OPERATION BREAKTHROUGH, PROJECT LEAP, AND ASTM E541

Three Federal Sources: NBSIR 75-642 (1975) | NBS SP 473 (1977) | NBS SP 552 (1979)

A History of the Center for Building Technology's Housing Certification Programs, 1968–1975

Executive Summary

This history is drawn from three federal publications that document different stages of the same period of building-regulatory development.

NBSIR 75-642 (1975): Project Summaries of the Center for Building Technology. The contemporaneous project record places Operation Breakthrough, the Coordinated Evaluation System (CES), and Project LEAP within the Center's Standards and Codes program while the LEAP criteria were still moving through ASTM.

NBS Special Publication 473 (1977): Research and Innovation in the Building Regulatory Process. It publishes Otis M. Mader's September 1976 NIBS keynote, 'The National Institute of Building Sciences-A Progress Report,' describing the newly created NIBS, its proposed national role in performance criteria, evaluation and prequalification, and its still-unfinished startup status.

NBS Special Publication 552 (1979): Research and Innovation in the Building Regulatory Process. Gene A. Rowland's retrospective account supplies the fuller LEAP history: the 1970 NCSBCS request, LEAP's January 1971 launch, transfer of the LEAP reports to ASTM, and ASTM E541's 1975 consensus result.

Core Finding

Operation Breakthrough included Project LEAP and the standards-development work that produced ASTM E541. The federal record shows that Operation Breakthrough was not limited to the evaluation of housing systems themselves. Within the same federal building-regulatory effort, Project LEAP addressed the qualification of the laboratories and agencies responsible for systems analysis, testing, inspection, and compliance assurance. NBS and NCSBCS then transferred the LEAP research to ASTM, where Committee E32 produced ASTM E541 by consensus in 1975.

1. The Publication

Item	Description
Report number	NBSIR 75-642
Title	Project Summaries of the Center for Building Technology, National Bureau of Standards 1974–75
Issued	January 1975
Prepared by	Center for Building Technology, Institute for Applied Technology, National Bureau of Standards
Purpose	To summarize the Center's current building-technology projects, objectives, sponsors, project leaders, status, and expected results.

The publication is organized by the Center for Building Technology's major program areas. Its organizational chart identifies four offices under Center Headquarters: Building Standards and Codes Services, Housing Technology, Federal Building Technology, and Energy Conservation, with Technical Evaluation and Application shown separately as a division. The table of contents places CES, LEAP, and the Operation Breakthrough projects within the Standards and Codes section.

2. The Center for Building Technology

The Center for Building Technology functioned as a federal building-research and technical-coordination center. Its work included building standards, codes, housing technology, testing, evaluation, regulatory assistance, and the transfer of technical findings to government and industry.

Program Function	Role Shown in NBSIR 75-642
Standards and Codes	Identification of national building-standard needs, participation in consensus standards, and delivery of completed standards to code officials.
Housing Technology	Research directed toward critical housing needs, mobile-home research planning, and technical support for federal housing programs.
Federal Building Technology	Research assistance, technical guidance, standards review, and coordination among federal agencies involved in building construction.
Energy Conservation / Technical Evaluation and Application	Application of NBS research, testing, evaluation, and technical information to building-regulatory and industry needs.

3. Operation Breakthrough in NBSIR 75-642

Operation Breakthrough was a HUD-sponsored program for the development, evaluation, demonstration, and documentation of industrialized housing systems. NBSIR 75-642 identifies several Center for Building Technology projects conducted in direct support of the program.

Operation Breakthrough Project	Documented Function
Building Concepts Used in Operation Breakthrough	Documented the building concepts and systems used in the program.
Breakthrough Housing Systems Producers Evaluation and Certification	Evaluated the technical systems and designs of the 22 housing-system producers participating in Phase I, using NBS and other laboratories and full-scale testing where required.
Compendium of Test Methods Used in Operation Breakthrough	Identified and documented laboratory test methods used in the evaluation of Operation Breakthrough systems.
Fire Compendium for Operation Breakthrough	Compiled the fire-related criteria, methods, and technical findings used in the program.
Shelley Building Smoke Test	Tested smoke detection and smoke movement under alternate egress requirements for a Breakthrough building.
Transportation and Handling Equipment — Operation Breakthrough	Documented transportation techniques and handling processes used for Operation Breakthrough housing systems.

The producer-evaluation project shows that Operation Breakthrough depended upon system analysis, laboratory testing, technical evaluation, and certification. NBS and outside laboratories were used to determine whether participating systems met the program's technical requirements.

4. The Coordinated Evaluation System

The Coordinated Evaluation System was established after the Executive Office of the President asked NBS in 1971 to develop programs that would reduce barriers created by the building-regulatory process. NCSBCS recommended the project.

CES Objective	Documented Work
State coordination	Assist states in developing coordinated and uniform evaluation, approval, and inspection systems.
Model documents	Develop rules, regulations, forms, and information flows for manufactured buildings and mobile homes.
Reduced duplication	Minimize repeated approvals and delays encountered by producers operating across jurisdictions.
Regulatory acceptance	Support use by state agencies, private evaluation and inspection agencies, and the manufactured-building industry.
Interstate reciprocity	Create consistent procedures that could support acceptance of approvals across state lines.

5. Project LEAP

NBSIR 75-642 records the Laboratory Evaluation and Accreditation Program as an NBS program established in response to NCSBCS to develop a technical basis for evaluating laboratories and agencies serving manufactured-building regulation. The LEAP work was led by James O. Bryson; Robert D. Dikkers led the companion Coordinated Evaluation System (CES). The 1975 project summary describes five research documents but identifies only four by number, and records the creation of ASTM Committee E32 to process the material, with LEAP participation also occurring in ASTM Committee E36. Maryland and Massachusetts were used for pilot work.

NBS Special Publication 552 adds the fuller chronology: NCSBCS requested the program in 1970; NBS initiated LEAP in January 1971; four LEAP research reports were transferred by NBS and NCSBCS to ASTM; and E32 produced ASTM E541 by consensus in 1975. SP 552 also states that the Massachusetts work laid groundwork for the Department of Commerce's Naval Facilities Engineering Command (NAVLAP) Program, described there as a voluntary laboratory-accreditation program.

6. From Project LEAP to ASTM E541

ASTM E541 was the consensus-standard result of the LEAP pathway. LEAP developed the criteria; NBS and NCSBCS carried the work into ASTM; ASTM Committee E32 processed the criteria for national use, reaching consensus in 1975 as ASTM E541, "Criteria for Evaluating Agencies Engaged in Systems Analysis and Compliance Assurance for Manufactured Buildings" (documented in NBS Special Publication 552, 1979).

7. A Single Building-Regulatory Framework

Layer	Project	Function
Housing system	Operation Breakthrough	Evaluate industrialized housing systems, producers, designs, and performance.
Evaluation agency	Project LEAP	Determine whether laboratories and agencies are competent to perform analysis, testing, and compliance assurance.

Layer	Project	Function
State process	Coordinated Evaluation System	Provide uniform state documents and procedures for evaluation, approval, inspection, and acceptance.
National standards	ASTM Committees E32 and E36 → ASTM E541 (1975)	Process the federal and state research through the voluntary consensus standards system.

8. Findings

Finding	Record
Operation Breakthrough was embedded in the Center for Building Technology.	Multiple HUD-sponsored Breakthrough projects appear within the Center's Standards and Codes program. (NBSIR 75-642)
System certification depended on technical evaluation infrastructure.	The producer-evaluation project used NBS and outside laboratories, engineering review, and full-scale testing. (NBSIR 75-642)
LEAP was connected to the same regulatory functions.	LEAP addressed the laboratories and agencies performing manufactured-building evaluation, testing, inspection, and compliance assurance. (NBSIR 75-642)
LEAP had a distinct formal origin.	Initiated in response to NCSBCS and sponsored by NBS, rather than identified as a HUD Operation Breakthrough subproject. (NBSIR 75-642; SP 552)
The work moved into national consensus standards.	LEAP documents were transferred into ASTM Committee E32 and E36 processes, reaching consensus in 1975 as ASTM E541. (SP 552)

Conclusion

NBSIR 75-642 is a contemporaneous federal record of the Center for Building Technology's industrialized-housing, standards, evaluation, and regulatory work. Operation Breakthrough was one of the Center's major housing programs. Project LEAP, ASTM E541, and the Coordinated Evaluation System addressed the supporting requirements of laboratory competence and state-level regulatory coordination. LEAP developed the technical basis for evaluating laboratories and agencies; ASTM E541 preserved that work as a national consensus standard; CES developed model procedures for state evaluation, approval, and inspection.

Operation Breakthrough was HUD-sponsored system and producer evaluation; LEAP was an NBS program initiated at the request of NCSBCS; ASTM E541 was the consensus-standard outcome of the LEAP work; and CES was a state-regulatory coordination project. Together, they were part of the Center for Building Technology's broader infrastructure for industrialized and manufactured construction.

Gene A. Rowland, Director
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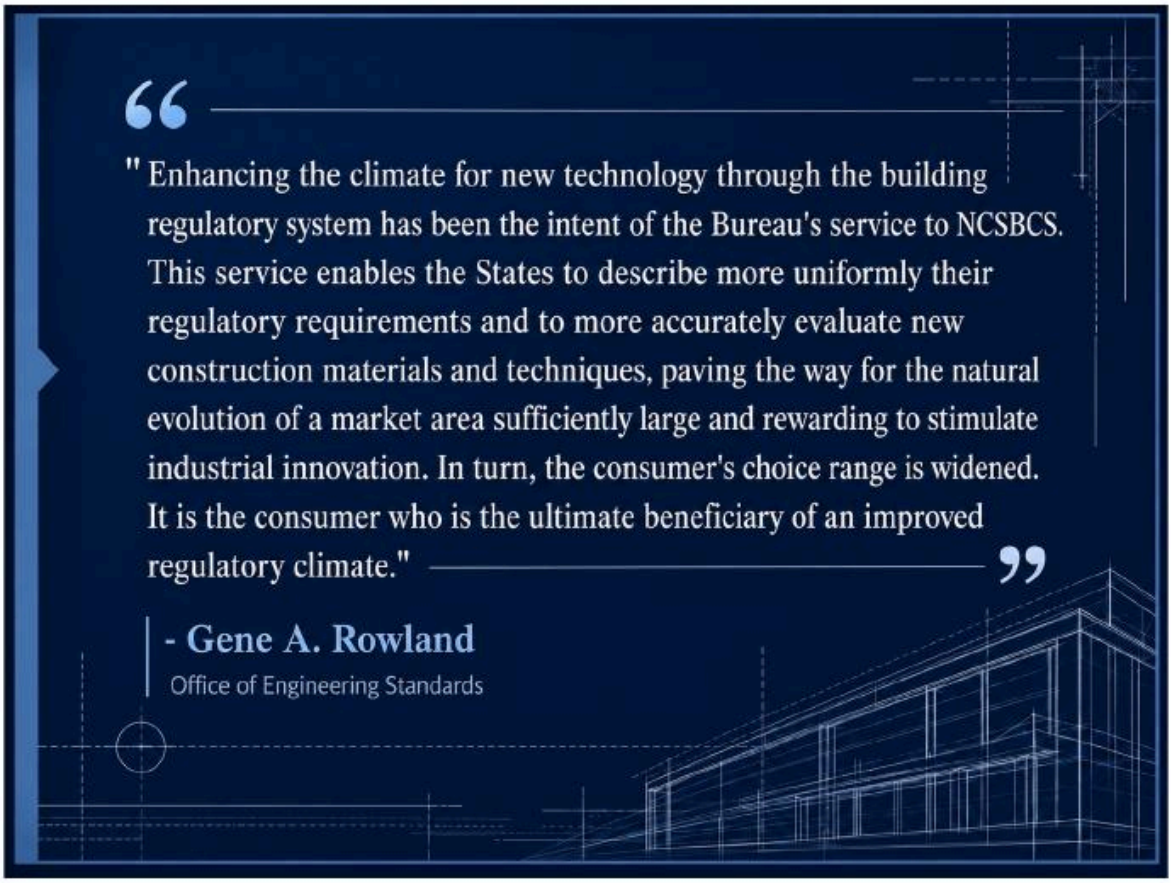
Closing: Consumer Choice Was the Public Purpose



Primary Sources

NBSIR 75-642: National Bureau of Standards, Project Summaries of the Center for Building Technology, National Bureau of Standards 1974-75 (January 1975). Relevant summaries include Standards and Codes, CES, LEAP, and the Operation Breakthrough projects.

NBS Special Publication 473: National Bureau of Standards and National Conference of States on Building Codes and Standards, Research and Innovation in the Building Regulatory Process (June 1977), proceedings of the First Annual NBS/NCSBCS Joint Conference, including Otis M. Mader's keynote, 'The National Institute of Building Sciences-A Progress Report.'

NBS Special Publication 552: National Bureau of Standards and National Conference of States on Building Codes and Standards, Research and Innovation in the Building Regulatory Process (July 1979), proceedings of the Third Annual NBS/NCSBCS Joint Conference, including Gene A. Rowland's keynote, 'A Perspective on NBS and NCSBCS Research and Assistance to the Building Regulatory Community,' which documents the LEAP-to-ASTM E541 pathway and the 1975 consensus result.

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