

JANUARY 1994

Almost two years ago, federal agency construction representatives met and voted to set a goal of designing all new projects in metric by January 1994. The reports herein--presented at the November 1993 meeting of the Construction Metrication Council--show that most agencies have met that goal, some even have exceeded it, and the remainder are not far behind.

Federal construction represents a big chunk of the nation's construction industry. Federal appropriations for construction, including grants and aid to states, now total over \$50 billion. To date, about \$20 billion in federal metric work is being readied for design award or is in the design or construction stage. By 1996, this figure will approach the \$50 billion federal total, not including billions more in state and local matching funds.

Such large expenditures will expose a significant portion of the U.S. construction industry to metric. No one will want to work with two different systems of measurement for very long, so chances are that U.S. construction will convert predominantly to metric within the next five to ten years.

Metrication will bring more than efficiency and better quality control to construction: *it will benefit every American by helping our nation compete more effectively in the global marketplace.*

Here are the federal agency reports:

- **General Services Administration.** The General Services Administration (GSA) officially will begin all new design work in metric as of January 1994; however, many metric projects already are under way. Projects in the design stage include three new U.S. courthouses in St. Louis, Missouri, Tampa, Florida, and Kansas, border stations in Vermont and Texas, a Census Bureau computer center in Maryland, and a FBI regional office building in Washington, D.C.

Currently out for bid is a Department of Veterans Affairs data center building in Philadelphia, Pennsylvania. Projects under construction include the renovation of a federal office building in Richmond, Virginia, the renovation of the GSA Appraiser's Store in Baltimore, Maryland, and a border station in New York. Completed projects include a GSA warehouse in Denver, Colorado, a border station in Arizona, and a mechanical plant addition in Washington, D.C. The total value of these and a number of smaller projects is over \$600 million.

To date, there have been no significant problems associated with the use of metric. A side benefit of conversion is that it has caused GSA to re-examine the premises behind many of its technical documents and to clarify and strengthen them.

GSA's metric construction experience indicates that the thoughtful use of rounded dimensions on construction drawings significantly helps field personnel in their work and gives them a positive attitude toward metric. Wherever possible rounded metric dimensions should be used.

- **General Services Administration, Philadelphia Region.** GSA's Philadelphia Region is building all new projects in metric. The 44 000 m², \$70 million

Department of Veterans Affairs Data Center in Philadelphia, Pennsylvania, has gone to bid and will be built as an all-metric job. The \$15 million Richmond, Virginia, project, a gut rehab of a 10-story federal office building, was awarded about 20 percent under budget (in line with current non-metric GSA projects). It is an all-metric job and is proceeding smoothly at about 20 percent completion.

The Philadelphia Region's *M2: Metric Design Guide, Third Edition*, was released in October and may be obtained by calling 215-656-5822. It contains many new manufacturer listings for metric products and specifies minimum order quantities. The region also has contacted approximately 100 contractors with annual billings of over \$50 million to inquire about their ability to bid on metric jobs. Most have responded positively, convincing the region that GSA can get a minimum of 10 competitive bids on a metric project anywhere in the country. Based on this finding and bidding experience to date, the region believes that large projects can be designed and built in metric with no cost premium if a common sense approach to metric is taken as advocated in its *Guide*.

The region has informal contacts with a large number of non-federally funded organizations that are converting to metric such as the Port Authority of New York and New Jersey, various state and local governments, and several corporations. It also has news about a number of non-federal metric efforts that are in the planning or design stage now.

- **GSA National Capitol Region.** GSA's National Capitol Region is designing all major new Washington area projects in metric. The office of Skidmore, Owings, and Merrill recently completed metric design documents that are about to be released for bid for a \$57 million FBI Regional Office building. Metric projects in the planning and design stages include a Census Bureau computer center (\$28 million), the Southeast Federal Center complex (a \$148 million GSA office building, a \$95 million Corps of Engineers building, and \$88 million in infrastructure work), the renovation of the Department of Interior building (\$106 million), and a complex for the Food and Drug Administration (between \$200 and 850 million). In addition, all new mechanical condition surveys and prospectus development studies are being prepared in metric.

- **Army Corps of Engineers.** Last year, the Corps of Engineers selected 14 metric pilot projects with a total value of \$124 million. Two are in construction, one is pending construction award, five are in the concept design or definition stage, and six have been delayed for budgetary reasons. Overseas metric work totaled about \$600 million for 1993 and is expected to reach \$1 billion in 1994. All new Corps facilities will be designed in metric after January 1994 to the extent economically and technically feasible. One Corps division and two districts are considering going "all metric" at this time.

A metric edition of the Corps' *Guide Specifications* was completed in October and all new and revised publications, criteria, manuals, and standard designs are being published in metric. The Corps is developing two metric training courses, each consisting of video tapes and training books for use at the field level. The first course focuses on providing a basic understanding of metric and the second, on the specifics of metric design and construction.

Corps representatives recently met with a number of large contractors from the Associated General Contractors of America who said that if the Corps is converting to metric, they would prefer that it do so immediately without a

transition period where both inch-pound and metric projects would co-exist and cause confusion.

- **Naval Facilities Engineering Command.** The goal of the Naval Facilities Engineering Command is to implement metric fully as a way of doing business. A metric version of its *Guide Specifications* is nearing completion. Beginning in 1994, metric will be added to all planning and design criteria updates. Computer systems and databases also are being converted to metric.

The Navy builds all its overseas projects in metric and currently is preparing a domestic construction metrication plan. Meanwhile, one field division is moving ahead with several metric pilot projects.

- **Air Force.** The Air Force has 12 metric military construction projects in progress that range in cost from \$1.2 to \$14.2 million. Eleven are in design and one is in construction. It also has a number of metric operations and maintenance projects, several of which are complete. There have been no significant problems associated with the use of metric to date.

- **Office of the Secretary of Defense.** The Corps of Engineers is using metric in the design of the first phase of the multiyear, \$1.2-billion Pentagon renovation program. All other Pentagon construction and repair projects are being designed and built in metric. Several have been completed to date, all very successfully.

- **Department of State.** The Department of State's overseas construction work has always been metric. In July 1992, its Foreign Buildings Operations established a metric-only policy for construction documents. Good progress toward that goal was reported at a November 1993 meeting to review metric implementation problems and achievements.

- **Department of Agriculture.** Department of Agriculture policy states that beginning in fiscal year 1994, new projects shall be designed in metric. Drawings and specifications are to be metric-only and cost estimates are to be completed in both inch-pounds and metric. Metric products will be used whenever practical and metric modules will be used for determining bay sizing and floor-to-floor heights.

- **U.S. Forest Service.** The Minerals and Geology Group is converting to metric in fiscal year 1994 and will be metric-only in fiscal year 1995. The Engineering Group plans to be metric-only by fiscal year 1997. All engineering publications have included metric units for several years. A metrication task group monitors and encourages metric conversion service-wide.

- **Federal Highway Administration (FHWA).** All federal and federally-aided highway construction--as much as \$25 billion annually--will be built in metric after September 30, 1996. Since most highway work is performed by the states, state highway agencies are preparing for the transition now. Currently, the majority of states are surveying in metric, many are designing in metric, and several have metric projects under construction.

The highway construction industry appears ready to begin building in metric but there are still some concerns in the utility and railroad industries, which at times become involved in road widenings and other right-of-way work.

Interim FHWA metric deadlines are 1994 for the conversion of manuals, documents, and publications and 1995 for the conversion of data collection and

reporting processes. Only metric units are being used in internal correspondence and research reports, and to the extent possible in external correspondence.

In May 1993, the American Association of State Highway Transportation Officials (AASHTO) published the *Guide to Metric Conversion*, a document designed to help the states convert their highway programs to metric. AASHTO is converting the balance of its standards and software programs to metric now and is working with the Transportation Research Board and Texas A&M to establish a metric information clearinghouse.

No decision has been made yet about highway signage. This is not a construction issue and is being treated as a separate concern.

The National Highway Institute (NHI) has developed a one-day metric training course, *Metric (SI) Training for Highway Agencies*, for use by state and local highway departments. The morning session focuses on units and rules of application and the afternoon session is devoted to solving typical metric design problems.

The North Carolina Department of Transportation is hosting the AASHTO-FHWA National Metric Conference in Raleigh, North Carolina, from January 31 through February 3.

- **National Aeronautics and Space Administration.** In 1993, NASA designed 11 projects, ranging in value from \$1 to \$4 million, in metric. Three have been awarded, all under budget, and the other eight are out for bid. No significant problems have been encountered to date. Based on the positive experience of these projects, 31 fiscal year 1995 projects with an aggregate value of \$45 million are being readied for or are now in design. If they go well, NASA will design its fiscal year 1996 and later projects in metric.

Working with the Army and Navy, NASA has nearly completed the metrication of its SPECSINTACT construction documents system.

- **Department of Labor.** In 1993, the Department of Labor's Employment and Training Administration formed a steering group to monitor metrication progress and completed a metric facility survey and utilization study. Two metric pilot projects are being considered for fiscal year 1994. If they are successful, all subsequent projects will be built in metric.

- **Department of Energy (DOE).** DOE is conducting a \$400-million study at Yucca Mountain, Nevada, to evaluate the site's potential as a high level waste repository. The study is being performed in metric and involves boring a tunnel 18 km long and 7.3 m in diameter. Other DOE metric projects include a monitored retrievable storage facility for spent commercial reactor fuel (\$1 billion) and a multipurpose storage canister system (estimated at \$5 billion).

DOE's power marketing administrations are identifying projects for metrication and should be able to meet the January 1994 goal of designing all new work in metric. Currently, the Bonneville Power Administration is constructing two \$22-million substations in metric. The decision to use metric was made after the design-build contracts for the two projects were awarded; nevertheless, there has been no cost penalty associated with metric. Bonneville also is designing a control center in metric and the contract will be awarded in February.

Most of DOE's national laboratories are implementing metric construction plans. The \$25-million, 3800-m² laboratory for the Human Genome Project at Lawrence Livermore Laboratory will be built in metric.

DOE's metric executive recently issued a memorandum to all programs and operations offices reminding them that projects initiated after January 1, 1994, are to be designed in metric.

- **National Institute of Standards and Technology (NIST).** Over \$500 million in new and renovated laboratory facilities at NIST's Gaithersburg, Maryland, and Boulder, Colorado, campuses are being designed in metric in a phased, multiyear program. Meanwhile, a \$1-million hazardous material handling facility is being built in metric as a pilot project. NIST's internal design and construction group expects to be fully converted to metric in 1995.

- **Central Intelligence Agency (CIA).** The CIA began using metric in its construction activities in 1992, first as the secondary unit and, beginning in 1993, as the primary unit. Inch-pounds units will be dropped in the near future and all CIA design and construction documents will specify products and materials only in metric. Design contractors had no difficulty using metric and construction contractors adjusted to it once metric became the primary unit.

- **Department of the Interior.** The Bureau of Reclamation will begin collecting data and designing all projects in metric in January 1994. In 1993, it completed 26 metric specifications. A \$300-million desalting plant for the Colorado River at the United States-Mexico border, under construction in phases since 1978, has been built primarily in metric.

The Bureau of Land Management will begin designing all new projects in metric in January 1994. In the past year, it designed three metric projects: the La Ventana Arch Project in New Mexico, the Las Vegas Federal Interagency Resource Complex in Nevada, and the San Pedro National Conservation Area Visitor Center in Arizona.

The Fish and Wildlife Service continues to use dual units in its drawings and specifications because so many of its projects are small and located in remote areas.

The National Park Service is developing a metric implementation plan for its Denver Service Center that includes the procurement of metric design aids, the conversion of existing guidelines and guide specifications, and a program for metric training. At least four metric projects are being considered for fiscal year 1994 although funding is uncertain: Independence National Historical Park (a 10-year, \$110 million project), the Depew and Raymondsill projects in the Delaware Water Gap National Recreation Area (about \$750,000), the McCreery project at New River Gorge National River, and a project for the Ozark National Scenic Riverway.

- **Bureau of Indian Affairs (BIA).** BIA is building two road construction projects in metric in the Phoenix area. Its metric transition planning is complete and all future projects will be built in metric.

- **Indian Health Service (IHS).** IHS envisions full use of the metric system in early 1994. Metric projects now in design include the Quarters Units at Belcourt, North Dakota; a youth regional treatment center at

Portland-Spokane, Washington; and a health center at White Earth, Minnesota. Future metric projects include, among others, a hospital at Fort Defiance, Arizona; a health center at Fort Belknap, Montana; and a youth regional treatment center at Aberdeen-Chief Gall, South Dakota.

The IHS *Technical Handbook for Health Facilities* and *Health Facilities Planning Manuals* are being converted to metric. In addition, IHS is preparing seminars and training programs for use in increasing employee awareness and understanding of the metric system.

- **The Smithsonian Institution.** The Smithsonian's annual construction budget is approximately \$100 million for projects nationwide. Virtually all design work beginning in fiscal year 1994 will be in metric. A number of small metric projects are proceeding smoothly through design now and a \$162-million master plan is being prepared in metric.

The Suitland Cultural Resources Center (13 000 m²) for the planned Museum of the American Indian (24 060 m²) also is under design. Its structural grid is 9 m by 9 m to accommodate display loading requirements. The museum itself, the last major structure to be built on the Mall in Washington, D.C., also will be built in metric and is awaiting design award.

A plan is being developed to field-verify the dimensions of the Smithsonian's existing buildings as part of a process to update building CADD files. The revised files will be in metric. Metric also is being implemented in the Smithsonian's public programs and all new exhibit signage.

- **Naval Sea Systems Command (NAVSEA).** The LX amphibious assault ship is the first major Navy ship acquisition program to be built in metric. Fifty smaller NAVSEA programs reported using metric last year, including those involving new boats and service craft. Such programs use many of the same construction products as buildings, particularly structural steel.

The Naval Air Systems Command, the Space and Naval Warfare Systems Command, and the Marine Corps have a total of 37 other metric programs including those for aircraft, jet engines, electronic systems, battle tanks, assault vehicles, and watercraft.

- **Department of Veterans Affairs (VA).** The VA is implementing metric on selected medical and nonmedical facilities around the country. The \$170-million, 79 000 m²-medical center planned for Brevard County, Florida, is scheduled to be designed in metric. It is VA's goal to implement metric aggressively while not incurring significant additional construction costs.

- **Architect of the Capitol (AOC).** AOC maintains and operates the Capitol Complex consisting of the U.S. Capitol building, the House office buildings, the Senate office buildings, the Library of Congress buildings, and the Supreme Court building. Metric has been used for all in-house design and renovation projects for over a year. Although no new capitol complex buildings are planned at this time, all future work will be in metric.

- **National Institutes of Health (NIH).** NIH's Division of Engineering Services has provided metric awareness training to its 650 employees as well as to NIH procurement personnel and small construction contractors. As a result, attitudes towards metric are very positive. Beginning in January 1994, all new NIH design work will be in metric.

- **Coast Guard.** The Coast Guard has three metric pilot projects under way with a total value of \$13.4 million, about 10 percent of its 1993 construction budget. It is converting its architectural programs and space standards to metric.

- **Tennessee Valley Authority (TVA).** TVA is promoting metric conversion through employee training, correspondence, the purchase of goods and services, and selected engineering and construction projects. Current metric pilot projects include buildings at four power plant sites and a new transmission and substation line.

This year, TVA mailed a Supplier of Preference Questionnaire to 4000 supply firms and manufacturers asking about their ability to supply metric products. Response has been excellent.

- **Public Health Service (PHS).** Since October 1993, all new federally funded PHS projects have been designed in metric. Beginning in January 1995, all new federally assisted construction projects will be built in metric unless design work was under way prior to January 1994.

As new planning and construction documents are created or updated, PHS is converting them exclusively to metric.

- **Department of Housing and Urban Development (HUD).** HUD published a notice in the September 8, 1993, *Federal Register* outlining its metrication policy and activities. The agency is creating a Metric Policy Committee, chaired by the Assistant Secretary of Policy Development and Research, a Metric Coordinating Committee, and, as necessary, interdepartmental metric work groups. All program offices are reviewing their operations to determine appropriate changes and drawing up plans to implement them.

- **Bureau of Prisons.** The Bureau of Prisons is distributing metric information to its six regions. Although the entire agency is experiencing the strains of rapid growth, metrication is beginning to take hold. Currently, the Bureau has \$2 billion in construction planned or under way and all new projects starting after January 1994 will be designed in metric.

- **Department of the Treasury.** Treasury plans to require all new projects to be designed in metric after January 1994. Existing plans for the Main Treasury Building and the Annex Building are being transferred to CADD and will be converted to metric by the end of fiscal year 1994.

Metric in Construction is the newsletter of the Construction Metrication Council of the National Institute of Building Sciences, Washington, D.C. Reproduction and distribution of its contents is encouraged provided the Council receives attribution. Copies of previous newsletters are available upon request.

**The Philadelphia Region of the General Services Administration is seeking information about current metric projects in the design or construction stages. Please direct responses to Otto Schick:
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