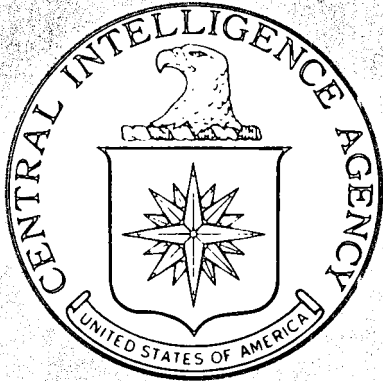


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LOADING AZIMUTHS AND SITE

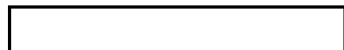
ORIENTATIONS, SOVIET ICBM SITES

Declass Review by NIMA/DOD



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LOADING AZIMUTHS AND SITE ORIENTATIONS

SOVIET ICBM SITES

Detailed analysis of [] photography of Soviet ICBM Launch Sites has revealed a definite relationship between the site loading azimuth and site orientation as determined by the azimuth to estimated targets for the launch sites.

For this report the following definitions were used in determining these azimuths and orientations:

1. Loading Azimuth - The azimuth along which the missile transporter is placed immediately prior to missile erection or placement of a missile into a silo. For soft sites this is the azimuth of the long axis of the elongated launch pad of the straight road or rail leading to the pad. For silo launch sites it is the azimuth of the short road segment or hardstand upon which the missile transporter is placed in order to lower the missile into the silo.

2. Estimated Direction of Launch - A sector 40 degrees in width, emanating from the launch point within which lies the continental United States. An exception to this is found at two sites apparently oriented towards Australia.

3. Site Orientation - The azimuth of a readily identifiable feature at the launch site or an associated electronics facility that is consistently constructed so as to fall within the sector defined by the estimated direction of launch. The features used to determine the site orientations of the various type sites are as follows:

(a) Type IA - A perpendicular to the long axis of the site guidance facility.

(b) Types IIA, IIB, IID, and IIID - The azimuth of the long axis of the launch pad and/or the access road serving the pad or silo. (At these sites the site orientation is identical to the loading azimuth). Exceptions to this are found at the soft sites at the Kostroma, Teykovo, and Yedrovo complexes where it is necessary to launch on an azimuth 45 degrees clockwise from the loading azimuth in order to reach the United States.

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(c) Type IIC, IIIB, and IIIC - The azimuth of the leg of the associated interferometer that falls within the sector of the estimated direction of launch. This site orientation can also be defined as an azimuth 45 degrees clockwise from the loading azimuth for the Type IIC and IIIC sites and 90 degrees counter clockwise from the loading azimuth of the Type IIIB sites.

(d) Type IIIA Sites - A perpendicular to a line drawn through the three silos or an azimuth the same as the loading axis depending upon which of these orients the site towards the United States. Two unexplained exceptions to this definition have been identified, one at Kostroma E and the other at Plesetsk C. In both cases it is necessary to launch on an azimuth 45 degrees clockwise from a perpendicular to a line drawn through the three silos.

Table 1 is a listing of loading azimuths, site orientations, and estimated direction of launch. Azimuths are considered accurate to plus or minus 5 degrees. Analysis of this table reveals the following pertinent facts:

Site orientation as defined in this report is towards the United States at all sites except two Type IIIA sites (Drovyannaya B and Svobodnyy G) which appear to be oriented towards Australia.

Of the twenty-three deployed Type IIIA sites, sixteen sites launch parallel to the loading axis of the site, three have a 60 degree difference between the loading azimuth and the site orientation, two have a 45 degree difference, and two have a 105 degree difference. At the Tyuratam Missile Test Center the Type IIIA sites at Complex D are also different with D-1 having a 60 degree difference between the loading azimuth and the site orientation and D-2 having a 45 degree difference.

The sixty-four deployed soft Type IIA, IIB, and IID sites for the SS-7/9 missile systems have site orientations parallel to the loading azimuth except for the eighteen sites at three complexes: Kostroma, Teykovo, and Yedrovo. It is interesting to note that these are the three westernmost ICBM complexes in the USSR.

It was not possible, at this time, to determine site orientations for the Type IIID sites at the Gladkaya Complex due to a lack of suitable coverage.

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At Tyuratam Launch Group L, eight of the ten sites have a loading azimuth and site orientation of 000 degrees. Site L-2 has a loading azimuth of 320 degrees and Site L-3 280 degrees. There is no readily apparent reason for these variations on azimuths.

It should be noted that all Type IIIC and IIID site orientations within the same complex have been estimated to be identical as determined by the azimuth of the associated interferometer.

Plesetsk G and H, the only Type IB launch areas identified to date, have not been included in the tabulation as no meaningful site orientation has been arrived at. It is estimated that the loading azimuth for these sites will be approximately 355 degrees.

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CIA/IAD Project

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TABLE I

<u>Complex</u>	<u>Launch Area</u>	<u>Type</u>	<u>Loading Azimuth</u>	<u>Site Orientation</u>	<u>Estimated Direction of Launch</u>
Aleysk	ALL	IIIC	310	355	340-020
Dombarovskiy	ALL	IIIC	305	350	330-010
Drovyannaya	A	IIB	020	020	005-045
Drovyannaya	B	IIIA	115	175*	005-045
Drovyannaya	C	IID	020	020	005-045
Drovyannaya	D	IID	020	020	005-045
Drovyannaya	E	IIIA	345	030	005-045
Drovyannaya	F	IIIA	345	030	005-045
Drovyannaya	Groups G-H	IIID	015	015	005-045
Gladkaya	A	IID	005	005	350-030
Gladkaya	B	IID	005	005	350-030
Gladkaya	D	IIIA	305	005	350-030
Gladkaya	Group - F	IIID	Unknown	Unknown	350-030
Imeni Gastello	ALL	IIIC	305	350	330-010
Itatka	A	IIB	010	010	340-020
Itatka	B	IIB	010	010	340-020
Itatka	C	IID	010	010	340-020
Kartaly	ALL	IIIC	295	340	325-005
Kostroma	A	IIB	295	340	310-350
Kostroma	B	IIB	295	340	310-350
Kostroma	C	IIB	295	340	310-350
Kostroma	D	IIB	295	340	310-350
Kostroma	E	IIIA	235	340	310-350
Kostroma	F	IID	295	340	310-350
Kostroma	G	IID	295	340	310-350
Kozelsk	A	IIC	305	350	310-350
Kozelsk	B	IIC	305	350	310-350
Kozelsk	D	IIC	305	350	310-350
Kozelsk	E	IIIB	080	350	310-350
Kozelsk	F	IIIB	080	350	310-350
Novosibirsk	A	IIB	005	005	340-020
Novosibirsk	B	IIIA	005	005	340-020
Novosibirsk	C	IIIA	005	005	340-020
Novosibirsk	D	IID	005	005	340-020
Novosibirsk	E	IID	005	005	340-020
Olovyannaya	A	IIIA	000	000	000-040

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Table 1 continued

<u>Complex</u>	<u>Launch Area</u>	<u>Type</u>	<u>Loading Azimuth</u>	<u>Site Orientation</u>	<u>Estimated Direction of Launch</u>
Olovyannaya	B	IIIA	000	000	000-040
Olovyannaya	C	IIIA	000	000	000-040
Olovyannaya	Groups D-F	IIID	020	020	000-040
Omsk	A	IIIB	070	340	335-015
Perm	A	IIB	315	315	315-005
Perm	B	IIB	315	315	315-005
Perm	C	IIB	315	315	315-005
Perm	D	IID	315	315	315-005
Perm	E	IID	315	315	315-005
Perm	F	IIIA	315	315	315-005
Perm	Group G	IIID	320	320	315-005
Plesetsk	1	IA	298	330	310-350
Plesetsk	2	IA	356	330	310-350
Plesetsk	3	IA	006	330	310-350
Plesetsk	4	IA	295	330	310-350
Plesetsk	A	IIA	330	330	310-350
Plesetsk	B	IIB	330	330	310-350
Plesetsk	C	IIIA	235	340	310-350
Plesetsk	D	IIC	265	310	310-350
Plesetsk	E	IIC	265	310	310-350
Shadrinsk	A	IIIA	000	000	325-005
Shadrinsk	B	IIIA	000	000	325-005
Shadrinsk	C	IIIA	000	000	325-005
Svobodnyy	A	IIB	030	030	015-055
Svobodnyy	B	IIB	030	030	015-055
Svobodnyy	C	IIB	030	030	015-055
Svobodnyy	D	IID	030	030	015-055
Svobodnyy	E	IID	030	030	015-055
Svobodnyy	F	IID	030	030	015-055
Svobodnyy	G	IIIA	120	180*	015-055
Svobodnyy	H	IID	030	030	015-055
Tatishchevo	Groups A-C	IIID	320	320	315-355
Teykovo	A	IIB	295	340	310-350
Teykovo	B	IIB	295	340	310-350
Teykovo	C	IIB	295	340	310-350
Teykovo	D	IID	295	340	310-350
Teykovo	E	IID	295	340	310-350

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Table 1 continued

<u>Complex</u>	<u>Launch Area</u>	<u>Type</u>	<u>Loading Azimuth</u>	<u>Site Orientation</u>	<u>Estimated Direction of Launch</u>
Teykovo	F	IID	295	340	310-350
Tyumen	A	IIC	295	340	330-010
Tyumen	C	IIC	295	340	330-010
Tyuratam					035-045 (to Kamchatka area) 330-010 (to U. S.)
Tyuratam	D-1	IIIA	335	035	
Tyuratam	D-2	IIIA	350	035	
Tyuratam	C	IIB, IID	000	045	
Tyuratam	E	IIC	080	035	
Tyuratam	F	IIIB	075	345	
Tyuratam	A-2	IIIC	000	045	
Tyuratam	B-3	IIIC	000	045	
Tyuratam	I	IIIC	000	045	
Tyuratam	K-1-2	IIIC	000	045	
Tyuratam	G-7	IIIC	000	045	
Tyuratam	K-3	IIID	045	045	
Tyuratam	Group L	IIID	000**	000**	
Uzhur	All	IIIC	325	010	345-025
Verkhnyaya Salda	A	IIB	345	345	325-005
Verkhnyaya Salda	B	IIA	345	345	325-005
Verkhnyaya Salda	C	IIA	345	345	325-005
Verkhnyaya Salda	D	IIB	345	345	325-005
Verkhnyaya Salda	E	IIB	345	345	325-005
Verkhnyaya Salda	F	IIIA	345	345	325-005
Verkhnyaya Salda	G	IIIA	345	345	325-005
Verkhnyaya Salda	H	IID	345	345	325-005
Verkhnyaya Salda	I	IID	345	345	325-005
Yedrovo	A	IIB	290	335	305-345
Yedrovo	B	IIB	290	335	305-345
Yedrovo	C	IID	290	335	305-345
Yedrovo	D	IID	290	335	305-345
Yedrovo	E	IIIA	330	330	305-345
Yedrovo	F	IID	290	335	305-345
Yedrovo	G	IID	290	335	305-345
Yedrovo	I	IIIA	330	330	305-345
Yoshkar Ola	A	IIB	335	335	320-000

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Table 1 continued

<u>Complex</u>	<u>Launch Area</u>	<u>Type</u>	<u>Loading Azimuth</u>	<u>Site Orientation</u>	<u>Estimated Direction of Launch</u>
Yoshkar Ola	B	IIB	335	335	320-000
Yoshkar Ola	C	IIB	335	335	320-000
Yoshkar Ola	D	IID	335	335	320-000
Yoshkar Ola	E	IID	335	335	320-000
Yoshkar Ola	F	IID	335	335	320-000
Yurya	A	IIA	340	340	320-000
Yurya	B	IIA	340	340	320-000
Yurya	C	IIB	340	340	320-000
Yurya	D	IIB	340	340	320-000
Yurya	E	IIIA	320	320	320-000
Yurya	F	IIB	340	340	320-000
Yurya	G	IIIA	320	320	320-000
Yurya	H	IID	340	340	320-000
Yurya	I	IID	340	340	320-000
Yurya	J	IID	340	340	320-000
Yurya	K	IIIA	320	320	320-000
Zhangiz Tobe	ALL	IIIC	295	340	340-020

* Oriented towards Australia

** L-2 is 320 degrees, L-3 is 280 degrees

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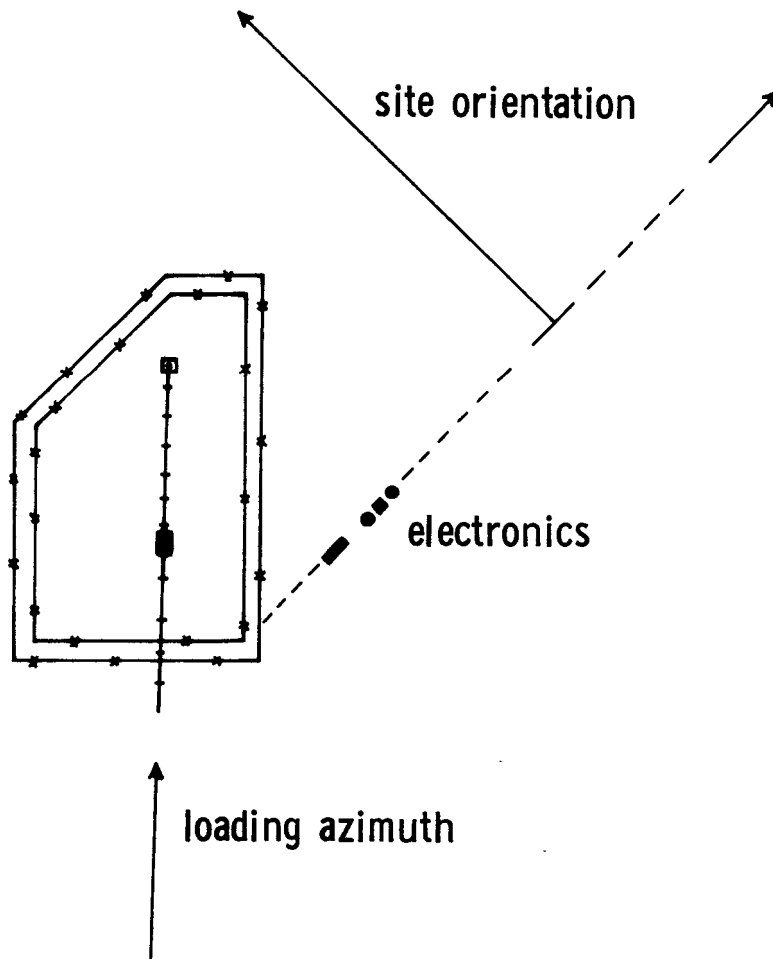
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RAIL SERVED ICBM LAUNCH SITE TYPE IA



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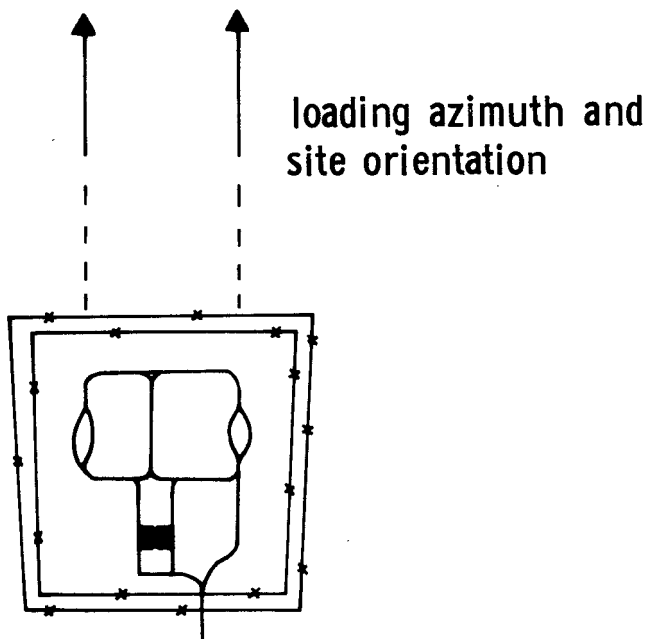
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ROAD SERVED SOFT ICBM LAUNCH SITE TYPE IIA



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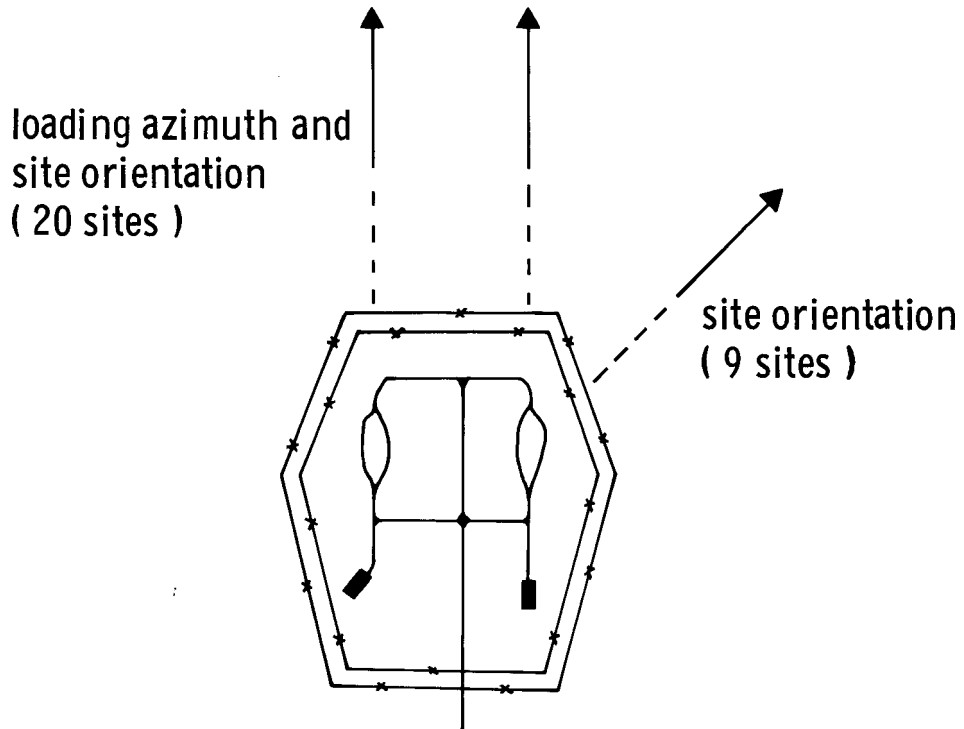
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ROAD SERVED SOFT ICBM LAUNCH SITE
TYPE IIB



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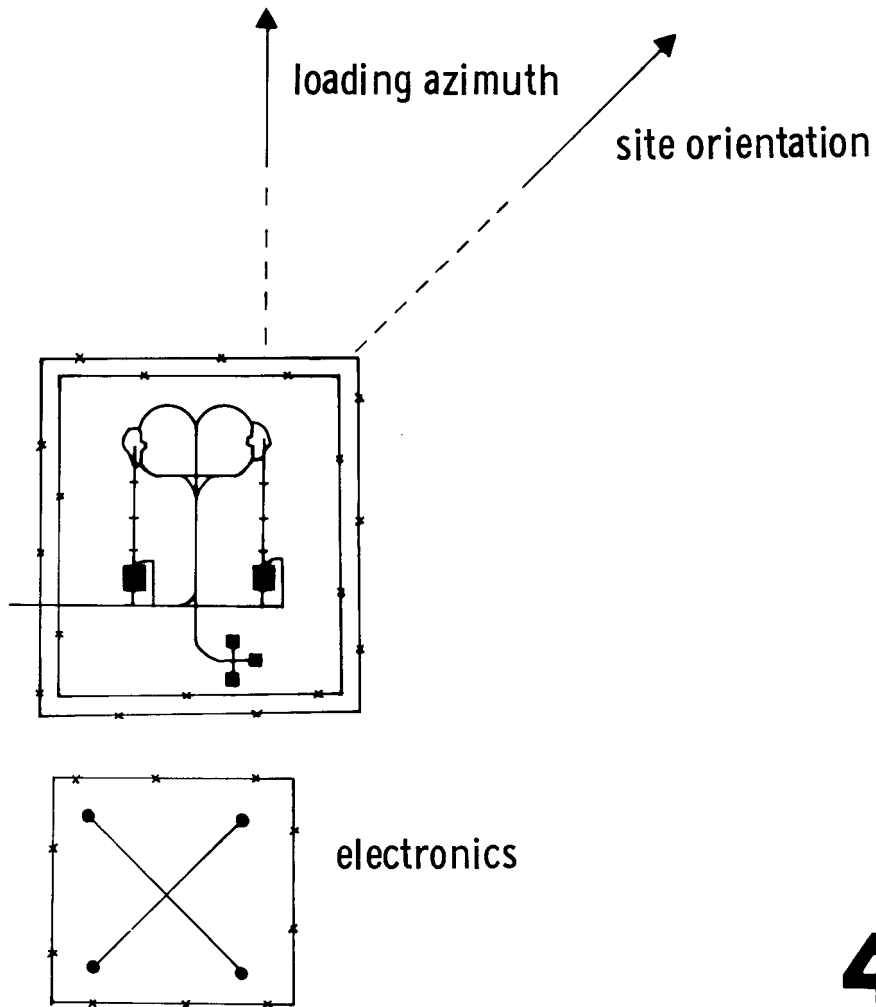
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ROAD SERVED SOFT ICBM LAUNCH SITE

TYPE IIC



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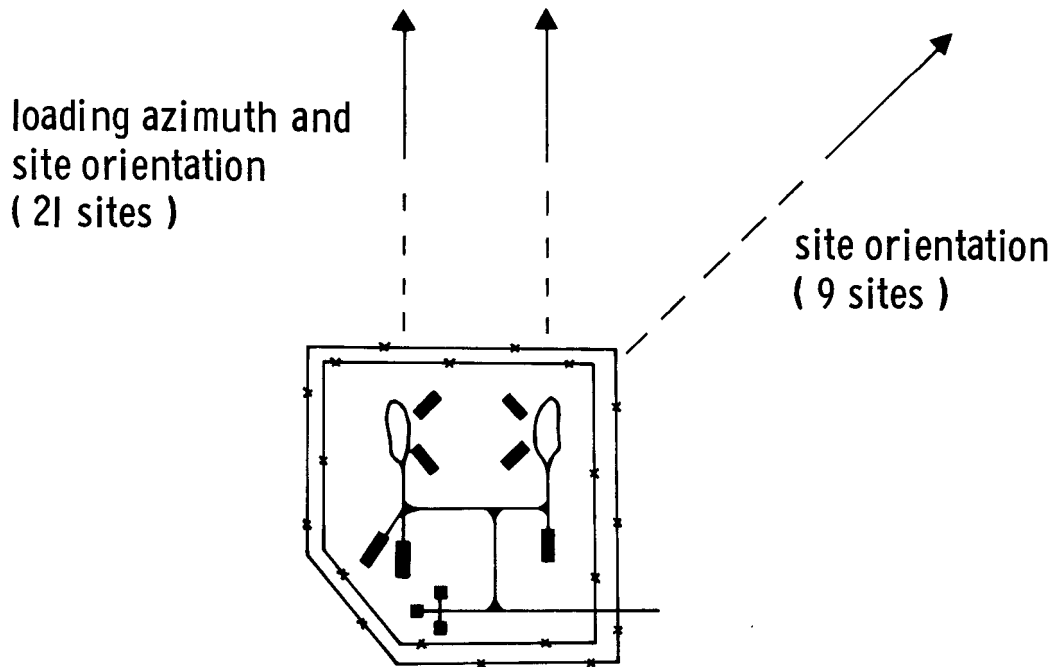
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ROAD SERVED SOFT ICBM LAUNCH SITE

TYPE IID



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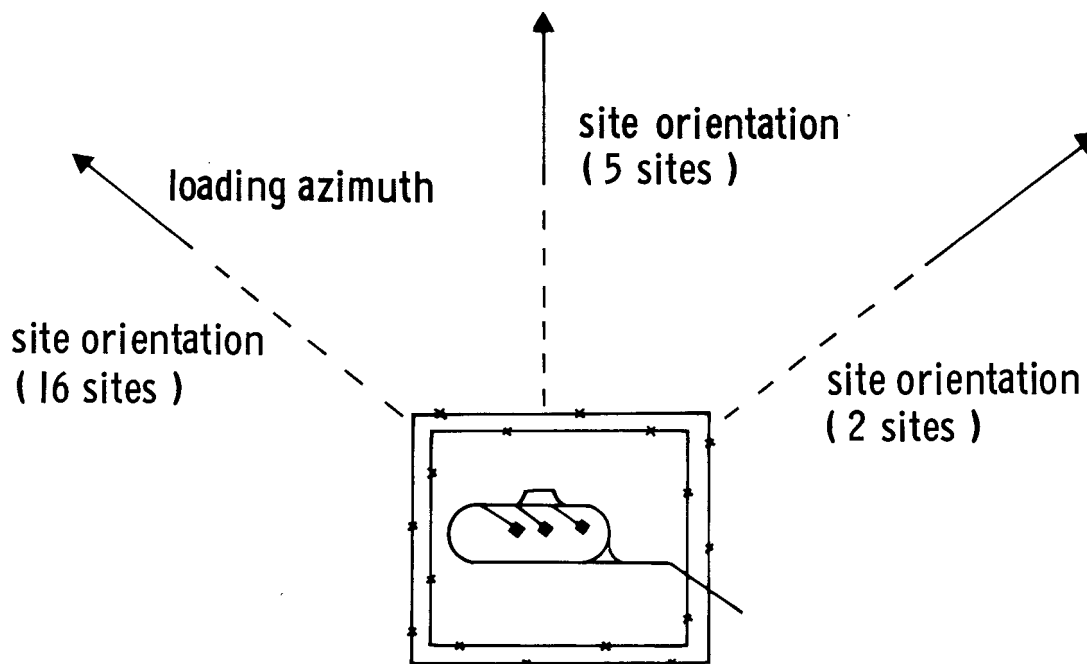
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HARDENED ICBM LAUNCH SITE TYPE IIIA



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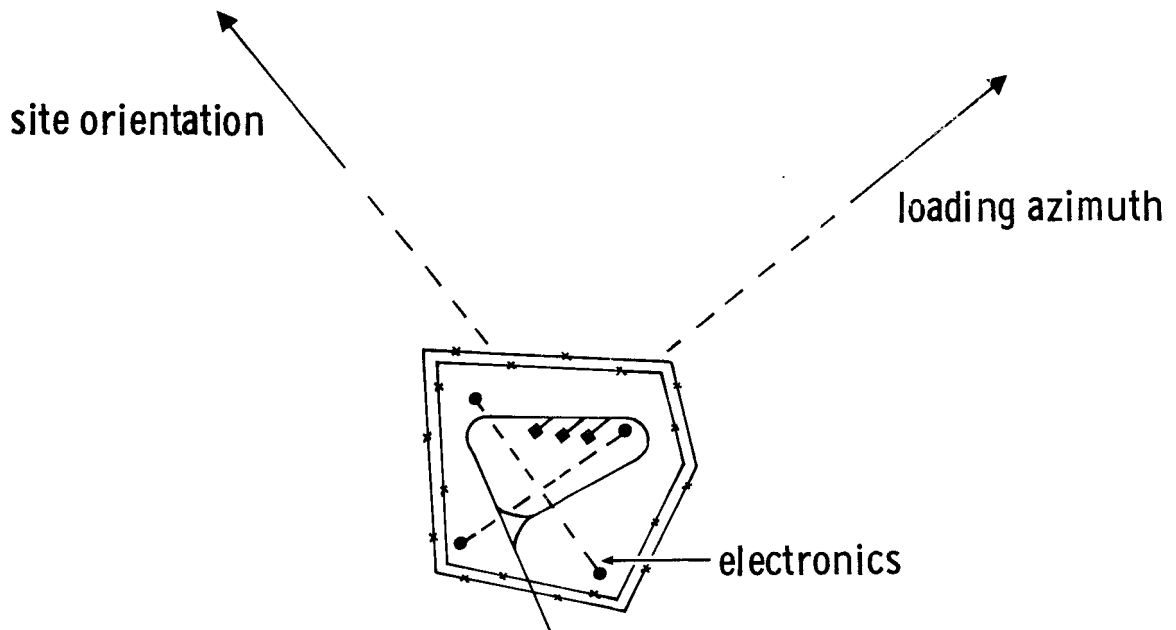
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HARDENED ICBM LAUNCH SITE

TYPE IIIB



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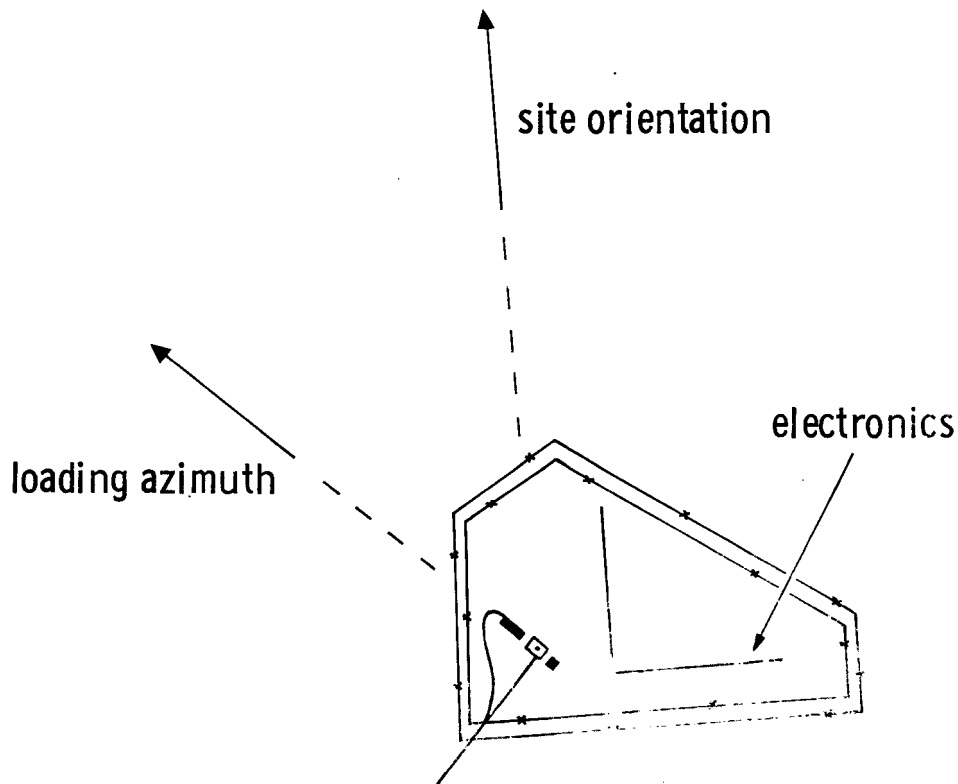
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HARDENED ICBM LAUNCH SITE

TYPE IIIC



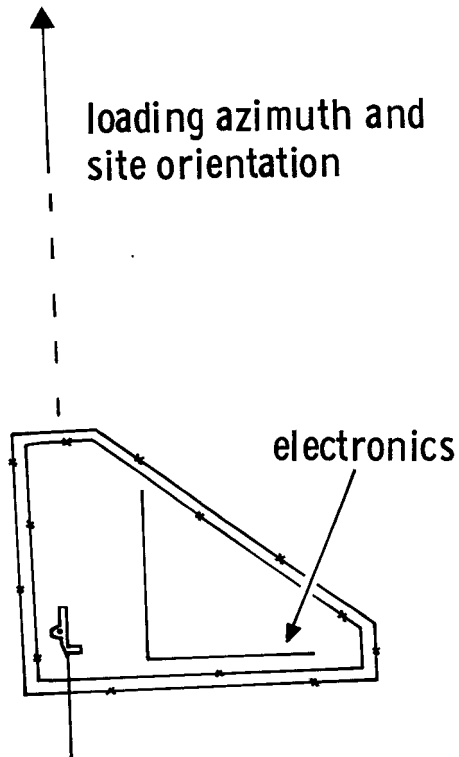
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HARDENED ICBM LAUNCH SITE TYPE IIID



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