CALIFORNIA DIVISION OF HIGHWAYS
BRIDGE DEPARTMENT COMPUTER SERVICE

SECTION PROPERTIES BY COORDINATES

INSTRUCTIONS FOR USERS

This service will compute section properties of any plane geometric figure that can be outlined by straight-line segments linking 200 or fewer points. The properties are area, centroid location, and moments and products of inertia with respect both to arbitrary "x" and "y" axes and to parallel centroidal axes.

DATA PREPARATION (on FORM H-BD D 69, Rev. 6-72)

Identification: DISTRICT, GROUP, BATCH and accounting data are standard. See General Instructions for Users, 1-1. Use PROBLEM number to identify the problem.

A MEMBER may be assigned a number from 1 to 99. If used, the number must be repeated on all lines of data for that member.

A SECTION may also be assigned a number from 1 to 99. If used, the number must be repeated for all lines of data for that section.

A LINE NO. must be assigned, sequentially starting from 1, to each line of data for a section.

SECTION LOCATION may be used to locate a section from the left end of a member.

MEMBER	SECTION	LINE NO	SECTION LOCATION (0.1 FT.)	X	Y

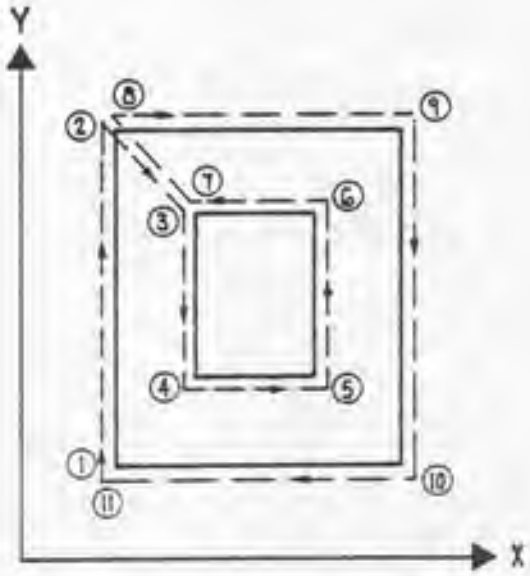
COORDINATES OF CONCRETE POINTS (0.01 FT.)

X	Y	X	Y	X	Y
30	35	40	45	50	55

Enter x-y pairs of COORDINATES in sequence from left to right on a line, using as many lines as required to include all points. All COORDINATES must be positive. The first and last pairs must be the same, but cannot be (0,0). A maximum of 200 points may be used to describe the section.

COORDINATES must be given in a clockwise sequence around the section unless an interior void is involved. The COORDINATES around a void must be given in a counter-clockwise sequence.

The illustration shows a correct sequence of points for a Section containing a void. It is continuous for the entire section. Points 1 and 11 are identical to indicate final "closure." Points 2 and 3 are separated from Points 8 and 7, respectively, by at least 0.01 ft. in one direction to avoid premature "closure."



RESULTS

For each section the input is reported first, as given. Then the section properties are given. They include the Area, Centroid Location, Moment of Inertia About Axes, and Moment of Inertia About Centroid. Centroid Location is expressed as a pair of coordinates in the x-y system of the problem. Units of the results are all feet to the appropriate power. Precision is 0.01 unit.

Following is an example intended to illustrate the main features of the program.

SECTION PROPERTIES BY COORDINATES

BDE00F

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NAME P. Pong

PHONE 6519

IDENT DIST	IDENT GROUP	IDENT BATCH	PROB
14	T	65	Ø1

S/C 2091, 2396

SOURCE DIST	SOURCE UNIT	CHARGE DIST	CHARGE UNIT	EXP. AUTH. GEN. LED. / SUB ACCT / MAINT. W.S. / ROUTE NO. / WORK ORDER NO.	SPECIAL DESIGNATION (USE WHEN APPLICABLE) BRIDGE NUMBERS / PARCEL OR CONTR. NO. / DMS, RPTS, LABR, COS, ENCR, PMTS. / SUB JOB NOS. / LOCATIONS
14	033	14	033	910002	

S/C 2091

MEMBER	SECTION	LINE NO.	SECTION LOCATION (0.1 FT.)	COORDINATES OF CONCRETE POINTS (0.01 FT.) X	Y	X	Y	X	Y	X	Y	X	Y
2	2	1	4000	200	00	200	100	300	100	400	200	400	1100
		2		300	1200	200	1200	200	1300	700	1300	700	1200
		3		600	1200	500	1100	500	200	600	100	700	100
		4		700	00	200	00						

S/C 2396

The first and last concrete point must be the same but cannot be (0.0).

All coordinates are to be positive.

A maximum of 200 points may be used to describe the section.

The coordinates are to be given in a clockwise sequence unless a void is involved, in which case the coordinates of the void are to be given in a counter-clockwise sequence.

Enter the coordinates horizontally from left to right on a line, using as many lines as required to indicate all points.

LINE NO. must be numbered sequentially starting from 1 for each section.

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INPUT DATA

MEMBER 2 SECTION 2 LOCATION 0.0

X	Y	X	Y	X	Y	X	Y	X	Y
2.00	0.0	2.00	1.00	3.00	1.00	4.00	2.00	4.00	11.00
3.00	12.00	2.00	12.00	2.00	13.00	7.00	13.00	7.00	12.00
6.00	12.00	5.00	11.00	5.00	2.00	6.00	1.00	7.00	1.00
7.00	0.0	7.00	0.0						

AREA	CENTROID LOCATION X	CENTROID LOCATION Y	MOMENT OF INERTIA ABOUT AXES X-X	MOMENT OF INERTIA ABOUT AXES Y-Y	MOMENT OF INERTIA ABOUT AXES X-Y	MOMENT OF INERTIA ABOUT CENTROID X-X	MOMENT OF INERTIA ABOUT CENTROID Y-Y	MOMENT OF INERTIA ABOUT CENTROID X-Y
23.00	4.50	6.50	1497.00	489.00	672.75	525.25	23.25	0.00

BATCH CHARGE UNITS = 1 APPROXIMATE MACHINE TIME 0.4 SECS APPROXIMATE COST $ 1.25