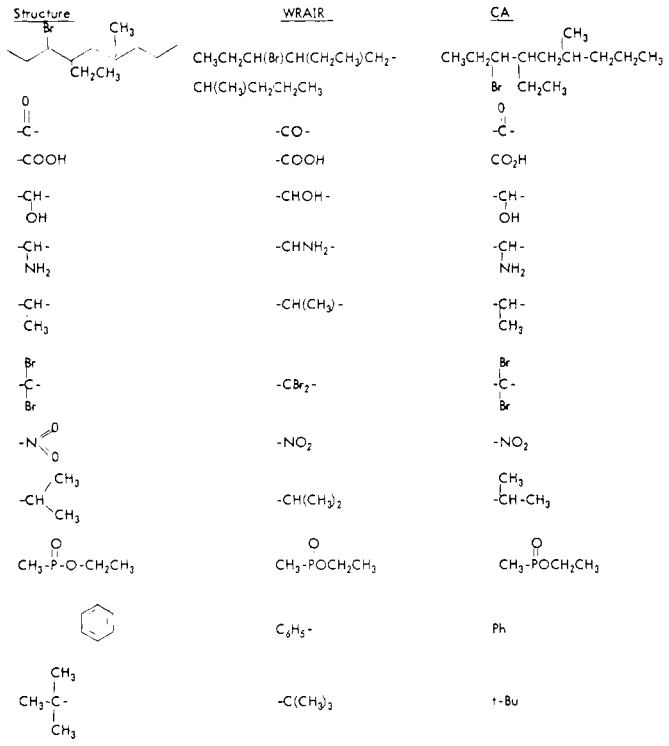

Chart VIII. Example of conventions for typing chemical structures

Among the problem areas of structure representation for computer input are the possible meanings of combinations like "CO" and "OC." There are two basic ways of handling this type of potential ambiguity. One is to set up a series of structure-drawing conventions at input, and the other is to apply rules relating to surrounding valence requirements. The actual methods chosen will depend on the circumstances surrounding the input process. In the ideal case, it is probable that the input conventions such as are noted in the above table will be applied, and, in addition, certain valence requirement checks on the input will be made by a computer edit routine.

ACKNOWLEDGMENT

We thank Aaron Addelston, C. M. Bowman, B. E. Holm, Stanley Kirschner, H. R. Koller, J. H. Kuney, H. K. Livingston, H. S. McDonald, J. M. Mullen, M. A. Paul, C. N. Rice, and E. G. Smith for helpful comments on this manuscript.

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A Reverse Coordinate Concept System for Retrieving Engineering Site and Building Drawings*

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Received October 30, 1968

A retrieval system is described for engineering and architectural drawings of buildings and the plot or site drawings showing all service lines. Using a "reverse coordinate concept," building drawings are located by specific bays, and site drawings by their physical location on a master grid or matrix with X and Y coordinates from 0-99. All drawings are indexed on cards bearing the address of a bay in a particular building or coordinates on the site grid. Approximately 5000 drawings are involved for 18 buildings on a 650-acre site.

One of the problems the engineer encounters in new construction, additions, or alterations to buildings or areas located in an industrial park is knowing what is already there. More than one company has been embarrassed by having a back-hoe operator pull out a water main that no one knew was there. Steam, water, gas, oil, sewer lines, and a myriad of other miscellaneous service lines may be buried under an area planned for excavation. Usually, large plot plans, often outdated, exist, showing each particular service line or combination of

*Presented at the 4th ACS Middle Atlantic Regional Meeting, Washington, D.C., February 14, 1969.

them. These are backed up with many smaller drawings showing details or changes made either in the original installation or at a later date. Similar situations of a more complicated nature exist for engineering and architectural drawings of buildings.

At the request of our Research Engineering Department, a system was devised for retrieving specific drawings, showing what is located at any individual area of our Technical Center. The area involved is the 650-acre site of our Technical Center, presently occupied by our Research and Development Center and our Central Engineering and Central Purchasing groups. A new building to house our Styling Center is under construction. About 5000 drawings are presently included in the system, which covers the entire plot and the 18 buildings of the Research and Development Center complex. Eventually, it is planned to include the other two buildings on the site. The system is divided into two compatible subsystems—one for site drawings and the other for building drawings.

THE SYSTEM

Site. A large plot plan of the 650-acre site showing building outlines and roadways was divided into a coordinate grid pattern of squares 100 × 100 feet, using ordinates of 0 to 99. Thus, any particular area can be located by its X-Y ordinates. The 100- × 100-foot module was selected for various reasons, but mainly because it is a convenient size to work with (we first tried a 200- × 200-foot module, but it soon became evident that there were too many drawings per module), and with one hundred 100-foot ordinates on each axis, the total area covered was greater than the present size of this facility, leaving room for considerable expansion in the one direction possible.

A card file was then developed, with one or more cards for each square for which there was a drawing showing a service line or roadway. On each card are listed the drawing numbers of every drawing involved in that particular area. To further identify each drawing, code letters follow each drawing number to show what services are shown in each drawing—i.e., CW for city water, PW for process water, ST for steam lines, PD for power distribution, etc. Other coding systems would be satisfactory.

Buildings. Each building is numbered and divided into numbered bays by floors. To accomodate buildings of various sizes and shapes, the bay size is flexible—i.e., the bays in the large pilot plant buildings are 20 × 50 feet and are determined by building columns, whereas the bays in the laboratory and administration buildings are 28 × 50 feet, with the 28-foot dimension selected to fall on the center line of the corridors. We had originally considered using room numbers, but these are not inviolate, as room sizes and shapes can be changed by merely moving partitions. The address for these areas contains the building number, floor number, and bay number—i.e., 3-2-9 would be building number 3, second floor, bay number 9. In a manner similar to that used for the site drawings, a card file was developed with one or more cards for each particular bay on each floor in each building. In addition, there is a "General Drawings" section which contains cards that reference drawings of one or a group of buildings or floors showing room layouts and room numbers. If individual bays are shown on General Drawings, the General Drawing number is also recorded on the bay cards. This enables a search to be made of General Drawings which contain a number of specific bays. For this operation, cards for the bays under consideration are compared by coordinate concept techniques to determine the General Drawing common to all bays. Other sections of the file are divided according to building numbers.

GENERAL

All drawings are numbered consecutively with a letter suffix to denote the size of the drawing—i.e., A, B, C, etc. This letter is important, since the original drawings are filed by size to save space. Following the letter is another number which denotes the number of that drawing in a particular series. There is space on the aperture card for the revision number, so a historical record of all changes is available.

Future plans include in-house microfilming on 35-mm. film and production of aperture cards which will be filed numerically. Two originals and at least one copy of each drawing will be made. One original will be sent to our Vital Records Storage, and the other original kept in our vault for emergency use. One copy will be used for the search file in the Research Engineering Department. Other copies will be made as experience dictates and kept at various locations throughout the Center. A reader-printer will be located in our Research Engineering Department, and readers will be located as required throughout the Center.

At the present time, most of the drawings have been indexed, and the search portion of the system is in use. By the end of 1969, it is expected that the microfilming will be completed and the entire system in operation.

ACKNOWLEDGMENT

I would like to acknowledge the efforts of C. E. Beaner of our Research Engineering staff, who has been so diligent in indexing the drawings and laying out the master grid and bays.