, Princeton, 1974-75, 1978-79
Chairman, ASCE Committee on Aesthetics in Design of Structures, 1978-85
Visitor, Federal Tech. Inst. Zurich, Summers 1980-83
Elected to Executive Council of the Society for the History of Technology, 1985-88
Invited to visit Japan and Write Detailed Aesthetic Evaluation of its New Bridges, 1989
Director, Princeton Program on Architecture and Engineering, 1990-2008
Named the first Gordon Y. S. Wu Professor of Engineering, 1996-date

Recent Honors
Dexter Prize for an outstanding book in the History of Technology, 1979
Phi Beta Kappa Visiting Scholar, 1984-85
History and Heritage Award, American Society of Civil Engineers, 1986
Elected Member, National Academy of Engineering, 1986
Honorary Doctor of Humane Letters, Union College, 1990
Honorary Doctor of Science, Grinnell College, 1991
George Winter Prize, American Society of Civil Engineers, 1992
Andrew D. White Professor-at-Large, Cornell University, 1987-1993
Usher Prize for the Best Scholarly Work, Technology & Culture (with Jameson Doig), 1995
Honorary Member, Princeton Class of 1995 and Princeton Class of 1979
Honorary Doctor of Engineering, Notre Dame University, 1997
Election as a Fellow of the American Academy of Arts & Sciences, 1998
Election as an Honorary Member of the American Society of Civil Engineers, 1999
Sarton Chair 1999-2000 and Sarton Medal, University of Ghent, Belgium, 1999
Election as an Honorary Member of the American Concrete Institute, 2003
National Science Foundation Director's Distinguished Teaching Scholar Award, 2003
Election as an Honorary Member of the International Association of Shell Structures, 2004
A Symposium in Honor of David P. Billington, Dept. of Civil & Environmental Eng., 187 pages, 2004.

John P. McGovern Lecture Award in Science, Cosmos Club Foundation, 2004
Charles Zollman Award, Prestressed and Precast Concrete Institute, 2004
Walter L.Robb Senior Engineering Education Fellow of the National Academy of Engineering for 2005-06
Robert Noyce Visiting Professor, Grinnell College, 2006
Morison Prize Lecture, MIT, May 2008
2008 Distinguished Award of Merit, American Council of Engineering Companies

Teaching Awards
Princeton Engineering Council Excellence in Teaching Awards, 1988, 1992, 2003
Charles A. Dana Award for Pioneering Achievements in Higher Education, 1990
N.J. State Professor of the Year, Carnegie Found. for the Advancement of Teaching, 1995
President's Award for Distinguished Teaching (at Princeton), 1996
Educator of the Year, Central New Jersey Section of Amer. Society of Civil Engineers, 1997
Educator of the Year, Consulting Engineers Council of New Jersey, 1998
Named one of five top educators in Civil Engineering since 1874 by the Engineering News Record, 1999
School of Engineering & Applied Science Distinguished Teacher Award, 2001

Teaching
Undergrad and Grad Structural Engineering Courses, 1960-date, Grad Course to Architects, 1961-1995
Structures Models and Architects (with J. R. Janney and R. Mark), Princeton School of Architecture, 1963
Introduced permanent introductory courses on engineering: "Structures and the Urban Environment", 1974 (with Maria Garlock since 2003, "Engineering in the Modern World", 1985 (with Michael Littman since 1996); and "Rivers and the Regional Environment" 1999 (with James Smith since 2000)

Teaching Exhibitions (jointly with colleagues and museum staffs)
Bridges & Sculpture, Princeton Art Museum, 1972
The Eads Bridge, Princeton Art Museum and St. Louis Art Museum, 1974
The Bridges of Robert Maillart, Princeton Art Museum 1976
The Bridges of Christian Menn, Princeton Art Museum, 1978 (traveled through the USA and Canada)
Heinz Isler – Structural Artist, Princeton Art Museum, 1980 (traveled through the USA and to Japan)
The New Art of Structural Engineering, The NSF Art of Science Project, National Science Foundation, Arlington, VA, 2000 (on exhibit at Engineering Directorate in NSF 2001- 2006)
The Art of Structural Design: A Swiss Legacy, Princeton Art Museum, 2003 (traveled 2004 to 2006)
Felix Candela: Engineer, Builder and Structural Artist, Princeton University Art Museum 2008-2009

Research as illustrated by over 180 Articles and 10 Major Scholarly Publications (Books)
Thin-Shell Concrete Structures, 2nd Ed., 1982, One of 25 books chosen as a McGraw-Hill Classic Text Reprint, 1989 (First Ed. 1965)
Robert Maillart's Bridges, Princeton University Press, 1979 (the Dexter Prize), Paperback, 1985
The Tower and the Bridge: The New Art of Structural Engineering, Basic Books, 1983, Paperback, Princeton University Press, 1985
Robert Maillart and the Art of Reinforced Concrete, Architectural History Foundation and Artemis (Zurich), 1990, Bilingual Publication, MIT Press
The Innovators: The Engineering Pioneers Who Made America Modern, John Wiley & Sons, 1996, Wiley Popular Science Series in Hardback, College Text in Paperback
Robert Maillart: Builder, Designer, Artist, A Biography, Cambridge Univ. Press, 1997 (Paperback 2008)
The Art of Structural Design: A Swiss Legacy, Yale University Press (Hardback), Princeton University Art Museum (Paperback), 2003
Power, Speed, and Form: Engineers and the Making of the Twentieth Century (with David P. Billington, Jr.,), Princeton University Press, 2006
Big Dams of the New Deal Era: A Confluence of Engineering and Politics (with Donald C. Jackson), University of Oklahoma Press, 2006
Felix Candela: Engineer, Builder and Structural Artist (with Maria M. Garlock) Princeton University Art Museum and Yale University Press, 2008

Sponsored Research

1963-66	"Analysis for Thin- Shell Roof Structures on Flexible Supports," (with Robert Mark), National Science Foundation.
1965-70	"Photo Mechanical Model Analysis for the Design of Concrete Structures," (with Robert Mark), Reinforced Concrete Research Council.
1967-70	"Limit Analysis for Thin-Shell Concrete Roof Structures," (with Robert Mark), National Science Foundation.
1969-75	"Humanistic Studies in Engineering," (with Robert Mark), National Endowment for the Humanities, Ford Foundation, Rockefeller Foundation.
1971-74	"Elastic Stability and Dynamic Behavior of Cooling Towers," (with John Abel), Research Cottrell, Inc.
1973-74	"The Stability of Large Thin-Shell Concrete Structures," National Science Foundation.
1974	"Eads Bridge Exhibition," National Endowment for the Arts.
1975-77	"The Buckling of Cooling Towers," Research Cottrell, Inc.
1975-77	"Structural Mechanics of Rapped Electrostatic-Precipitator Plates," (with Dennis Nagy, Peter Lee, and Robert Mark), Electrical Power Research Institute.
1977-79	"Robert Maillart and the Origin of Modern Concrete Structures," jointly sponsored by the National Endowment for the Humanities and the National Science Foundation.
1977-79	"Wind Response and Non-Linear Behavior of Cooling Towers," Research Cottrell, Inc.
1977-78	"The Use of Maillart's Design Ideas in Contemporary American Public Works," National Endowment for the Arts.
1979	"Development of Specific Proposals to Improve Design in American Public Works," National Endowment for the Arts.
1979-81	"Behavior of Large-Size Cooling Towers Under Earthquake and Wind," Research Cottrell, Inc.
1979-81	"Curriculum Materials for Humanistic Studies in Modern Engineering," (with Robert Mark), National Endowment for the Humanities. Matching Grants - Sloan Foundation , Mellon Foundation
1980-83	"Robert Maillart and the Aesthetics in Engineering," jointly sponsored by the National Endowment for the Humanities and the National Science Foundation.
1981-82	"The Behavior of Thin Shells on Discrete Flexible Supports," Research Cottrell, Inc.
1983-84	"Development of Teaching Materials Directed Toward the Education of Liberal Arts Students in Engineering," Alfred P. Sloan Foundation.

1984-86	The Engineer's Experience and the New Liberal Arts, Alfred P. Sloan Foundation. (with M. Mahoney, R. Mark and J. Mulvey)
1985	Sloan Foundation Princeton Summer Seminar (with M. Mahoney, R. Mark and J. Mulvey)
1985-87	"Earthquake Response Characteristics of Bridges Under Multiple Support Excitations," National Science Foundation (with A. Abdel-Ghaffar).
1986-89	"The Engineer's Experience and the New Liberal Arts," Alfred P. Sloan Foundation (with M. Mahoney, R. Mark and J. Mulvey),
1986-88	"The Engineer's Perspective: A Reinterpretation of Large Scale Urban Building," (with Robert Mark) National Endowment for the Humanities, the Andrew Mellon Foundation and the Alfred P. Sloan Foundation
1987	Sloan Foundation Princeton Summer Seminar (with M. Mahoney, R. Mark and J. Mulvey).
1988	Sloan Foundation Princeton Summer Seminar (with M. Mahoney, R. Mark and J. Mulvey).
1989	Writing Projects, Sloan Foundation (with M. Mahoney, R. Mark and J. Mulvey).
1990	Book Writing Project, Sloan Foundation.
1991-94	"Curriculum Development for a Freshman Course in Engineering", National Science Foundation
1995-98	"A Series of Books on Engineering in Modern America", Alfred P. Sloan Foundation
1996-98	CD-ROM on the Automobile as a Companion to forthcoming book, "The Entrepreneurs", Alfred P. Sloan Foundation
2001-2004	"A Study in the History of Technology Focused on the Introduction of Thin Shell Concrete Structures and Prestressed Concrete into the United States, National Science Foundation
2003-2007	Director's Distinguished Teaching Scholar Award, National Science Foundation

Consulting

1968	For Ellis Armstrong on the Use of the Dutch Experience for the Design of a Dam Across the Turnagain Arm in Alaska
1970-89	For Research Cottrell Inc. the Structural Analysis and Design for Thin-Shell Concrete Cooling Towers
1971-73	For the Education Development Center on the Design of Part of a Sixth Grade Curriculum on Man and the Man-Made World (dealing largely with the relations between politics, art, technology and culture).
1973-74	EXXON Corporation on the Structural Analysis of Large Scale Undersea Cylinders of Concrete

1974-78	For Research Cottrell Inc. on the Structural Analysis and Design of Precipitators
1982-86	For Davidson College on the Teaching of Engineering to Liberal Arts Students
1984-1993	State of New Jersey on Highway Accident Analysis
1988-1991	Martin-Marietta Corp. Thin Shell Concrete Structures
1989-1993	Great Projects, Public Television, Series Planned on Engineering
1988-1992	State of Maryland, State Highway Administration, Consultant on Bridge Design
1994-1997	French Government, Commission on the Millau Viaduct
2002	For Bechtel Corp. on a Thin Shell concrete Dome
2003	For the Washington Group on Containment Vessels

PUBLICATIONS

David P. Billington

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1. "The Dynamic Testing of Self Anchorage in a Prestressed Concrete Beam," *Precontrainte,* No. 2, 1952, Bruxelles.

1a. "Belgium and Concrete," *Institute of International Education*, News Bulletin, Vol. 29, No. 3, December 1953.

2. "Economical Design of Prestressed Concrete Beams," *Journal, American Concrete Institute,* September 1953.

3. "Factory-Made Prestressed Concrete Girders Trucked 90 Miles to Site," (with M.E. Warner), *Civil Engineering,* August 1956.

4. "Building Frames in Prestressed Concrete," *Journal, American Concrete Institute,* June 1956.

5. "Precast Concrete shows Twenty-one Per Cent Savings on Air Force Building," (with M.E. Warner), *Civil Engineering,* April 1957.

6. "Potentialities for Long Span Prestressed Concrete Structures in U.S.A.," *Proceedings of the World Conference on Prestressed Concrete,* San Francisco, August 1957.

7. "Busy Ferry Terminal in Manhattan Rebuilt," (with M.E. Warner), *Civil Engineering,* October 1957.

8. "Advances in Prestressing Reported," (at the Third Congress of the International Federation of Prestressing, Berlin), *Civil Engineering,* September 1958.

9. "An American Engineer Views Precast and Prestressed Concrete in the Soviet Union," *Civil Engineering,* October 1958.

10. "Report on the Visit of an American Delegation to Observe Concrete and Prestressed Concrete Engineering in the U.S.S.R.," (with five others), *Portland Cement Association,* 1959.

11. "New Design Possibilities with Building Frames and Thin Shells," *Journal of the Prestressed Concrete Institute,* Vol. 5, No. 3, September 1960. (Received Award of Merit.)

12. "Design and Stability Consideration for Unique Pier," (with James Michalos), *Journal of the Waterways and Harbors Division,* American Society of Civil Engineers, May 1961.

13. "Thin Shell Structures," *Civil Engineering,* December 1961.

14. "Policy-Making Positions for Engineers," (with Norman J. Sollenberger), *Civil Engineering,* April 1963.

15. "Structures, Models and Architects," (with J. Janney and R. Mark), *Princeton School of Architecture,* 1964.

16. "The Dynamic Response of Offshore Structures to Time Dependent Forces," (with W.S. Gaither), *Proceedings IXth Conference on Coastal Engineering,* Lisbon, 1964.

17. *"Thin Shell Concrete Structures,"* McGraw-Hill Book Co., New York, 1965, 332 pages.

18. "Small Scale Model Analysis of Thin Shells," (with R. Mark), *Journal, American Concrete Institute,* June, 1965, pp. 673-688.

19. "Stresses in Hyperboloids under Edge Loadings," (with D.G. Elms and R. Mark), *Journal, Engineering Mechanics Division,* American Society of Civil Engineers, August 1965.

20. "Numerical Analysis of Translational Shell Roofs," (with A.W. Hedgren, Jr.), *Journal of the Structural Division,* American Society of Civil Engineers, February 1966.

21. "Analysis of Four-Legged Tower for Dynamic Loads," (with W.S. Gaither and A.M. Ebner), *Journal of Engineering Mechanics Division,* American Society of Civil Engineers, April 1966.

22. "Computers and Thin Shell Analysis," *Computer Applications in Concrete Design and Technology,* Publ. SP-16, American Concrete Institute, 1967.

23. "Non-Linear Theories of Thin Elastic Shells with Reference to Axisymmetric Shells of Revolution," *Laboratory for Applied Mechanics,* Technical University at Delft, The Netherlands, January 1967.

24. "Mortar Model Test on a Cylindrical Shell of Varying Curvature and Thickness, (with A.W. Hedgren, Jr.), *Journal, American Concrete Institute,* February 1967.

25. "Holland Between River and Sea," *Civil Engineering,* May 1967.

26. "Note on Finite Symmetrical Deflections in Thin Shells of Revolution," *Journal of Applied Mechanics,* September 1967 (a small part of Ref. 23).

27. "Folded Plates Continuous over Flexible Supports," (with M. Pultar and J.D. Riera), *Journal, Structural Division,* American Society of Civil Engineers, October 1967.

28. "Vibrations of Timoshenko Beams," (with A.M. Ebner), *Journal, Structural Division,* American Society of Civil Engineers, March 1968.

29. "Thin-Shell Concrete Structures," *Structural Engineering Handbook,* (Ed. Gaylord and Gaylord), Chapter 20, 61 pages, McGraw-Hill Book Company, 1968.

30. "Engineering Education and the Origins of Modern Structure," *Civil Engineering,* January 1969.

31. "Humanities in Civil Engineering," (with R. Mark), *Journal of Engineering Education,* May 1969.

32. "Photoelastic Analysis of Concrete Storage Tanks," (with R. Mark), *Journal, Structural Division,* American Society of Civil Engineers, September 1969, pp. 1939-1951.

33. "From Theory to Practice via Research in Thin-Shell Concrete Structures," *Proceedings International Colloquium on Shell Structures,* Madrid, October 1969.

34. "Statement of David P. Billington, Professor of Civil Engineering, Princeton University," *Hearings before the Select Subcommittee on Education of the Committee on Education and Labor,* House of Representatives, Ninety-first Congress - Second Session on H.R. 15196, 1970.

35. "Concrete Thin Shells of Revolution," *Concrete Thin Shells,* ACI Publ. SP-28, American Concrete Institute, Detroit, Michigan, Fall 1971, pp. 237-274.

36. "Model Analysis of a Continuous Micro concrete Cylindrical Shell," (with P.L. Darvall and R. Mark), *Journal, American Concrete Institute,* November 1971, pp. 832-843.

37. "Design of Cooling Towers in the U.S.A.," *Colloquium on Recommendations for the Structural Design of Hyperbolic or other Similarly Shaped Cooling Towers,* Int. Assoc., Shell Str., Brussels, 1971.

38. "The Buckling of Concrete Cooling Tower Shells," *Pacific Symposium of Hydromechanically Loaded Shells,* Part 1, Int. Assoc. Shell Str., Honolulu, Hawaii, U.S.A., October 1971.

39. "On Building University-Community 'Bridges'," *University,* a Princeton Quarterly, Princeton, Spring 1972, pp. 17-21.

40. "Correlations Study of the Behavior of Concrete Thin Shells to Collapse," (with P. LeP. Darvall), *IASS Bulletin No. 49,* June 1972, pp. 59-63.

41. "Stability Analysis of Cooling Towers: A Review of Current Methods," (with J. Abel), *Proceedings, Conference on Shell Structures and Climatic Influences,* International Association for Shell Structures, Calgary, July 1972.

42. "The Deck-Stiffened Arch Bridges of Robert Maillart," *Journal of the Structural Division,* American Society of Civil Engineers, July 1973, pp. 1527-1539.

43. "Meaning in Maillart," *VIA,* University of Pennsylvania, Vol. 2, 1973, pp. 28-39.

44. "Art in Engineering - the Need for a New Criticism," *Engineering Issues,* American Society of Civil Engineers, October 1973, pp. 499-511.

45. "Public Works - Higher Esthetics Standards Needed," *Civil Engineering,* October 1973, pp. 36-40 (a rewritten part of 44).

46. "An Example of Structural Art: The Salginatobel Bridge of Robert Maillart," *Journal of the Society of Architectural Historians,* Vol. XXXIII, March 1974, pp. 61-72.

47. "A Simplified Theory of Thin Cylindrical Shells," (with Yung-shih Wang and Peter C.Y. Lee), *Journal of the Engineering Mechanics Division,* American Society of Civil Engineers, August 1974, pp. 719-736.

48. "Buckling of Cylindrical Shells by Wind Pressure," (with Yung-shih Wang), *Journal of the Engineering Mechanics Division,* American Society of Civil Engineers, October 1974.

49. "Thermal Loading of Thin-Shell Concrete Cooling Towers," (with Richard D. Larrabee and John Abel), *Journal of the Structural Division,* American Society of Civil Engineers, December 1974, pp. 2367-2383.

50. "Structures and Machines: The Two Sides of Technology," *Soundings,* Fall 1974, pp. 275-288.

51. "Engineering Education and the Art Museum," *Catalogue of the Eads Bridge Exhibition,* Princeton, November 1974.

52. "Buckling of Cooling-Tower Shells: State-of-the-Art," (with Peter P. Cole and John Abel), *Journal of the Structural Division,* American Society of Civil Engineers, June 1975.

53. "Buckling of Cooling Shells: Bifurcation Results," (with Peter P. Cole and John Abel), *Journal of the Structural Division,* American Society of Civil Engineers, June 1975.

54. "Effect of Shell Cracking on Dynamic Response of Concrete Cooling Towers," (with John Abel), *Proceedings, IASS World Conference on Space Enclosures,* Montreal, July 1976.

55. "Design of Cooling Towers for Wind," (with John Abel), *Proceedings, American Society of Civil Engineers Structural Division Specialty Conference,* Madison, Wisconsin, August 1976, pp. 242-267.

56. "Historical Perspective on Prestressed Concrete," *Journal,* Prestressed Concrete Institute, Vol. 21, No. 5 September-October 1976.

57. "Technology and the Structuring of Cities," *Small Comforts for Hard Times: Humanists on Public Policy,* Ed. M. Mooney and F. Stuber, Columbia University Press, 1977, Chapter 14, pp. 182-198.

58. "Structural Art and Robert Maillart," *Architectural Science Review,* Vol. 20, No. 2, June 1977.

59. "History and Esthetics in Suspension Bridges," *Journal of the Structural Division,* American Society of Civil Engineers, Vol. 103, No. ST8, August 1977.

60. "History and Esthetics in Concrete Arch Bridges," *Journal of the Structural Division,* American Society of Civil Engineers, Vol. 103, No. ST11, November 1977.

61. "Hyperbolic Cooling Tower Dynamic Response to Wind," (with R.L. Steinmetz and John F. Abel), *Journal of the Structural Division,* American Society of Civil Engineers, January 1978, pp. 35-53.

62. *The Bridges of Christian Menn,* catalogue and essay for an exhibition in the Princeton University Art Museum, September 1978, 16 pages.

63. *Robert Maillart's Bridges: The Art of Engineering,* Princeton University Press, 1979, 146 pages (won the 1979 Dexter Prize from the Society for the History of Technology).

64. "A Historical View of Concrete Shells: Technique and Aesthetics," *Final Report of the Symposium of the International Association of Shell and Spatial Structures,* Darmstadt, 1981, pp. 3-32.

65. "Effect of Accelerometer Mass on the Flexural Motion of Plates," (with N. Chang and D.A. Nagy), *International Journal of Solids and Structures,* Vol. 14, No. 10, 1978, pp. 851-860.

66. "Finite Element Simulation of the Structural Dynamic Behavior of Rapped Electrostatic Precipitator Plate System," (with D.A. Nagy), *Modeling and Simulation,* Vol. 9, Part I, Proceedings of the Ninth Annual Pittsburgh Conference, pp. 141-147.

67. "Finite Element Studies of Collecting Plate System," (with D.A. Nagy), *Journal of the Structural Division,* American Society of Civil Engineers, Vol. 105, No. ST6, June 1979, pp. 1103-1119.

68. "Precipitator Plate Imperfections and Eccentricities," (with D.A. Nagy), *Journal of the Energy Division,* American Society of Civil Engineers, Vol. 105, No. EY1, August 1979, pp. 181-198.

69. "History and Aesthetics in Suspension Bridges: Closure," *Journal of the Structural Division,* American Society of Civil Engineers, Vol. 105, No. ST3, March 1979, pp. 671-687.

70. "Thin-Shell Concrete Structures," *Structural Engineering Handbook,* (Ed. Gaylord and Gaylord), Chapter 20, 66 pages, McGraw-Hill Company, 1979 (second edition): a revised version of 1968 first edition Chapter 20.

71. "Robert Maillart and Swiss Bridge Competitions," *The Development of Long-Span Bridge Building,* Zurich, August 1979, pp. 129-136.

72. "Maillart and the Origins of Concrete Spatial Forms," *Proceedings, World Congress on Shell and Spatial Structures,* Madrid, September 1979, Vol. 5, pp. 8.21-8.42.

73. "Wind Loading and Response of Cooling Towers," (with Norman J. Sollenberger and Robert H. Scanlan), *Journal of the Structural Division,* American Society of Civil Engineers, Vol. 106, No. ST3, March 1980, pp. 601-621.

74. "Heinz Isler as Structural Artist," *Heinz Isler as Structural Artist,* Catalogue of an Exhibition, Princeton University Art Museum, April 1980, pp. 9-24.

75. "Wilhelm Ritter, Teacher of Maillart and Ammann," *Journal of the Structural Division,* American Society of Civil Engineers, Vol. 106, No. ST5, May 1980, pp. 1103-1116.

76. "Structures and History," *Norman J. Sollenberger: An Educator's Educator,* Dept. of Civil Engineering, Princeton University, Edited by D.P. Billington and J.W. Williams, Jr., May 16, 1980, pp. 27-40.

77. "Bridge Design and Regional Esthetics," *Journal of the Structural Division,* American Society of Civil Engineers, Vol. 107, ST3, March 1981, pp. 473-486.

78. "Shells in Industry," *Bulletin of the International Association for Shell and Spatial Structures,* No. 70, 1981, pp. 11-17.

79. "Test Methods for Concrete Shell Buckling," (with Harry G. Harris), *Concrete Shell Buckling,* SP-67, American Concrete Institute, 1981, pp. 187-231.

80. "Bridge Aesthetics: 1925-1933," *Final Report,* 11th Congress in Vienna of the International Association for Bridge and Structural Engineering, Zurich, 1981, pp. 47-52.

81. "Swiss Bridge Design Spans Time and Distance," *Civil Engineering,* November, 1981, pp. 42-46.

82. "Bridges as Structural Art," *Blueprints,* National Building Museum, Fall 1981, page 12.

83. "S.C. Hollister Colloquium," (with John Abel), Conference Report, *Technology and Culture,* Society for the History of Technology, Vol. 22, No. 4, October 1981.

84. "Unknown Contributions of Robert Maillart to Thin Shell Concrete Structures," 71 *Jahresbericht,* Verein Schweizerischer Zement-, Kalk-, und Gips-Fabrikanten, Zurich, 1981, pp. 64-72.

85. "Art in Engineering - The Need for a New Criticism," *Engineering and the Humanities,* Ed. James H. Schaub and Sheila K. Dickison, John Wiley & Sons, New York, 1982, pp. 176-189. (Revised version of 44).

86. "Liberal Learning and Engineering Education," (with R. Mark), *The Forum for Liberal Education,* Association of American Colleges, May/June 1982, pp. 4-5.

87. *"Thin Shell Concrete Structures,"* 2nd Ed., McGraw-Hill Book Co., 1982, 373 pages.

88. "Belgium and the History of Concrete Structures," *Liber Amicorum: F.G. Reissauw,* April 1982, pp. 29-34.

89. "Buckling of Cooling Towers," (with J.F. Abel, D.A. Nagy and C. Wiita-Dworkin), *Journal of the Structural Division,* American Society of Civil Engineers, Vol. 108, No. ST10, October 1982.

90. "Anton Tedesko: Thin Shells and Esthetics," *Journal of the Structural Division,* American Society of Civil Engineers, Vol. 108, No. ST11, November 1982, pp. 2539-2554.

91. "The Engineer's Personality and the Influence it has on his work - An Historical Perspective," (with A. Tedesko), *Concrete International,* December 1982, pp. 20-26.

92. "The Acts in Technology," *Anglican Theological Review,* Vol. 65, No. 1, January, 1983, pp. 31-48.

93. "Cooling Towers on Flexible Foundations," (with Julian A. Dumitrescu and James G. Croll), *Journal of the Structural Division,* American Society of Civil Engineers, Vol. 109, No. 10, October 1983, pp. 2248-2264.

94. *"The Tower and the Bridge: The New Art of Structural Engineering,"* Basic Books Inc., New York, 1983, 306 pages. (Paperback, Princeton University Press, 1985)

95. "Robert Maillart: Die Kunst der Ingenieurbauten," *Werk, Bauen & Wohnen,* No. 12, December 1983, pp. 18-22.

96. "Concentrated Edge Loads on Hyperboloidal Shells," (with Julian A. Dumitrescu), *Journal of the Structural Division,* American Society of Civil Engineers, Vol. 110, No. 1, January 1984, pp. 75-89.

97. "The Cathedral and the Bridge: Structure and Symbol," (with Robert Mark), *Technology and Culture,* Vol. 25, No. 1, January 1984, pp. 37-52.

98. "Bridges and the New Art of Structural Engineering," *American Scientist,* Vol. 72, No. 1, January-February, 1984, pp. 22-31.

99. "Building Bridges: Perspective on Recent Engineering," *Bridge to the Future; A Centennial Celebration of the Brooklyn Bridge,* Annals of the New York Academy of Sciences, Vol. 424, Eds. Margaret Latimer, Brooke Hindle, Melvin Kransberg. 1984, pp.309-324.

100. "Unbekannte Beitrage Robert Maillarts zur Konstruktion dunner Betonschalentragwerke," *Schweizer Ingenieur und Architekt,* Vol. 102, 24 May 1984, pp. 449-455. (Translation of #84).

101. "Buckling of a Spherical Dome in a Centrifuge," (with J.H. Prevost, R. Rowland and C.C. Lim), *Experimental Mechanics,* Vol. 24, No. 3 Sept. 1984, pp. 203-207.

102. "Design as Art and Invention," *Technology and Science,* Proceedings of a New Liberal Arts Symposium, Ed. J.N. Burnett, Davidson College, 1984, pp. 203-207.

103. "Robert Maillart (1872-1940)," *Fünf Schweizer Brückenbauer,* Verein für Wirtschaftshistorische Studien, Zurich, 1985, pp. 128-150. (Translated into German by Tom Peters).

104. "Structures and Machines in Urban Society," *The Weaver,* Vol. 4, No. 1, Fall, 1985.

105. "Engineering Design: The Numerical and the Artistic," *Computers for the Liberal Arts - Proceedings of the First Conference, Reed College,* November 1985, pp. 48-54.

106. *"The Tower and the Bridge: The New Art of Structural Engineering,"* (paperback edition of publication #94), Princeton University Press, Princeton, New Jersey, December 1985, 306 pp.

107. "Funghi sotto i solai," (Mushroom under the Floor Slab), *Rassegna,* Vol. VII, Dec. 1985, pp. 18-30.

108. "Robert Maillart: I'Arte Nelle Opere di Ingegneria," *Rivista Tecnia,* December 1985, 57-60 (Translation of #95).

109. "Technology and the Teaching of Values," *American Association for Higher Education Bulletin,* ed Jann Teeple-Hewes, December 1985, pp. 8-10.

110. "In Defense of Engineers," *The Wilson Quarterly,* New Years Edition, January 1986, pp. 86-97.

110A. "In Defense of Engineers," *The Bridge,* Vol. 16, No. 2, Summer 1986, pp. 4-7. (Reprint of #110).

111. "Felix Candela and Structural Art," *Bulletin of the International Association for Shell Structures,* January 1986, pp. 5-10.

112. "The President's Science Advising," *The Presidency and Science Advising,* Edited by Kenneth W. Thompson, University Press of America, Inc., Lanham, Maryland, 1986, pp. 63-80.

75A. "Wilhelm Ritter, Teacher of Maillart and Ammann," *Schweizer Ingenieur und Architekt,* Vol. 113, #7, 26 March 1987, pp. 94-100.

110B. "In Defense of Engineers," *TR News,* Transportation Research Board, National Research Council, Nov.-Dec. 1986, No. 127, pp. 3-8. (Reprint of #110).

110C. "In Defense of Engineers," *CESSE Quill,* Council of Engineering and Scientific Society Executives, Winter 1987, Vol. 25, No. 1, pp. 1-5. (Reprint of #110).

113. "The Engineer as Artist - from Roebling to Khan," *Technique and Aesthetics in the Design of Tall Buildings,* October 1983, Fazlur Khan Memorial Session, Institute for the Study of High Rise Habitat, Lehigh University, 1986, pp. 71-89.

114. "Maillart, Robert, Bauingenieur," *Neue Deutsche Biographie,* 15, 1987, pp. 707-708.

115. "Structural Imperative and the Origin of New Form," (with Robert Mark), *Technology and Culture,* Vol. 30, No. 2, April 1989, pp. 300-329.

116. "People in Public Works, Robert Maillart," *APWA Reporter,* June 1989, pp. 24-25.

116a. Editor, *Workshop on Design in Engineering Education,* Princeton University, December 13-14, 1988, 46 pp.

117. "Impressions of Japanese Bridges," *Japanese Bridge Journal,* Vol. 24, No. 6, 1990, pp 17-28.

118. "Creative Connections: Bridges as Art," *Civil Engineering,* March 1990, pp. 50-53.

119. *"Robert Maillart and the Art of Reinforced Concrete,"* Architectural History Foundation, 1990, 151 pages.

120. "Robert Fulton and the Steamboat," *Episodes in American Invention,* 1990, pp. 5-37, NLA Monograph, Stoney Brook.

121. "The Importance of History and Criticism for the Future of Thin Shell Concrete Structures," *Proceedings, A Symposium on Spatial Structures,* Dresden, Sept. 1990, pp. 1-13.

122. "An Integrated Vision: Engineering and the Liberal Arts," *Dana Symposium Volume,* Nov. 1990, pp. 25-36.

123. "The Sloan NLA Summer Seminars at Princeton," *The New Liberal Arts Program: A 1990 Report,* Ed. Samuel Goldberg, Alfred P. Sloan Foundation, N.Y., 1990, pp. 177-189.

124. "The New Art of Engineering," *Bridging the Gap: Rethinking the Relationship of Architect and Engineer,* Van Nostrand Reinhold, 1991, pp. 3-21.

125. "Analysis of Seismic Failures in Skew R.C. Bridges," (with R. Wakefield and A Nazmy), *Journal of the Structural Division,* American Society of Civil Engineers, Vol. 117, No. 3, March 1991, pp. 972-986.

126. "History and Aesthetics in Cable-Stayed Bridges," (with A. Nazmy), *Journal of Structural Engineering,* ASCE, Vol. 117, No. 10, Oct. 1991, pp. 3103-3134.

127. "Form and Aesthetics in Cable-Stayed Bridges," (with G. Deodatis), *Proc. of Cable-Stayed Bridges, Recent Developments and the Future,* ed., M. Ito et al., Elsevier, 1991, pp. 35-55.

128. "Maillart and Concrete Art," *Concrete Quarterly,* Oct. 1991.

129. "Maillart and the Salginatobel Bridge, Switzerland," *Structural Engineering International,* Vol. 1, No. 4, Nov. 1991, pp. 46-50.

130. "Robert Maillart's Brücken" (with Sarah L. Billington), *Werk, Bauen, and Wohnen,* No. 5, May 1992.

131. "Innovative Long-Span Structures: History, Aesthetics and Education," *Proceedings IASS-CSCE International Congress,* 1992, Toronto, Canada, pp. 2-10.

132. "Bridges and Structural Art," (with Norman J. Sollenberger), *Christian Menn Berge-Brücken-Beton,* Nov. 1992, pp. 46-66.

133. "Theory and History of Suspension Bridge Design from 1823 to 1940," (with Stephen Buonopane), *Journal of Structural Engineering,* ASCE, Vol. 119, No. 3, March 1993, pp. 954-977.

134. "Engineering in the Modern World: A Freshman Course in Engineering," *1993 Frontiers in Engineering Conference,* Washington, D.C., Nov. 1993.

135. "The Engineering of Symbols: The Statue of Liberty and Other Nineteenth-Century Towers and Monuments," *The Statue of Liberty Revisited,* Ed. Wilton S. Dillon and Neil G. Kotler, Smithsonian Inst. Press, Washington, D.C., 1993, pp. 115-133.

136. "What is Liberal Education in a Technological Era?," *America's Investment in Liberal Education,* Ed. David H. Finifter, Arthur M. Hauptman, Jossey-Bass, No. 85, Spring 1994, pp. 53-59.

137. "Ammann's First Bridge: A Study in Engineering, Politics, and Entrepreneurial Behavior," (with Jameson W. Doig), *Technology and Culture,* Vol. 35, No. 3 (July 1994): 537-570 (won the 1995 Usher Prize from the Society for the History of Technology).

138. "The New Art of Structural Engineering: An Introductory Course in Structures," *Structural Engineering International,* Vol. 4, No. 3 (Aug. 1994): 187-189.

139. "Safety Analysis of Suspension-Bridge Cables: Williamsburg Bridge," (with John Matteo and George Deodatis), *Journal of Structural Engineering,* Vol. 120, No. 11, (Nov. 1994), 3197-3211.

140. "Gabled Hyperbolic Paraboloid Roofs without Edge Beams," (with Tamara Jadik), *Journal of Structural Engineering,* Vol. 121, No. 2 (Feb. 1995), pp. 328-335.

141. "Performance of the Menai Straits Bridge Before and After Reconstruction," *Proceedings, Structural Engineering Conference ASCE,* Boston, April 1995.

142. "Architecture and Engineering at Princeton University," (with Robert Mark), *Journal of Architectural Engineering,* June 1995, pp. 93-96.

143. "Structural Expression in Tall Buildings," (with S. Billington), *Architecture of Tall Buildings,* eds. M. Ali and P.J. Armstrong 1995, pp. 187-225.

144. "Safety of Suspension Cables of the Williamsburg Bridge," (with G. Deodatis and R. Haight), *Proceedings IABSE Symposium*, San Francisco, 1995, pp. 1539-1544.

145. "Breaking Barriers of Scale: A Concept for Extremely Long Span Bridges," (with Christian Menn), *Structural Engineering International,* January 1995, pp. 48-50.

146. "Spatial Sermons - Connecting the Practical and the Spiritual," *In Trust,* 1995, pp. 16-23.

147. "Design in Education," *Journal of the International Association for Shell and Spatial Studies,* Vol. 37, No. 1, April 1996, pp. 17-20.

148. *The Innovators: The Engineering Pioneers who made America Modern,* John Wiley and Sons Inc., New York, 1996, 258 pages.

149. "Kenneth Hamilton Condit", *Luminaries: Princeton Faculty Remembered*, Ed. Patricia M. Marks, Princeton, 1996, pp. 45-50.

150. "Thin-Shell Concrete Structures", (with Julian A. Dumitrescu), *Structural Engineering Handbook*, Ed. Edwin H. Gaylord, Jr., Charles N. Gaylord, and James E. Stallmeyer, Fourth Edition, McGraw-Hill, New York, 1997, Chapter 26, 67 pages.

151. "Bridges", *Encyclopedia Britannica*, 15th Edition, (with P. Billington and H.S. Shirley-Smith) 1997, Vol. 26, pp. 328-341.

152. "Anton Tedesko, Model Research and the Introduction of Thin Shells into the United States", (with Eric M. Hines), *Proceedings* International Conference on Experimental Model Research and Testing of Thin-Walled Structures, Ed. M. Drdacky and T. Pekoz, Prague, Sept. 1997, pp. 21-30.

153. "Cable Safety Factors for Four Suspension Bridges", (with R.Q. Haight and D. Khazem) *Journal of Bridge Engineering*, Vol. 2, No. 4, November 1997, pp. 157-167.

154. *Robert Maillart: Builder, Designer, and Artist*, Cambridge University Press, New York, 1997, 331 pages.

155. "Record Spans in Japan" (with John A. Ochsendorf), *Civil Engineering*, Feb. 1998, pp. 60-63.

156. "Die Ästhetik moderner Schrägseilbrücken", (with Nicolas Janberg), *Baukultur*, (Wiesbaden, Germany), March, 1998, pp. 12-16.

157. "Performance and Repair of the Structures of Robert Maillart", (with Eric Hines), *Proceedings*, Second International Conference on Concrete Under Severe Conditions, Tromsø, Norway, June 21-24, 1998, pp. 1055-1064.

158. "Better Bridges Through Engineering Design Competitions", *Proceedings*, World Congress on Structures, San Francisco, July 1998, paper T127-2.

159. "The Education of Structural Engineers and Relationship of Architecture to Structural Art", *Proceedings*, World Congress on Structures, San Francisco, July 1998, paper P307-2.

160. "Case Study of Bridge Design Competition", (with Eric Hines), *Journal of Bridge Engineering*, ASCE, Vol. 3, No. 3 (August, 1998): 93-102.

161. "FE Analysis of Tucker High School Roof Using Nonlinear Geometry and Creep", (with Nicholas P. Edwards), *Journal of Structural Engineering*, ASCE, Vol. 124, No. 9 (September, 1998): 984-991.

161A. "Remarks by Newly Elected Members", *Bulletin, American Academy of Arts and Sciences*, Vol. 52, No. 2 (November/December, 1998), pp. 20-23.

162. "Self-Anchored Suspension Bridges", (with John A. Ochsendorf), *Journal of Bridge Engineering*, ASCE, Vol. 4, No. 3 (August 1999): 151-156.

163. "Robert Maillart: The Engineer's Synthesis of Art and Science", *Sartoniana*, Vol. 13, (2000) pp. 17-45.

164. "Transferring Technology from Europe to America: Cases in Concrete – Thin Shells and Prestressing, *Sartoniana*, Vol. 13, (2000) pp. 47-72.

165. "The Revolutionary Bridges of Robert Maillart", *Scientific American*, Vol. 283, No. 1, July 2000, pp. 72-79.

166. "Risk Assessment of Citycorp Center Original Design", (with Gayle M. Katzman and Erik VanMarcke), *Safety Risk and Reliability – Trends in Engineering*, Conference Report, Zurich, 2001, pp. 303-306.

167. "The Introduction of Prestressed Concrete into the United States: Magnel and the Walnut Lane Bridge and Beyond", (with Ryan Woodward), *Japanese Concrete Journal*, Vol. 40, 2001 (Jan. 2002), pp. 82-90).

168. "History and Aesthetics of Strait Crossings", *Proceedings 4th Conference on Strait Crossings*, Bergen, Norway, Sept. 2001

169. "Tall Concrete Structures: Ideas and Works of Fazlur Rahman Khan", (with Richard Ellis), *Japanese Concrete Journal*, Vol. 40, No. 2 (Feb. 2002), pp. 29-36.

170. "Space Structures at Princeton University", (with Gayle M. Katzman), *International Journal of Space Structures*, Vol. 17, No. 2&3, 2002, pp. 219-226.

171. "From Pathfinder to Glen Canyon: The Structural Analysis of Arched, Gravity Dams", (with Chelsea Honigmann and Moira A. Treacy), Bureau of Reclamation, *Proceedings* for a Centennial Conference, June 2002.

172. "Hershey Arena: Anton Tedesko's Pioneering Form", (with Edmond P. Saliklis), *Journal of Structural Engineering*, Vol. 129, No. 3, March 2003, pp. 278-285.

173. "Conceptual Design for the Sunniberg Bridge", (with Chelsea Honigmann), *Journal of Bridge Engineering*, Vol. 8, No. 3, May/June 2003, pp. 122-130.

174. *The Art of Structural Design: A Swiss Legacy*, Yale University Press (Hardback), Princeton University Art Museum (Paperback), 2003, 211 pages.

175. "Construction History of the Composite Framed Tube Structural System", (with Richard Ellis), *Proceedings of the First International Congress on Construction History*, Madrid, Jan. 2003, pp. 799-810.

176. "J**ö**rg Schlaich as a Structural Artist", *leicht weit – Light Structures* / J**ö**rg Schlaich Rudolf Bergermann exhibition, November, 2003, pp. 16-27.

177. "Historical Perspective on Prestressed Concrete", *PCI Journal*, Vol. 49, No. 1, January/February 2004, pp. 14-30. (Winner of the Charles Zollman Award.)

178. "Anton Tedesko and the Introduction of Thin Shell Concrete Roofs in the United States", (with Eric Hines), *Journal of Structural Engineering*, ASCE, November 2004, pp. 1639-1650.

179. "Buckling Studies of the Trojan Tower", (with E.P. Saliklis and N. Tregger), *Proceedings*, 5th International Symposium on Natural-Draught Cooling Towers, Istanbul/Turkey, May 20-22, 2004.

180. "Thin Shell Concrete Structures: The Master Builders", (with Maria M. Garlock), *Journal of the International Association for Shell and Spatial Structures,* Vol. 45, No. 31, (December 2004), pp. 147-155.

181. "Discipline and Play: The Art of Engineering", (Conversation with Bruce Cole, Chairman of the National Endowment for the Humanities), *Humanities*, March/April 2005, pp. 7-10, 50-54.

182. "Aesthetics and Ethics in Pedestrian Bridge Design" (with Shawn Woodruff), *Proceedings of the International Conference on Pedestrian Bridges*, Venice, Dec. 2005 (presented by Shawn Woodruff as the first keynote address to the conference).

183. "History and Aesthetics of the Bronx-Whitestone Bridge" (with Michael Barelli, Joshua White), *Journal of Bridge Engineering*, ASCE, March/April 2006, pp.230-240.

184. "Teaching Ethics in Engineering Education through Historical Analysis", *Journal of Science and Engineering Ethics*, Volume 12, Issue 2, 2006, pp. 205-222.

185. *Power, Speed and Form – Engineers and the Making of the Twentieth Century* (with David P. Billington, Jr.), Princeton University Press, 2006, 294 pages.

186. *Big Dams of the New Deal Era – A Confluence of Engineering and Politics* (with Donald C. Jackson), University of Oklahoma Press, 2006, 416 pages.

187. "Felix Candela, Elegance and Endurance: An Examination of the Xochimilco Shell" (with Noah Burger), *Journal of the International Association for Shell and Spatial Structures Bulletin, IASS*, Dec. 2006.

188. "Structural Responses of Nuclear Containment Shield Buildings with Unanticipated Construction Openings", (with Sinead Mac Namara, Maria M. Garlock), *Journal of Performance of Constructed Facilities*, ASCE, March/April, 2007, pp. 152-156.

189. "The Creative Response to Concrete Cracking" (with Powell Draper), *Proceedings*, Sixth International Conference on Fracture Mechanics of Concrete and Concrete Structures, June 2007 (Keynote Address).

190. "Tedesko's Philadelphia Skating Club: Refinement of an Idea" (with Edmond P. Saliklis and Anneliza W. Carmalt), *Journal of Architectural Engineering*, June 2007, Vol. 13, No. 2, pp. 72-77.

191. OP-ED, One Bridge Doesn't Fit All, *The New York Times*, August 18, 2007.

192. "Simplicity, Scale, and Surprise: Evaluating Structural Form" (with Edmond P. Saliklis and Michael Bauer), *Journal of Architectural Engineering*, March 2008, Vol. 14, No. 1, pp. 25-29.

193. "Finite-Element Analysis of Felix Candela's Chapel of Lomas de Cuernavaca" (with Powell Draper and Maria E. Moreyra Garlock), *Journal of Architectural Engineering*, June 2008, Vol. 14, No. 2, pp. 47-52.

194. "Engineering Innovation at Bonneville Dam" (with Abbie Liel), *Technology and Culture*, July 2008, Vol. 49, No. 3, pp. 727-751.

195. "*Felix Candela: Engineer, Builder, Structural Artist*" (with Maria E. Moreyra Garlock), Yale University Press, Princeton University Art Museum, 2008, 207 pages.

196. "Bayonne Bridge: The Work of Othmar Ammann, Masterbuilder" (with Ashley Thrall), *Journal of Bridge Engineering: ASCE*, November/December 2008, Vol. 13, No. 6, pp. 635-643.