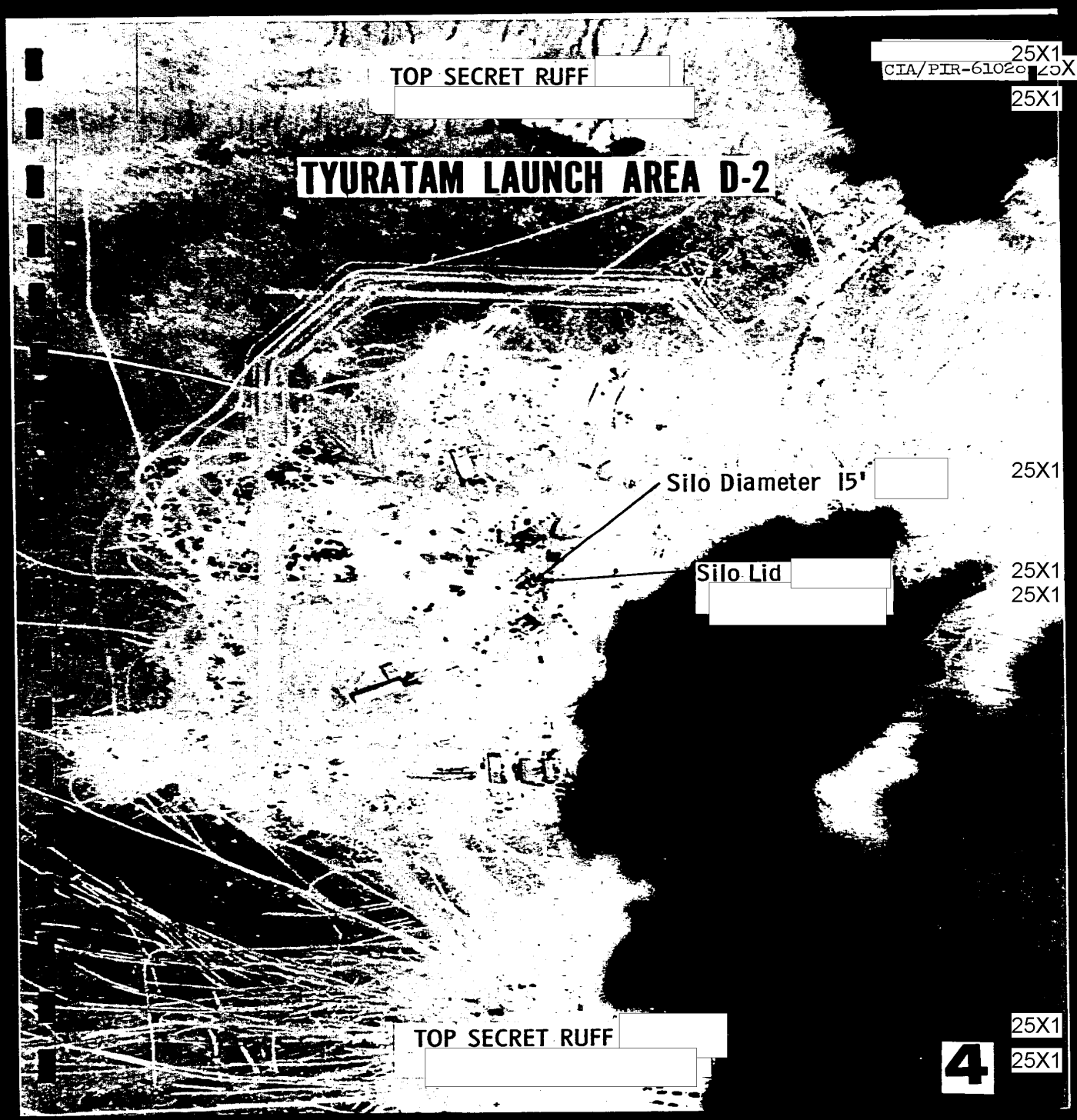

STAGE I - CLEARING AND GRADING

The first activity noted at a Type III-C single silo site is usually, although not always, the start of construction of buildings at the site support facility (Figure 5).* In addition, a certain amount of preparatory work is sometimes done at the location of the launch site itself (Figure 6). Normally, a period of three to four weeks is occupied in this fashion, before the large open cut excavation is begun. However, the excavation is occasionally begun first, especially at the later sites in a complex. Lacking recent negation coverage then, the most accurate estimate of a starting date must take into account the amount of construction activity already present.

STAGE II - OPEN CUT EXCAVATION

Three to four weeks are required to make the excavation, typically a large square about 120 feet on a side (Figure 7). Based upon height measurements of the silo headworks (the 20 meter square structure with interior compartmentation which surrounds the silo), it is believed that the excavation averages about 40 feet in depth. Most often two earthen cuts about 15 to 20 feet wide serve for access into the excavation. Generally these give a characteristic U-shaped appearance, although V and T-shapes have been observed. The center portion of the "U" serves as support for a construction ramp during later stages. Fencing is usually erected at this time, and the squares and rectangles, if required to be mounded, are formed from spoil taken from the excavation. The rectangles are invariably located on the northwestern side of the excavation and the squares on the southeastern side. The road serving the silo, representing the loading axis, always enters over the rectangle. This loading axis appears to be consistent within each complex and is 45 degrees counterclockwise from a firing azimuth toward the U.S. (Figure 23).

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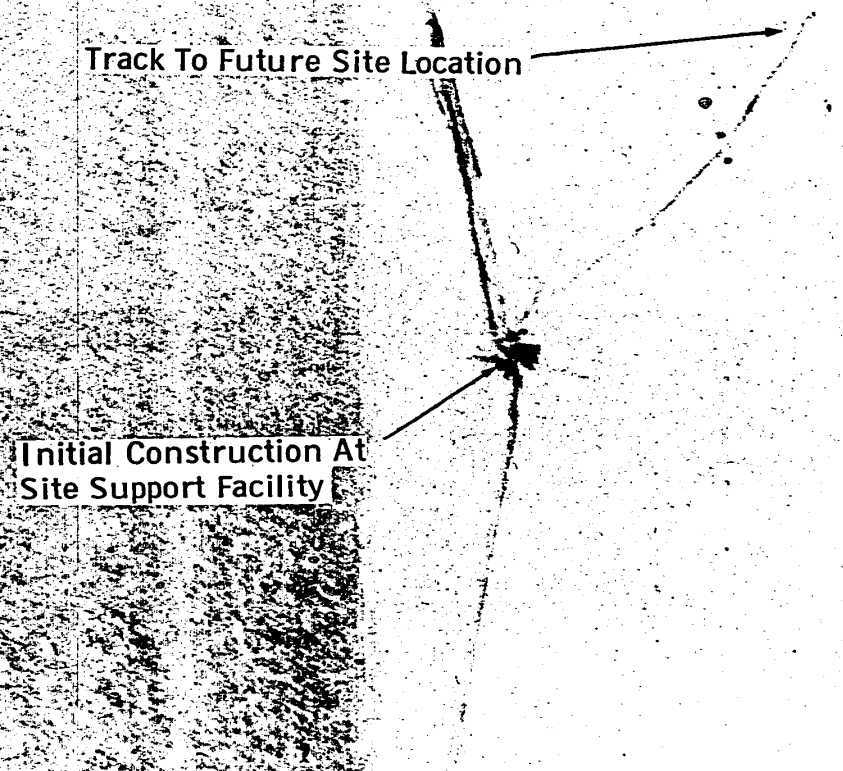
* A detailed description of these buildings is beyond the scope of this report. However it should be kept in mind that construction of the site support facility continues as work on the silo itself progresses.

TYPE III C ICBM LAUNCH SITE



STAGE I - ONE WEEK

STAGE III - CORING VISIBLE

The silo coring is normally visible for an average of three months (Figures 8-13). The exact method used to core the shaft to a probable depth of about 100 feet is unknown. The absence of pre-cast concrete rings on site throughout this stage suggests that the outer wall of the silo may be slip-formed. It is estimated that the thickness of the silo wall is approximately two and one-half feet.

After the coring is completed, a prefabricated, bevelled steel ring made in three sections with and an outer diameter of approximately 50 feet, is emplaced over the silo wall on the floor of the excavation. Concrete is then poured, apparently in two stages, (Figures 11 and 12) to cover the ring, leaving a single opening A temporary flat cover obscures the coring during this operation and is removed when the foundation slab is complete (Figures 12 and 13).

STAGE IV-A - RAMPS/FORMS UNDER CONSTRUCTION FOR SILO

Two intermediate steps appear to exist between the time the coring is obscured and the actual work on the headworks begins. These are however, included as the earliest events of Stage IV-A. The sequence shown in Figures 14 and 15 can be established at Imeni Gastello Launch Site B on . The first of these steps consists of the erection over the coring of a 30 diameter structure elevated some distance above the base of the excavation and having a light-toned cover. This may be seen during the latter part of Stage III before the bevelled ring is covered or during what is being defined as the earliest part of Stage IV-A. It remains in place for a variable length of time, and is probably simply a covering which provides access to the coring and shelter from the weather, while necessary fixtures and utilities are being placed in the lower part of the silo. Upon its removal, a low capping about is observed over the coring (Figure 15). This is probably a safety cover. With the start upward of the headworks, this portion of the structure becomes obscured and it is not clearly observed again. In several instances however, when the headworks are about one-third complete, the probable exhaust duct area can be seen, and the suggestion is given that the opening persists upward to the base of the slab which forms the finished elevation (Figures 17 and 31).

Gradually over a period of about six months the square, compartmented structure rises to, or slightly above, surface level (Figures 16-21). An access ramp (or ramps), extending out over the headworks normally appears about midway through this stage, although this has been observed to occur in some instances before construction on the headworks has begun. At about the same time, a pair of dark lines becomes visible on the adjacent rectangle (Figure 17). This apparently represents initial construction of a long, narrow, elevated cradle, in most instances straight-sided but in one example having sloping sides. On this is assembled a concrete silo liner 110 feet long with an estimated diameter of 10 (Figure 18).

Generally, as the headworks near completion (although a great deal of variation is noted) a small cruciform structure (Figures 20, 21 and 24) is emplaced next to the headworks a little below ground level and apparently always on the side of the mounded square. This may be an emergency shelter and/or entrance, inasmuch as the dimensions do not allow the installation of any extensive equipment (see Figure 20 for this and other pertinent mensuration data).

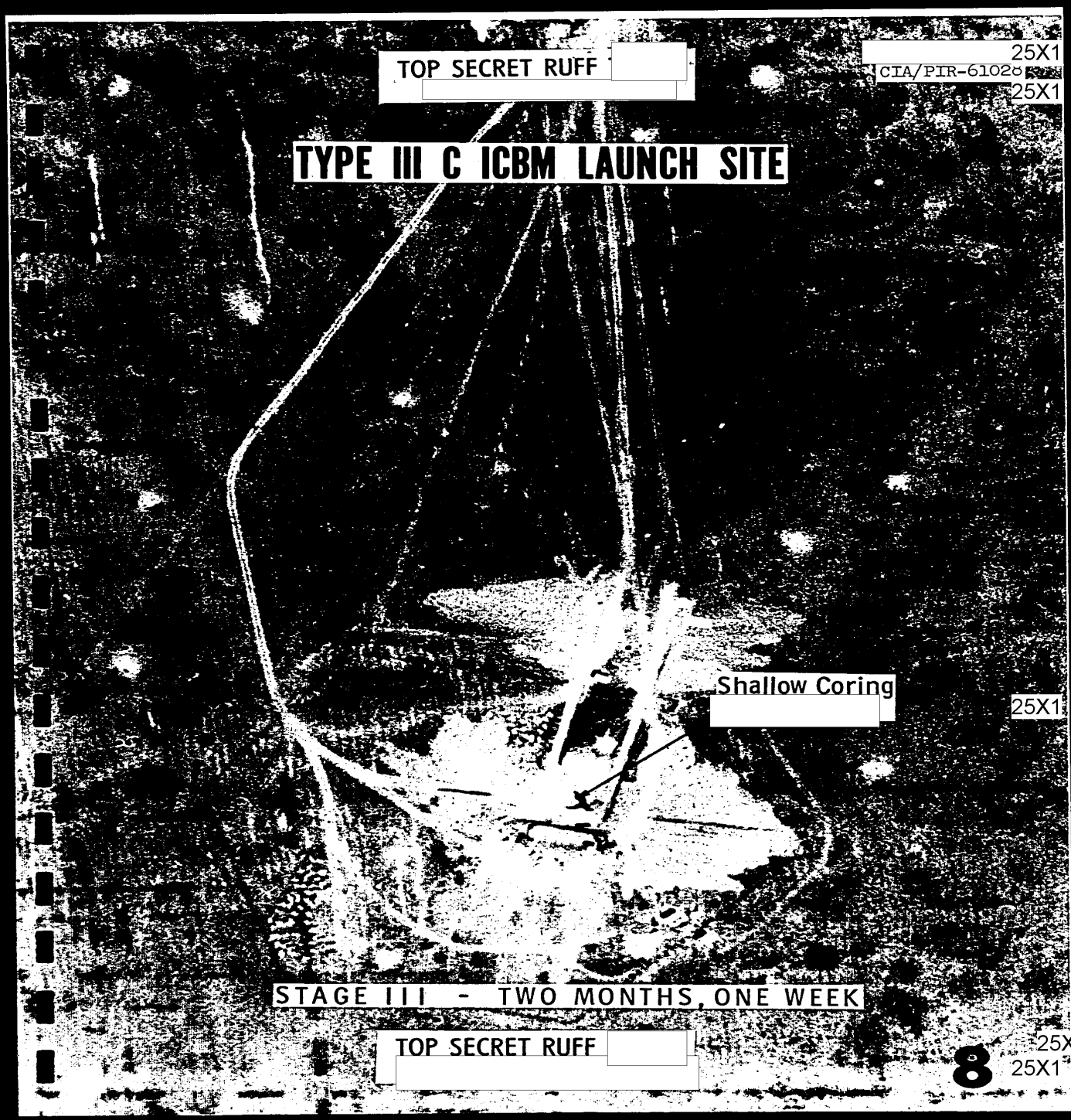
The headworks are finally roofed, and the silo liner stands ready to be put into position.

STAGE IV-B
CLEARING AND EXCAVATION FOR GUIDANCE AND CONTROL

Six to eight months after construction has begun on the site selected as control center, a large excavation to house the control bunker is made over a period of about one and a half months (Figure 22).

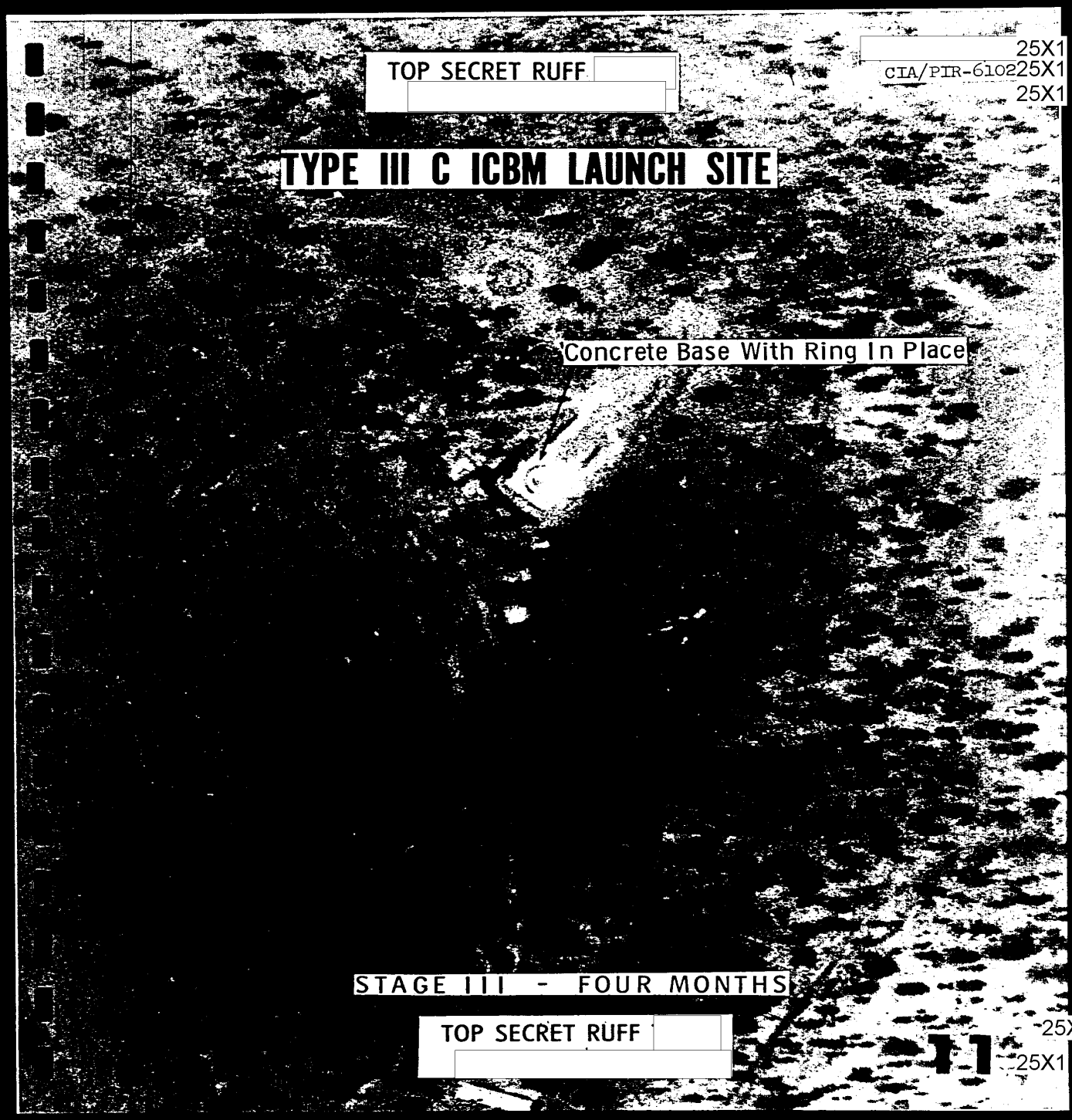
Only one variation in the relationship on the control bunker and its associated interferometer to the site itself has been seen at the deployed complexes. Normally, the excavation has been placed 100 to 200 feet from the silo excavation and beyond the square, in such a manner that a line passed through the rectangle, silo, and square will intersect the vertex of the 'L' and form a 45 degree angle with one leg (Figure 23). That this relationship is not a necessity however, is illustrated by the exception found at the Uzhur ICBM Complex, where the interferometer is installed in difficult terrain.

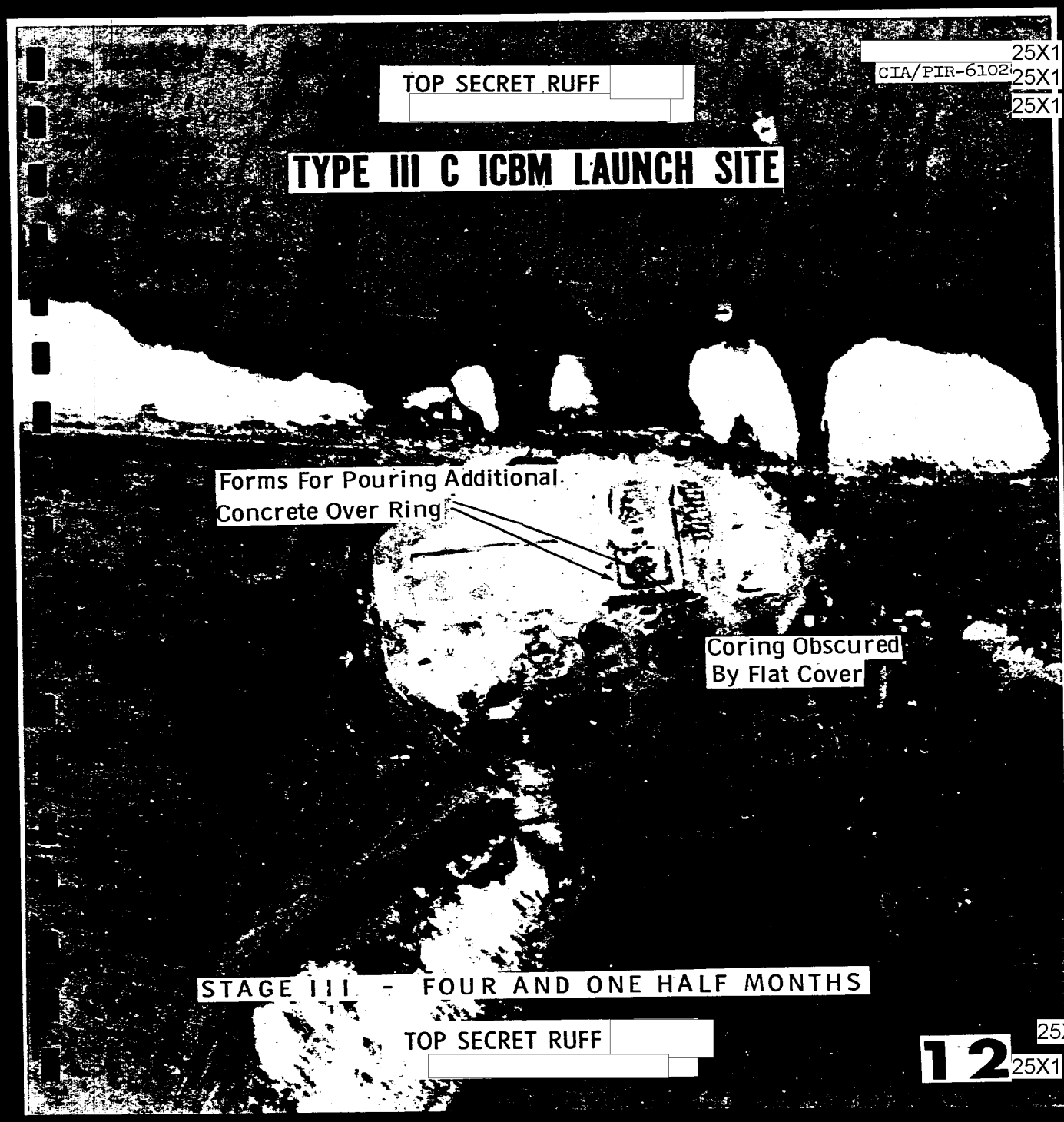
Since the excavation for the control bunker commences well after the start of the silo, the future presence of an interferometer at a particular site cannot be predicted except upon the basis of extended fence lines. Thus, small excavations near the silos have led the past to report that work on an 'L' might be in progress. Unless the criteria cited above of timing, location and distance are met, caution should be exercised in making such an assessment.



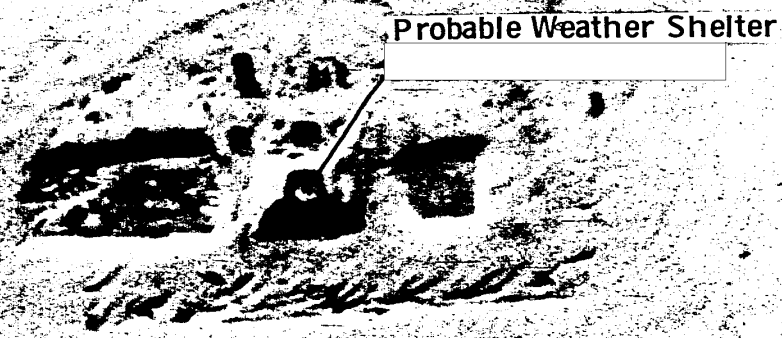
TYPE III C ICBM LAUNCH SITE

STAGE III - TWO AND ONE HALF MONTHS





TYPE III C ICBM LAUNCH SITE



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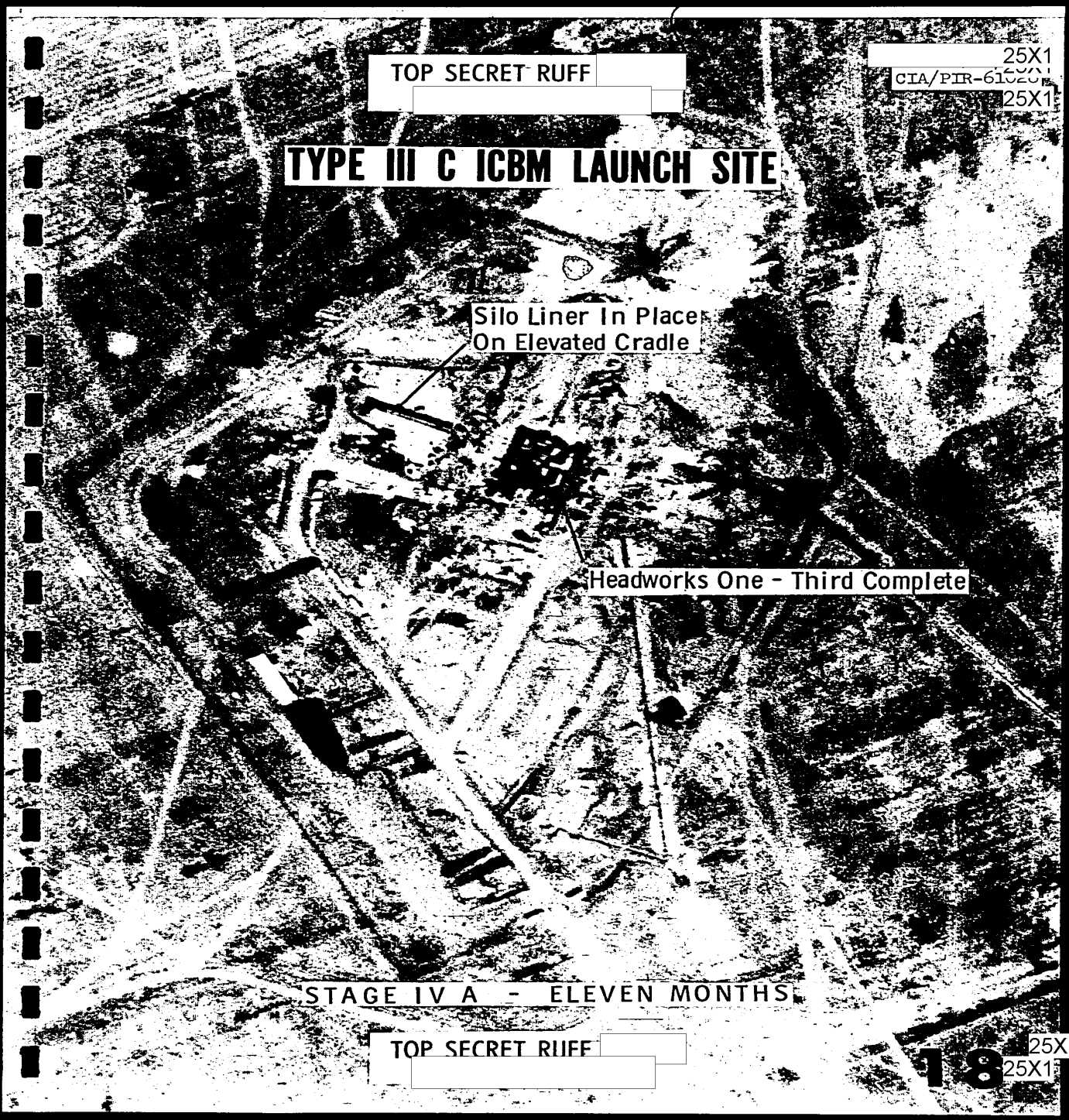
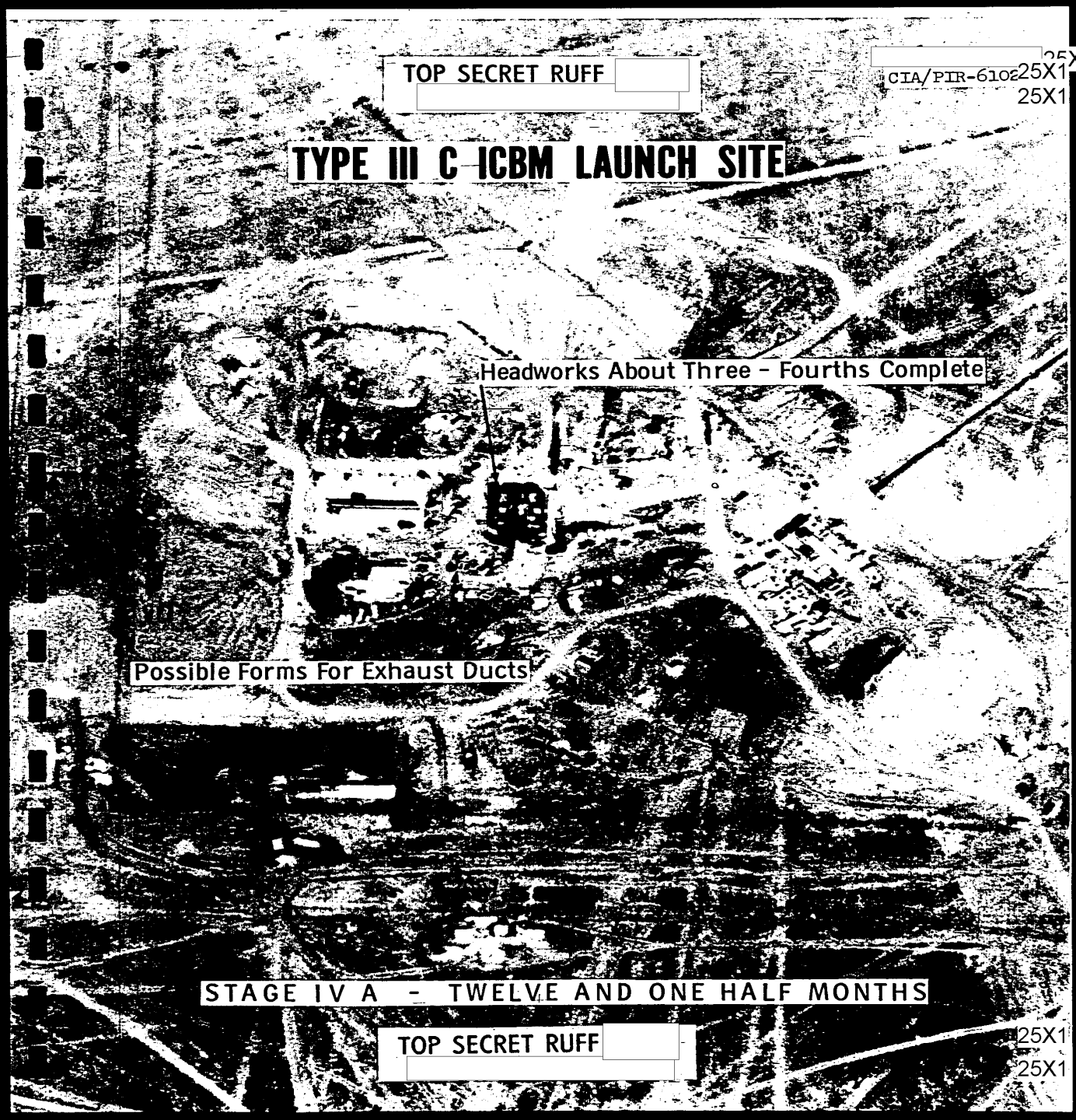
STAGE IV A - SIX MONTHS





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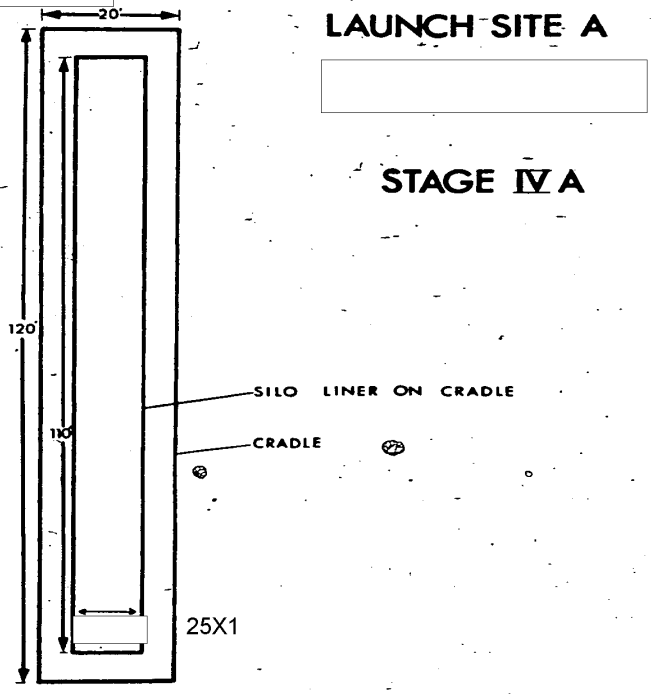
IMENI GASTELLO LAUNCH SITE A

STAGE IV A



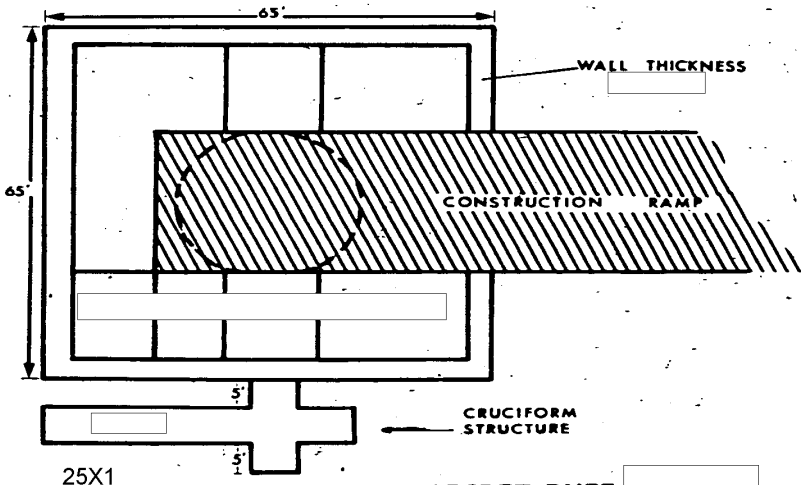


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FIGURE 20

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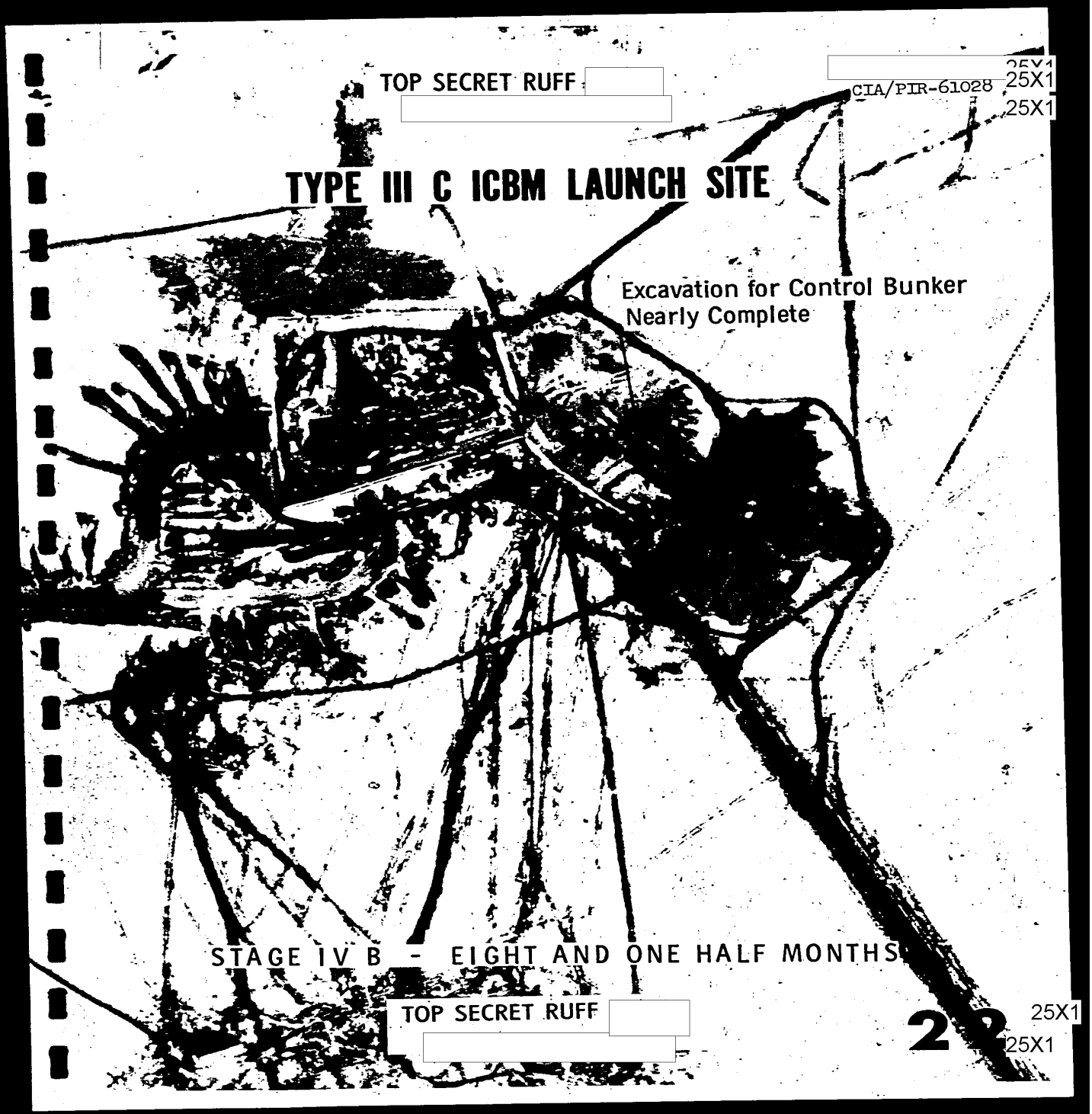

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25X1

N

Generalized Sketch (not to scale) Showing Normal Relationship of Silo to Interferometer

INTERFEROMETER LEGS 1312' (400 meters) DIVIDED INTO 50 meter SEGMENTS

25X1

DITCHING (est.)

25'

25'

60'

45°

90'

CONTROL BUNKER

EXCAVATION

DITCHING 25X1

MOUNDED SQUARE

150'

line paralelling long axis of control bunker

65°

SILO

FIRING AZIMUTH (TO U.S.)

LOADING AZIMUTH

MOUNDED RECTANGLE

TOP SECRET RUFF

25X1

23

25X1

25X1

STAGE V - SILO COMPLETE TO SURFACE LEVEL

Stage V, probably the most difficult to recognize on KH-4 photography, represents the interval, nominally a month, between the time the silo is outwardly complete to surface level and backfilling begins (Figure 24). When the first sites started at a complex reach this stage, the beginning of a well-engineered system of improved roads serving the sites becomes apparent.

STAGE VI-A - BACKFILL SILO

At Tyuratam the only Type III-C silos which have, as of this writing, been completely backfilled, the process of backfilling has taken from three and a half to four and a half months (Figure 25). Installation of equipment within the headworks undoubtedly continues simultaneously, as does work on the control bunker and interferometer at control sites. It is probably during this period that the silo liner is installed. There have been no other major changes detected during this stage and Stage VII, however, good quality coverage of this stage is lacking, since none of the deployed sites have advanced to this point.

STAGE VI-B - CONTROL AND GUIDANCE UNDER CONSTRUCTION

After the initial excavation has been made, work proceeds on the compartmented control bunker (Figures 26 and 27), which is oriented at a 45-degree angle to the silo headworks. Two 400-meter long ditches of undetermined depth (but not as deep as the control bunker excavation) and estimated to be 4 to 6 feet wide are extended at right angles, one always oriented toward the U.S. At 50 meter intervals, a notch is made in each leg probably to accommodate a support for the wave guide antenna. Two long, narrow arched roof buildings are added outside the fence of control sites about midway through this stage, and a large excavation somewhat shallower than that housing the control bunker is made nearby at about the same time. The positioning of this second excavation is not constant. It is approximately 100 feet square with a small notch in one corner. Its function has not been determined. A junction box about 25 feet square is also positioned in front of the control bunker, about 30 feet distant. At one site, at least, it is on a slightly higher level than the base of the excavation for the control bunker. The control bunker is estimated to have walls the same thickness as the silo headworks. It is built to, or slightly above surface level, and is approximately the same height as the headworks of the silo. If the depth of the ditching for the interferometer legs is as little as six feet, engineering opinion is that the entire facility is equally as hard as the silo.

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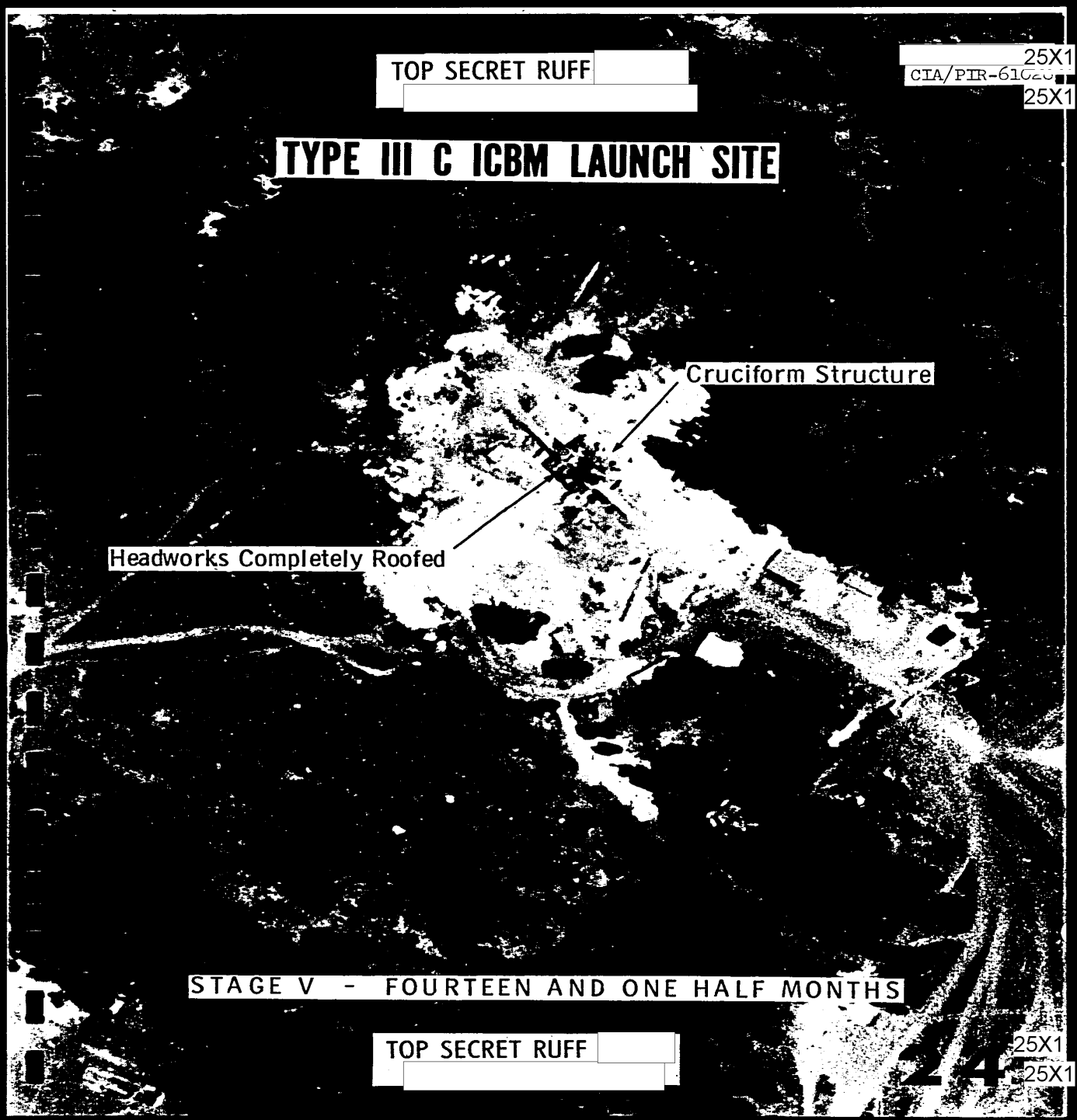
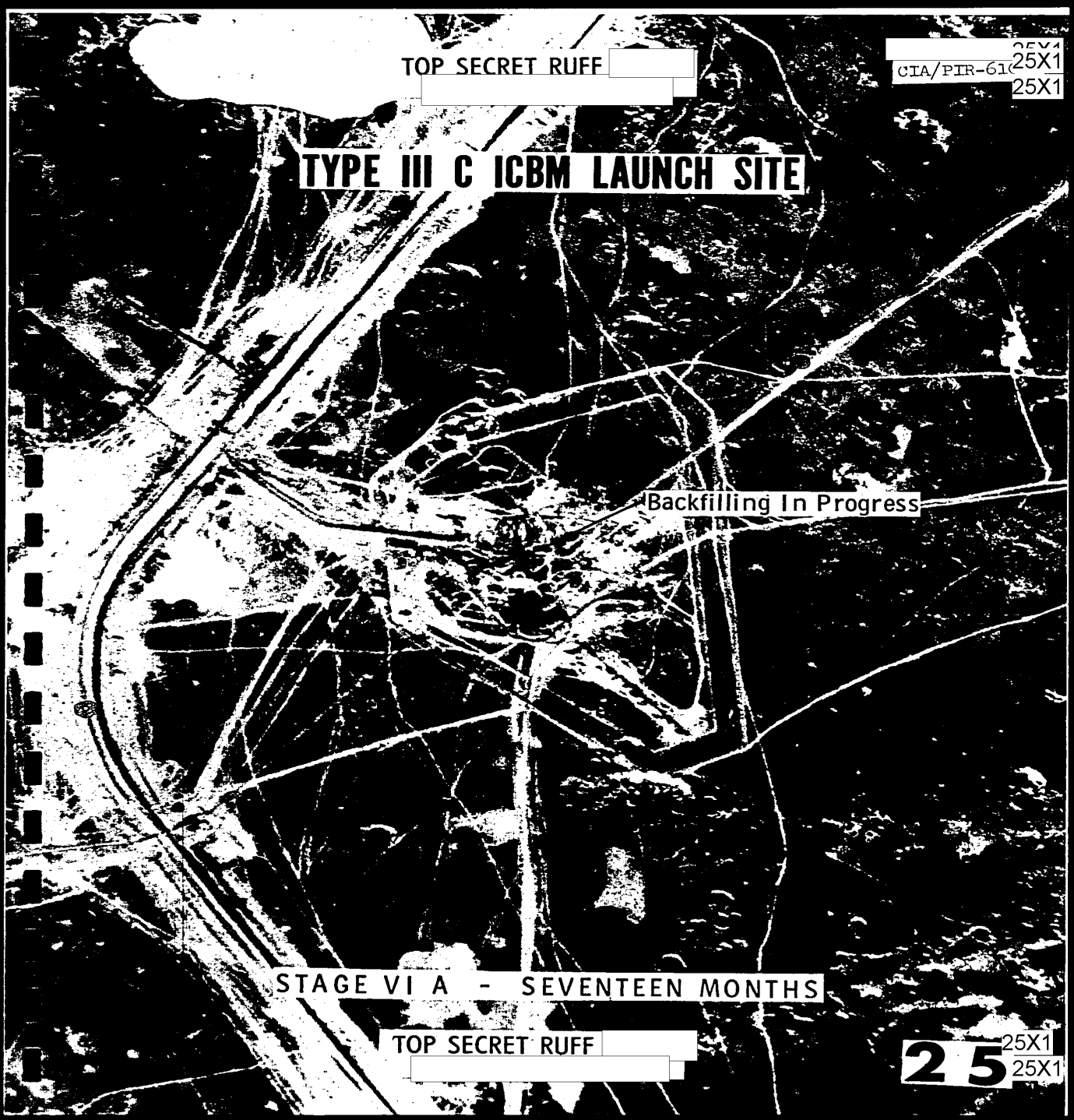
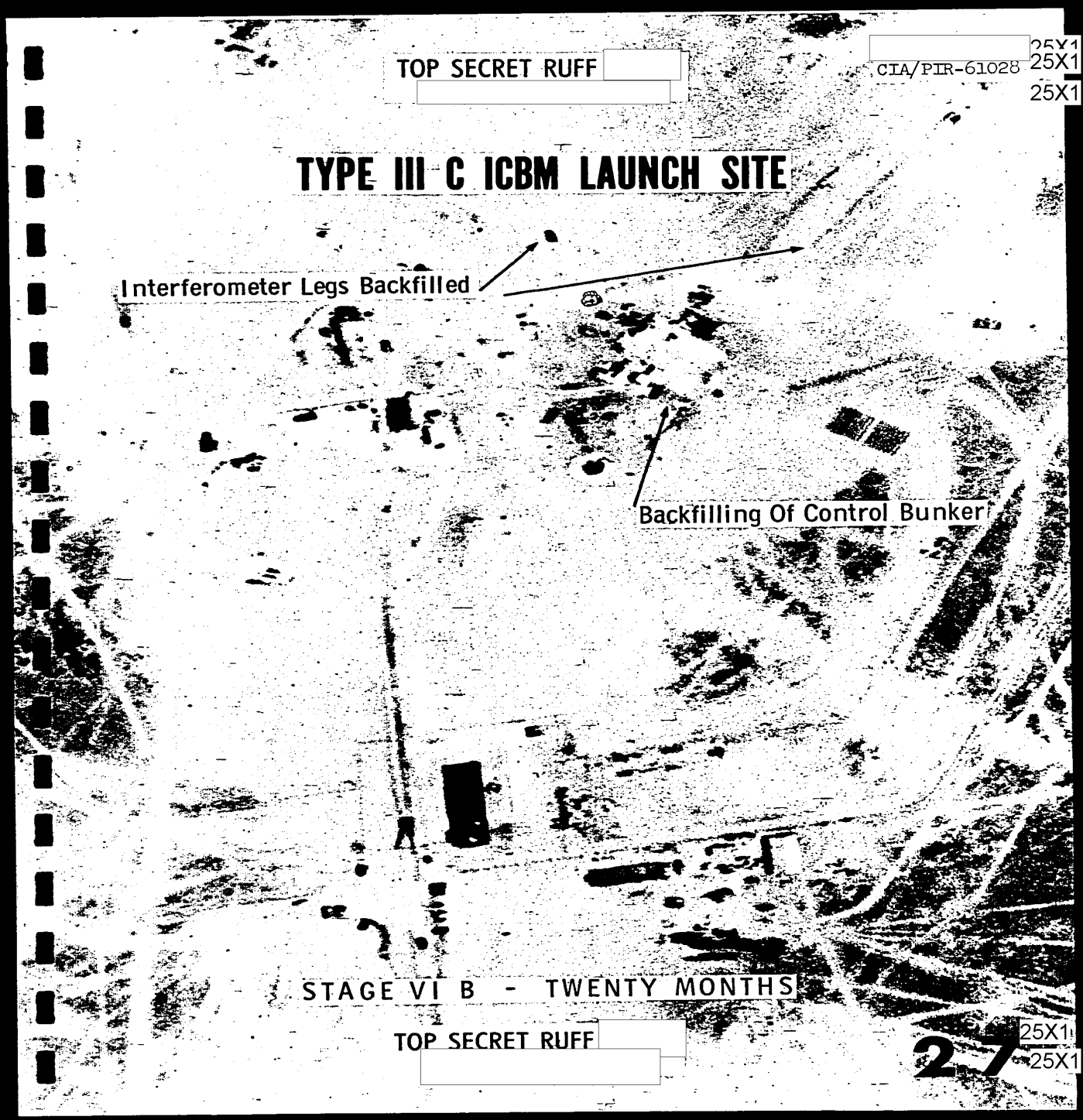
25X1







STAGE VII - SILO DOOR INSTALLED

At this time, only two sites, Launch Complex I and Launch Site B-2, both at Tyuratam Missile Test Center, have been photographed in Stage VII, which is that period covering the installation of the silo door (Figure 28). The completion of road and general tidying up around the site was accomplished within a probable two months at the sites listed above.

STAGE VIII - CONTROL AND GUIDANCE FINISHED

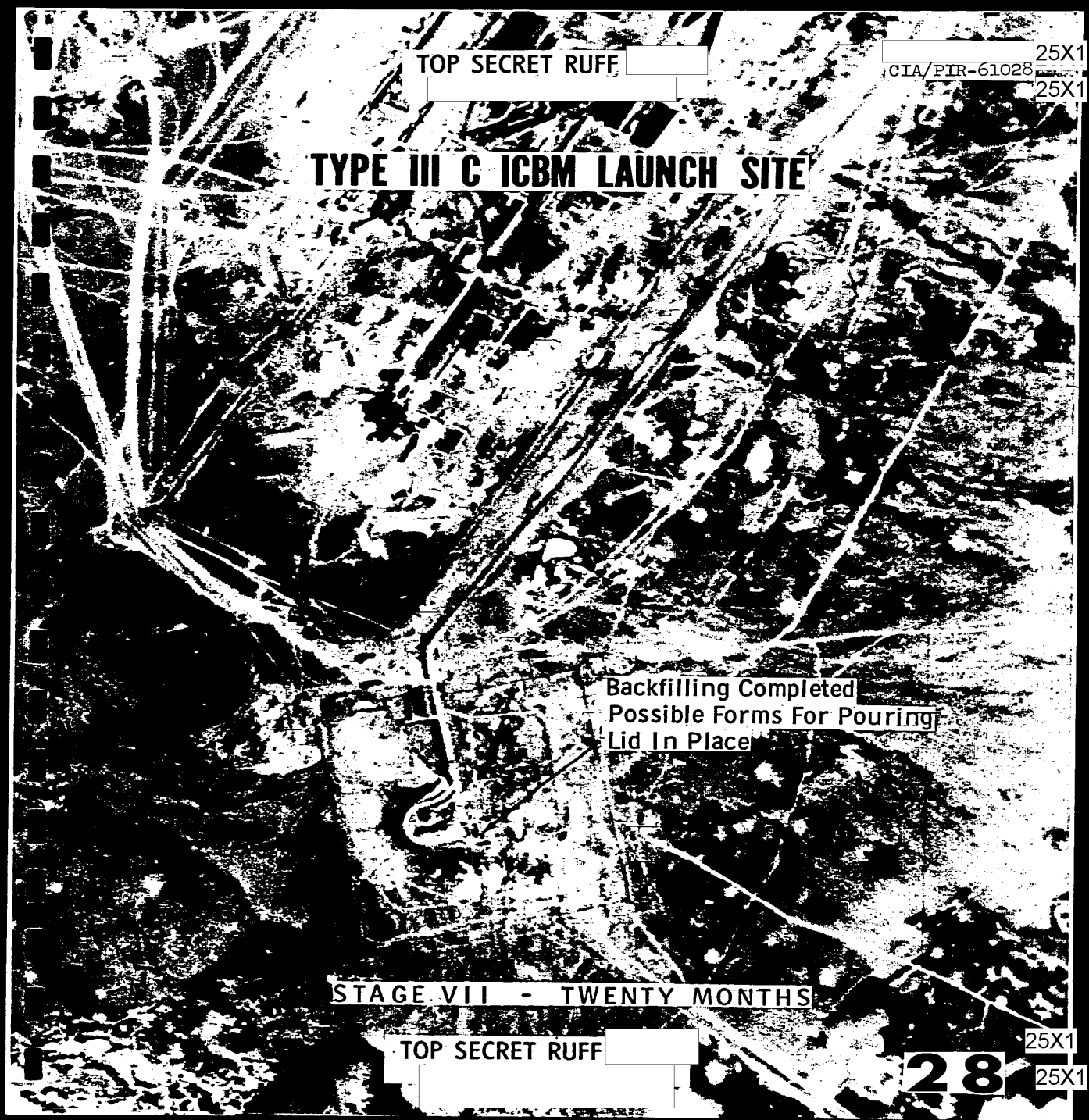
No interferometers at the Type III-C complexes have yet been completed. A projected estimate using Launch Complex I, Tyuratam Missile Test Center, which appears to be nearing completion indicates that it is possible to complete an installation of this type within a time span of about 11 months. Inasmuch as construction here has taken place at a significantly faster pace than at any of the deployed sites, it is estimated that one to three additional months will be required in the field, for a total time, from the start of Stage IV-B, of 14 to 16 months.

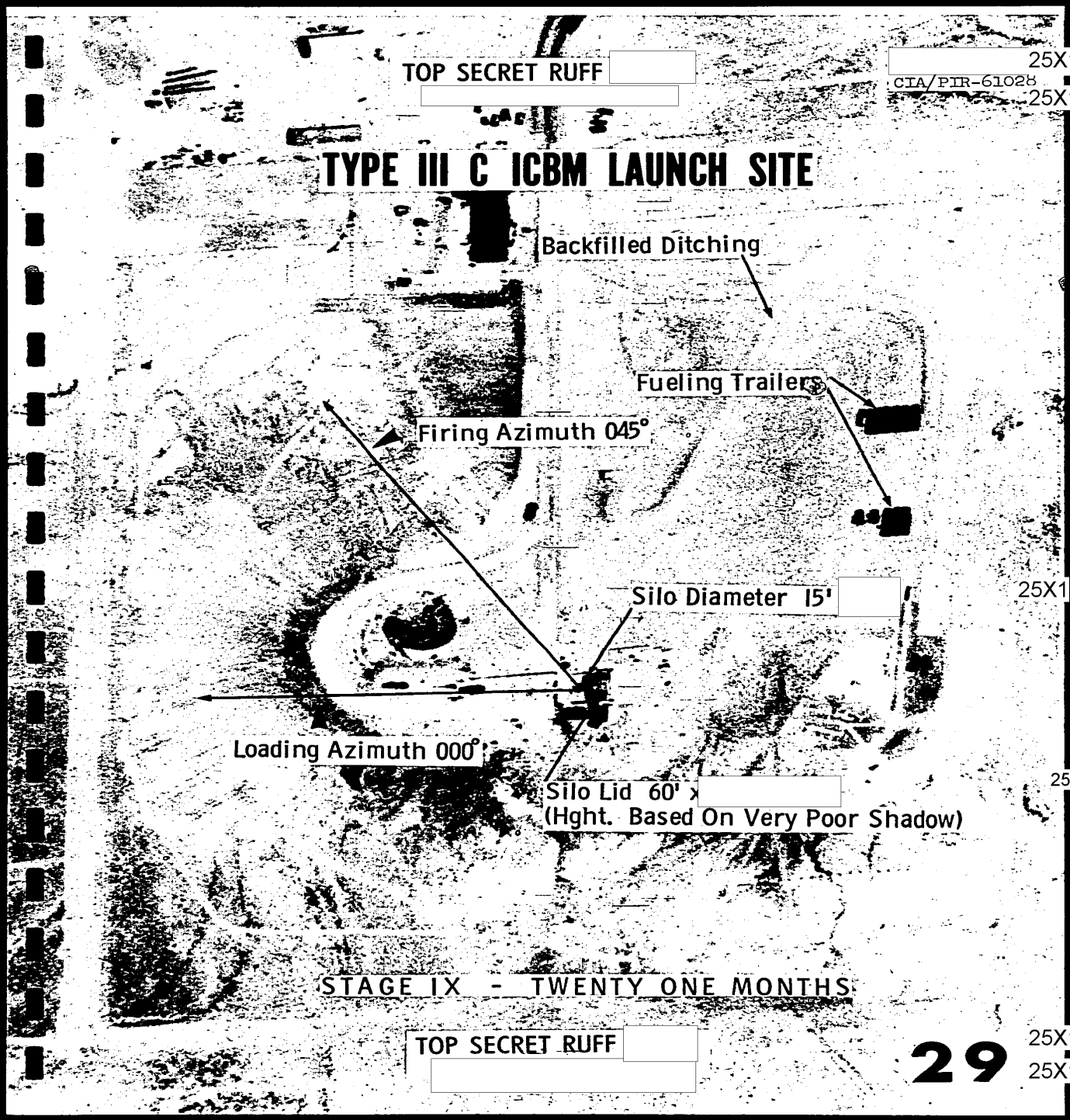
25X1

STAGE IX - FINAL BACKFILL AND GRADING (FINAL SIGNATURE)

Once the silo door is installed, a nominal period of two weeks has been alloted for final tidying up around the site. The final signature or outward completion of a Type III-C site (Figure 29) has been accomplished in a minimum of thirteen and a half months (Launch Area B-2, TTMTC). This is a rate of construction far exceeding anything likely to be attained at the deployed sites.

Figure 30 is an isodensimetric tracing of the open silo at Launch Area B-2, Tyuratam Missile Test Center, showing the probable location of the exhaust ports. Slight changes in tone, not detectable visually, are indicated by this technique which can scan the image at 1000 x magnification. A concept of how the venting is accomplished is shown in Figure 31. A possible seal is annotated for which no photographic evidence exists, however, good design practice would dictate that the silo liner be spring mounted and suspended from the headworks.





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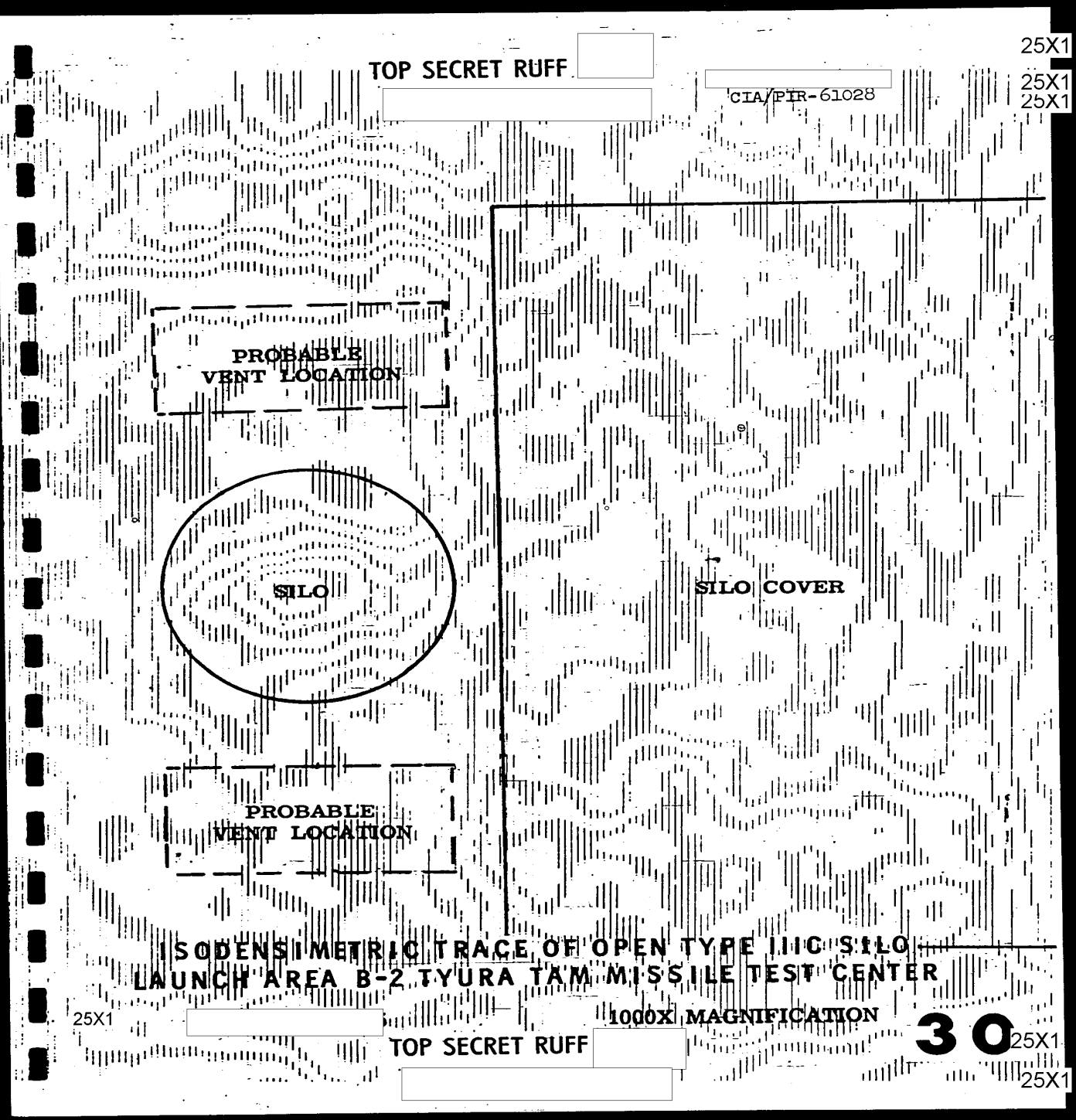


ISODENSIMETRIC TRACE OF OPEN TYPE IIIC SILO
LAUNCH AREA B-2 TYURA TAM MISSILE TEST CENTER

25X1

1000X MAGNIFICATION

TOP SECRET RUFF

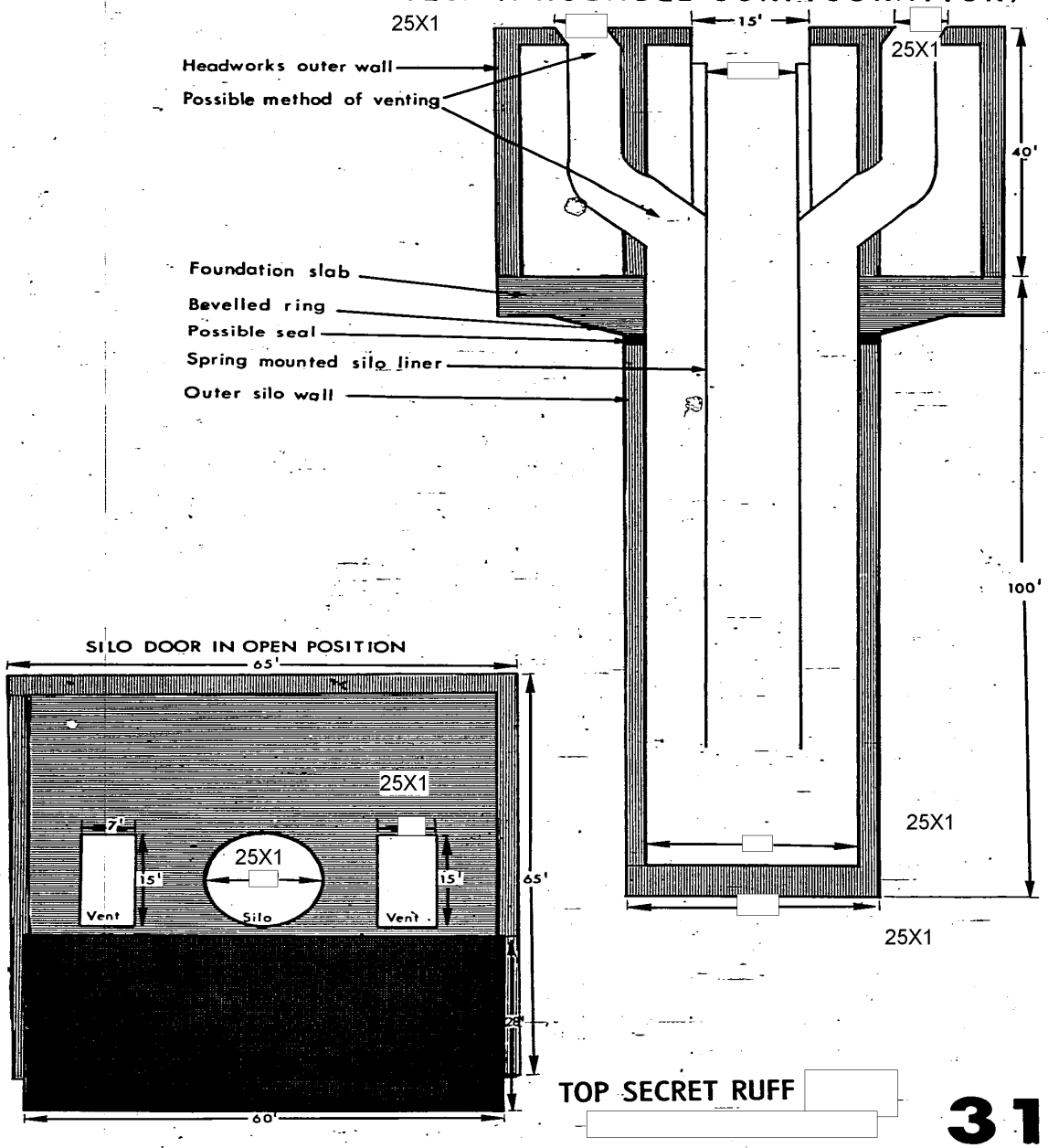
30

25X1

25X1

CIA/PIR-61028

TYPE IIIC ICBM SILO (PROBABLE CONFIGURATION)



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25X1

CIA/PIR-61028

CIA IMAGERY ANALYSIS DIVISION

25X1

Figure	Launch Site	Mission	Date	Classification

REQUIREMENTS

C-RR5-82,685
C-RR5-82,686

CIA/IAD PROJECTS

30826-5
30827-5

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S-019407
int/ date
INDEXED SB 23 Dec 65
CODED QCA
CHECKED 7 Dec 65
RELEASED

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