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*C. D. Duffy**

A Standard Transportation Geographic Code

Standard codes and conventions pervade the transportation field. They appear as old as organized transportation itself. In the narrow straits of the Bosphorus, or of Messina, eastbound and westbound galley masters of Roman, and prior days, must have had a standard code for passing on the right or left as conventional as those for today's waterway, highway, and railroad vehicles. Standards are set for the good of all parties when the hodgepodge of individual behavior patterns finally becomes unbearable. A standard railroad gauge developed in the 1870's from some twenty-three prior individual gauges; in the same decade standard time for the nation evolved from even more local variations; and most recently in 1962 and 1963 a Standard Transportation Commodity Code for the first time in the nation's history.

The latter exists, and is being actively used today, in very large part because of the logical conceptual and developmental abilities, the fortitude, the informal rapport, and the salesmanship of members of the Transportation Research Forum. Formal and informal ad hoc committees and subcommittees of the Transportation Association of America, the Association of American Railroads, the National Motor Freight Association, Inc., the Federal Statistical Users Conference, and the National Industrial Traffic League, with representatives of other modes, individual companies, and governmental agencies also contributed mightily. A rapidly emerging Standard Transportation Geographic Code for place names (points or areas at which freight shipments originate or are destined) has a similar genesis.

These two codes are natural partners in transportation paperwork streamlining and data processing usage. Codes for "what is it?" and "where did it come from, and where is it going?" are inseparably entwined in many transportation problems.

The Standard Transportation Geographic Code—henceforth called the Geographic Code—like the Commodity Code will be more quickly and uniformly accepted in my judgment if both become an integral and necessary part of important tariff publications with daily usages. The Commodity Code was designed to become an integral part of the rail classification, the most commonly used motor carrier classification, and others. A reason why 1964 is the first apt year for construction of a Standard Transportation Geographic Code is that one of the larger modes—the motor carrier industry with its many hundreds of millions of shipments annually—must revise its nationwide scope tariff, and thereby adopt a new logical geographical place name code capable

**Westinghouse Electric Corp.*

of being handled economically by data processing machines. Having heard the plea for standard transportation codes from shippers, and likely from the interested governmental agencies, the National Motor Freight Transportation Association, Inc., which is charged with the duty of developing this new geographic code some months ago generously decided to accept informally suggested incorporations and modifications of their swiftly evolving code by other parties interested in the national transportation scene. Each day progress must be made on the development of this motor carrier code; and hence it must be realized that each day the ability of the NMFTA to accept comments of other parties decreases. The cooperation of all is required immediately if this geographical code of the motor carriers is to become the first Standard Transportation Commodity Code.

The Geographic and Commodity Codes will have many similar characteristics. The Geographic Code will be numeric for ease of handling on integrated data processing machines as is the Commodity Code. The Geographic Code likewise must preserve complete digital uniformity among the modes to the lowest possible digital level—perhaps only four or five initially in the Geographic Code—while concurrently using the minimum practical number of digits that will achieve its purposes. The Geographic Code must be readily expandable, without upsetting the basic language structure. Each successive digit from the first to the last must with significant logical preciseness increasingly define the involved areas.

What other characteristics should the Geographic Code have? For the shipper to have any interest whatsoever there are several. Above all else, the Code should apply uniformly to the greatest practical digital depth to all possible modes moving large numbers of shipments—express, air, truck, rail, and possibly water. Parcel Post—since the adoption and heavy promotion of the Zip Code concept solely for the unique purposes of improving the Post Office Department's handling of the mails—appears completely beyond the pale.

The Code should permit wired, card, and/or tape data communication between shippers and carriers for billing and accounting purposes. New York's massive electric utility company, the Consolidated Edison Company, is now plugging into the Westinghouse high-speed Tele-Computer order entry and shipment system to place its purchase orders for 6000 items. Con Ed regularly buys with nearly the same electronic speed as the Westinghouse sales offices use—bills of lading for their purchases being printed five or a thousand miles away in minutes.* Following this philosophy why should not Westinghouse be plugged into the tele-computer center of a Helm's Express, REA, or a Pennsylvania Railroad.

Another necessary characteristic to shippers of the Geographic Code should be sufficient uniformity of digital depth to permit efficient use by shippers on their own data transmitting and processing equipment to speed compilation of management data on an economical basis for traffic, transportation, accounting, and physical distribution purposes.

Many government agencies have similar requirements, I believe; and likely some I have not yet devined.

* For a fuller description, see Appendix A.

For carriers and their associations' daily usage, digital uniformity even deeper within the individual modes than is possible among the modes is an absolute operational necessity.

For economists, carrier market research studies, and effective meaningful use of the interested government statistical agencies, the code must be compatible with other federal—and privately—collected economic data. Notable among this latter data is that on manufacturing and/or transportation collected by the Bureau of the Census and the regulatory commissions. The Standard Transportation Commodity Code accomplished this objective by deliberate substantially uniform use of the Bureau of Census' Standard Industrial Code digits as its initial digits. Similar relative uniformity for the Standard Transportation Geographic Code is unlikely. The objective can be achieved in all likelihood by a careful structuring of this new code, so that "electronic" bridging to the existing federal formats can be achieved with relative ease.

Why should there be a Standard Transportation Geographic Code? There are many reasons in addition to those mentioned before. Basically, the freight transportation industry is at least as burdened with as great a ratio of "paperwork volume" per value of transactions as any equally large economic segment of the business community that is not already computerized. Also the movement of freight is delayed by archaic, inefficient paperwork systems to an extent amazing to any knowledgeable student of transit times. Freight billing systems and the simpler tariffs are crying for computerization. Few carriers or shippers can afford to develop their own geographical languages. Individual carrier-developed languages would not be effective on the large volume of interchanged shipments. Even shippers as large as Westinghouse Electric cannot, I assure you, afford to develop their transportation codes. Modal standardization is economically feasible, but more expensive than nationwide standardization—the only solution of significance to shippers, economists, and statistical gathering groups. In addition to these reasons, a more important point on development of a widely used data processing code is that, once the code is developed, duplicate copies on punched cards or tape can be made available to all parties for the fraction of the cost of the original development of the code—a cost perhaps in the magnitude of 3 to 7%.

A Standard Transportation Geographic Code will be more difficult to develop than the Standard Transportation Commodity Code, and initially likely cannot be developed to as deep a digital uniformity. Construction of the Commodity Code—difficult as it was, and the current "debugging" is proving to be—benefited from coordinating into a new standard numeric language substantially only the following codes: the Standard Industrial Code, the rail freight classification, the most commonly used motor classification, certain unique commodity descriptions in a limited number of commodity tariffs, and the former 62 item codification (Red Book) by which the modes furnished commodity statistics to the Interstate Commerce Commission. The SIC was incorporated by making its digits the primary digits of the new code. Historical compatibility had existed among the older codes, a fact well known in detail to most members of the Forum.

No such historical compatibility of codes exists in the economic geography of American or Canadian transportation, and extremely little uniformity of approach. In a brilliant preliminary analysis of the problem area written earlier this year, Mr. Herbert O. Whitten of the Chesapeake and Ohio Railway Company, a former president of the Forum, and the father of both the Standard Transportation Commodity Code and of the title of this paper—identified many, many diverse geographical approaches in common use in various sections of the railroad industry alone today, most having no compatibility with the others.

The REA block, a simple logical device for rate making, has no codification parallel among the rails or trucks. The motor carrier industry has many non-coinciding geographical approaches. There is a significant lack of geographical uniformity among the various federal agencies and departments. All in all, the multitude of currently used geographical subdivisions of America for transportation purposes—administrative, regulatory, rate making, and data collection—bear little resemblance to each other, with the fortunate exception of rough coincidence near the county-line level of major rail and motor carrier jurisdictions. The latter was partially modeled on the former only 30 years ago, so an appreciable resemblance of coincidence of common boundaries still exists. America has a hodgepodge of transportation geographical divisions, because the former needs for administration, regulation, rate making, and data collection were divisive. Today's data processing equipment, the systems and sub-systems approach to management, and more complex needs for the development of meaningful transport data—all require that standardized boundaries be drawn and a standard code developed.

There appear to be only two broad types of fundamental approaches to the development of a numeric Standard Transportation Commodity Code that could bring about any worthwhile degree of uniformity. The first is represented by a regional approach in the initial digit and then a political subdivision approach in the next few succeeding digits: a logical region, state, county and —hopefully—point within the county approach. The second is development of a geographic grid spread across the entire nation and Canada as are the lines of latitude and longitude wherein each successive digit defines an increasingly small, nearly square box as does the familiar REA block system.

The former is the approach being followed by the National Motor Freight Traffic Association, Inc., today in coordination with the many other groups and individuals mentioned previously. Yet, this is being done while all involved recognize the many long-range mathematically logical advantages of the latter for streamlining calculation and computerization purposes.

The grid approach to these thoughtful students of the problem seems to suffer two all-important defects in the short run. First, it represents too revolutionary an approach to gain the absolutely necessary acceptance by large segments representing a maximum practical portion of the transportation community—an acceptance without which any theoretically desirable system is doomed to failure. Second, substantially all currently available types of related transportation, commercial, manufacturing, population, construction, agricultural, and extractive industry data—and data collection systems—would be completely foreign initially to the grid system. Theoretically a grid system by the use of one set of ever expandable numbers of digits for latitudinal lines and a similar set for longitudinal lines is ideal, but impractical. Yet long run, as the "regional-state-county-place within county" code becomes more finite, substantially all advantages of a grid code may become available to all for relatively little cost. The Bureau of Census appears to have available already "bridges" in data processing languages between the region-political unit Transportation Code being developed and a geographical matrix code that can with eight digits pinpoint roughly each square mile in the nation in an arithmetical array that permits rapid calculation of shippers' physical distribution problems, for instance by the Pythagorean theorem.

The region-political subdivision Standard Transportation Geographic Code now under development and consideration has been discussed thoroughly only through the four digit county level. These four digits currently appear adequate generally to define with preciseness–regions of the United States (and Canada), each state, and each county (province). This may be as deep as geographic uniformity can be obtained at this point in time in a Standard Code, although the coming few months may find digital uniformity possible in greater depth. All important, however, is the development of an initial Standard Code to whatever depth is possible now, while giving due regard to the long-range desire of uniformity at a greater depth.

Not all parts of this coding as described below appear to be completely rigid as yet, but for ease of description they will be considered firm. Regarding the first digit–which defines a region–an eight-part regional division of the United States for the 50 states, reserving "O" for Canada and "9" for Mexico and others, has developed. Appendix B shows this arrangement. Thereby two digits define both regions and states. Per Appendix C New York is in Region 1 (first digit) and is State 7 (second digit). Notice the North to South and the East to West ranking of regions across the nation east of the Rockies, which appears to be the best arrangement reflecting existing rate territories, and availability of related economic data within a two digit code. Each region is given an alphabetical name which is of a unique use for this particular code but descriptive of the region. The District of Columbia is given a distinct number; voids in the second digit are left for future expansion in U.S. possessions or in an Alaska.

At the recent meeting of the ad hoc task force on this subject–a group that has been meeting actively this summer–a decision was made to use more than one of the available 100 "two digit" region-state codes within a state only under the following circumstances: (1) where there are 100, or more, counties in a state, or changes in the foreseeable future could result in over 100 (Iowa has 99 counties now), or (2) where particularly important transportation boundaries traverse the middle of states–notably the division between Official and Southern Territories through Virginia, Kentucky, etc., well reflected in both rail and motor rate territories. There are eight states with over 100 counties, but only one state (Texas) with over 200 counties that thereby requires three separate initial two digit codes.

For the two digit county codes within the states considerable effort has again been devoted to maximizing the significance of the specific assigned digits to each. Using New York again (Appendix C) as an illustration, the five counties with a third digit of "1" are in the northeast corner of the state in what might be called a Watertown (Jefferson and nearby counties) Group. The third digit progresses arithmetically to the south and west–the Albany Group being based on "3", Buffalo on "7", and New York City on "9". Further, at the county line level a conscious effort is being made to endeavor to separate generally historically different rate territories. At the fourth county digit level an effort is being made to progress numerically in logical fashion from the northeastern county to the southwestern corner is observable—Orleans County "71" is the most northeasterly county in the Buffalo Group; Chautauqua, coded "78" is the most southwesterly in the same group.

No standard geographic code dealing with a complex of widely diverse previous codes can be expected to be perfect, uniform to an infinite degree, and completely acceptable to all interested parties initially. Yet even this "region-state-county group-county" four digit logical code seems to have even greater promise than is at first apparent.

The physical distribution problems, including location of warehouses and plants, of shippers can readily be solved by the ready development of a finite number of county seat to county seat rate relationships. Most industrial marketing data is already on a regional basis developed by counties. On the carrier side, even as widely diverse a subject as local taxation has both state and county roots. And a uniform code only to this level does have important tariff streamlining possibilities, advancing appreciably the day of practical simple tariff propagation and rate determination by data processing equipment.

Uniformity of coding among the modes and other interested parties below the county level appears today as the most difficult accomplishment. For the moment, each mode may have to have its own fifth, sixth, and seven digits there; but, if the type of common interest in the development of a Standard Transportation Geographical Code that has developed in the past years continues as it appears to be, ultimately these deeper digits can be made either compatible or hopefully uniform.

When the Paperwork Streamlining Subcommittee of the National Industrial Traffic League was formed only a scant half-dozen years ago, few were dreaming of compatibility of transportation geographical codes. Today it is possible to report on active development of an even more desirable and complex Standard Transportation Geographic Code. The role of the NITL Subcommittee—and of myself—has only been that of a catalyst and observer. Hence, those carrier and agency personnel who are actively developing this code—and to whom our great appreciation is due—can more actively expound upon its content and specific characteristics, but I believe the above gives a general picture of the need for a Standard Transportation Geographic Code, some important uses thereof, and recent developments thereon. This code and the Standard Transportation Commodity Code appear to be the basic two codes to streamlining transportation paperwork, speeding the movement of freight, and computerization of freight rates. Other standard expandable numeric codes for carrier names, customer names, etc., may ultimately be required, but development of a Standard Transportation Geographic Code will be most difficult of all. And that development is well on its way.

APPENDIX A

From "Purchasing Week"

INSTANT PURCHASING: CON ED PLUGS INTO WESTINGHOUSE EDP ORDERING SETUP

New York—One of the longest steps yet toward the goal of instant purchasing will be taken this August when Con Edison becomes the first power utility in the country to put its buying on a highspeed telecomputer basis with a major supplier. The utility will hook into the Westinghouse Computer Center in Pittsburgh, with its teletype net of 300 sales offices, plants, and warehouses, throughout the U.S. and Canada, in a setup that will permit a Con Ed order to be processed and delivery started seconds after receipt.

The move will be the latest in a series of developments emphasizing combined use of modern communications and computer equipment in purchasing that got well underway with Data-Phone hookups only about a year ago. Such installations have since spread rapidly from coast to coast, with some recently expanded to include a "triple play" network of manufacturer-supplier-buyer (see P/W Oct. 7, '63, p. 1, and Jun. 15, '64, p. 1.)

While the Westinghouse telecomputer setup is by far the most advanced in existence, efforts are being made along similar lines by other companies, with many more certain to jump on the bandwagon in coming months.

"With this system," explained John Sweetman, Con Ed P. A. and the man with over-all responsibility for the telecomputer operation, "we will be able to transmit purchase orders direct from headquarters here in New York to any warehouse or manufacturing facility of Westinghouse in the United States in a matter of seconds. This will do two basic things for us:

"It will cut down on paperwork by eliminating preparation of a purchase order and cut lead times drastically, in some cases from two weeks to one day."

A requisition will come to Con Ed headquarters in downtown New York City from one of 16 warehouses located within its service area. A buyer at headquarters will scrutinize the requisition against over-all supply. If he approves it, and it involves any of 6,000 items Con Ed regularly buys from Westinghouse (out of an over-all stock of over 100,000 different items), a clerk in the Stock Control Bureau will transmit a digital message to the Westinghouse Computer Center over a leased wire.

The digit will include Con Ed's stock control number for the item, a quantity indication, and the Westinghouse stock number for the item. Transmission from Con Ed, at least at first, will be made by means of a manual keypunch 28 ASR Message Preparation and Transmission Machine leased from ATT. It will have a tape readout for feeding into the accounting department's tape-to-card machines.

Computers Scan Inventory—The transmission will go directly into one of two Univac 490 real-time computers at the Westinghouse center in Pittsburgh. The computer will scan—in a matter of milliseconds—the entire Westinghouse inventory and automatically shunt the Con Ed transmission to the appropriate supply point where the materials required are available for immediate shipment. A six-part form will be immediately printed out at the supply point, **including a bill of lading** (Ed. note: emphasis ours), an original shipment order, a packing list, and a carton label.

Printouts will be prepared simultaneously at the Computer Center itself and at the New York sales office of Westinghouse. Since most of the 6,000 items will be those ordered repetitively, and therefore on a one-year blanket contract, most orders will be "requests for release," with prices firm. In those cases where price has not been predetermined, Con Ed will enter it on the digital transmission as negotiated, and it will be checked for errors by the Westinghouse New York office as the printouts are made.

The system will also enable Con Ed to make inquiries as to the availability, manufacturing progress, or expected delivery time of equipment about to be ordered or already on order with Westinghouse. Information will be flashed back to Con Ed by computer and received on an ATT 28 RO Message Receiver.

"With this," said Sweetman, "we will be able to cut inventory in our own warehouses. If we know exactly what the vendor is carrying, we can carry less ourselves. Since it costs 20% of the value of an item a year to carry it in stock, this could result in significant savings."

(Ed. note: Westinghouse and Con Ed recognize the awkward lack of a common commodity language between them, and between their utility and electrical manufacturing industries generally).

APPENDIX B

MOTOR SERVICE POINT CODE

REGION and STATE GROUPING

PHASE A
(August 11th revision)

REGION 1: ATLANTIC NORTH
11 Maine
12 New Hampshire
13 Vermont
14 Massachusetts
15 Rhode Island
16 Connecticut
17 New York
18 New Jersey
19 Pennsylvania

REGION 2: ATLANTIC CENTRAL
21 Delaware
22 Maryland
23 District of Columbia

24)
25) Virginia

26 West Virginia

27)
28) Kentucky

REGION 3: ATLANTIC SOUTH
30)
31) North Carolina

32 Tennessee
33 South Carolina

34)
35) Georgia

36 Alabama
37 Mississippi
38 Florida

39 Puerto Rico, Virgin Is. and Canal Zone

REGION 4: GREAT LAKES
41)
42) Michigan

43 Wisconsin
44 Ohio

45)
46) Indiana

47)
48) Illinois

REGION 5: MISSOURI RIVER (MIDDLEWEST)
50 Minnesota
51 North Dakota
52 South Dakota

53)
54) Iowa

55 Nebraska

56)
57) Missouri

58)
59) Kansas

REGION 6: RED RIVER (SOUTHWEST)
61 Arkansas
62 Oklahoma

63)
64) Louisiana

65)
66) Texas
67)

REGION 7: ROCKY MOUNTAIN
71 Montana
72 Wyoming
73 Idaho
74 Colorado
75 Utah
76 Nevada
77 New Mexico
78 Arizona

REGION 8: PACIFIC
81 Washington
82 Oregon
83 California

84)
85) Open

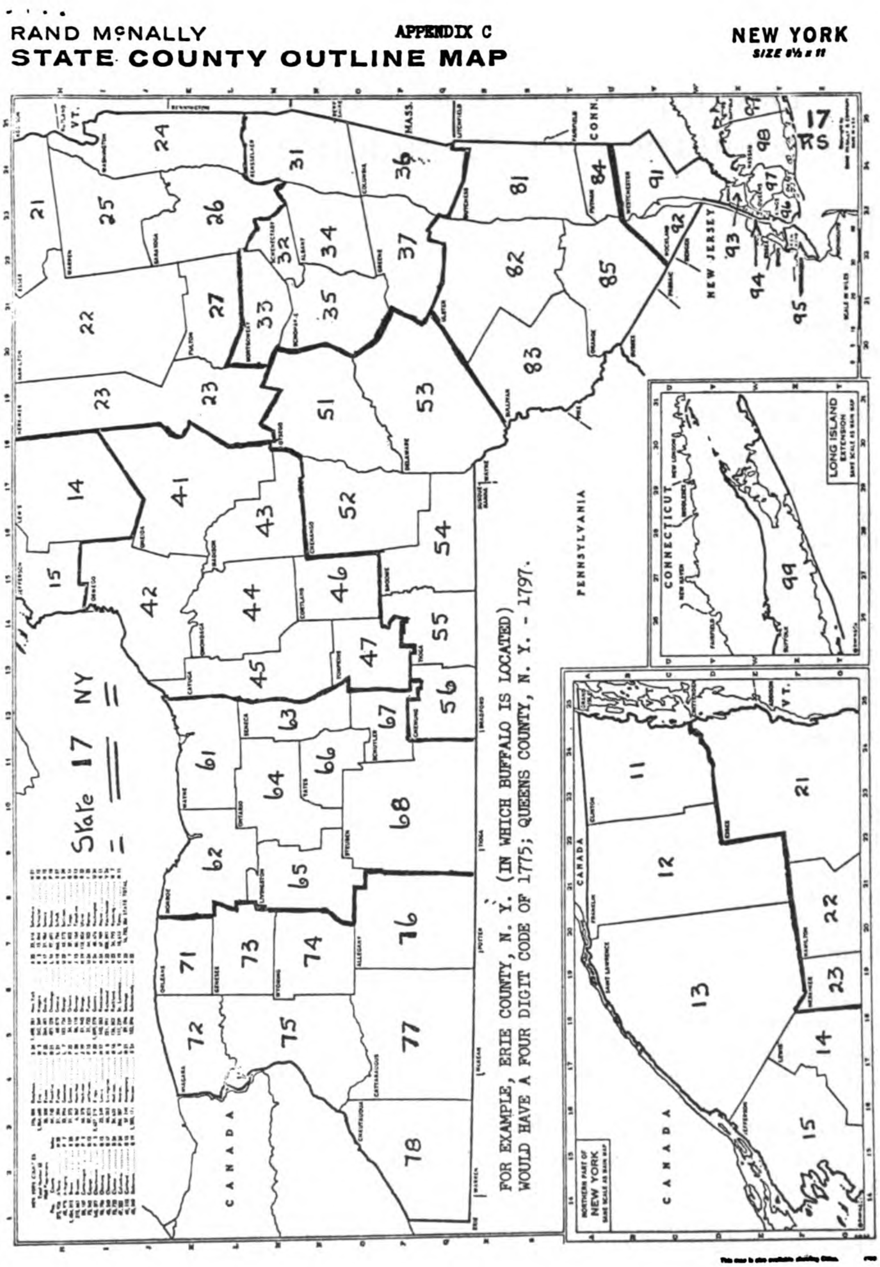
86 Alaska

87)
88) Open

89 Hawaii and Pacific Is.

REGION O: CANADA

REGION 9: MEXICO


RAND McNALLY
APPENDIX C
NEW YORK
STATE COUNTY OUTLINE MAP
SIZE 8½ x 11
State 17 NY
FOR EXAMPLE, ERIE COUNTY, N. Y. (IN WHICH BUFFALO IS LOCATED)
WOULD HAVE A FOUR DIGIT CODE OF 1775; QUEENS COUNTY, N. Y. - 1797.
PENNSYLVANIA
CANADA
NEW JERSEY
CONNECTICUT
LONG ISLAND EXTENSION
NORTHERN PART OF NEW YORK