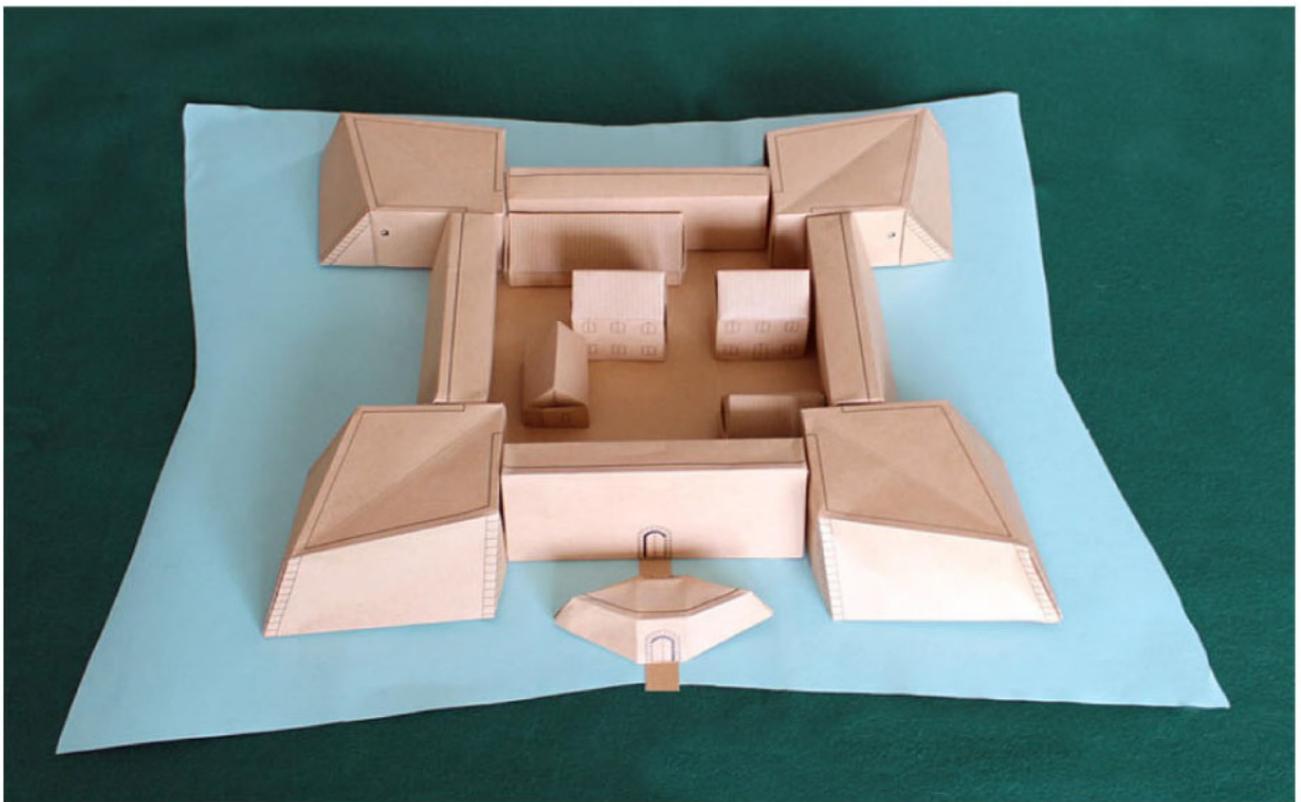
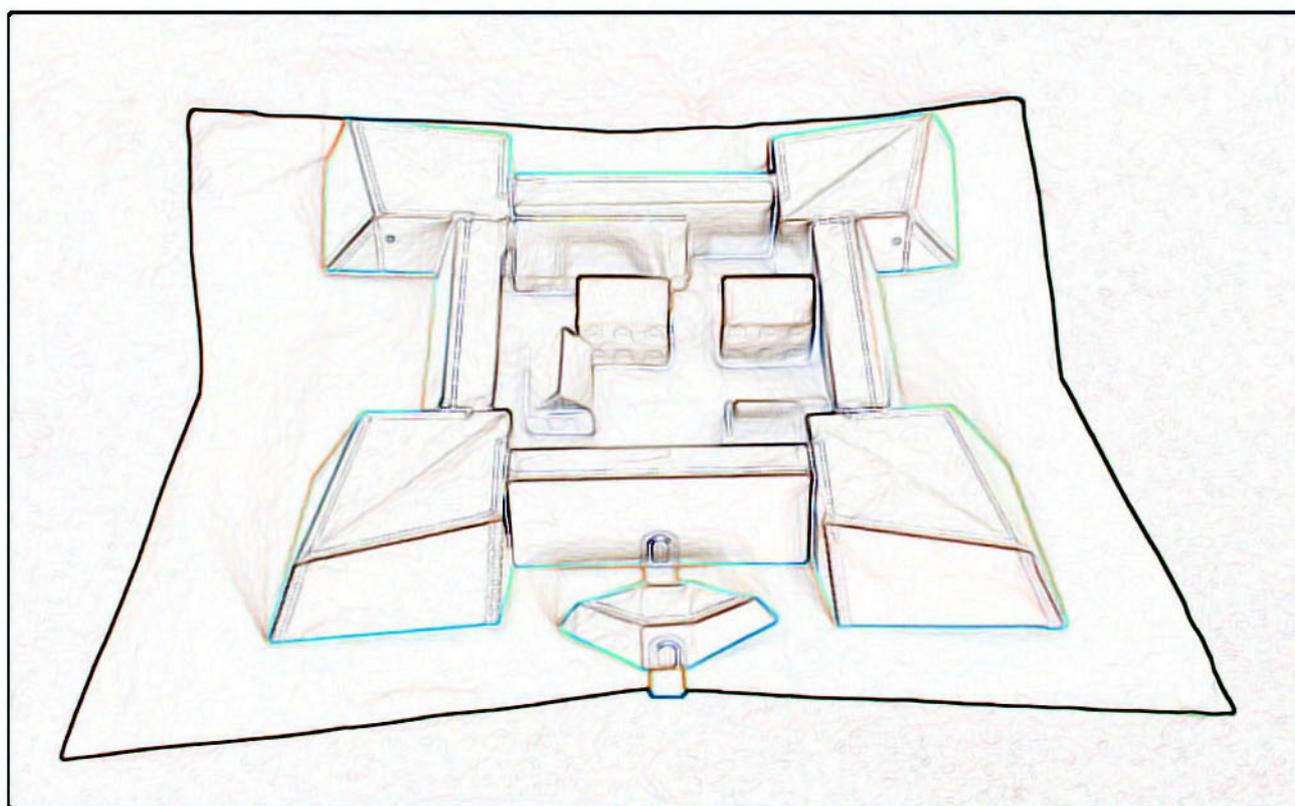
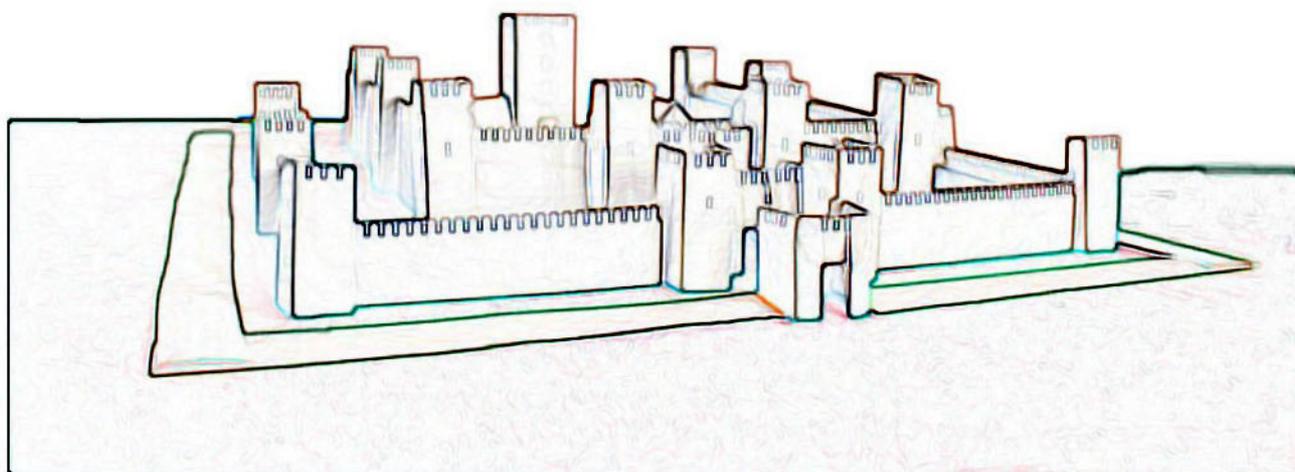


CASTELLI E FORTEZZE COMPONIBILI



Origami di Franco Pavarin

CASTELLI E FORTEZZE COMPONIBILI



Origami di Franco Pavarin

PREFAZIONE

Mi sono sempre interessato alla castellogia, forse perchè la regione dove sono nato, il Veneto, è molto dotata di città murate e bei castelli.

Infatti qualche anno fa ho scritto il "Manuale dell'architetto origamista" spiegando come realizzare castelli ed edifici un mattoncino alla volta.

Un lavoro certosino certo. E se il tempo o la pazienza non sono sufficienti?

Ecco che mi è venuta l'idea di creare gli elementi costitutivi del castello con singoli pezzi, semplificandone enormemente la creazione. Per ulteriore semplificazione ho disegnato i crease pattern di ogni singolo pezzo, partendo sempre dal foglio A4.

Infine ho dotato il libro di stringate spiegazioni sulle caratteristiche costruttive delle fortificazioni pensando che possano essere di una qualche utilità sia per un uso ludico che per un uso didattico.

Giugno 2023

Franco Pavarin

I have always been interested in castellogia, perhaps because the region where I was born, the Veneto, is very endowed with walled cities and beautiful castles.

In fact, a few years ago I wrote the "Manual of the origamist architect" explaining how build castles and buildings one brick at a time.

Certainly painstaking work. What if time or patience is not enough?

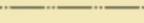
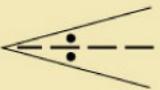
Here came the idea of creating the building blocks of the castle with individual pieces, greatly simplifying its creation. For further simplification I drew the crease patterns of each single piece, always starting from the A4 sheet.

Finally, I have equipped the book with concise explanations on the constructive characteristics of the fortifications thinking that they can be of some use both for recreational use than for educational use.

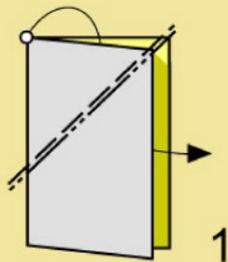
June 2023

Frank Pavarin

Simbologia origami

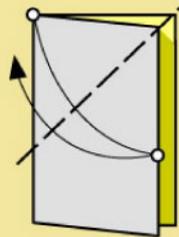
		Indicazione	Risultato 3D
	Piega a valle (piega bassa)		
	Piega a monte (piega alta)		
	Ruotate e piegate		
	Ruotate, piegate e riportate alla posizione iniziale		
	Ribaltate sull'asse verticale		
	Ribaltate sull'asse orizzontale		
	Ruotate di 180°		
	Piega bisettrice a valle		
	Figura ingrandita		

Realizzazione delle pieghe reverse



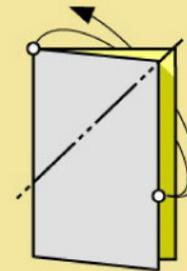
1

Eseguite una piega rovescia interna



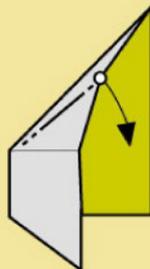
2

Una piega a valle



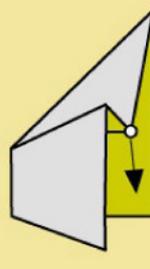
3

Ripiegate con piega a monte sulla medesima traccia



4

Aprite e rovesciate il verso della piega



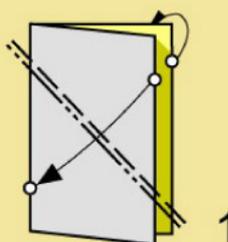
5

Inserite all' interno il vertice indicato



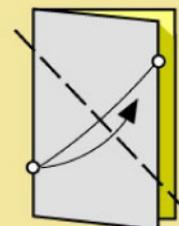
6

Piega rovescia interna ultimata



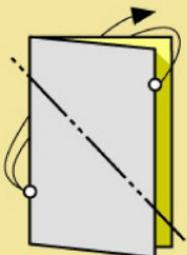
1

Eseguite una piega rovescia esterna



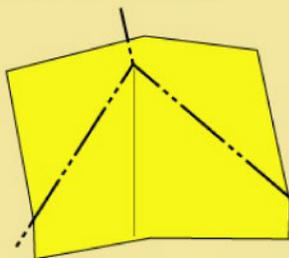
2

Una piega a valle



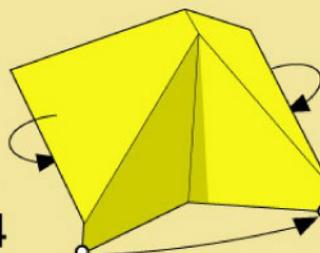
3

Ripiegate con piega a monte sulla medesima traccia



4

Aprite e rovesciate il verso della piega



5

Richiudete



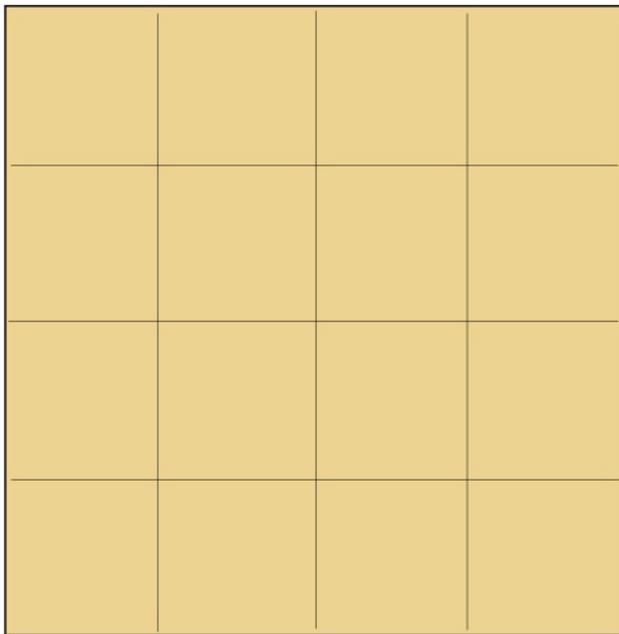
6

Piega rovescia esterna ultimata

FORMATI

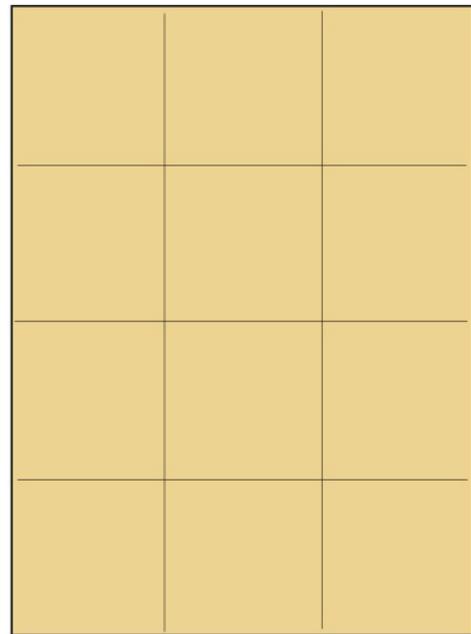
Gli elementi si costruiscono con fogli dimensionati sul modulo-base di 5x5cm.
Consiglio di adoperare carta da pacchi pesante o cartoncino leggero.

The elements are built with sheets sized on the 5x5 cm basic module.
I recommend using heavy wrapping paper or lightweight cardstock.



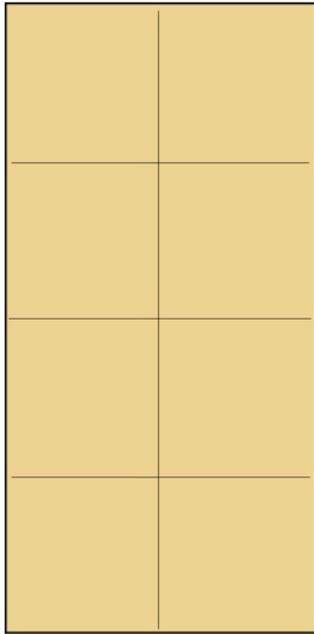
A 20x20 cm

Cortina alta
Porta su torre chiusa
Bastione
Cortina bastionata



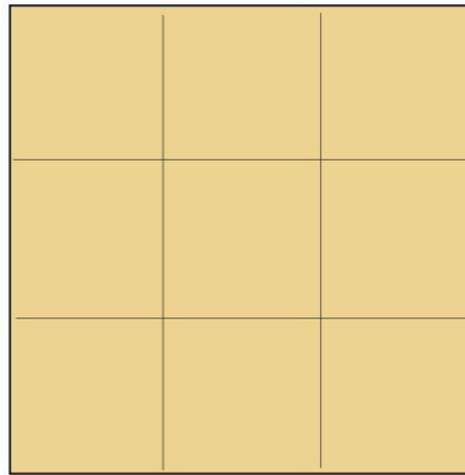
B 15x20 cm

Cortina alta corta

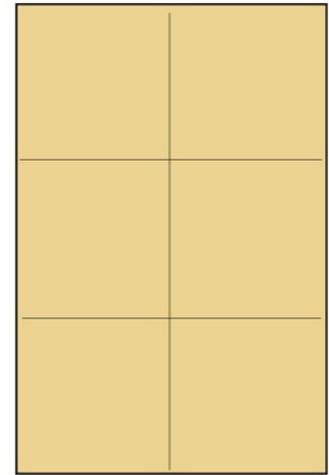


C 10x20 cm

Mastio
Scuderie
Magazzini
Cortina bassa
Porta su torre aperta
Rivellino

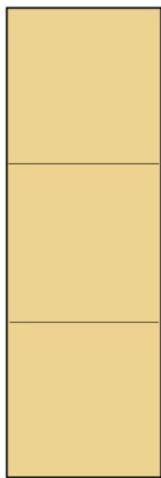


D 15x15 cm



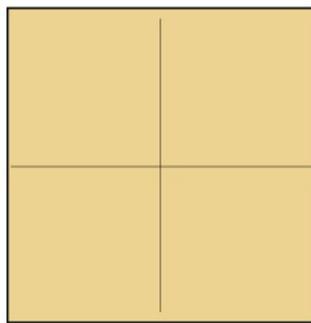
E 10x15 cm

Cortina bassa corta
Casa grande
Rivellino bastionato



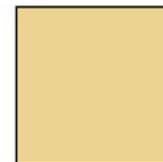
F 5x15 cm

Torre chiusa



G 10x10 cm

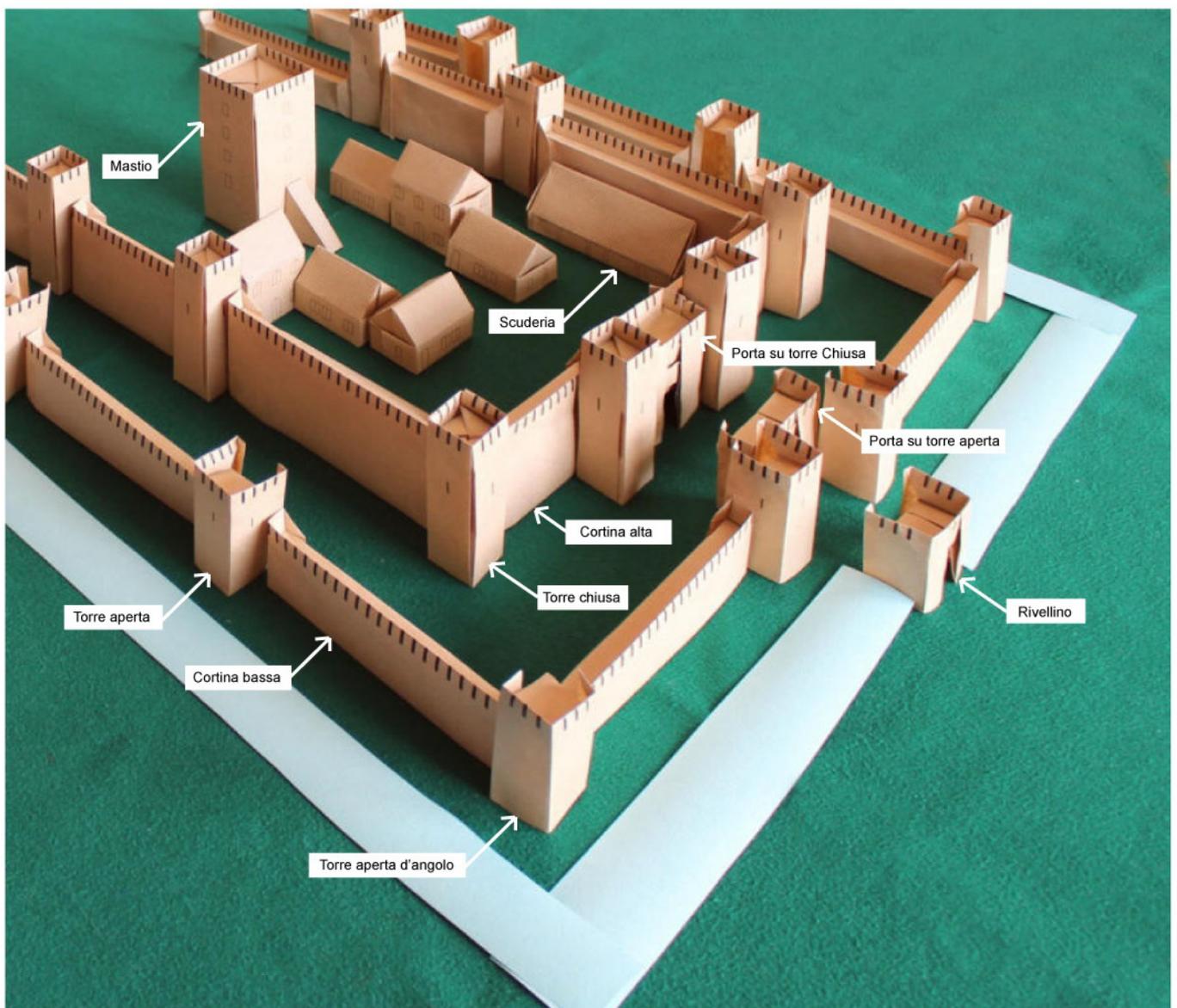
Casa piccola
Cortina bassa corta
Torre aperta
Torre aperta d'angolo



BASE 5x5 cm

Scala mastio

NOMENCLATURA



Caratteristiche costruttive delle fortificazioni medioevali

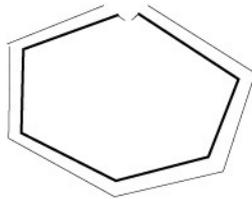
Le caratteristiche costruttive base per costruire una fortificazione sono conosciute fin dai tempi più remoti delle civiltà. Sostanzialmente, dato che le armi da getto erano frecce o pietre, chi stava più in alto era avvantaggiato, quindi l'altezza era il suo primo requisito.

Le cose cambiano completamente con l'invenzione della polvere da sparo, e già i primi veri cannoni, circa nel 1400, sono in grado di provocare brecche nelle cortine.

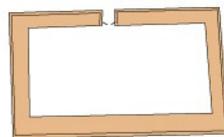
ELENCAZIONE, PER PASSAGGI SUCCESSIVI, DEGLI INTERVENTI MIGLIORATIVI DELLA SICUREZZA DI UN CASTELLO

Un castello è tanto più sicuro quante più di queste caratteristiche ha.

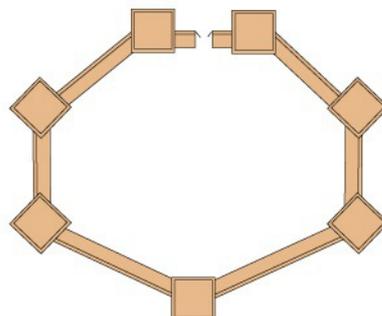
- 1) Le prime fortificazioni erano costituite da palizzate costruite su un terrapieno



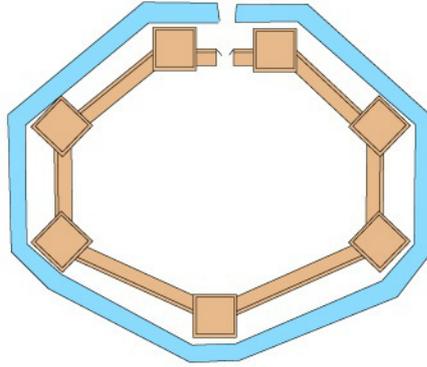
- 2) Si costruisce uno spesso muro in pietra o mattoni con in cima un cammino di ronda protetto da un parapetto, detto cortina



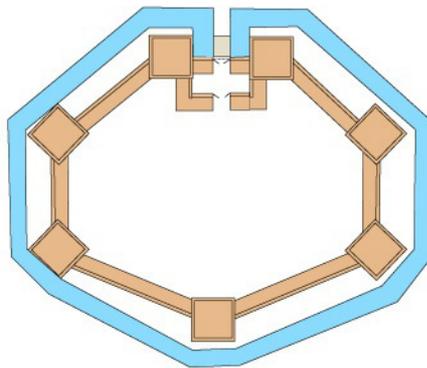
- 3) Si aggiungono le torri, che se sono sporgenti dalla cortina, permettono al difensore di colpire sui fianchi l'aggressore che tenta di scalarla.



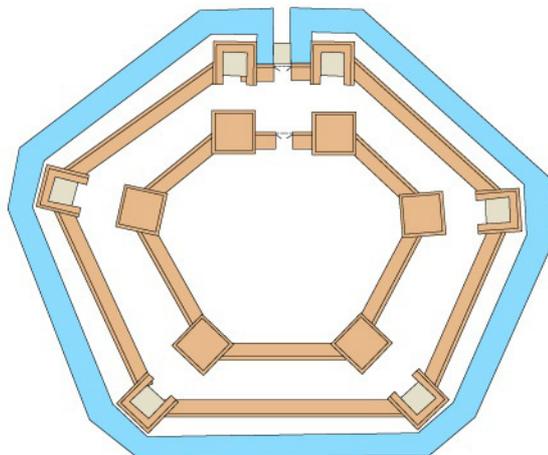
- 4) Costruzione di un fossato con acqua. Oltre che costituire un ostacolo, serviva per scoraggiare lo scavo di gallerie



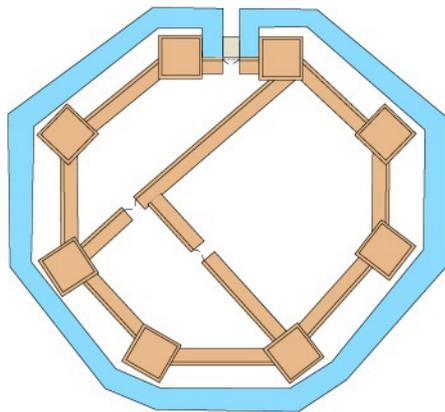
- 5) Si presta particolare attenzione alla protezione degli accessi: per entrare si deve superare una serie di chiusure successive, come ponti levatoi, saracinesche e porte a battenti. Ottimi esempi le porte delle città romane.



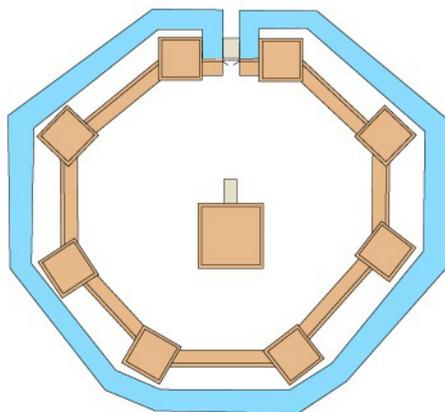
- 6) Doppia cinta muraria. La cinta esterna ovviamente deve essere più bassa di quella interna e le torri devono essere aperte in gola, per permettere ai difensori di colpire con frecce gli aggressori che eventualmente scalando se ne impossessano.



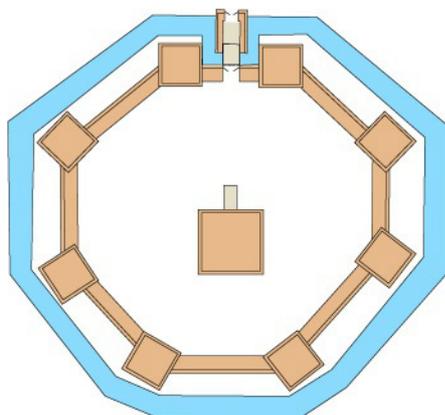
7) Suddivisione in più cortili. Si costringe l'aggressore a conquistare un cortile alla volta.



8) Costruzione di un mastio. Si tratta di una torre interna più alta e più robusta destinata all'ultima estrema resistenza. Provvista di cibo ed acqua, spesso aveva l'accesso rialzato per impedire all'assalitore di usare un ariete.



9) Costruzione del rivellino. Si tratta di una torre bassa e aperta posta anteriormente alla porta d'accesso alla fortezza avente la funzione di impedire all'assalitore di accostarvi un ariete o una torre mobile.



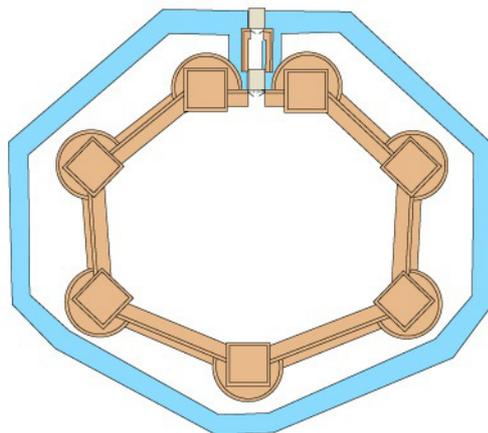
METODI DI CONQUISTA DI UN CASTELLO

- Assalto diretto: con scale si cercava di scavalcare la cortina.
- Sfondamento della porta o della cortina mediante ariete o torre mobile.
- Costruzione di un tunnel per entrare nella fortezza.
- Galleria di mina. Si costruiva un tunnel sotto una sezione di cortina e si puntellava. L'incendio dei puntelli ne provocava il crollo.
- Assedio prolungato, cercando la presa per fame.

Il periodo di transizione 1400-1500

Si cerca di adeguare le fortificazioni alla nuova minaccia costituita dai primi cannoni, aggiornandole con i seguenti interventi:

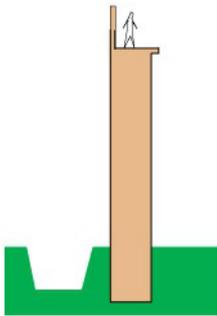
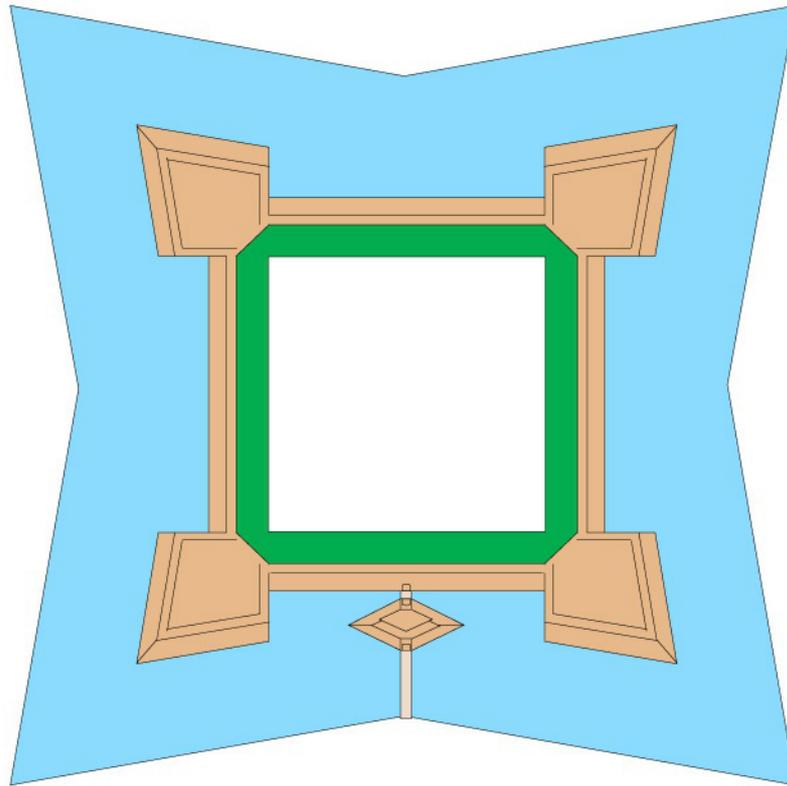
- Vengono cimate le torri (vengono abbassate) con conseguente abbandono della difesa piombante.
- Si scarpano le cortine (vengono allargate alla base).
- Si aggiungono esternamente alle torri altre nuove torri più basse e tonde, in grado di resistere meglio alle cannonate)



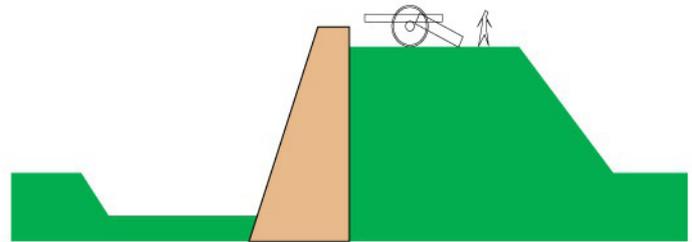
La fortezza bastionata 1500-1700

Le bocche da fuoco diventano talmente potenti che le fortificazioni medioevali non sono più in grado di resistere. Quindi vengono edificate delle fortezze in base a nuovi criteri costruttivi:

- La cortina viene costruita più bassa, larga, scarpata, senza merlatura e con all'interno un largo terrapieno.
- Al posto delle torri si costruiscono i bastioni, alti come la cortina ma con forma romboidale, con finestre laterali per eseguire il tiro di fiancheggiamento con i cannoni.
Ci sono fortezze con molti bastioni, ad esempio Palmanova ne ha nove.
- Il fossato viene costruito molto più largo.
- Il rivellino assume anch'esso una forma romboidale. Spesso ne venivano costruiti più di uno, in modo da costringere l'assediate a conquistarli tutti prima di avvicinarsi all'accesso.



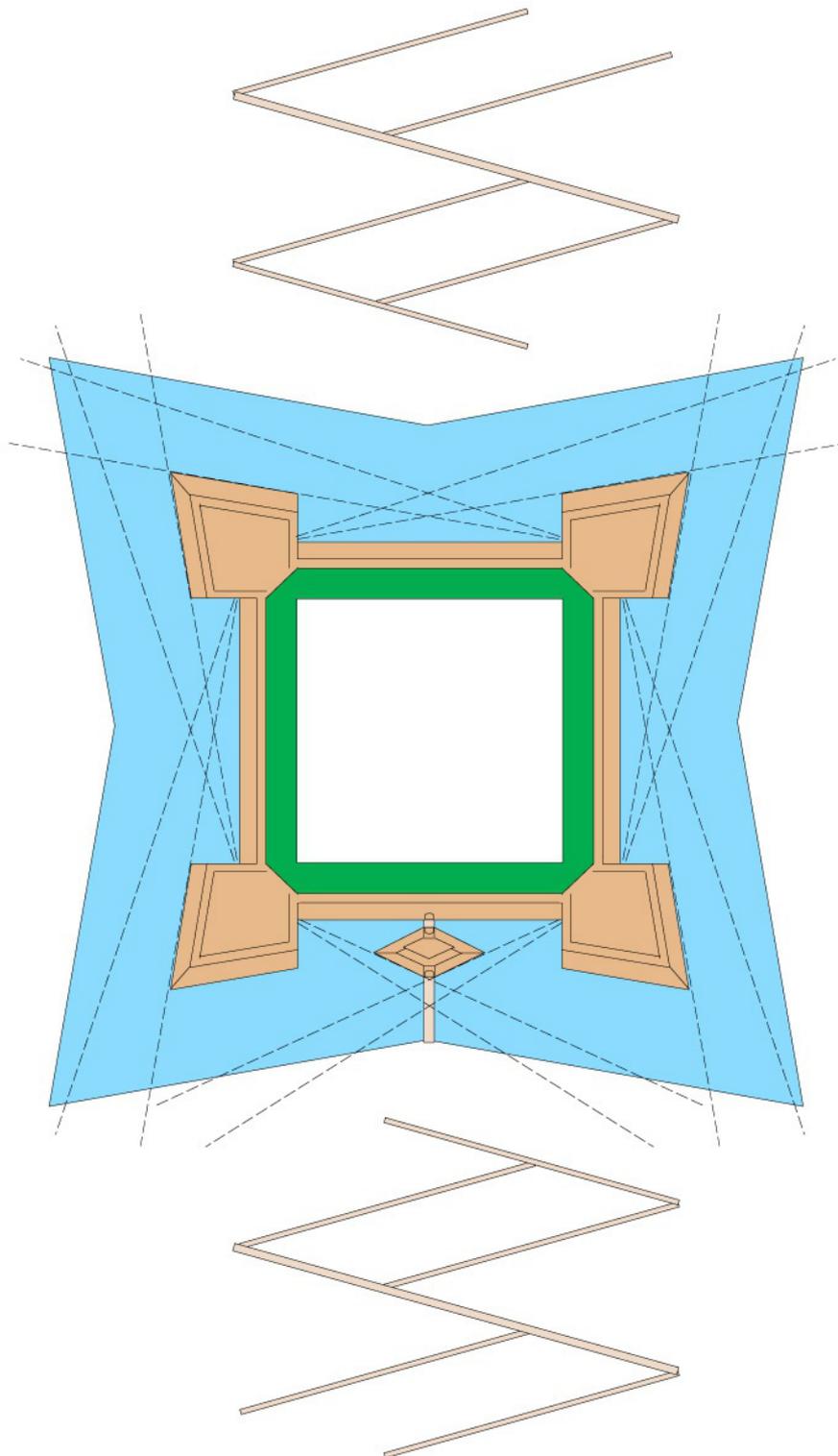
Sezione di una cortina medioevale



Sezione di una cortina bastionata

METODI DI CONQUISTA DI UNA FORTEZZA BASTIONATA

- Assedio prolungato, cercando la presa per fame.
- Breccia con bocche da fuoco. Si demolisce un bastione a cannonate.
- Breccia con galleria. Dopo aver prosciugato il fossato, si procede con trincee e si scava una galleria sottostante ad un bastione, che si demolisce poi con esplosivo.



SVOLGIMENTO DELLE OPERAZIONI D' ASSEDIO DI UNA FORTEZZA BASTIONATA

Il difensore impedisce all'aggressore di avvicinarsi per scalare la cortina sparando cariche a mitraglia (sfere di metallo, chiodi e rottami) incrociate lambendo i bastioni.

L'aggressore quindi cerca di avvicinarsi il più possibile ad un bastione protetto da trincee per poter, dopo aver precedentemente prosciugato il fossato, scavare una galleria sottostante ad un bastione. L'aggressore cumula esplosivo la cui detonazione fa crollare il bastione.

CONSTRUCTION CHARACTERISTICS OF MEDIEVAL FORTIFICATIONS

The basic construction characteristics for building a fortification have been known since the earliest times of civilization. Basically, since projectile weapons were arrows or stones, whoever was taller had an advantage, so height was his first requirement.

Things changed completely with the invention of gunpowder, and already the first real cannons, around 1400, were able to cause breaches in the curtains.

LISTING, FOR NEXT STEPS, OF THE IMPROVEMENTS OF THE SECURITY OF A CASTLE

A castle is all the more secure the more of these characteristics it has.

- 1) The first fortifications consisted of palisades built on an embankment
- 2) A thick stone or brick wall is built with a patrol path on top protected by a parapet, called a curtain
- 3) The towers are added, which if they protrude from the curtain, allow the defender to hit the attacker who tries to climb it from the sides.
- 4) Construction of a ditch with water. In addition to being an obstacle, it served to discourage the excavation of tunnels
- 5) Particular attention is paid to the protection of accesses: to enter, one must overcome a series of successive closures, such as drawbridges, rolling shutters and swing doors.
Excellent examples are the gates of Roman cities.
- 6) Double wall. The outer wall must obviously be lower than the inner one and the towers must be opened in the throat, to allow the defenders to hit with arrows the aggressors who eventually climb if they take possession.
- 7) Subdivision into several courtyards. The attacker is forced to conquer one courtyard at a time.
- 8) Construction of a keep. It is a taller and sturdier inner tower intended for the latter extreme resistance. Provided with food and water, it often had raised access to prevent the assailant to use a battering ram.
- 9) Construction of the ravelin. It is a low and open tower placed in front of the access door to the fortress with the function of preventing the assailant from approaching it with a ram or mobile tower.

METHODS OF CONQUERING A CASTLE

- Direct assault: with ladders they tried to climb over the curtain.
- Breakthrough of the door or curtain using a ram or mobile tower.
- Construction of a tunnel to enter the fortress.
- Mine gallery. A tunnel was built under a section of curtain wall and shored up. The fire on the props caused it to collapse.
- Prolonged siege, seeking the grip by starvation.

THE TRANSITION PERIOD 1400-1500

An attempt was made to adapt the fortifications to the new threat posed by the first cannons, updating them with the following interventions:

- The towers are topped (they are lowered) with consequent abandonment of the plumbing defence.
- The curtains are shoed (they are widened at the base).
- Added externally to the towers other new towers, lower and rounder, able to better resist the cannon fire)

THE BASTION FORTRESS 1500-1700

The guns become so powerful that the medieval fortifications are no longer able to resist. Then fortresses are built on the basis of new construction criteria: - The curtain wall is built lower, wider, with a slope, without crenellations and with an internal wide embankment.

- In place of the towers, bastions are built, as tall as the curtain wall but with a rhombus shape, with side windows for flanking cannon fire.

There are fortresses with many bastions, for example Palmanova has nine.

- The moat is built much wider.
- The ravelin also takes on a rhomboidal shape. Often more than one was built, so as to force the besieger to conquer them all before approaching the approach.

METHODS OF CONQUERING A BASTIONED FORTRESS

- Prolonged siege, seeking the grip by starvation.
- Breach with guns. A bastion is demolished with cannon fire.
- Breach with gallery. After having drained the moat, trenches and excavations are carried out a gallery below a bastion, which is then demolished with explosives.

PERFORMANCE OF SIEGE OPERATIONS OF A BASTIONED FORTRESS

The defender prevents the aggressor from approaching to scale the curtain by firing machine gun charges (balls of metal, nails and scrap) crossed by lapping the ramparts.

The aggressor then tries to get as close as possible to a bastion protected by trenches in order to be able, after having previously drained the moat, to dig a tunnel underneath a bastion.

The attacker stacks explosives whose detonation causes the rampart to collapse.

CARACTERÍSTICAS CONSTRUCTIVAS DE LAS FORTIFICACIONES MEDIEVALES

Las características constructivas básicas para construir una fortificación se conocen desde los primeros tiempos de la civilización. Básicamente, dado que las armas de proyectiles eran flechas o piedras, quien fuera más alto tenía una ventaja, por lo que la altura era su primer requisito.

Las cosas cambiaron por completo con la invención de la pólvora, y ya los primeros cañones reales, hacia 1400, eran capaces de abrir brechas en las cortinas.

LISTADO, PARA PRÓXIMOS PASOS, DE LAS MEJORAS DEL SEGURIDAD DE UN CASTILLO

Un castillo es tanto más seguro cuanto más de estas características tiene.

- 1) Las primeras fortificaciones consistían en empalizadas construidas sobre un terraplén
- 2) Se construye un muro grueso de piedra o ladrillo con un camino de patrulla en la parte superior protegido por un parapeto, llamado cortina.
- 3) Se añaden las torres, que si sobresalen de la cortina, permiten al defensor golpear al atacante que intenta escalarla por los lados.
- 4) Construcción de una zanja con agua. Además de ser un obstáculo, sirvió para desanimar la excavación de túneles
- 5) Se presta especial atención a la protección de los accesos: para entrar hay que superar una serie de cierres sucesivos, como puentes levadizos, persianas y puertas batientes.
Excelentes ejemplos son las puertas de las ciudades romanas.
- 6) Pared doble. Evidentemente, la pared exterior debe ser más baja que la interior y la las torres deben abrirse en la garganta, para permitir que los defensores golpeen con flechas a los agresores que eventualmente subirán si toman posesión.
- 7) Subdivisión en varios patios. El atacante se ve obligado a conquistar un patio a la vez.
- 8) Construcción de un torreón. Es una torre interior más alta y resistente destinada a estos últimos. resistencia extrema. Provisto de alimentos y agua, a menudo había elevado el acceso para evitar el agresor a utilizar un ariete.
- 9) Construcción del revellín. Es una torre baja y abierta colocada frente a la puerta de acceso a la fortaleza con la función de impedir que el asaltante se acerque a ella con un ariete o torre móvil.

MÉTODOS DE CONQUISTAR UN CASTILLO

- Asalto directo: con escaleras intentaron pasar por encima de la cortina.
- Rompimiento de la puerta o cortina mediante ariete o torre móvil.
- Construcción de un túnel para acceder a la fortaleza.
- Galería de minas. Se construyó un túnel debajo de una sección de muro cortina y se reforzó. El fuego en los puntales hizo que se derrumbara.
- Asedio prolongado, buscando el control por inanición.

EL PERÍODO DE TRANSICIÓN 1400-1500

Se intentó adaptar las fortificaciones a la nueva amenaza que suponían los primeros cañones, actualizándolas con las siguientes intervenciones: -Se

rematan las torres (se bajan) con el consiguiente abandono de la defensa cañera.

- Las cortinas están calzadas (son ensanchadas en la base).
- Añadidas externamente a las torres otras torres nuevas, más bajas y redondas, capaces de resistir mejor el fuego de los cañones)

LA FORTALEZA DEL BASTIÓN 1500-1700

Los cañones se vuelven tan poderosos que las fortificaciones medievales ya no pueden resistir. Luego se construyen fortalezas en base a criterios de nueva construcción: - El muro cortina se construye más bajo, más ancho, con pendiente, sin almenas y con un interior

amplio terraplén.

- En lugar de las torres se construyen baluartes, tan altos como el muro cortina pero con forma de rombo, con ventanas laterales para flanquear el fuego de los cañones.

Hay fortalezas con muchos baluartes, por ejemplo Palmanova tiene nueve.

- El foso está construido mucho más ancho.
- El revellín también adquiere forma romboidal. A menudo se construyó más de uno, para obligar al sitiador a conquistarlos a todos antes de acercarse.

MÉTODOS PARA CONQUISTAR UNA FORTALEZA BALUARTADA

- Asedio prolongado, buscando el control por inanición.
- Infracción con armas de fuego. Un bastión es demolido con fuego de cañón.
- Incumplimiento con galería. Después de haber drenado el foso, se realizan trincheras y excavaciones una galería debajo de un bastión, que luego es demolido con explosivos.

REALIZACIÓN DE OPERACIONES DE ASEDIO A UNA FORTALEZA BALUARTADA

El defensor impide que el agresor se acerque a escalar el telón disparando cargas de ametralladora (bolas de metal, clavos y chatarra) atravesadas lamiendo las murallas.

El agresor trata entonces de acercarse lo más posible a un baluarte protegido por trincheras para poder, después de haber vaciado previamente el foso, cavar un túnel debajo de un baluarte.

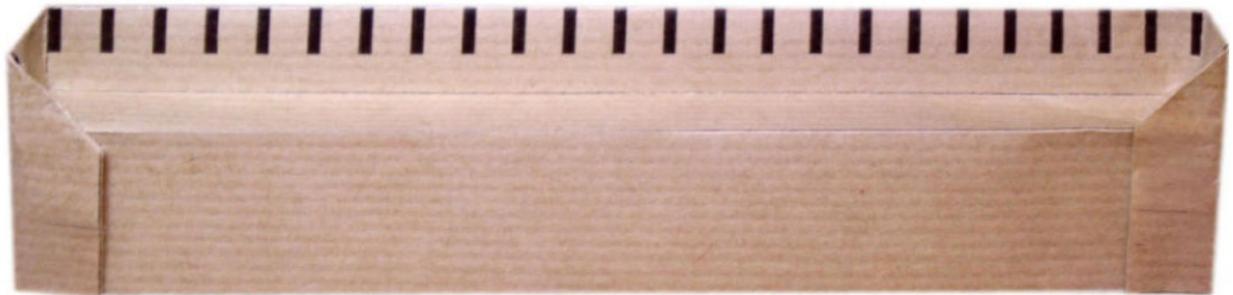
El atacante apila explosivos cuya detonación hace que la muralla se derrumbe.

CORTINA BASSA

LOW CURTAIN WALL

CORTINA BAJA

Formato C 10x20



Costruita con mattoni o pietre, Alla sommità è protetta da un cammino di ronda con merli guelfi (sostenitori del papa) o ghibellini (sostenitori dell'imperatore).

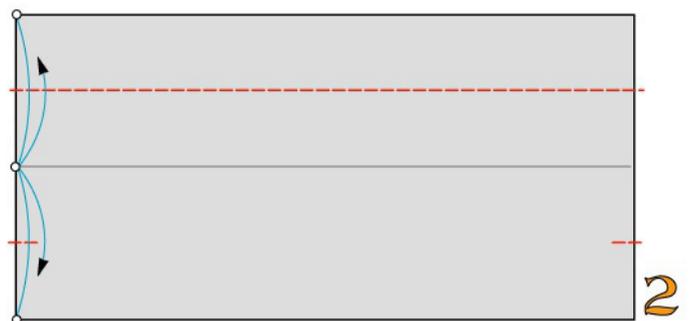
I merli guelfi sono rettangolari  mentre quelli ghibellini sono a coda di rondine 
Costituisce la parte più esterna di un castello con due cinte di mura ed era più bassa per permettere ai difensori della cinta più interna di colpire con frecce l'assalitore che se ne fosse eventualmente impossessato.

Built with bricks or stones, the top is protected by a walkway with Guelph merlons (supporters of the pope) or Ghibellines (supporters of the emperor).

The Guelph merlons are rectangular  while the Ghibelline ones are dovetailed 
It constitutes the outermost part of a castle with two walls and was lower to allow the defenders of the innermost wall to hit the assailant with arrows if he eventually took possession of it.



1 piega a valle

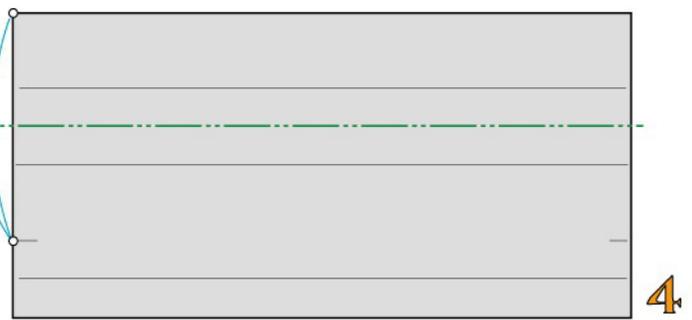


3 pieghe a valle, di cui 2 piccole



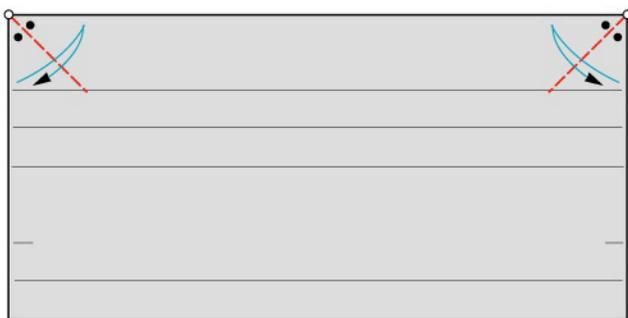
1 piega a valle

3



1 piega a monte

4



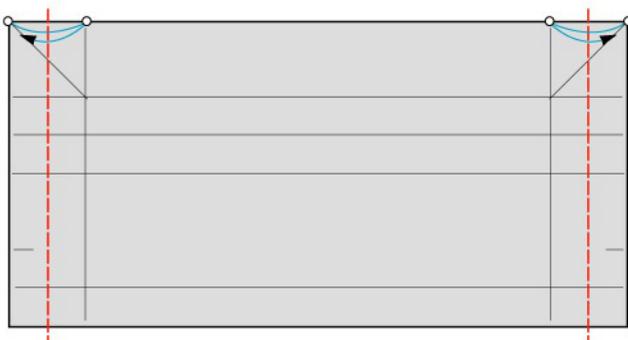
2 pieghe bisettrici a valle

5



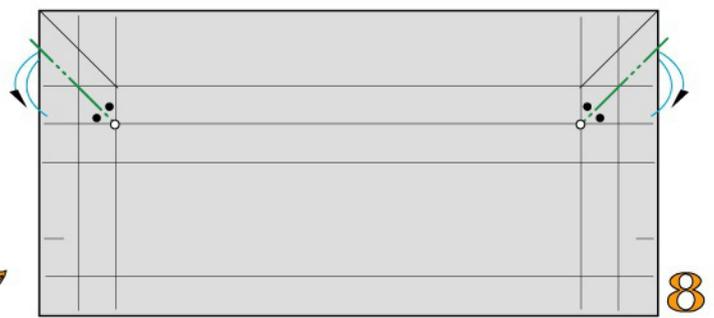
2 pieghe bisettrici a valle

6



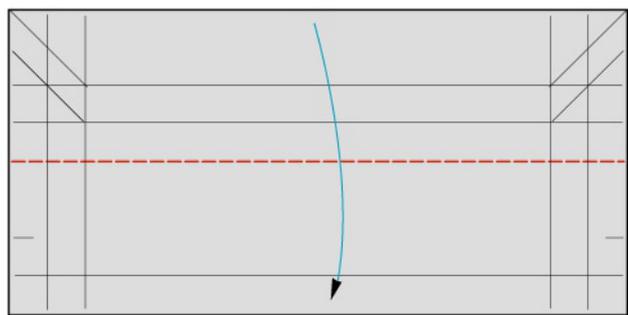
2 pieghe a valle

7



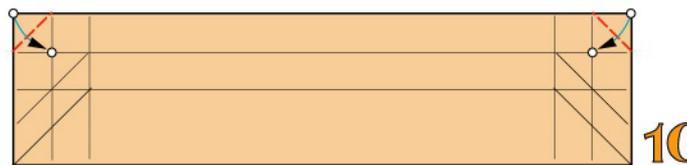
2 pieghe bisettrici a monte

8



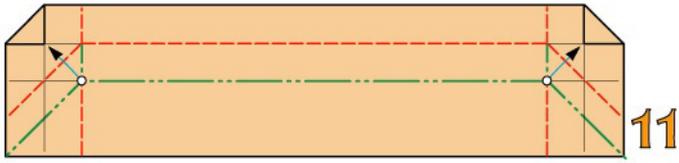
Ripiegate a valle

9

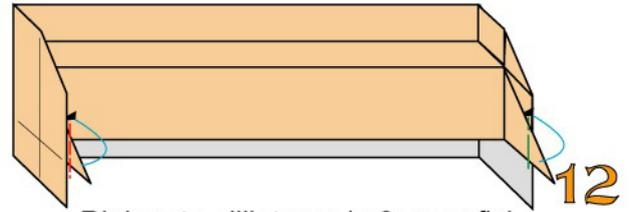


2 pieghe diagonali a valle

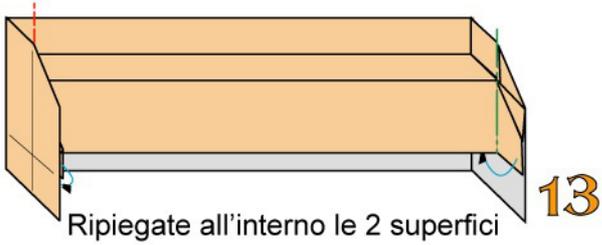
10



Ripiegando a valle a monte modellate 3D



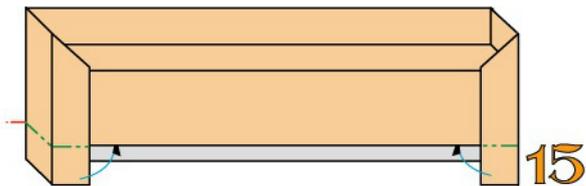
Ripiegate all'interno le 2 superfici



Ripiegate all'interno le 2 superfici



Ruotate le 2 superfici



Ripiegate il bordo all'interno



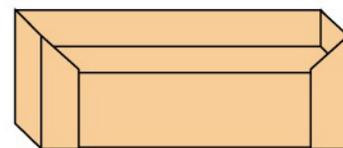
Cortina bassa ultimata

CORTINA BASSA CORTA

Partite dal formato E (10x15)



Le pieghe sono uguali a quelle appena viste

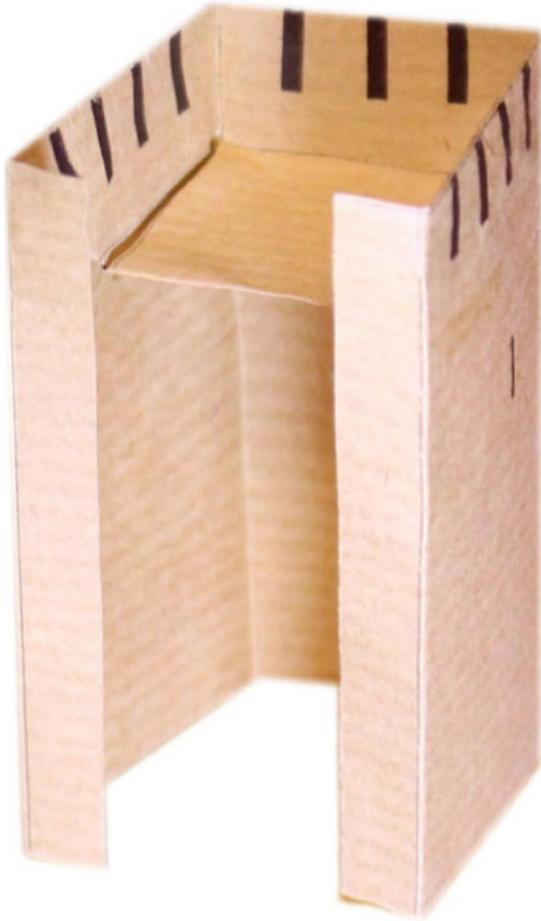


Cortina bassa corta ultimata

TORRE APERTA

OPEN TOWER

Partite dal Formato "G" 10x10

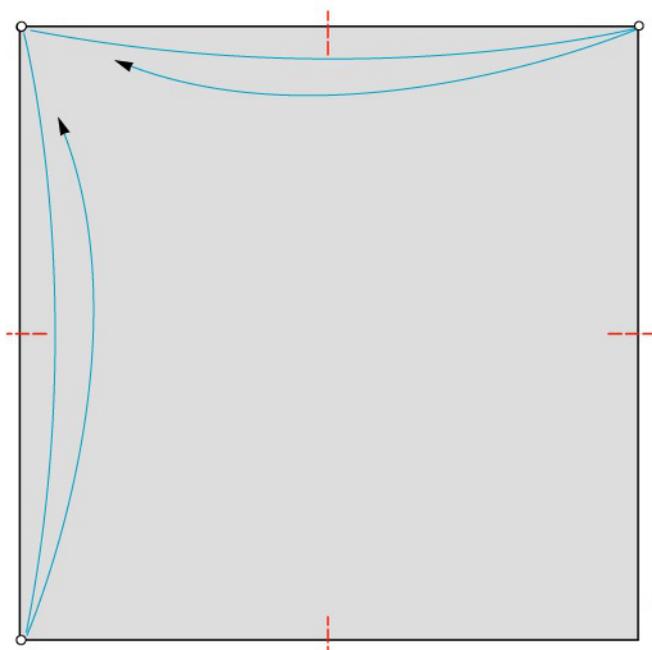


TORRE ABIERTA

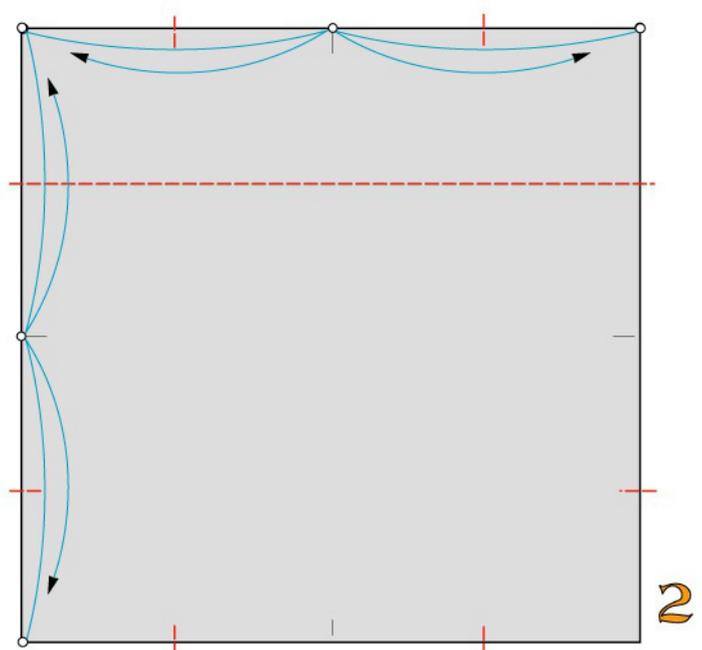
Costituisce la parte più esterna di un castello con due cinte di mura ed era più bassa per permettere ai difensori delle torri della cinta più interna di colpire con frecce l'assalitore che se ne fosse eventualmente impossessato.

Era provvista di feritoie laterali per colpire sui fianchi gli assalitori che avessero tentato la scalata della cortina. I solai sono costruiti con travi e tavolato di legno.

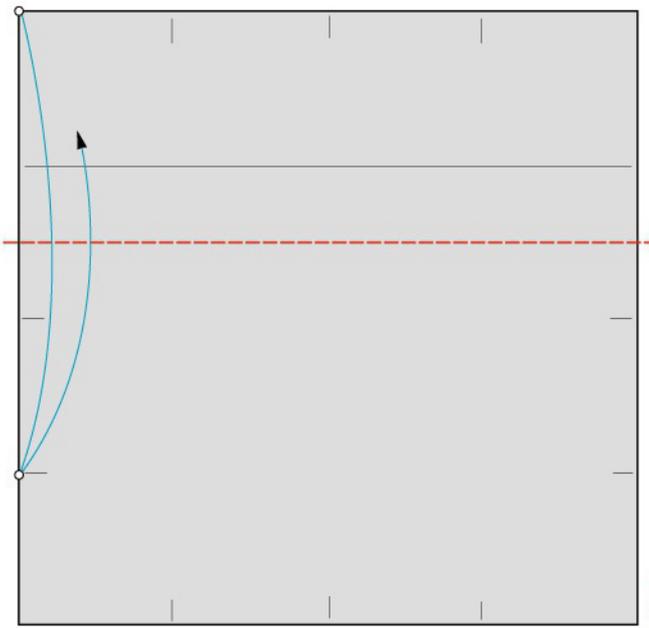
It constitutes the outermost part of a castle with two walls and was lower to allow the defenders of the towers of the innermost wall to hit the assailant with arrows if he eventually took possession of them. It was provided with side loopholes to hit attackers on the sides who had attempted to climb the curtain.



4 piccole pieghe a valle

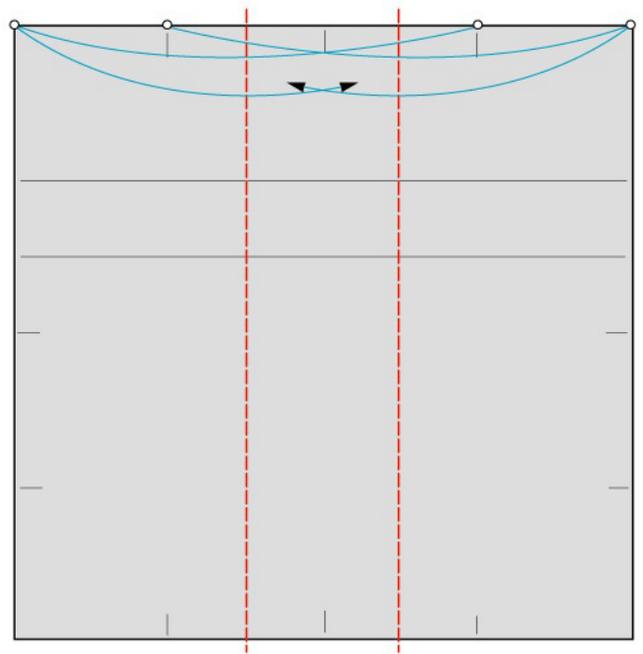


4 pieghe a valle, di cui 6 piccole



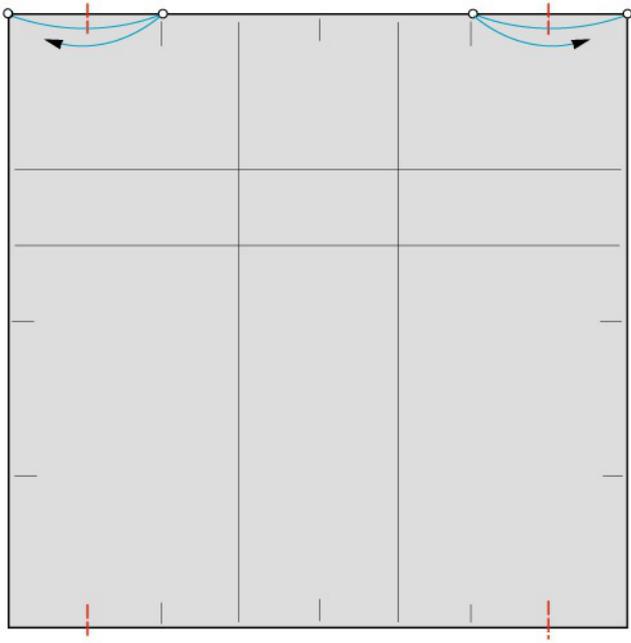
3

1 piega a valle



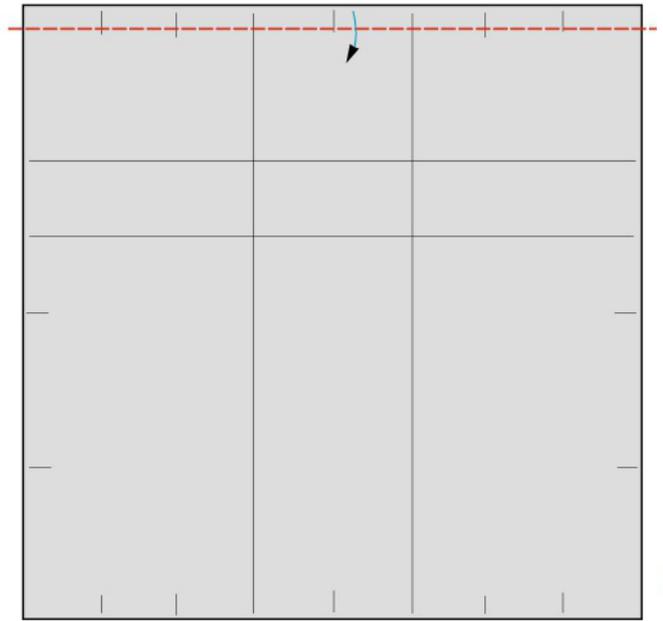
4

2 pieghe a valle



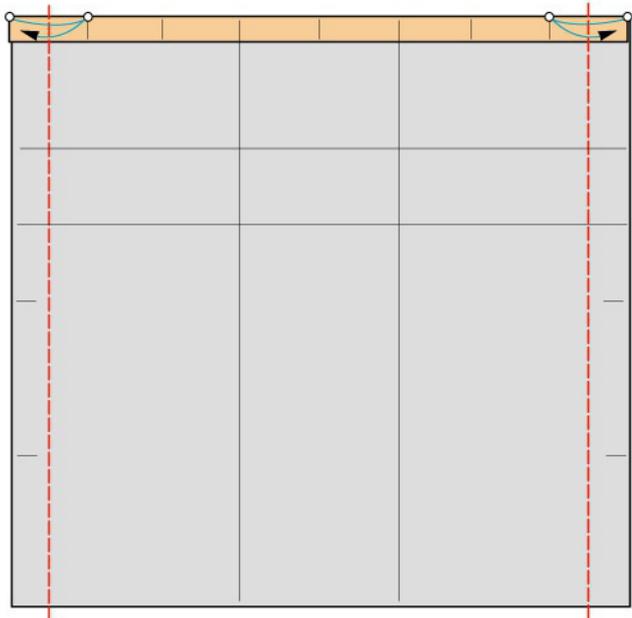
5

4 piccole pieghe a valle



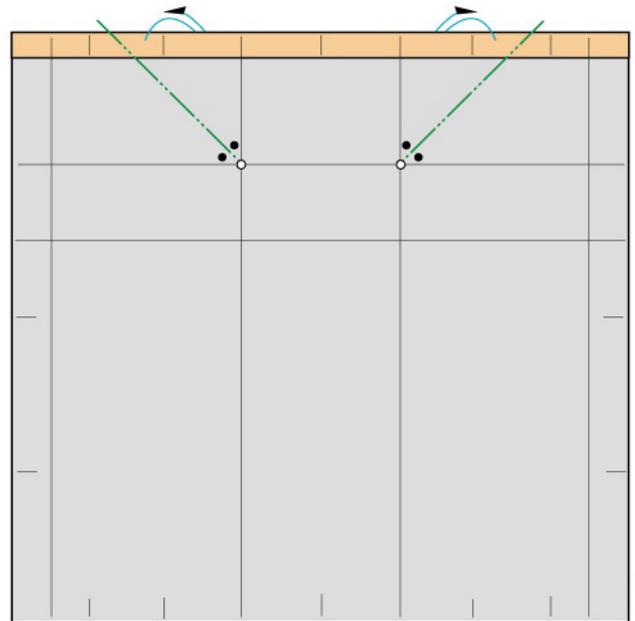
6

1 piega a valle



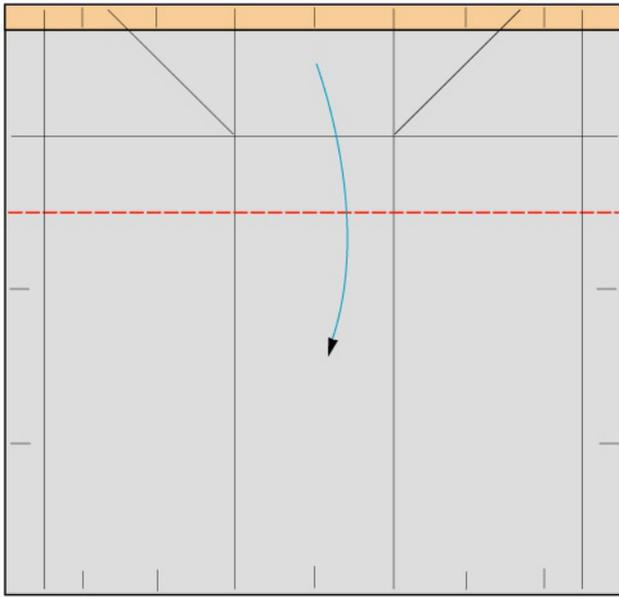
7

2 pieghe a valle

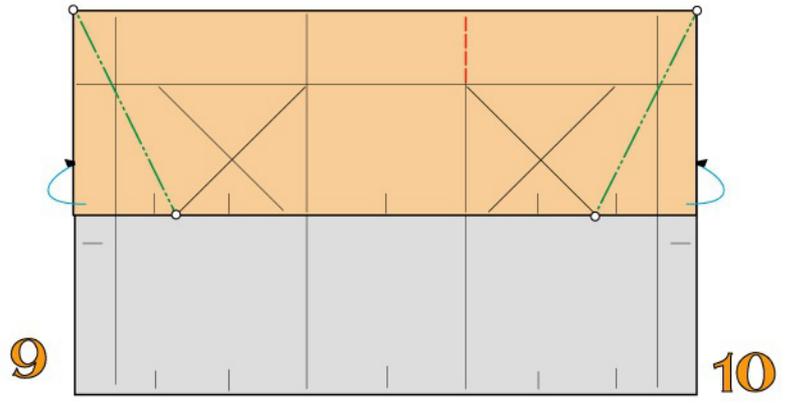


8

4 pieghe bisettrici a valle



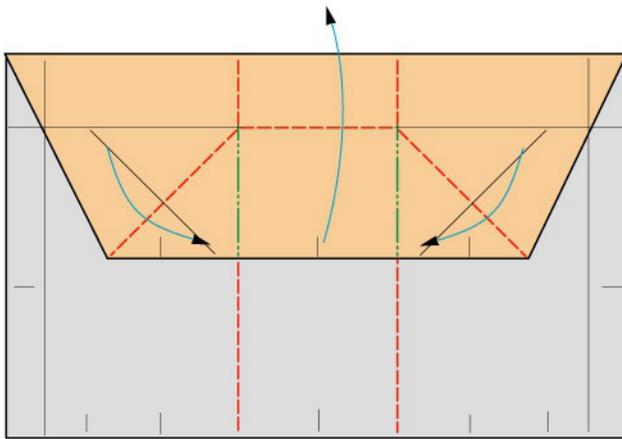
1 piega a valle



9

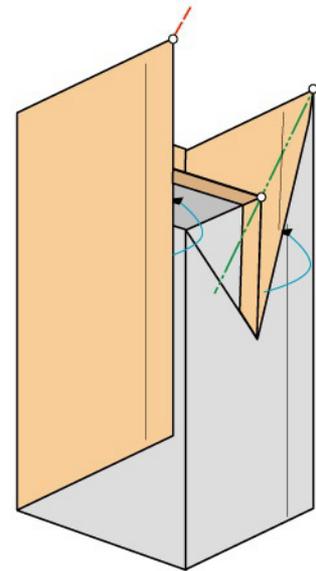
2 pieghe a monte

10



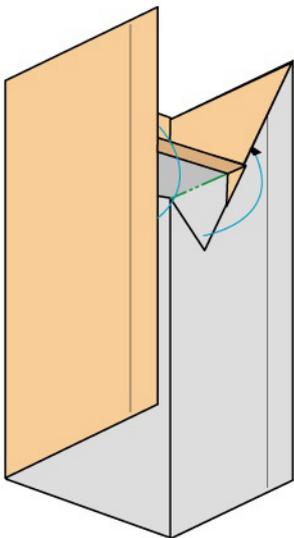
11

Ripiegando a valle e a monte, modellate 3D



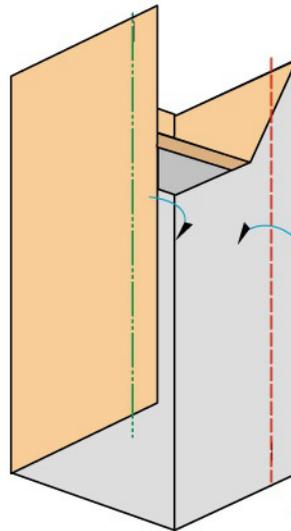
12

Ripiegate a monte



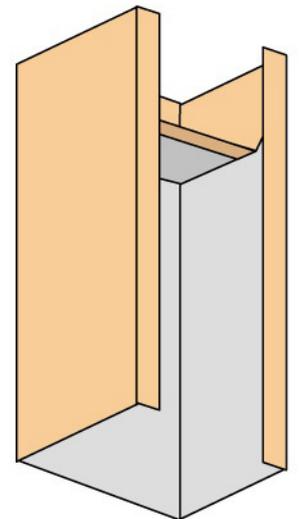
13

Ripiegate a monte



14

2 pieghe a monte,
1 per lato



15

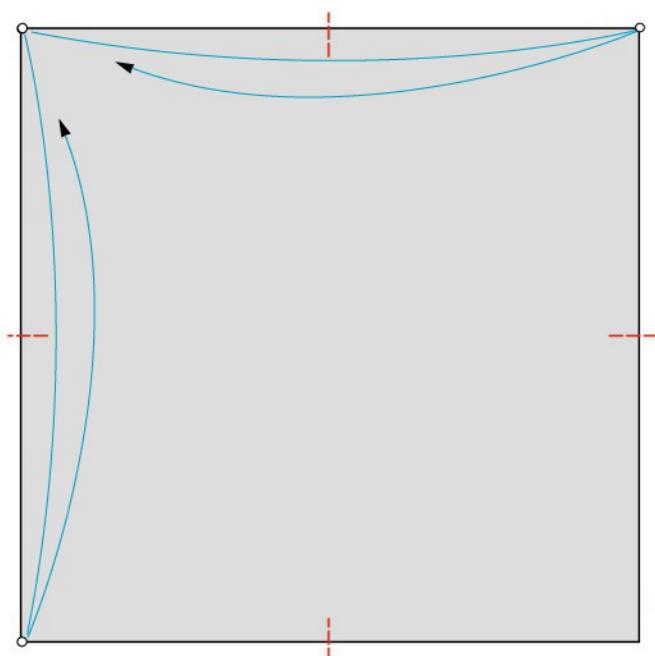
Torre aperta ultimata

TORRE APERTA D' ANGOLO

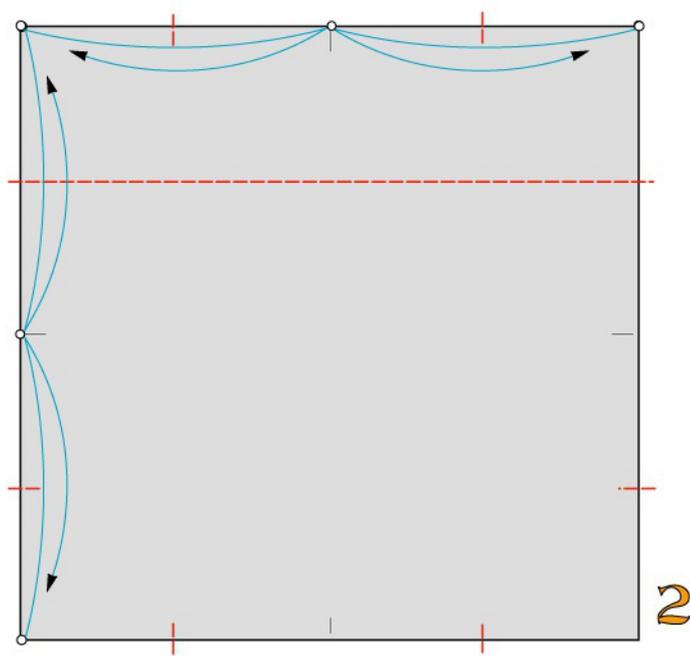
Formato G 10x10

CORNER
OPEN
TOWER

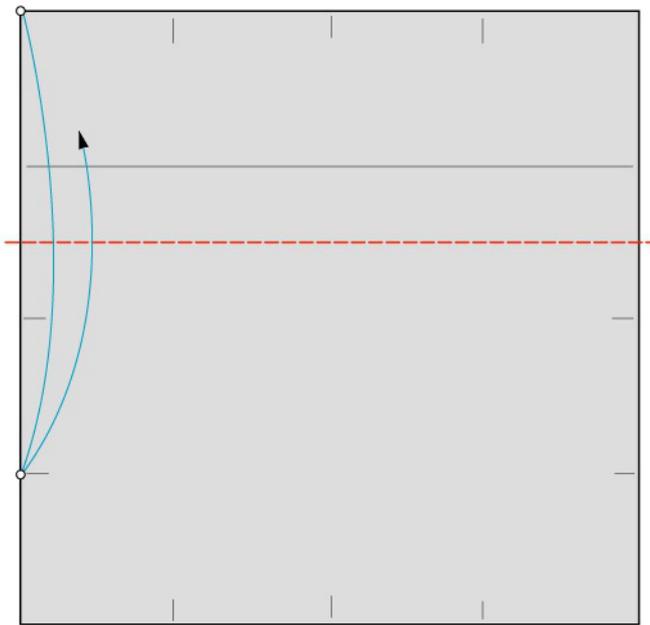
TORRE
APERTA EN
ESQUINA



4 piccole pieghe a valle

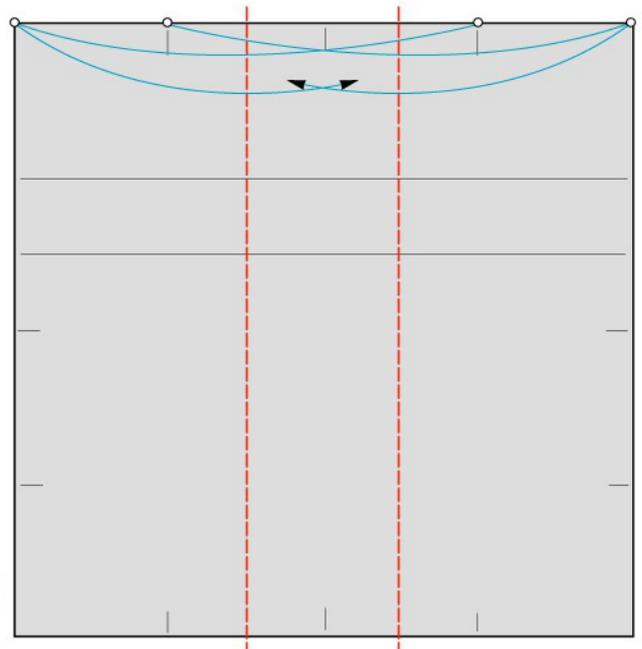


7 pieghe a valle, di cui 6 piccole



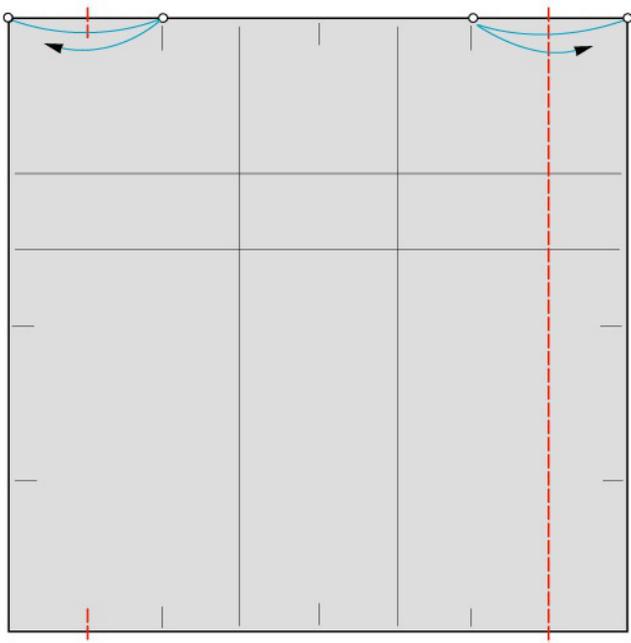
1 piega a valle

3



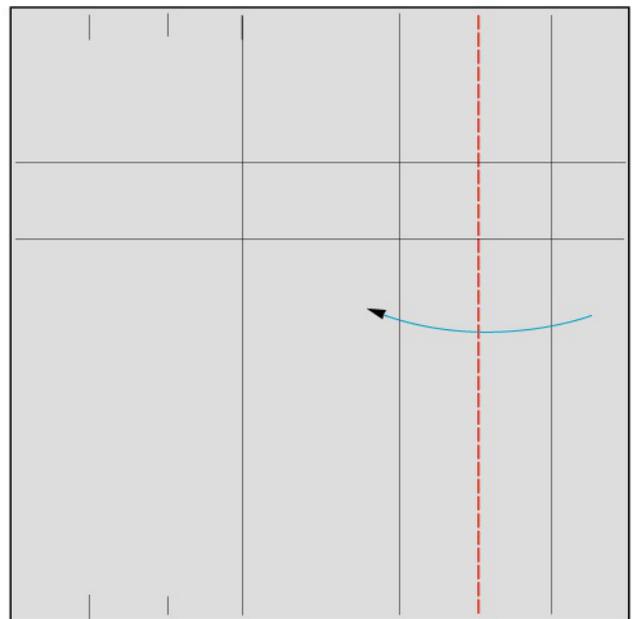
2 pieghe a valle

4



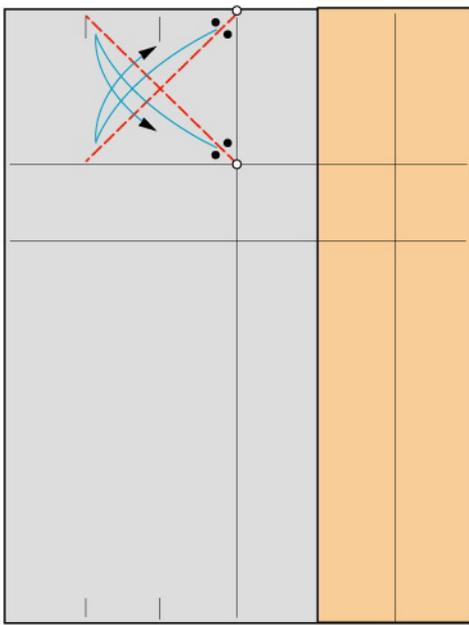
3 piege a valle, di cui 2 piccole

5



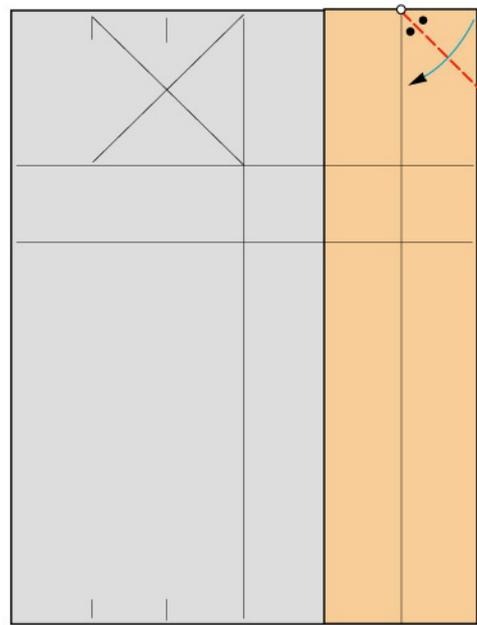
1 piega a valle

6



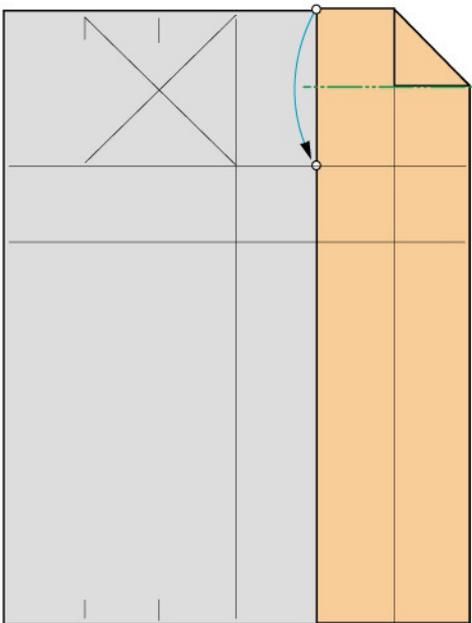
7

2 pieghe bisettrici a valle



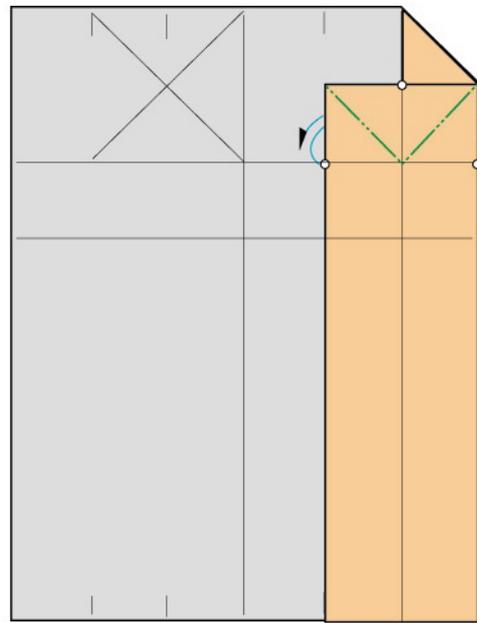
8

1 piega bisettrice a valle



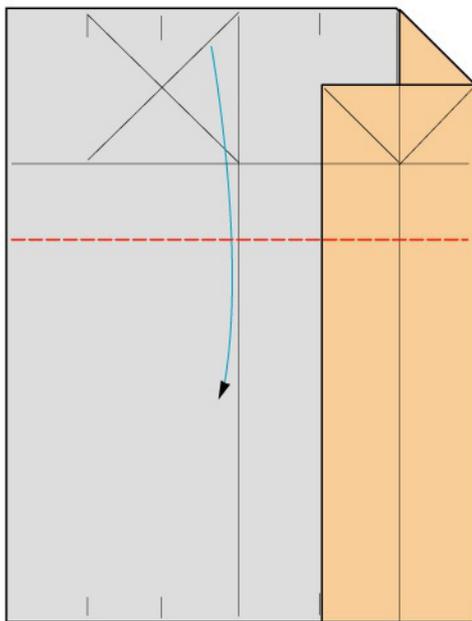
9

1 piega a monte



10

2 pieghe diagonali a monte



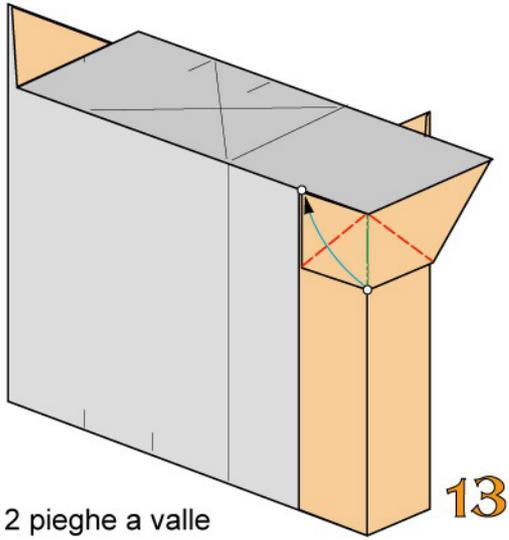
11

1 piega a valle



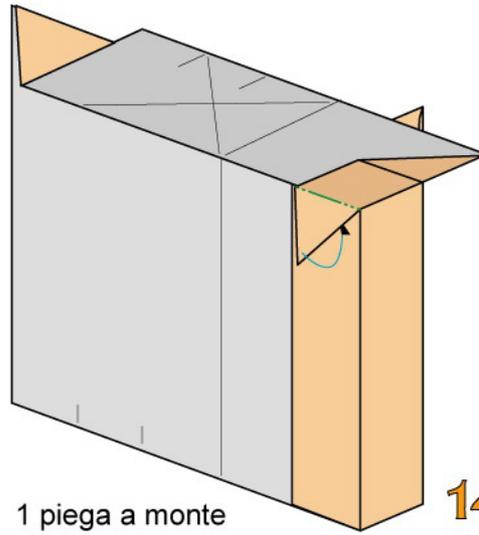
12

Ripiegando a valle e a monte, modellate 3D



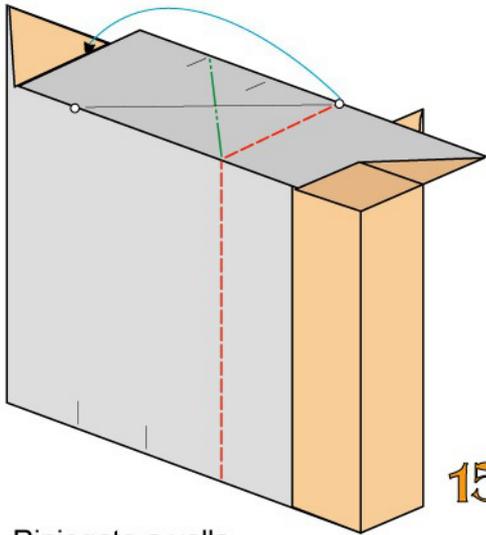
2 pieghe a valle

13



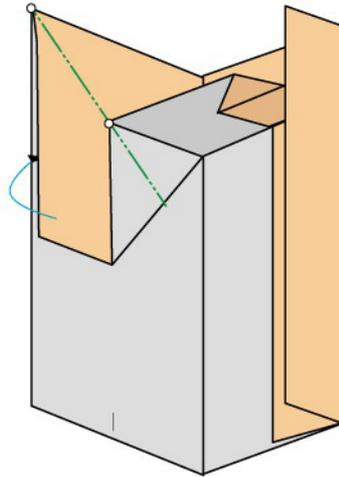
1 piega a monte
e intascate

14



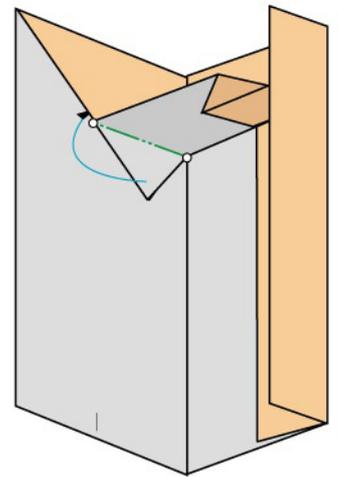
Ripiegate a valle
modellando 3D

15



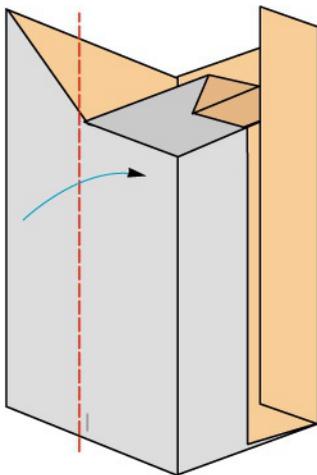
1 piega a monte

16



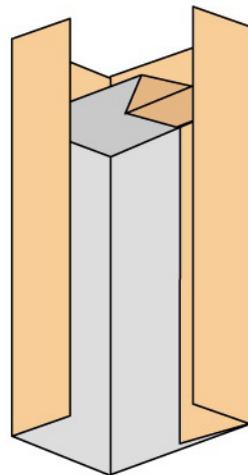
Ripiegate all'interno

17



1 piega a valle

18



Torre angolare aperta ultimata

19

PORTA SU TORRE APERTA

Formato C 10x20

TOWER DOOR OPEN

PUERTA DE LA TORRE ABIERTA

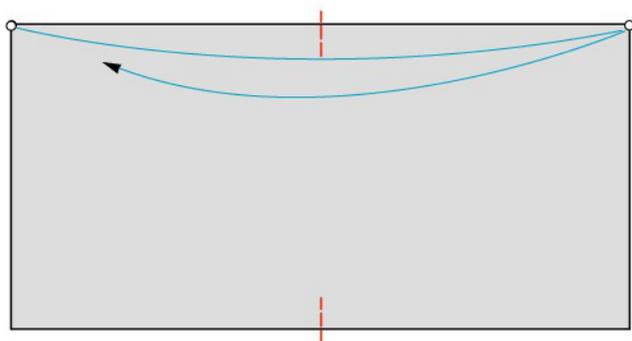
Costituisce la parte più importante della cinta muraria esterna. Solitamente era preceduta da un ponte levatoio e da una saracinesca. Spesso i battenti erano rivestiti di ferro.

La torre era più bassa di quella della cinta interna per permettere ai difensori della torre più alta interna di colpire con frecce l'aggressore che se ne fosse eventualmente impossessato.

It constitutes the most important part of the outer wall. It was usually preceded by a drawbridge and a portcullis. Often the doors were covered with iron.

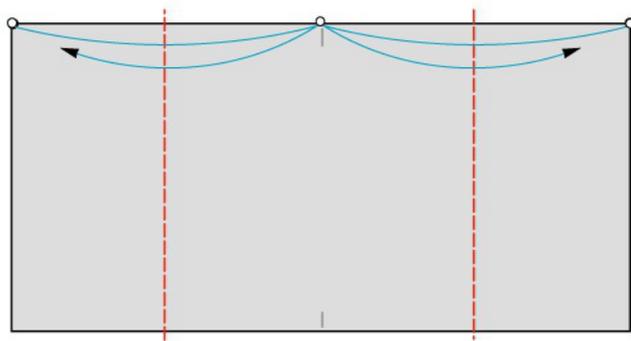
The tower was lower than that of the inner wall to allow the defenders of the taller inner tower to shoot arrows at any aggressor who might take possession of it.





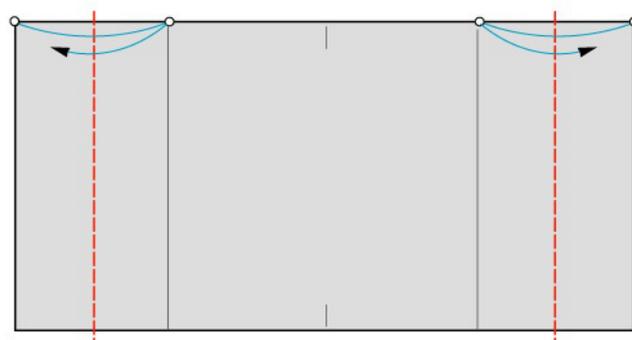
1

2 piccole pieghe a valle



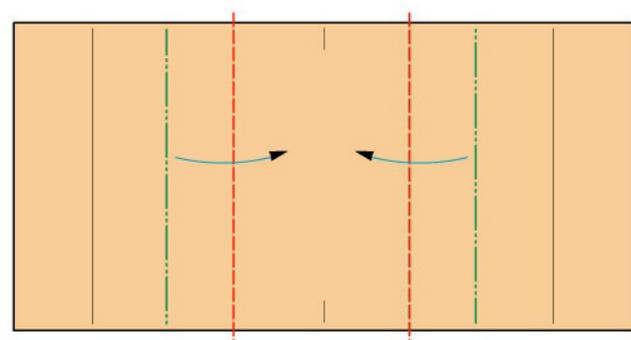
2

2 pieghe a valle



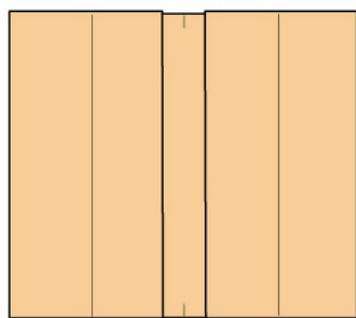
3

2 pieghe a valle e ribaltate



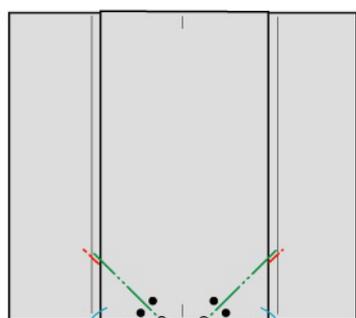
4

2 pieghe a monte e ripiegate a valle



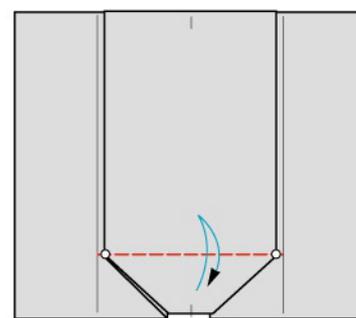
5

Ribaltate



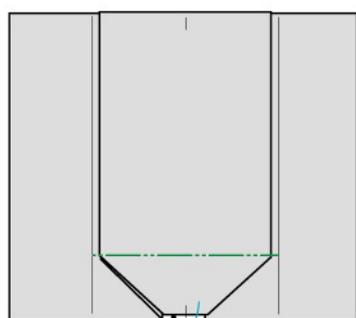
6

2 pieghe rovesce interne



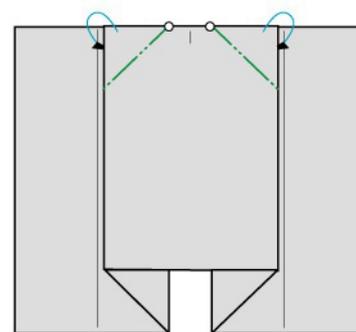
7

1 piega a valle



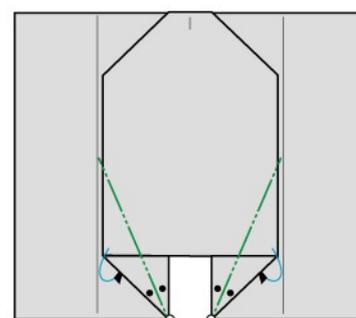
8

Ripiegate a monte



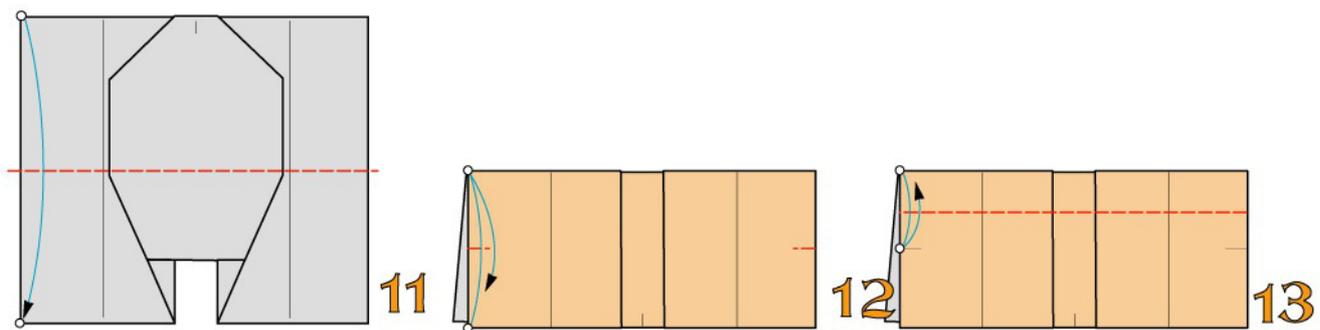
9

2 pieghe a monte



10

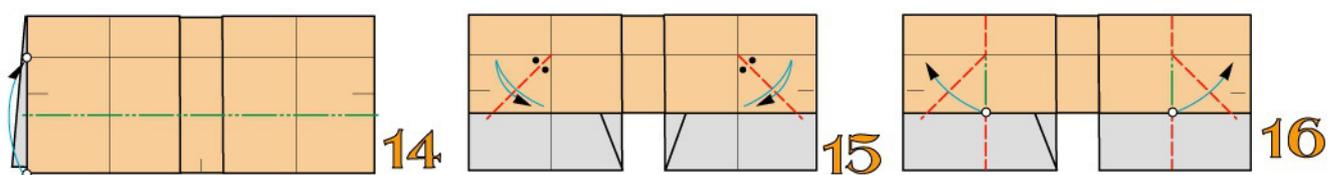
2 pieghe bisettrici a monte



1 piega a valle

2 piccole pieghe a valle

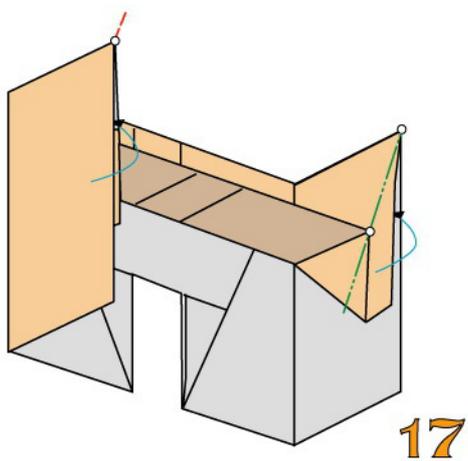
1 piega a valle



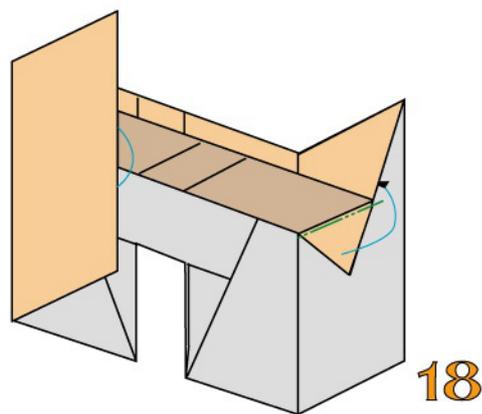
1 piega a monte

2 pieghe bisettrici a valle

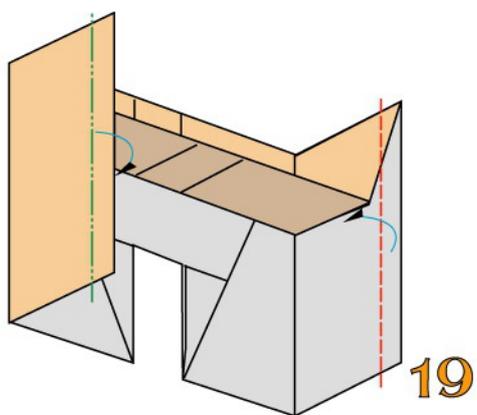
Ripiegando a valle a monte modellate 3D



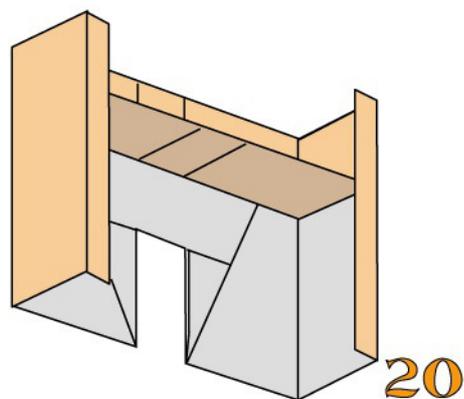
Piegate all'interno



Piegate all'interno



Piegate all'interno



Porta su torre aperta ultimata

CORTINA ALTA

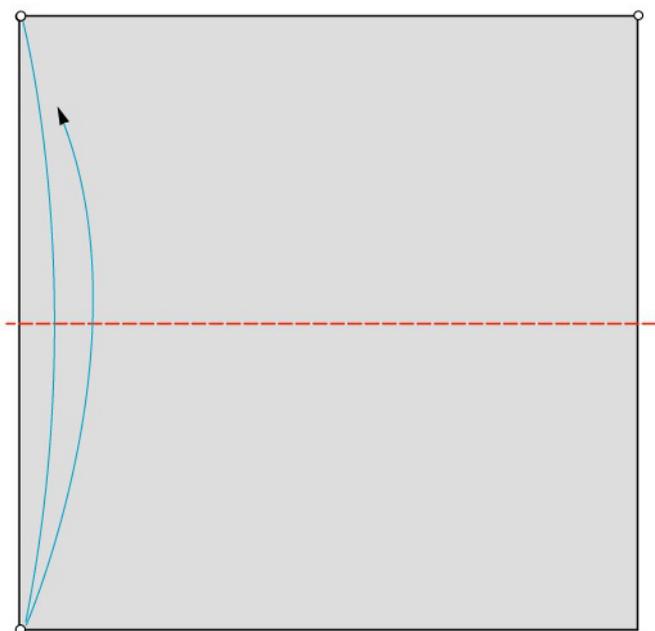
HIGHT CURTAIN WALL MURO CORTINA ALTO

Formato A 20x20

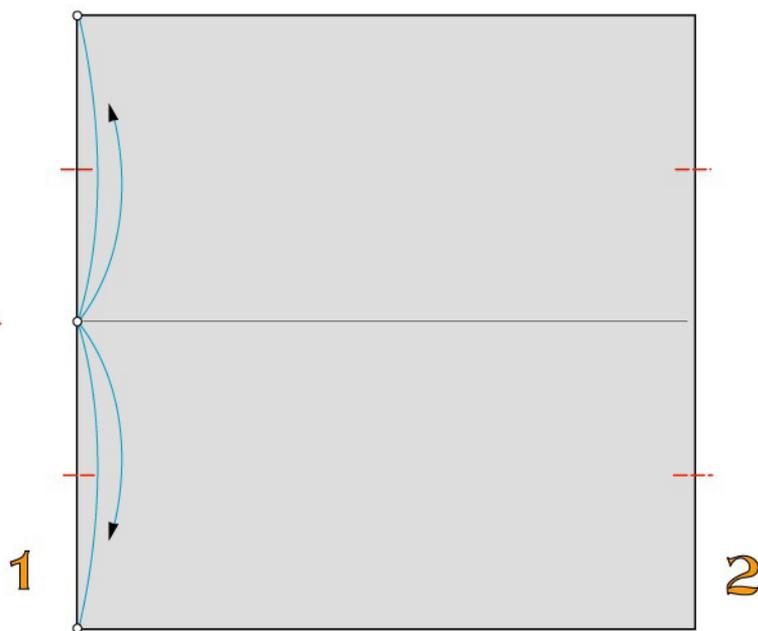


Costituisce la parte più interna di un castello con due cinte di mura ed era più alta per permettere ai difensori di colpire con frecce l'assailante che si fosse eventualmente impadronito di tratti della cinta esterna

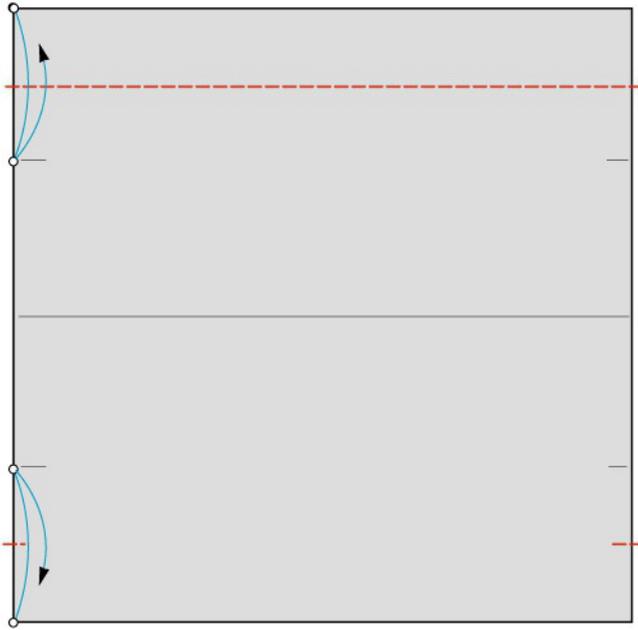
It forms the innermost part of a castle with two belts and was taller for allow the defenders to shoot arrows at any assailant who might have seized of sections of the outer wall



1 piega a valle

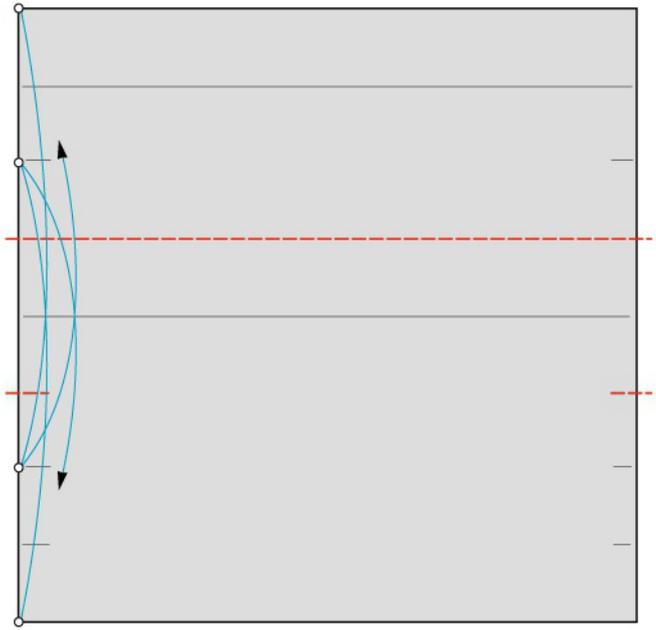


4 piccole pieghe a valle



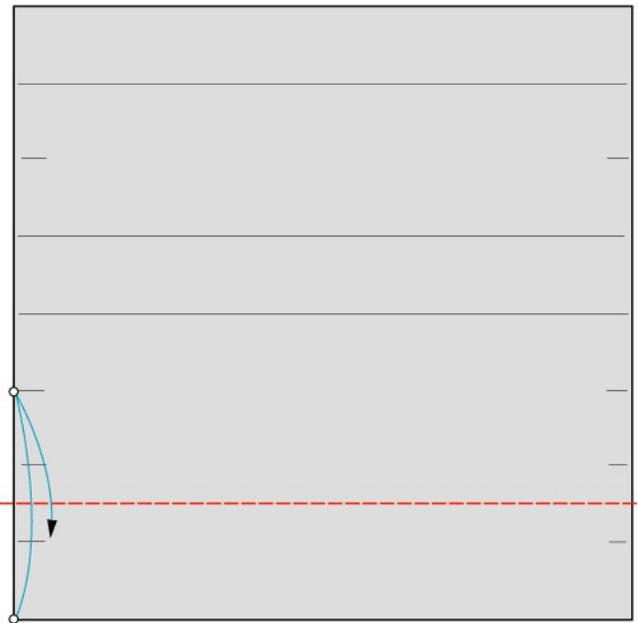
3

3 pieghe a valle, di cui 2 piccole



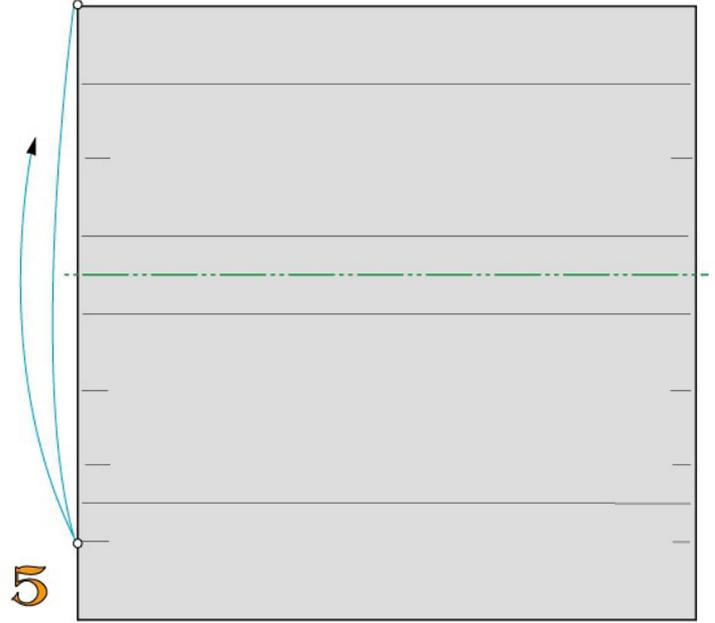
4

3 pieghe a valle, di cui 2 piccole



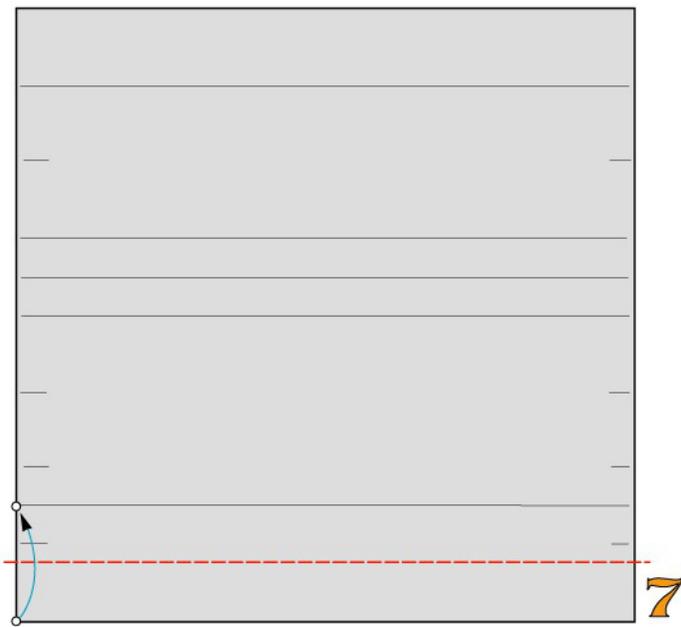
5

1 piega a valle



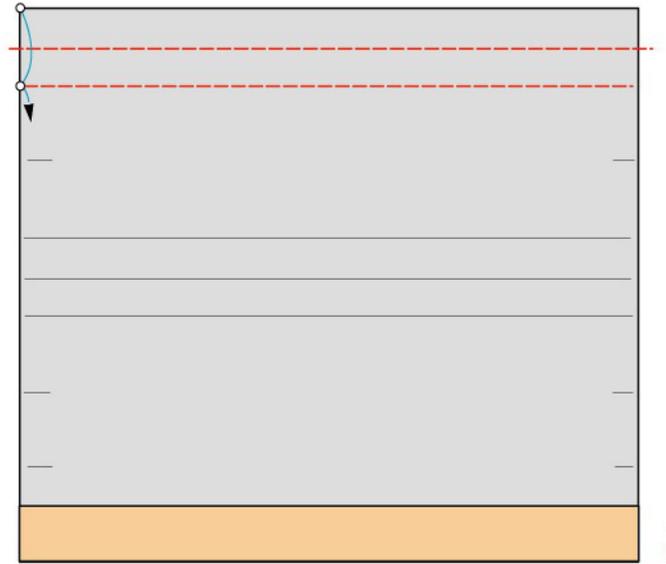
6

1 piega a monte



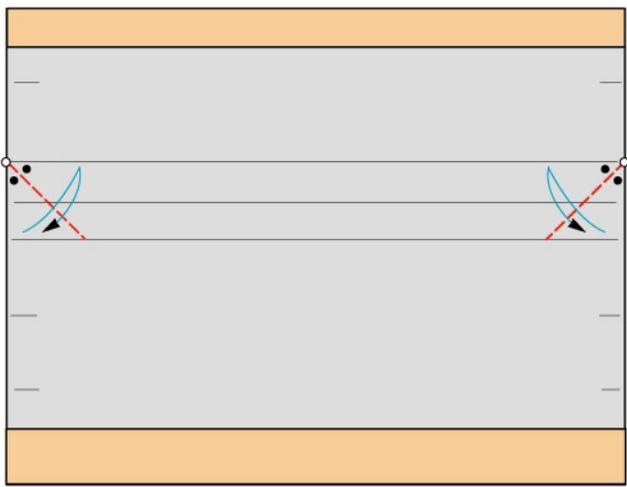
1 piega a valle

7



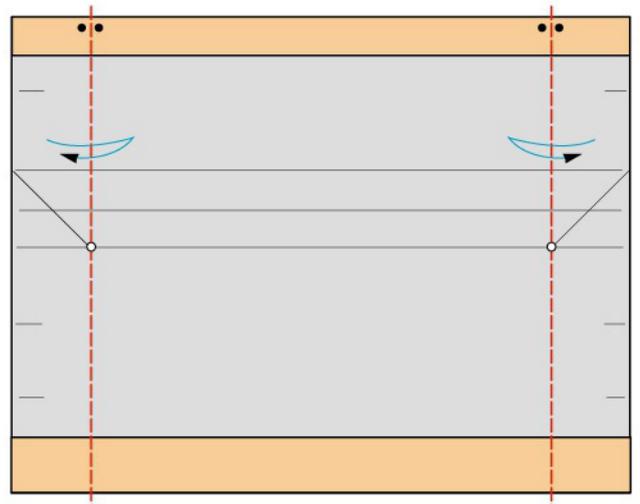
2 pieghe a valle

8



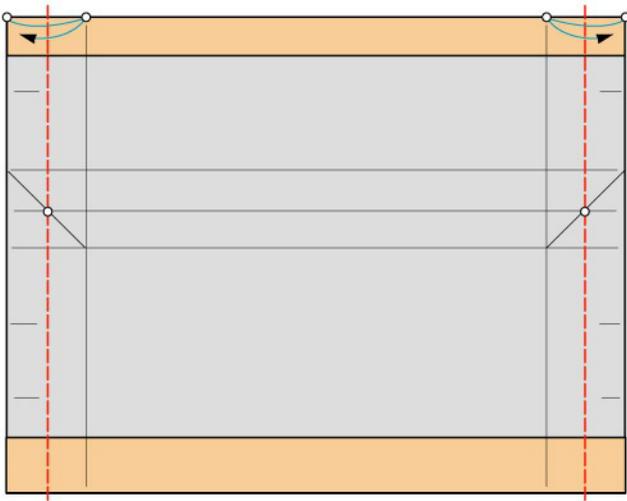
2 pieghe bisettrici a valle

9



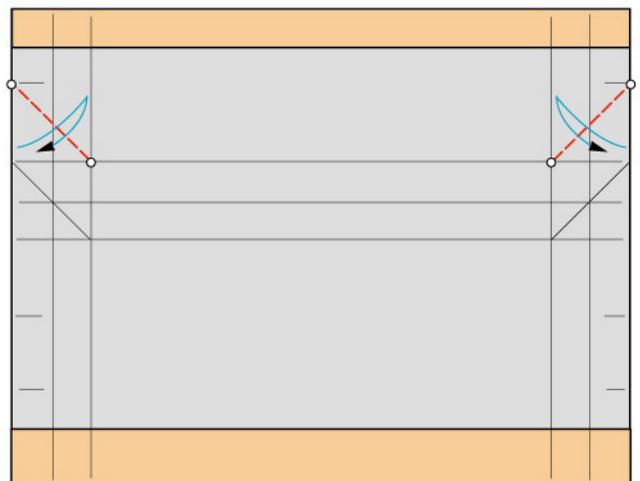
2 pieghe bisettrici a valle

10



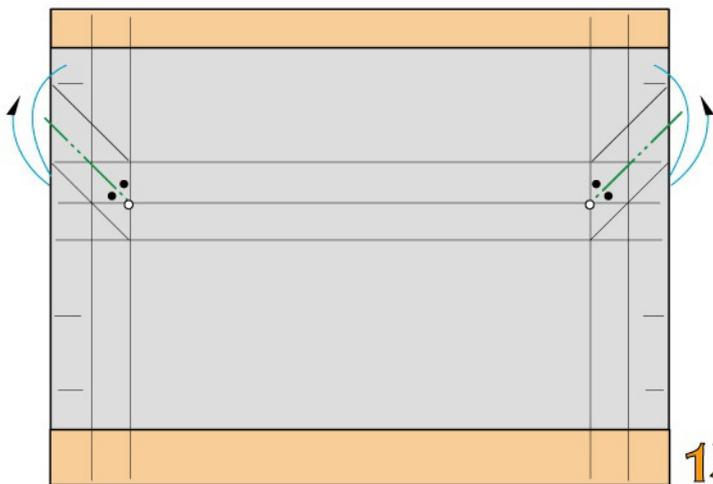
2 pieghe a valle

11



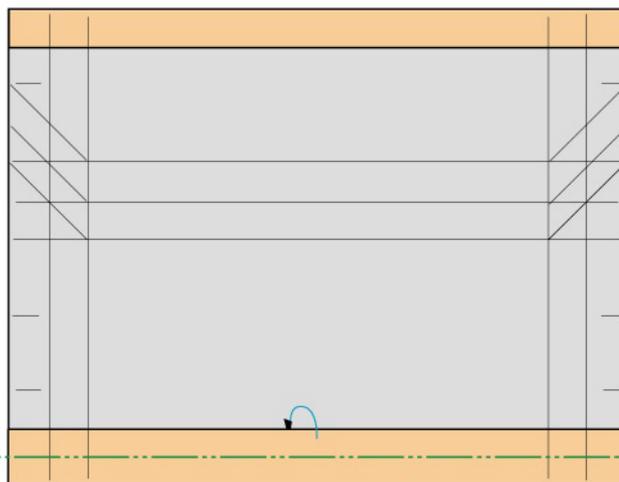
2 pieghe diagonali a valle

12



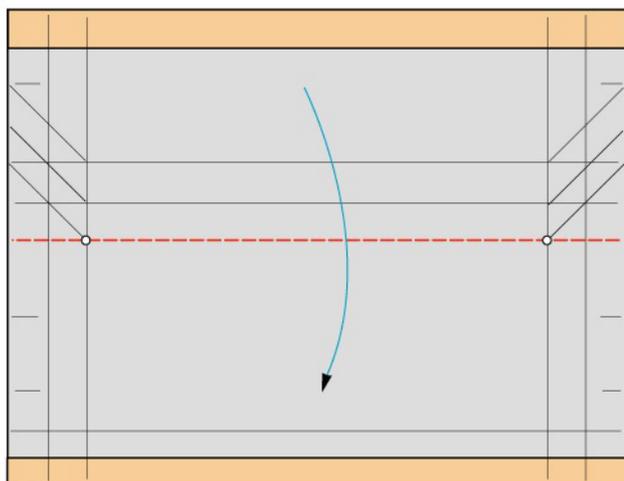
13

2 pieghe bisettrici a monte



14

1 piega a monte



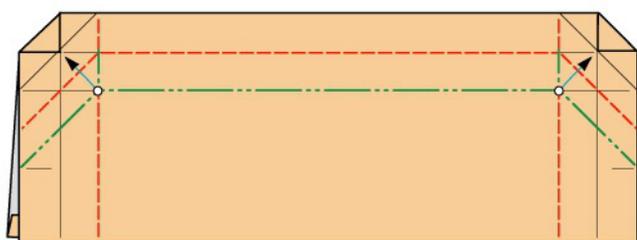
15

1 piega a valle



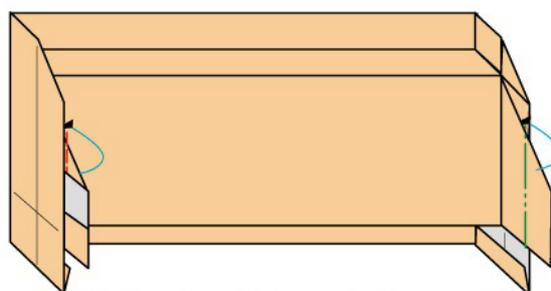
16

2 pieghe a valle



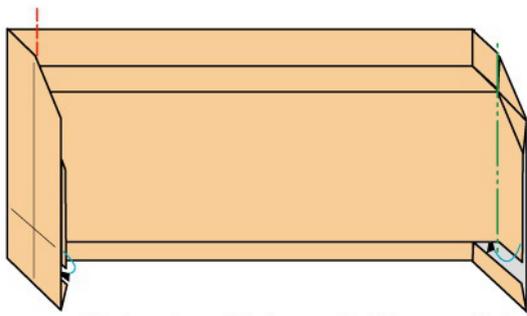
17

Ripiegando a valle a monte modellate 3D



18

Ripiegate all'interno le 2 superfici



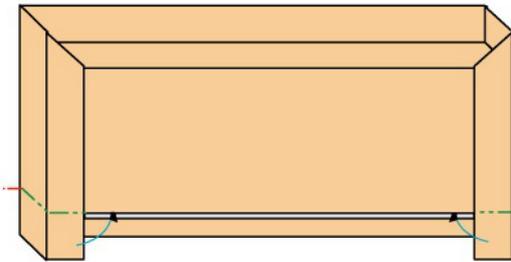
Ripiegate all'interno le 2 superfici

19



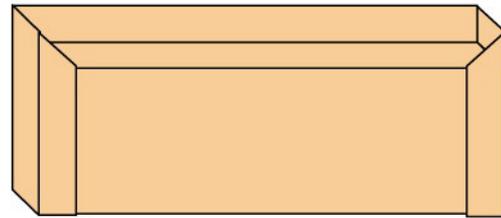
Ruotate le 2 superfici

20



Ripiegate il bordo all'interno

21

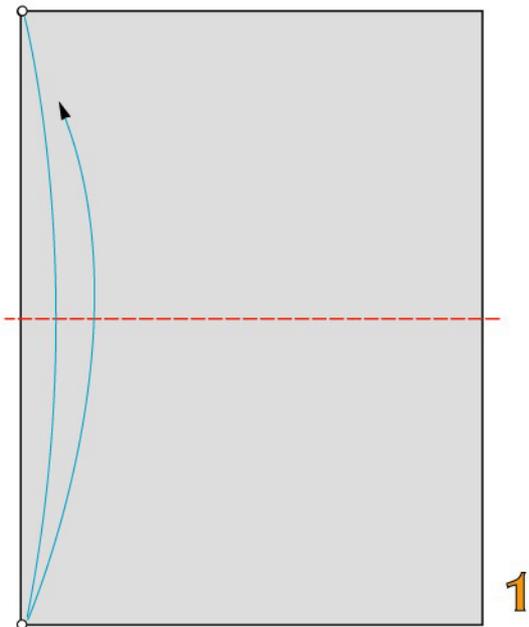


Cortina alta ultimata

22

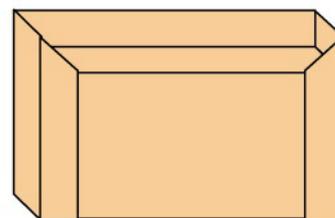
CORTINA ALTA CORTA

Partite dal formato B (15x20)



1

Le pieghe sono uguali a quelle appena viste



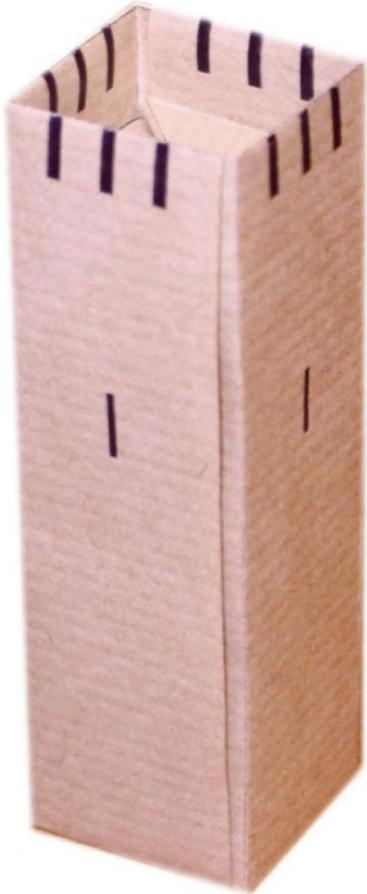
Cortina alta corta ultimata

TORRE CHIUSA

TOWER CLOSED

TORRE CERRADA

Formato F 5x15



Costituisce la parte più interna di un castello con due cinte di mura ed era più alta per permettere ai difensori di colpire con frecce l'assalitore che si fosse eventualmente impossessato di una torre esterna aperta.

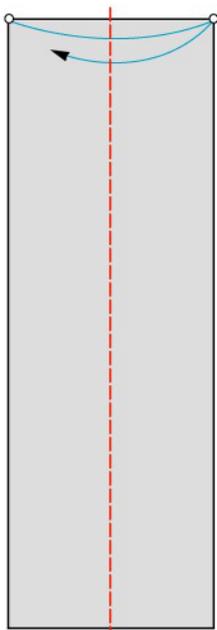
Era provvista di feritoie laterali per colpire sui fianchi gli assalitori che avessero tentato la scalata della cortina.

Si costruisce unendo 4 moduli uguali.

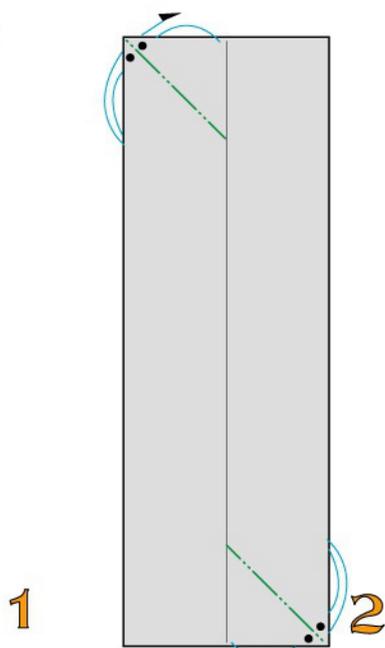
It constitutes the innermost part of a fortress with two walls and was higher to allow the defenders to shoot arrows at the assailant who had eventually taken possession of an open external tower.

It was equipped with side loopholes to hit the attackers on the sides who had attempted to climb the curtain.

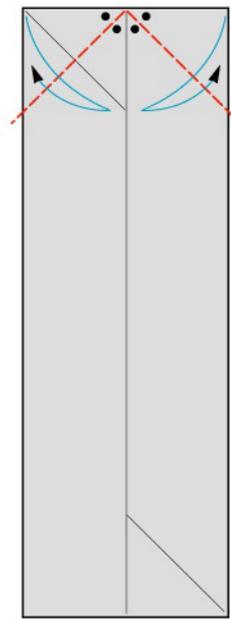
It is built by joining 4 equal modules.



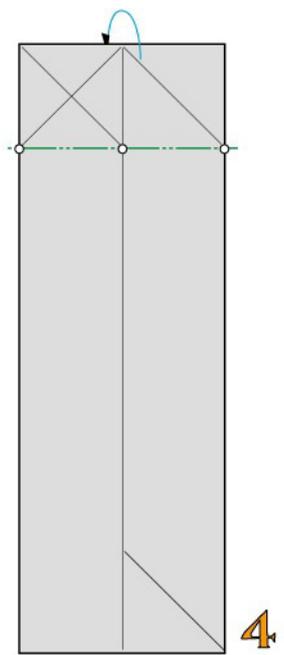
1 piega a valle



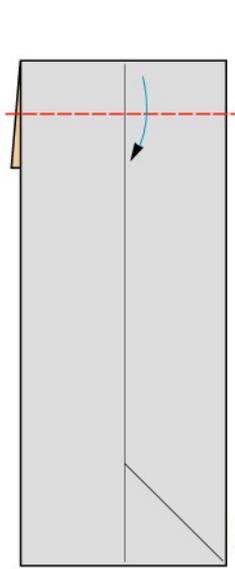
2 pieghe bisettrici a monte



2 pieghe bisettrici a valle

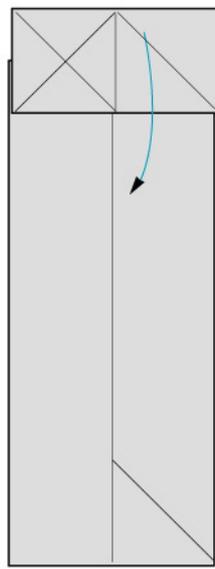


1 piega a monte



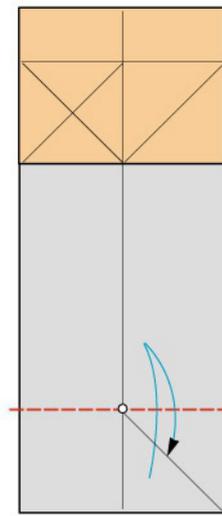
5

1 piega a valle



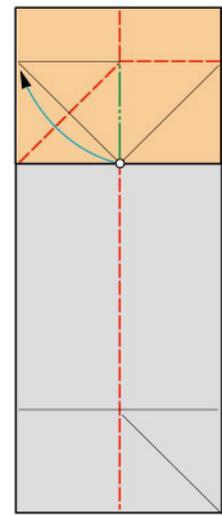
6

Ruotate la superficie indicata



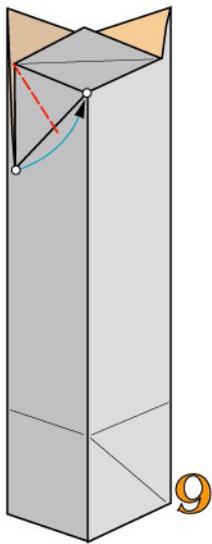
7

1 piega a valle



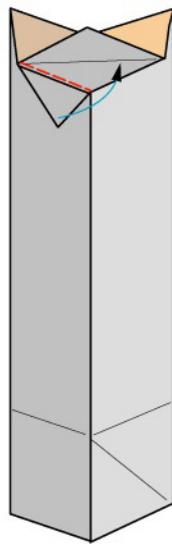
8

Ripiegando a valle e a monte, modellate 3D



9

1 piega a valle



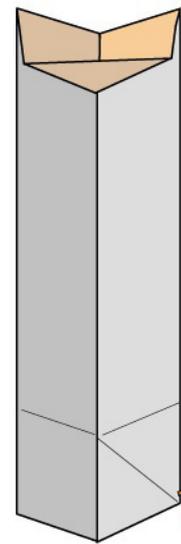
10

1 piega a valle



11

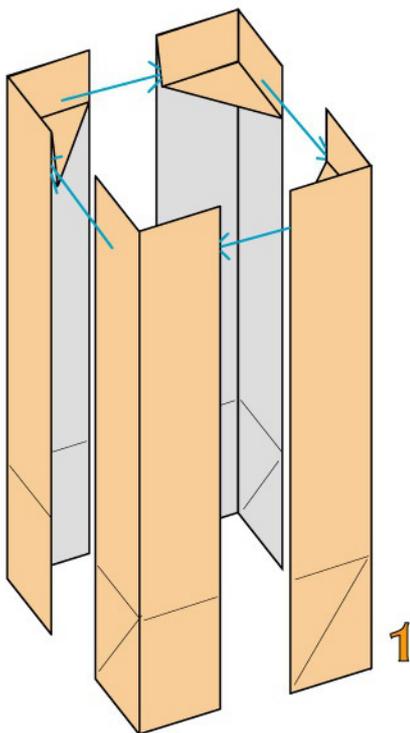
1 piega a valle



12

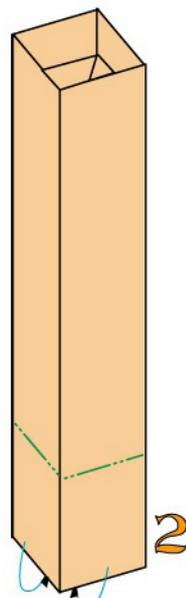
Modulo ultimato

MONTAGGIO DEI MODULI



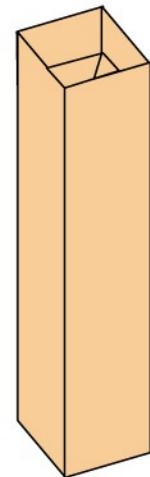
1

Inserite vicendevolmente uno all'interno dell'altro



2

Ripiegate i bordi all'interno



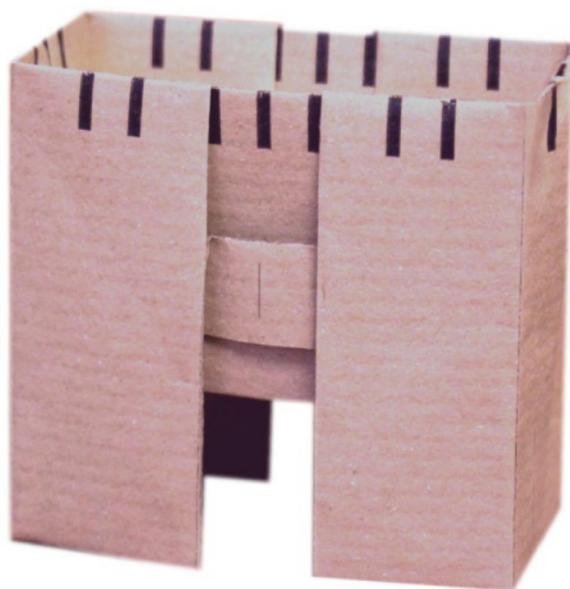
3

Torre chiusa ultimata

PORTA SU TORRE CHIUSA

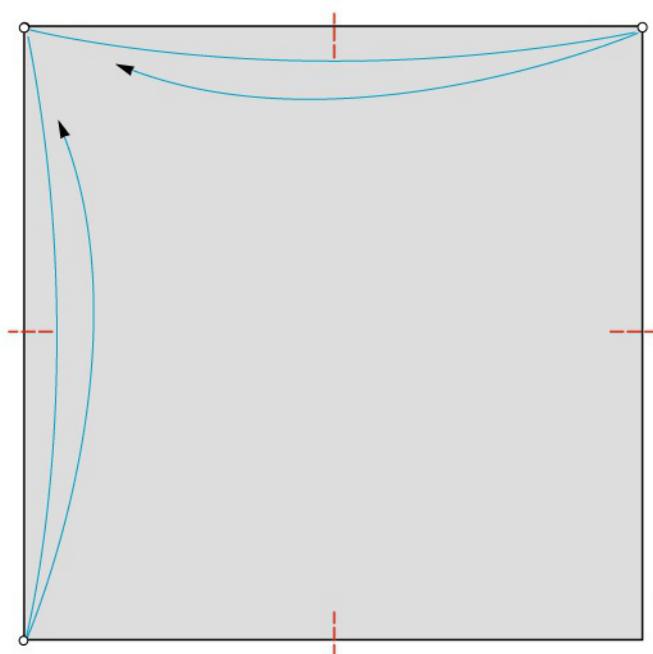
Formato A 20x20

DOOR TO TOWER CLOSED
PUERTA A LA TORRE CERRADA

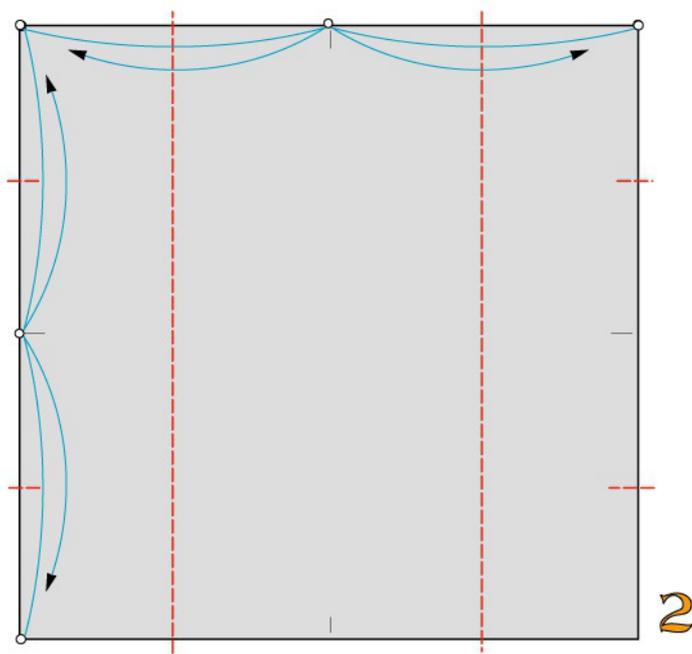


Costituisce la parte più importante della cinta muraria. Solitamente era preceduta da un ponte levatoio e da una saracinesca. Spesso i battenti erano rivestiti di ferro.

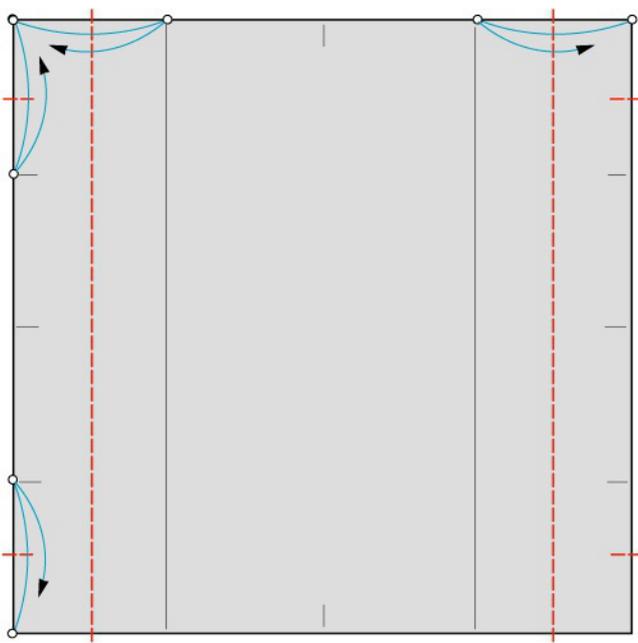
It constitutes the most important part of the wall. It was usually preceded by a drawbridge and a portcullis. Often the doors were covered with iron.



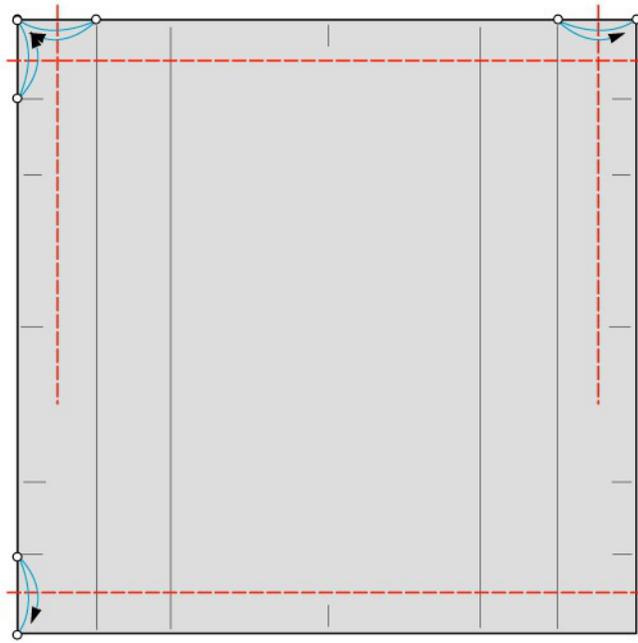
4 piccole pieghe a valle



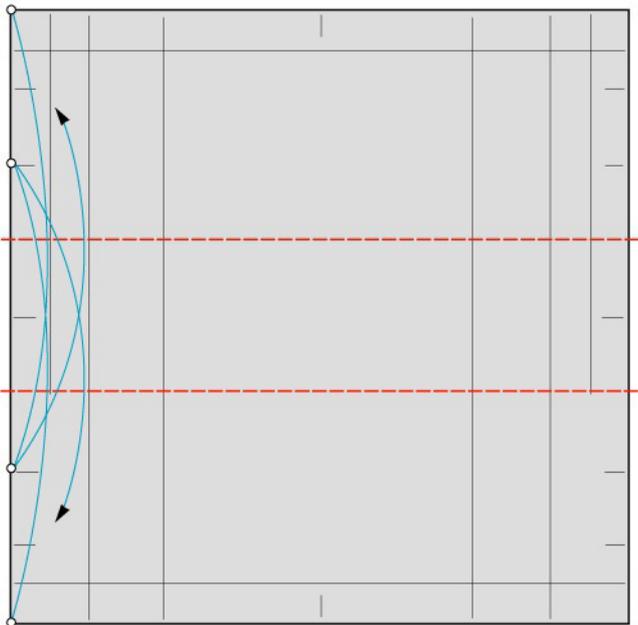
6 pieghe a valle, di cui 4 piccole



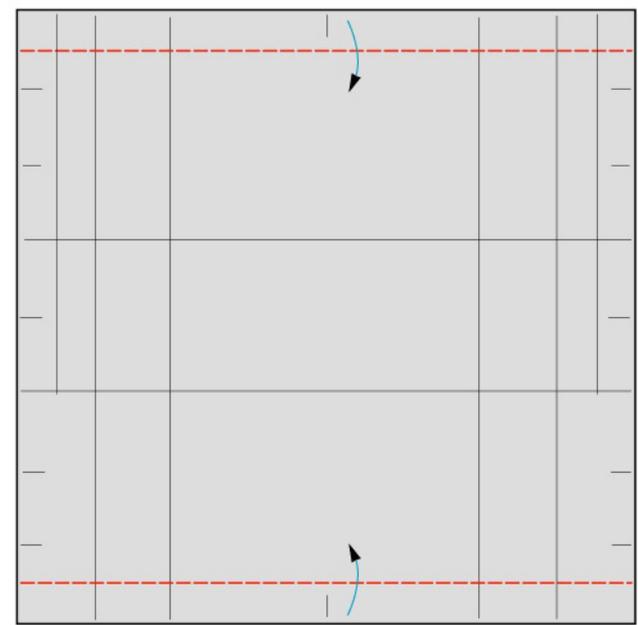
6 pieghe a valle, di cui 4 piccole



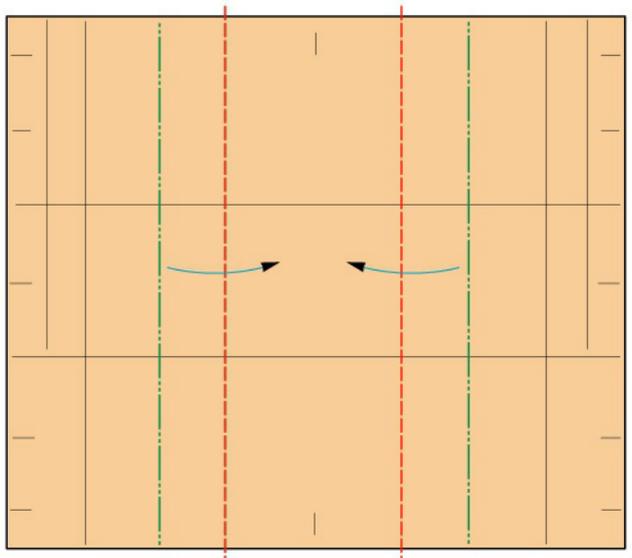
4 pieghe a valle



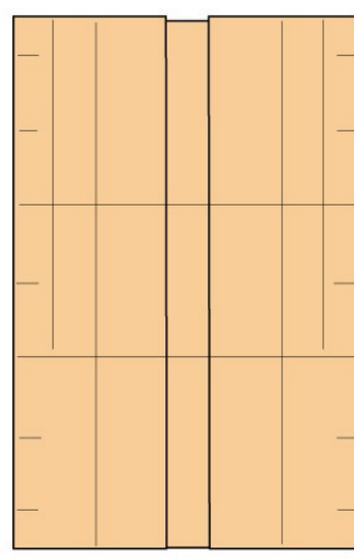
2 pieghe a valle



2 pieghe a valle

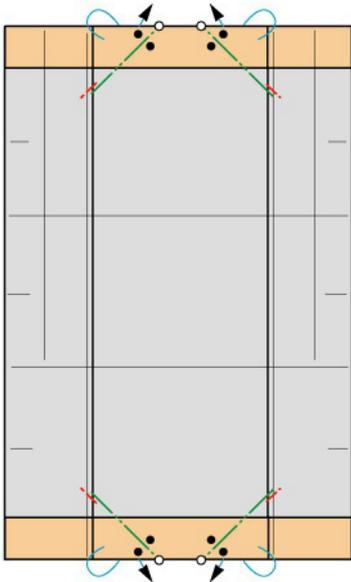


2 pieghe a monte e ripiegate a valle



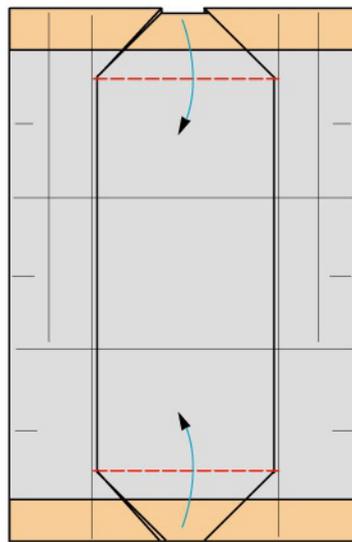
Ribaltate





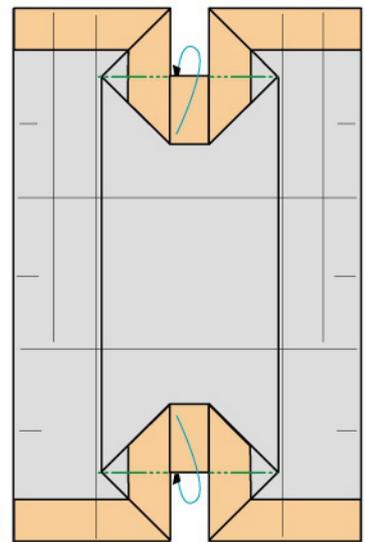
4 pieghe rovesce interne

9



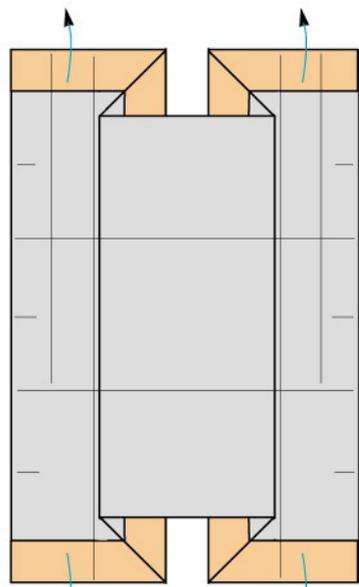
2 pieghe a valle

10



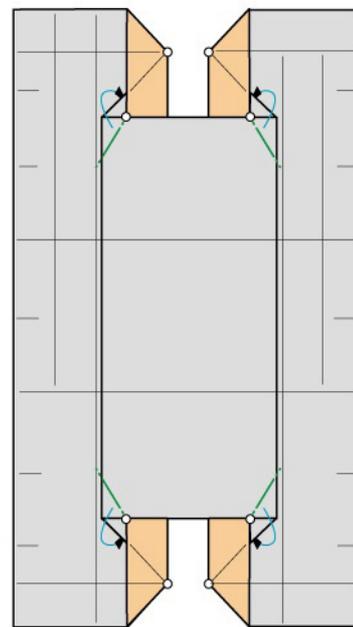
Intascate ripiegando a monte

11



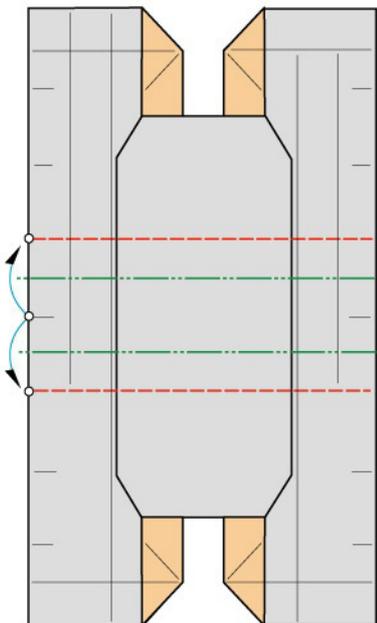
Estraete le superfici indicate

12



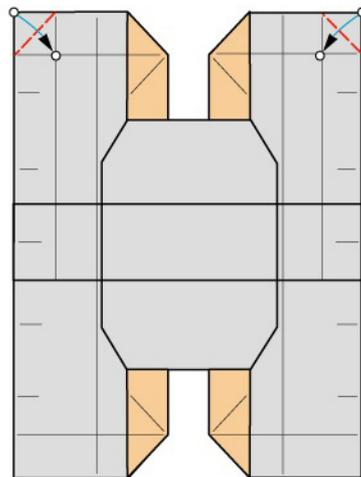
4 pieghe a monte

13



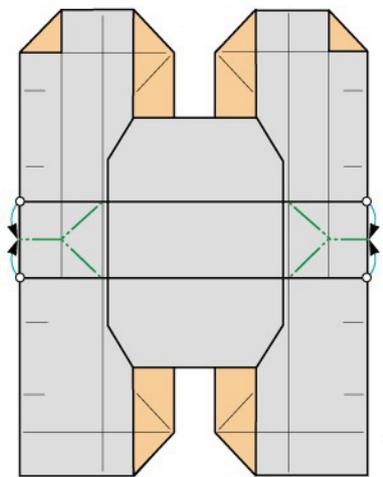
2 pieghe a monte e ripiegate a valle

14



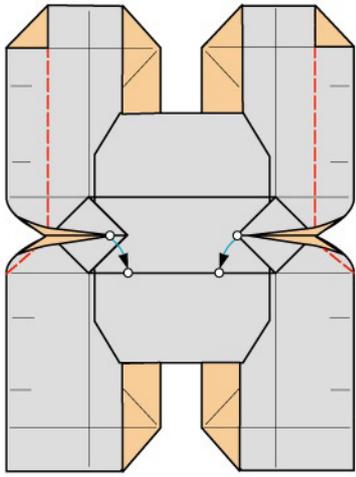
2 pieghe a valle

15



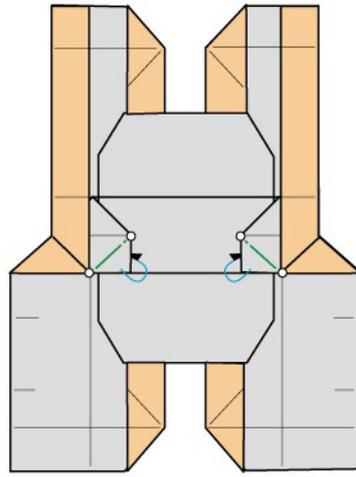
6 pieghe a monte e comprimate modellando 3D

16



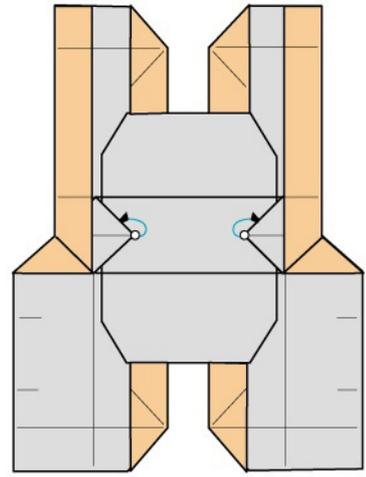
17

Ripiegando a valle modellate 2D



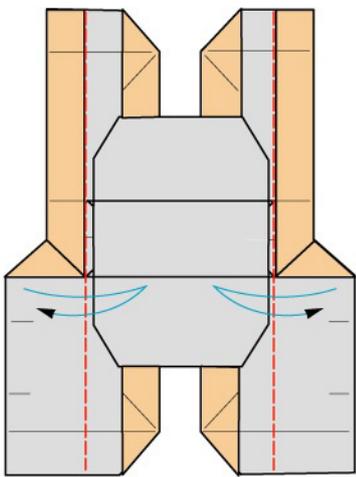
18

2 pieghe a monte



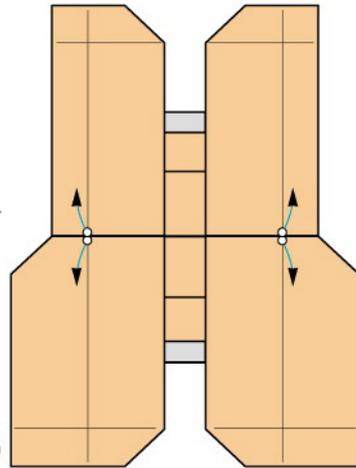
19

Inserite i 2 vertici nelle tasche sottostanti



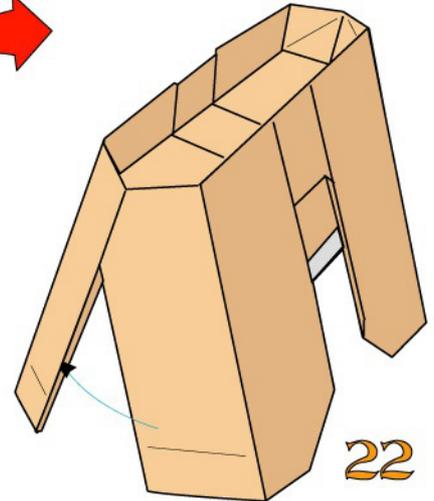
20

Ripiegate a valle e ribaltate



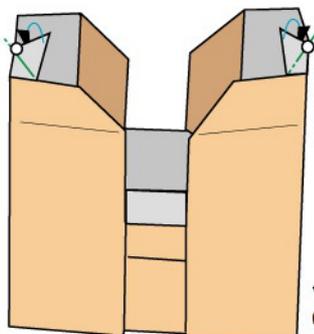
21

Aprite modellando 3D



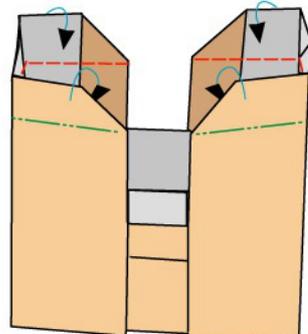
22

Ribaltate



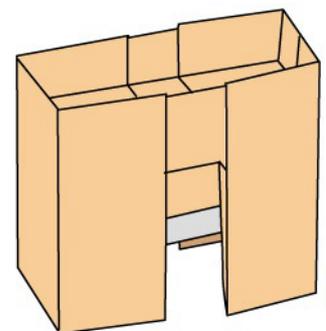
23

Con 2 pieghe a monte bloccate il modello



24

Piegate i bordi all'interno e ribaltate



25

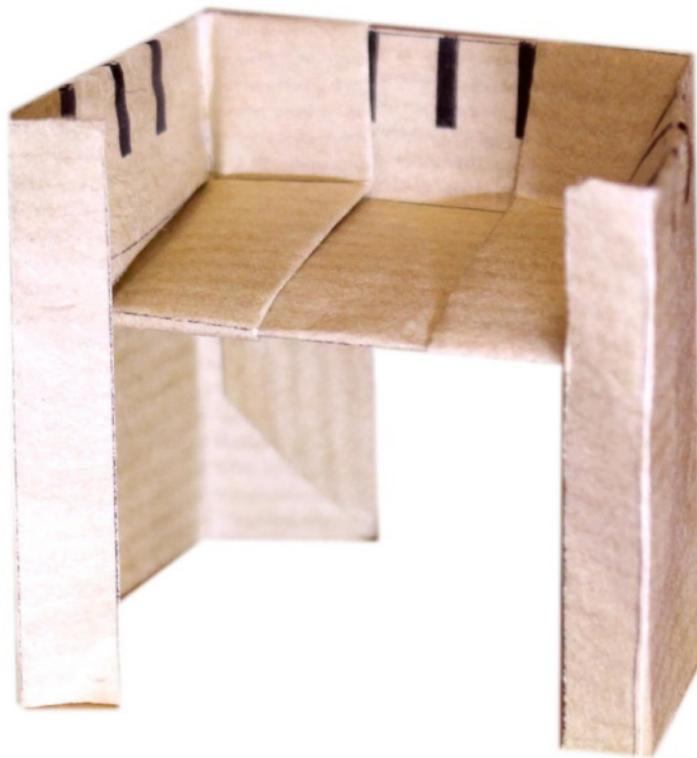
Porta su torre chiusa ultimata

RIVELLINO

RAVELIN

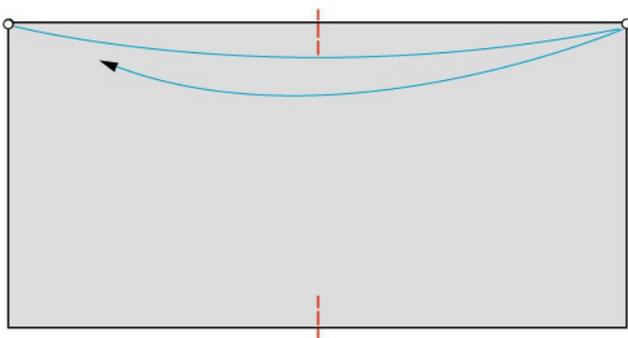
REVELLÌN

Formato C 10x20

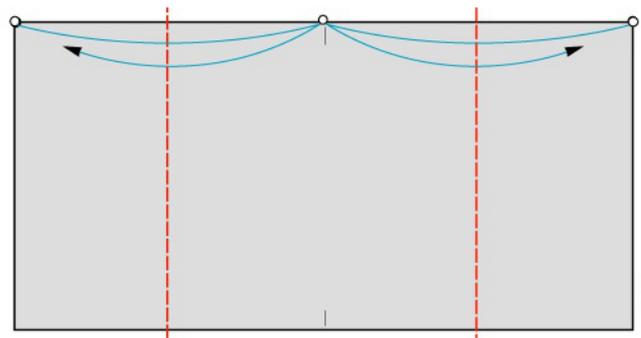


È una torre bassa e aperta posta anteriormente ad una porta di accesso del castello avente la funzione di impedire all'assalitore di accostarvi un ariete o una torre mobile.

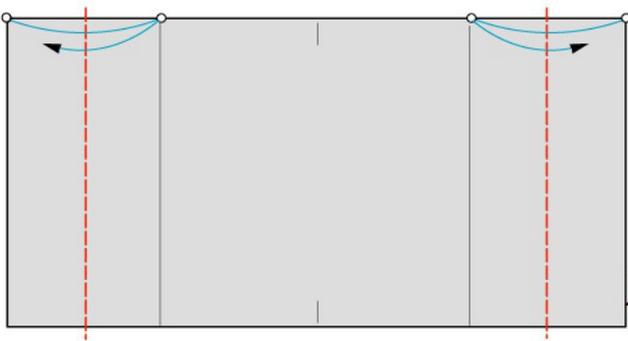
It is a low and open tower placed in front of an access door to the castle with the function of preventing the attacker from approaching it with a ram or mobile tower.



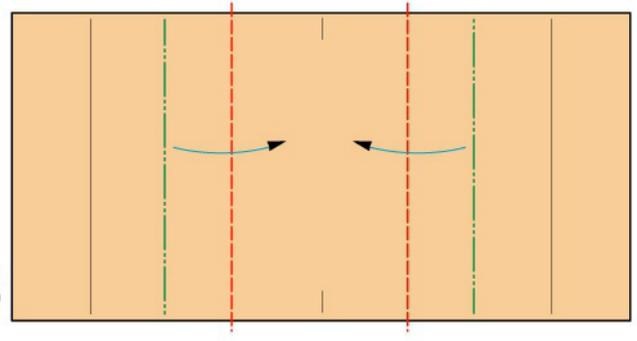
2 piccole pieghe a valle



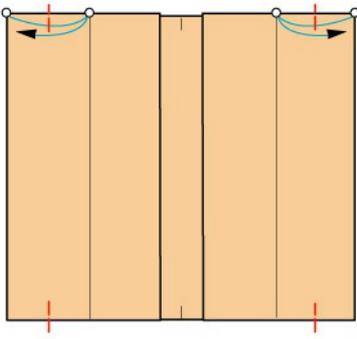
2 pieghe a valle



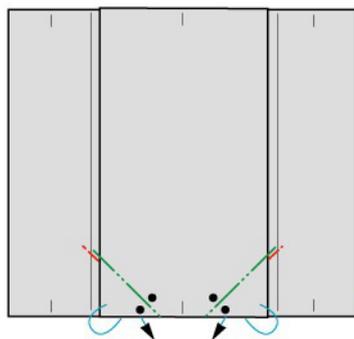
2 pieghe a valle e ribaltate



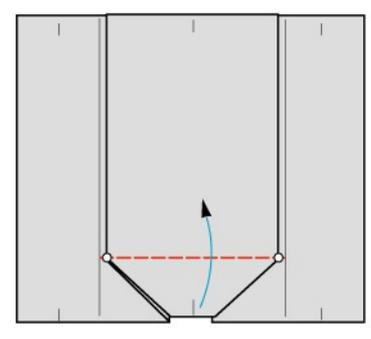
2 pieghe a monte e ripiegate a valle



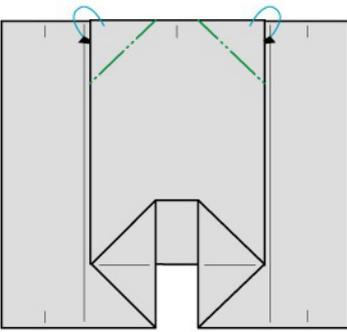
Ribaltate



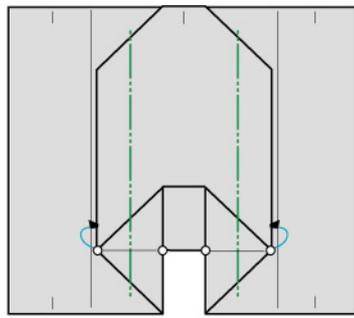
2 pieghe rovesce interne



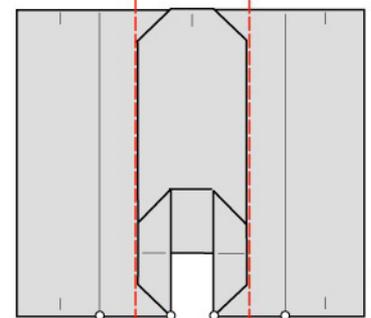
1 piega a valle



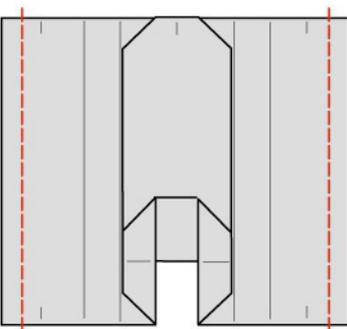
2 pieghe a monte



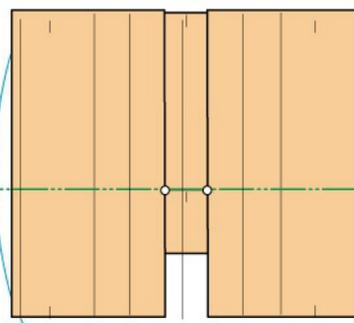
2 pieghe a monte



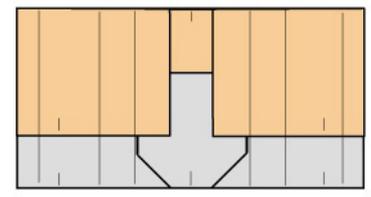
2 pieghe a valle



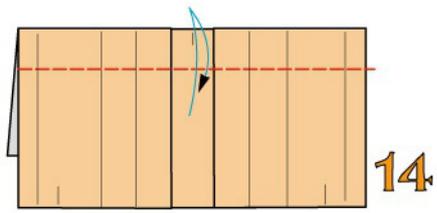
2 pieghe a valle



1 piega a monte



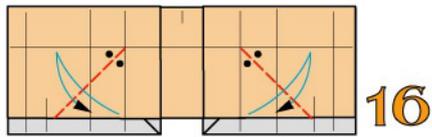
Ribaltate



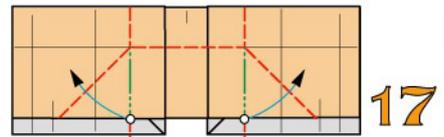
1 piega a valle



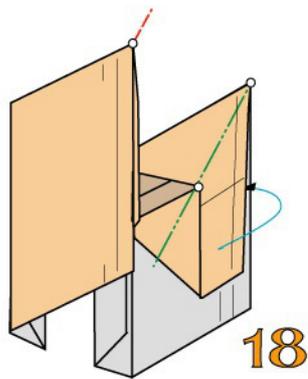
1 piega a monte



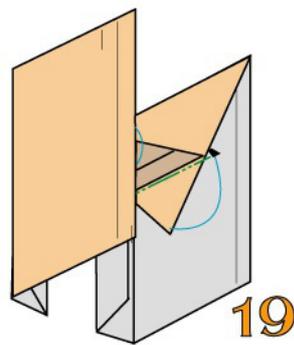
2 pieghe bisettrici a valle



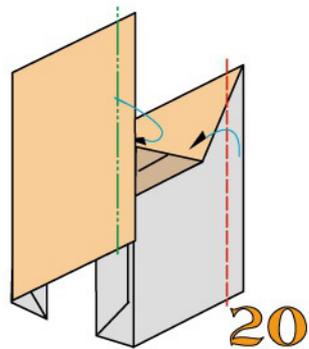
Ripiegando a valle a monte modellate 3D



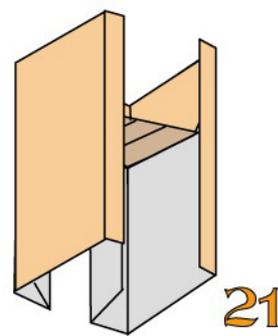
Piegate all'interno



Piegate all'interno



Piegate all'interno



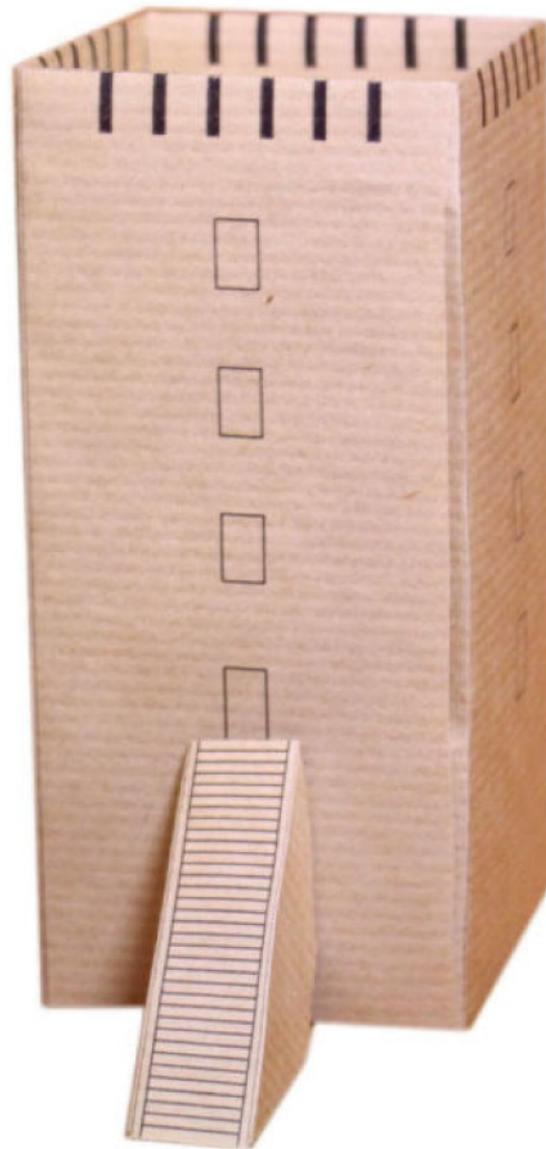
21

MASTIO

KEEP TOWER

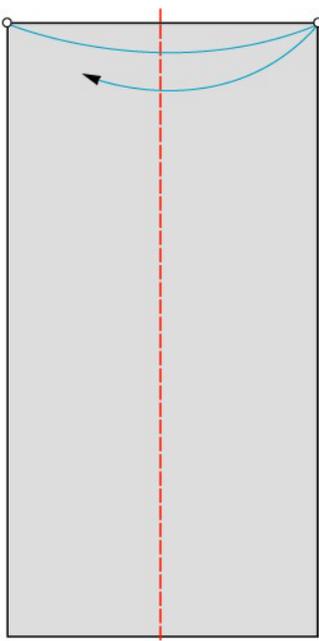
TORRE MAZMORRA

Formato C 10x20



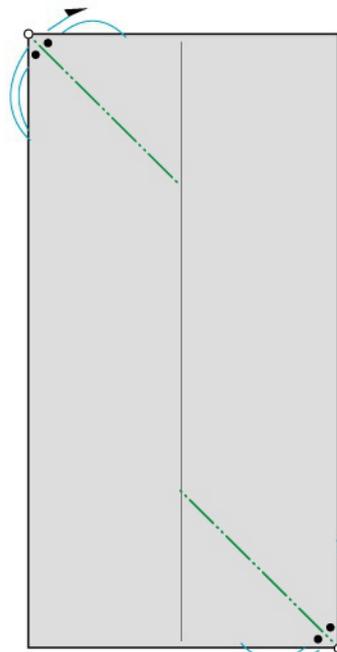
È una torre interna più alta e più robusta destinata all'ultima estrema resistenza.
Fornita di cibo ed acqua, spesso aveva l'accesso rialzato per impedire all'assalitore di usare un ariete.

It is a taller and sturdier inner tower intended for the last extreme stand.
Supplied with food and water, it often had a raised entrance to prevent the attacker from using a battering ram.



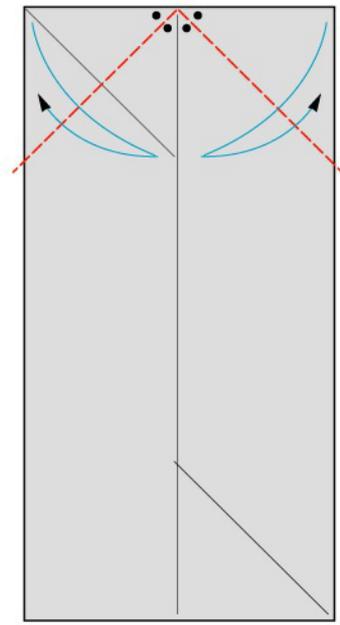
1

1 piega a valle



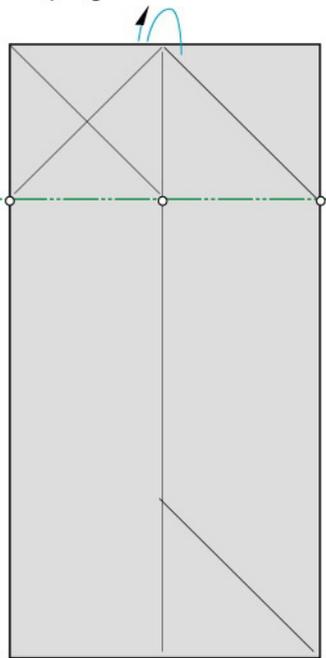
2

2 pieghe bisettrici a monte



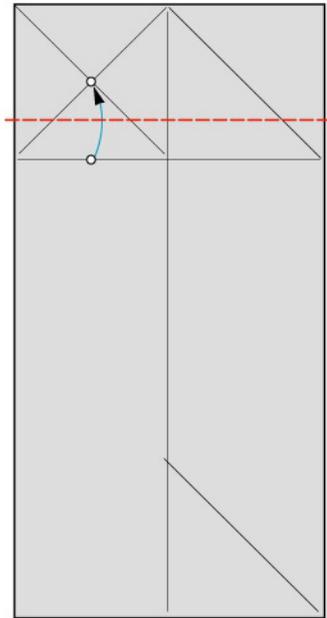
3

2 pieghe bisettrici a valle



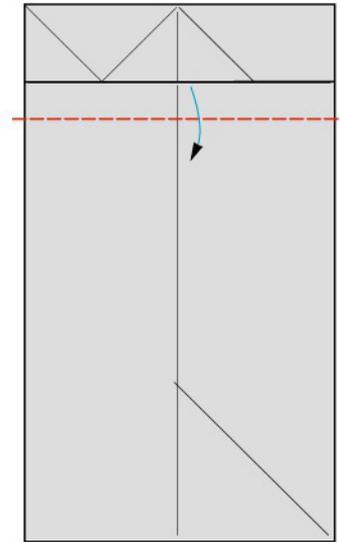
4

1 piega a monte



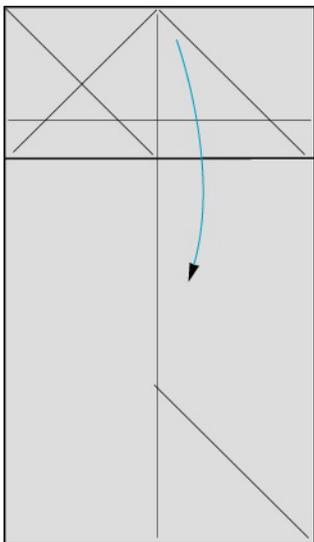
5

1 piega a valle



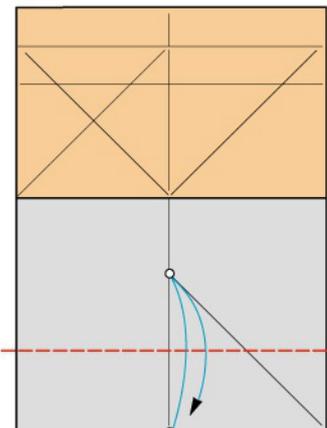
6

1 piega a valle



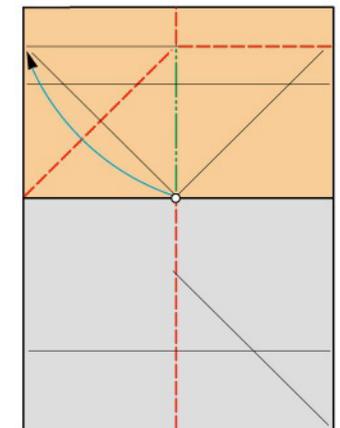
7

Ruotate



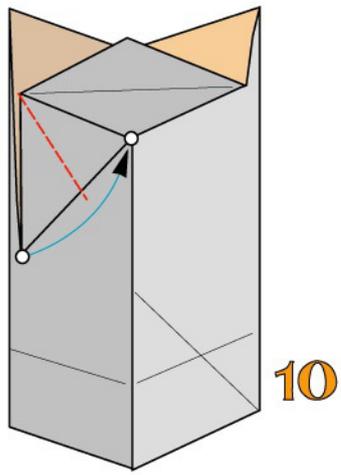
8

1 piega a valle



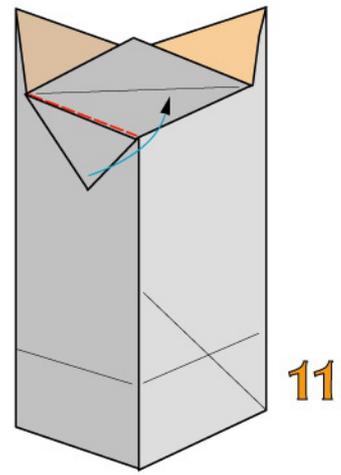
9

Ripiegando a valle e a monte, modellate 3D



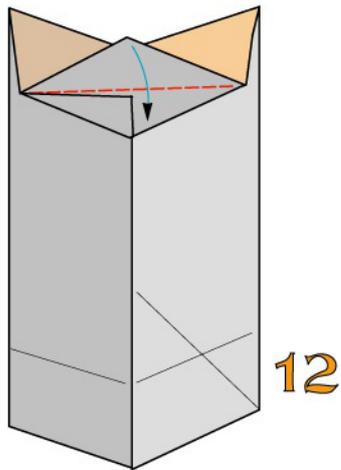
10

1 piega a valle



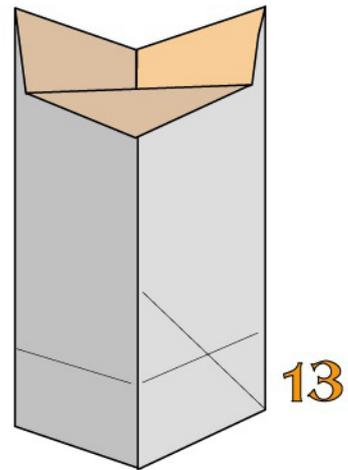
11

1 piega a valle



12

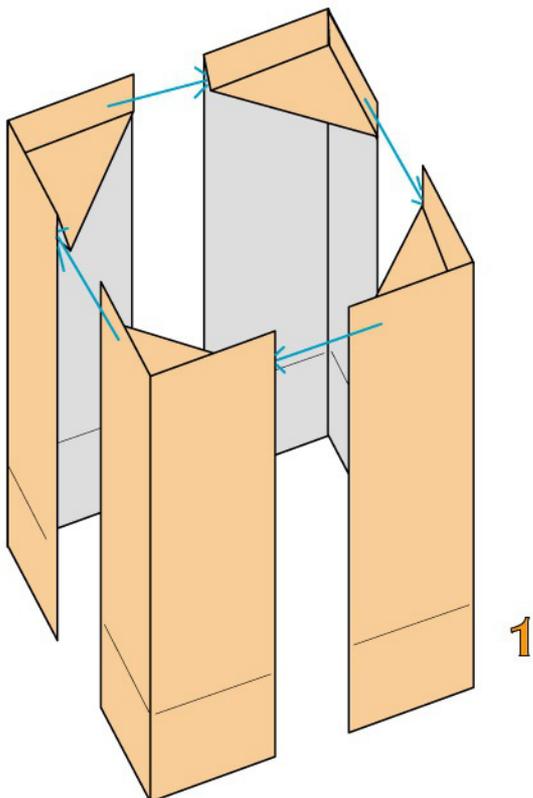
1 piega a valle



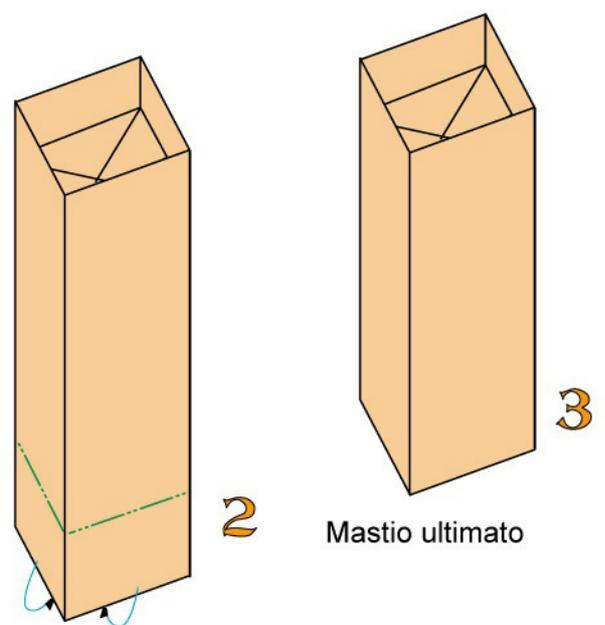
13

Modulo ultimato

MONTAGGIO DEI MODULI

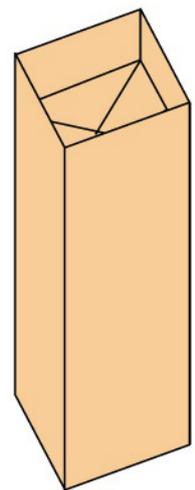


1



2

Ripiegate i bordi all'interno



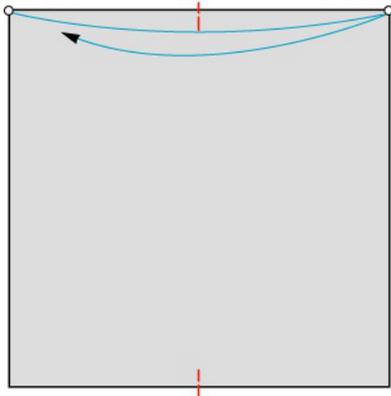
3

Mastio ultimato

Inserite vicendevolmente uno all'interno dell'altro

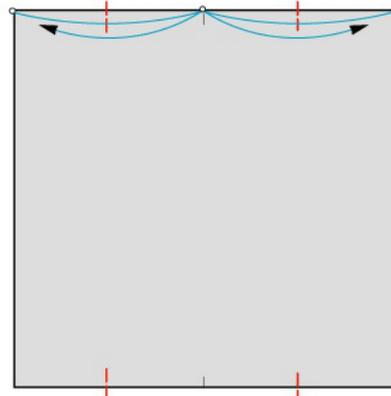
COSTRUZIONE DELLA SCALA

Partite da un modulo-base (5x5)



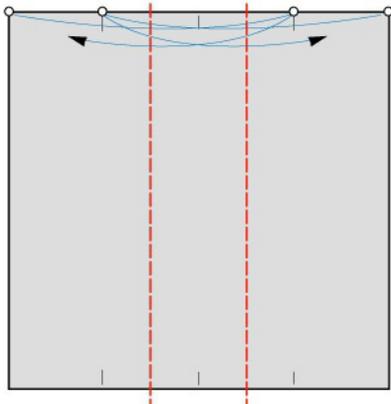
1

2 piccole pieghe a valle



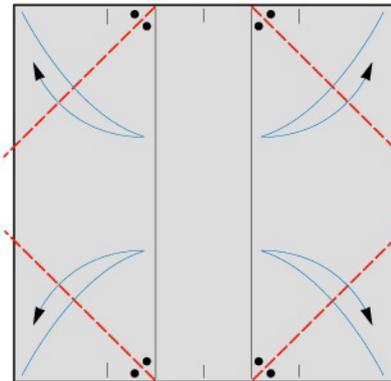
2

4 piccole pieghe a valle



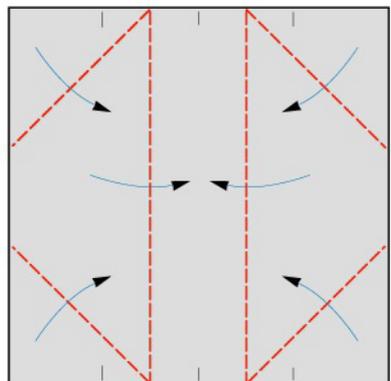
3

2 pieghe a valle



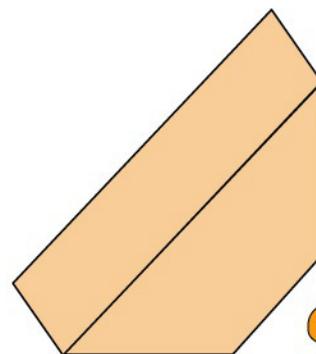
4

4 pieghe bisettrici a valle



5

Ripiegando a valle modellate 3D e ribaltate



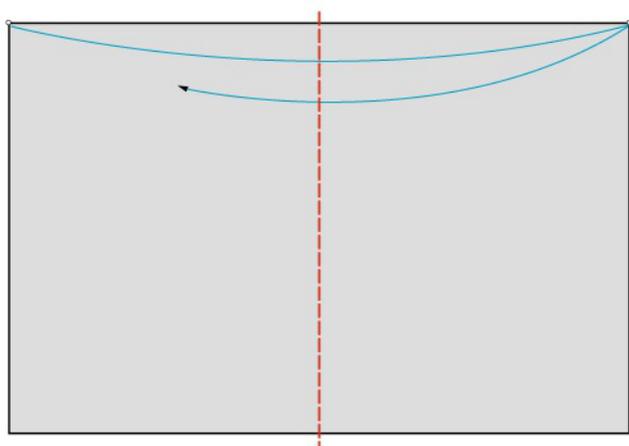
6

Scala del mastio ultimata

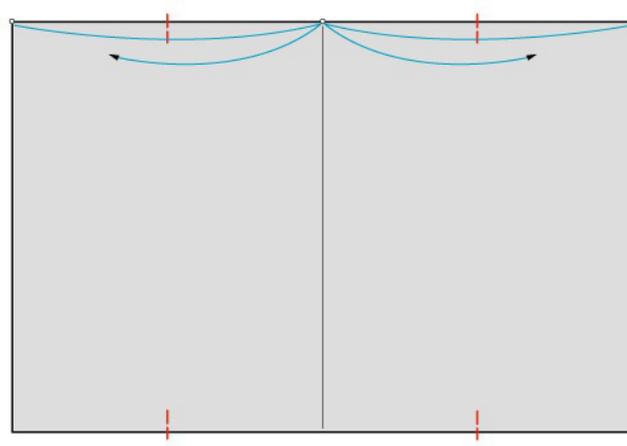
CASA GRANDE



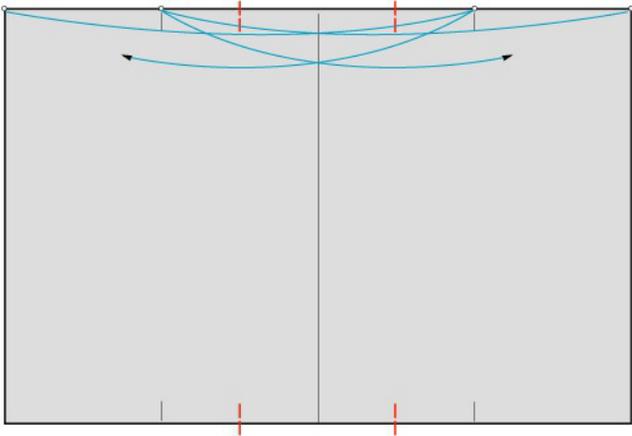
Formato E 10x15 cm



1 piega a valle

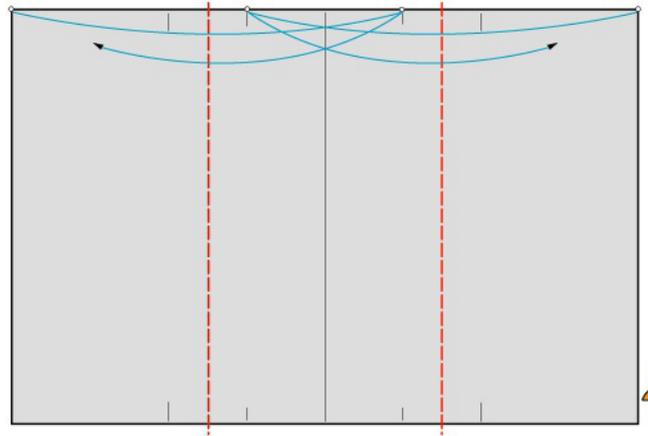


4 piccole pieghe a valle



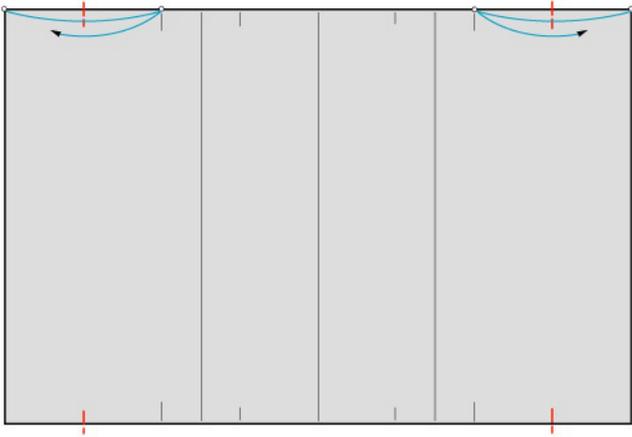
4 piccole pieghe a valle

3



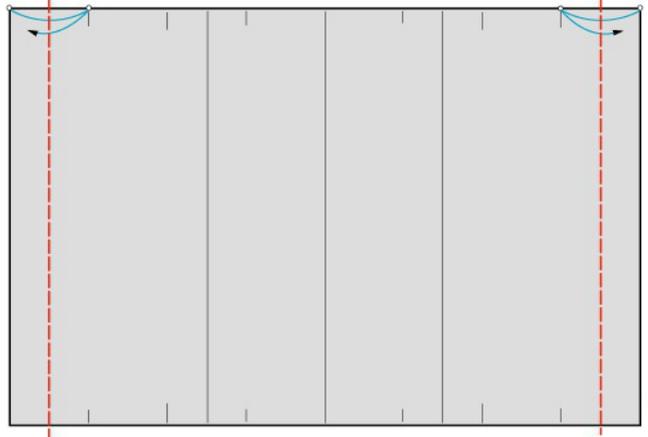
2 pieghe a valle

4



4 piccole pieghe a valle

5



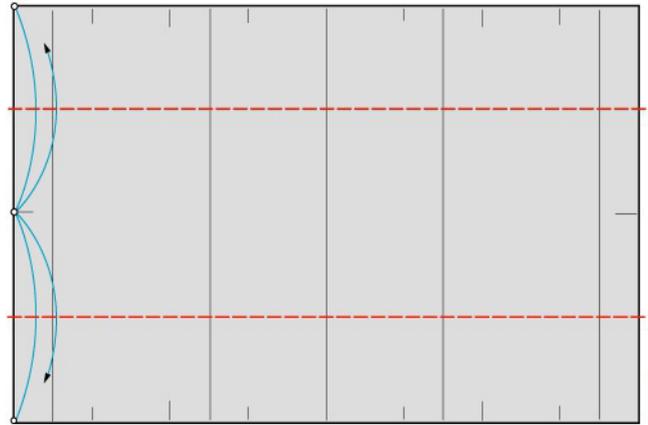
2 pieghe a valle

6



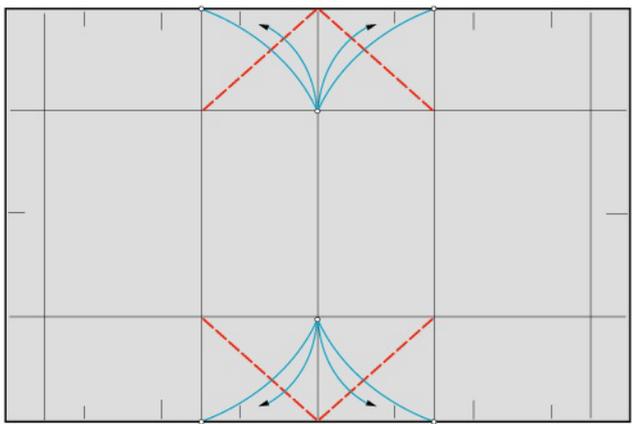
2 piccole pieghe a valle

7



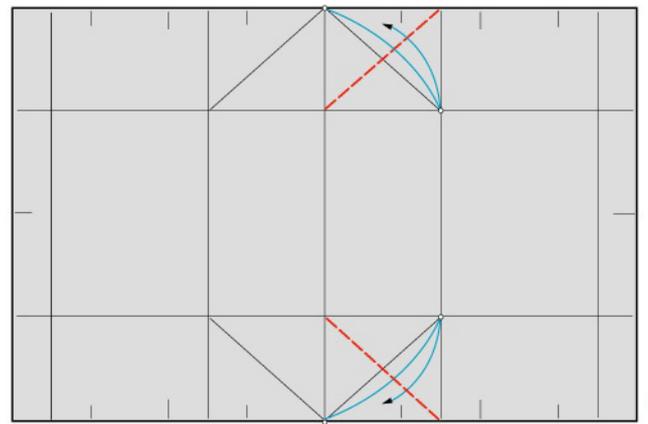
2 pieghe a valle

8



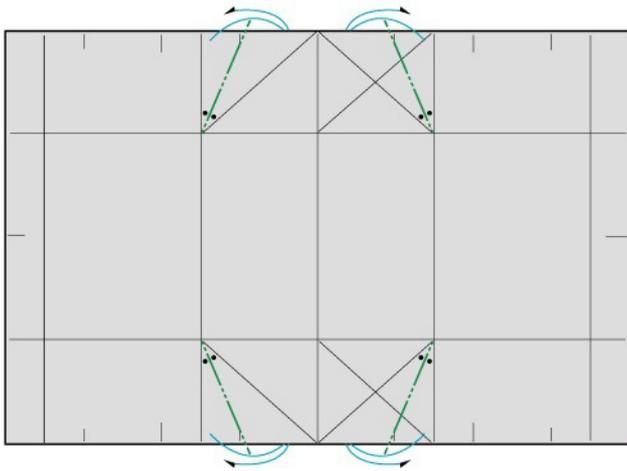
4 pieghe diagonali a valle

9



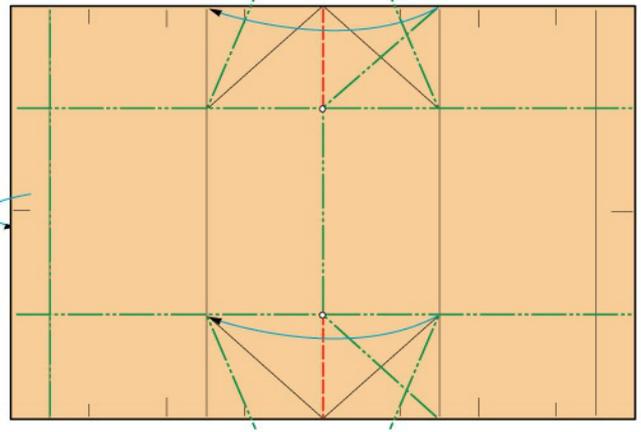
2 pieghe diagonali a valle

10



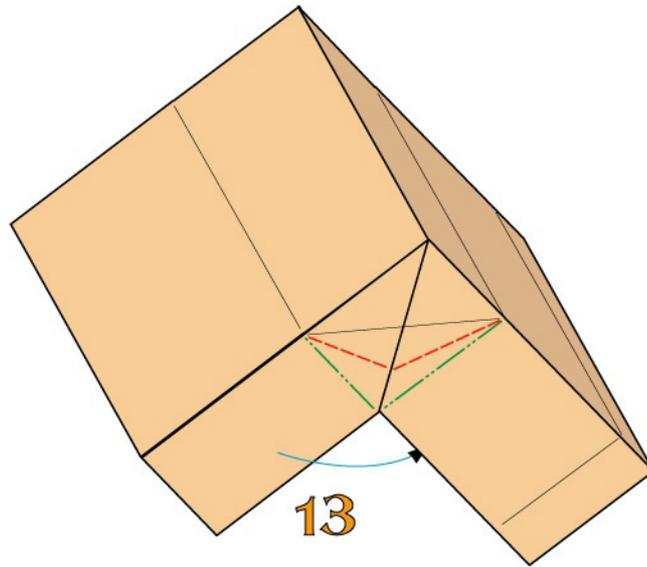
4 pieghe bisettrici a monte e ribaltate

11



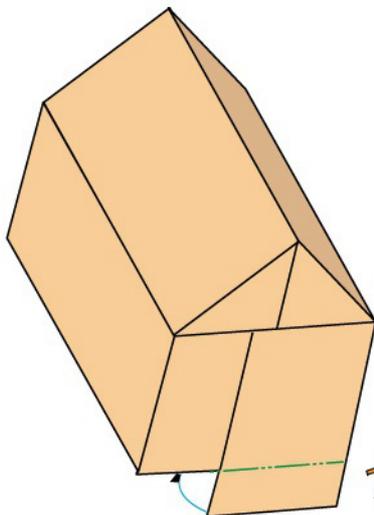
Ripiegando a valle a monte modellate 3D

12



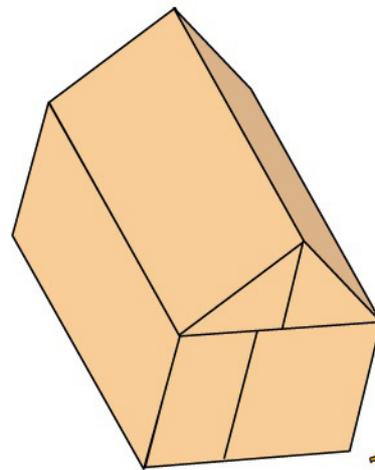
13

Ripiegate 2 volte a valle e 2 a monte per lato



14

Rovesciate il bordo all'interno



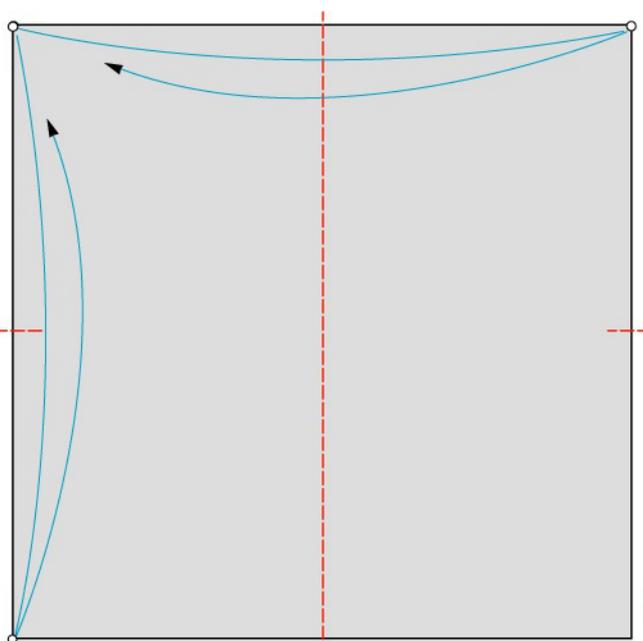
15

Casa grande ultimata

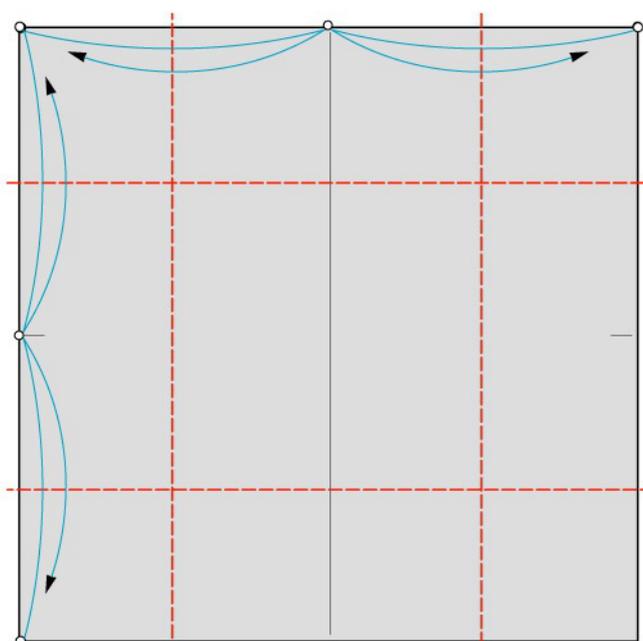
CASA PICCOLA



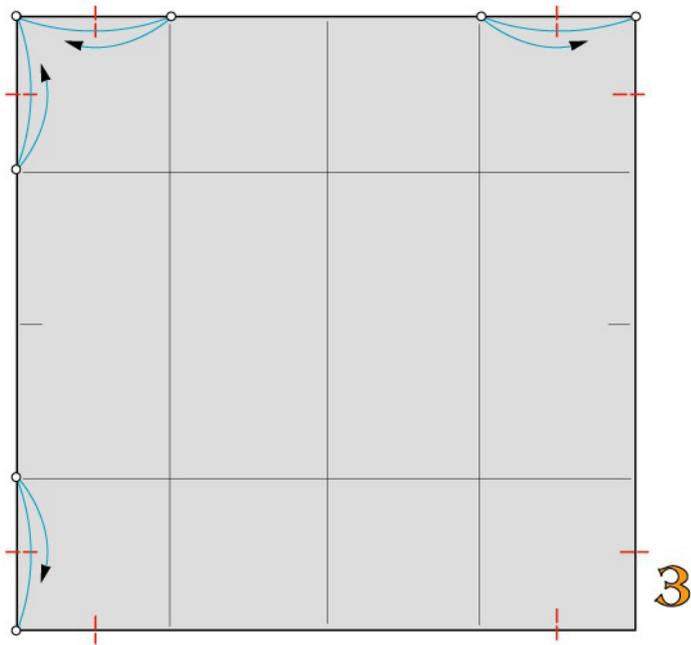
Formato **G 10x10**



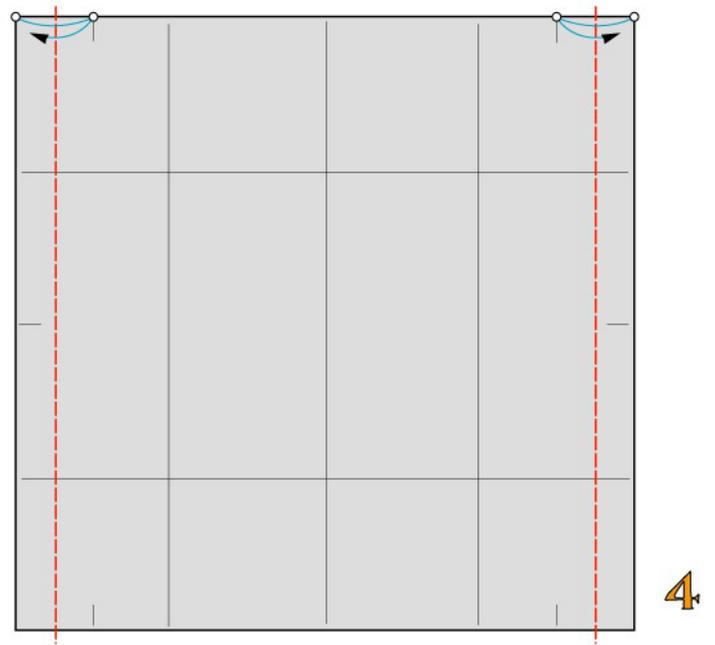
3 pieghe a valle, di cui 2 piccole



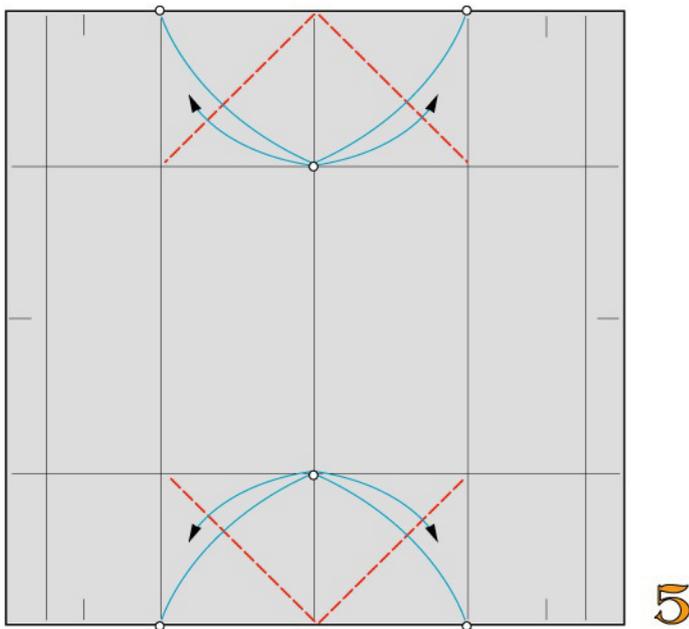
4 pieghe a valle



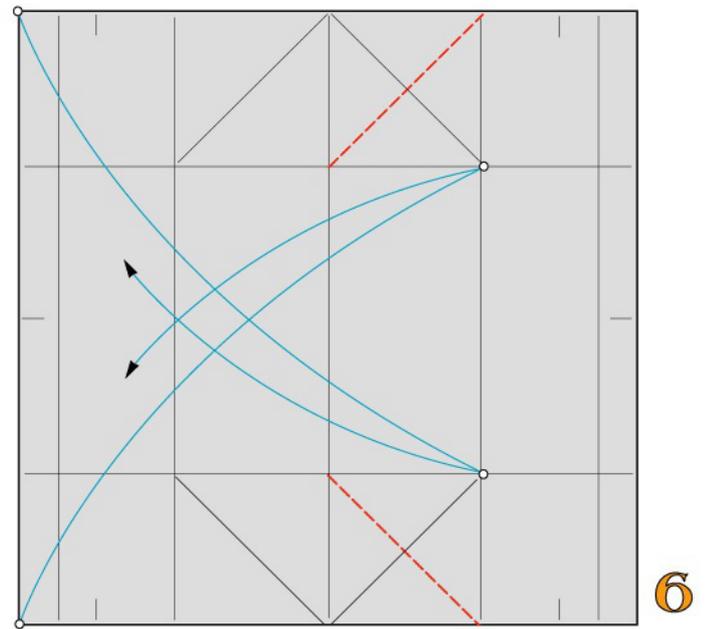
8 piccole pieghe a valle



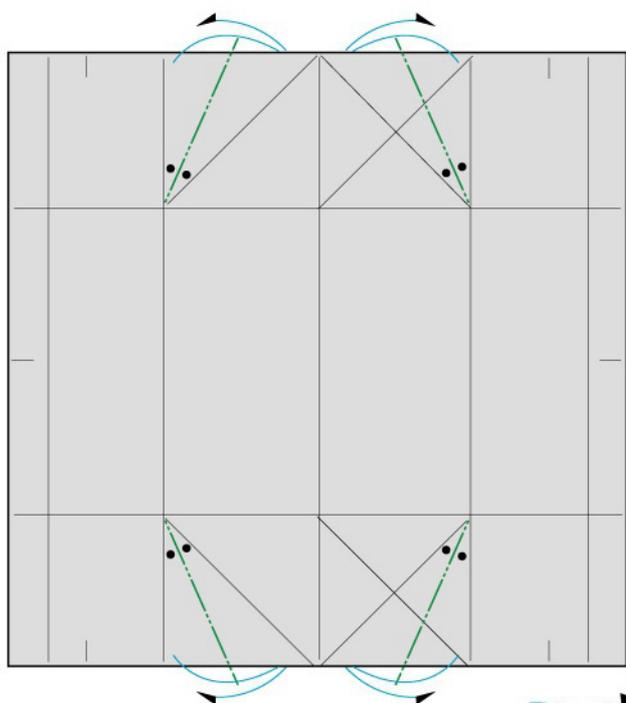
2 pieghe a valle



4 pieghe diagonali a valle

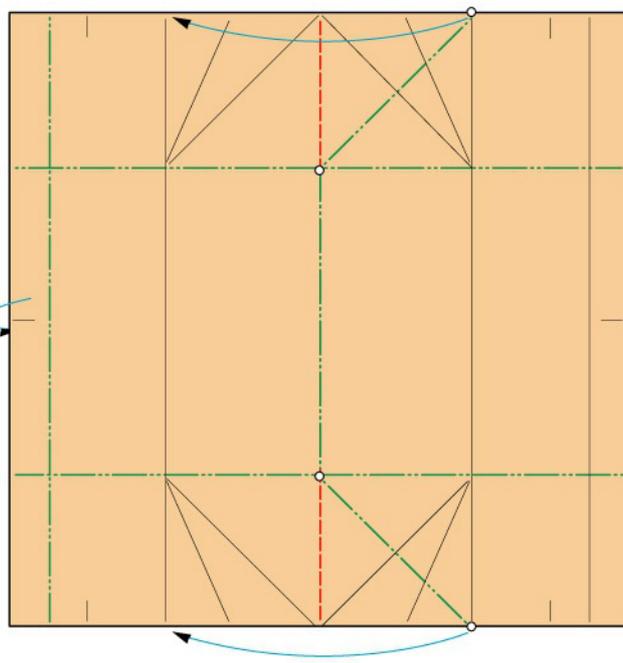


2 pieghe diagonali a valle



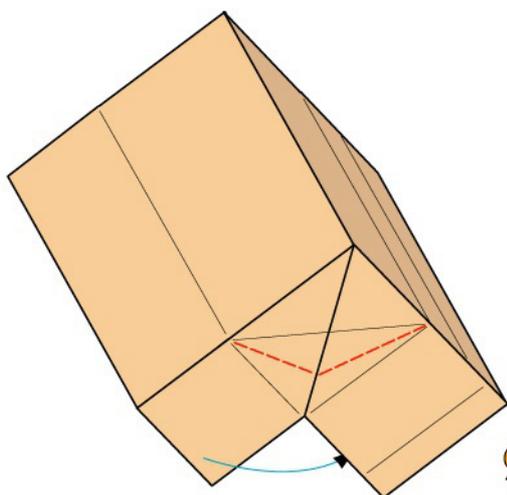
4 pieghe bisettrici a monte e ribaltate

7



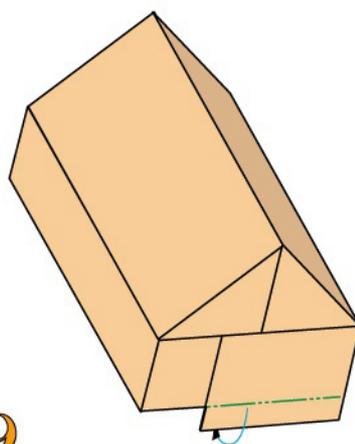
Ripiegando a valle a monte modellate 3D

8



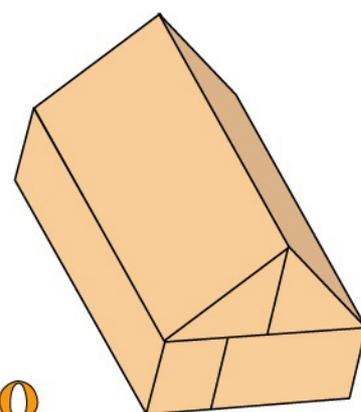
Ripiegate 2 volte a valle e 2 a monte per lato

9



Rovesciate il bordo all'interno

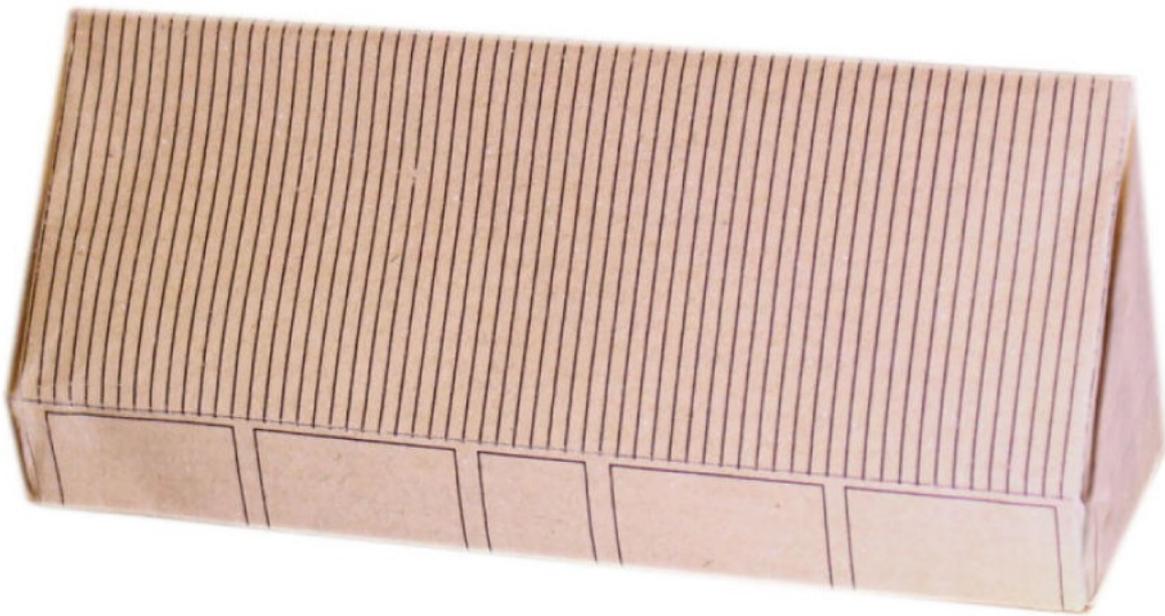
10



Casa piccola ultimata

11

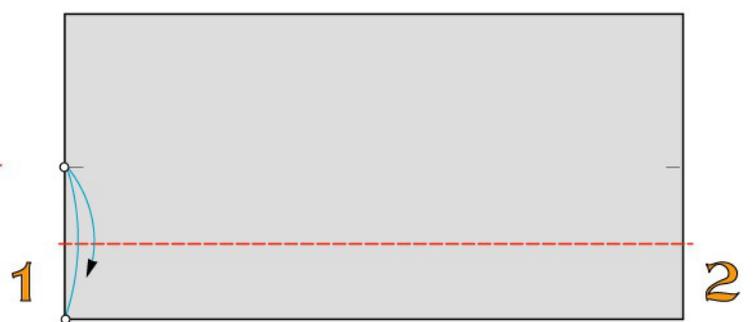
SCUDERIA



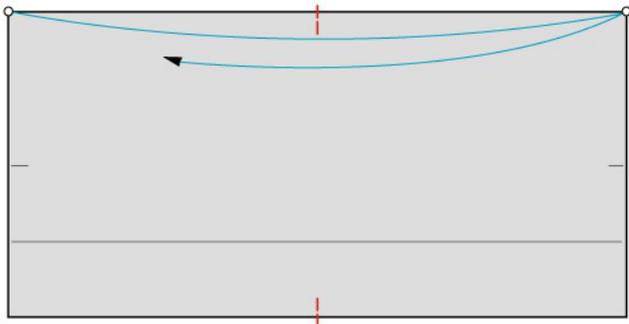
Formato C 10x20 cm



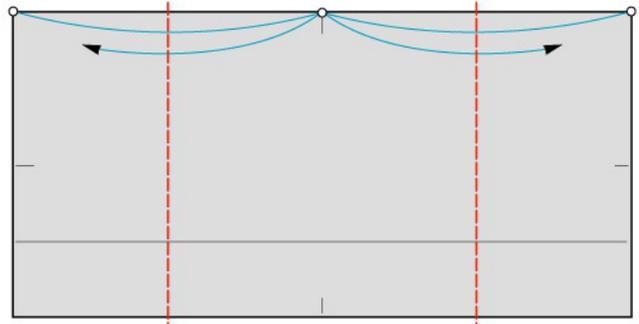
2 piccole pieghe a valle



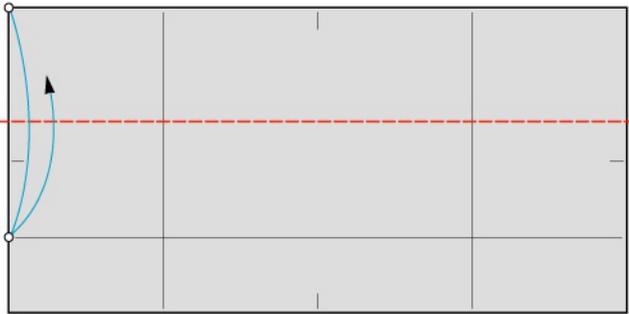
1 piega a valle



2 piccole pieghe a valle

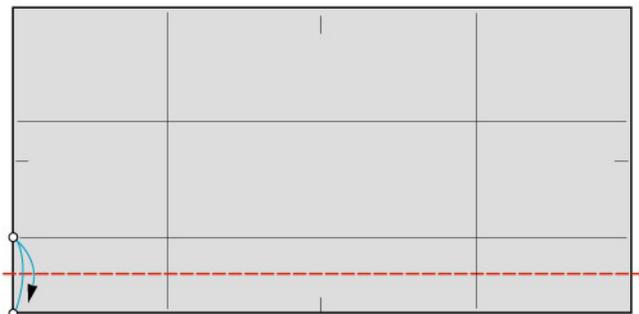


2 pieghe a valle



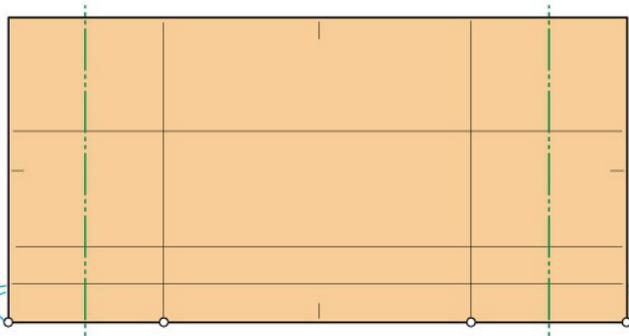
1 piega a valle

3



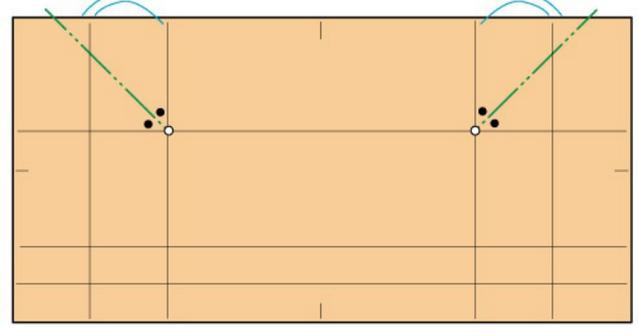
1 piega a valle e ribaltate

4



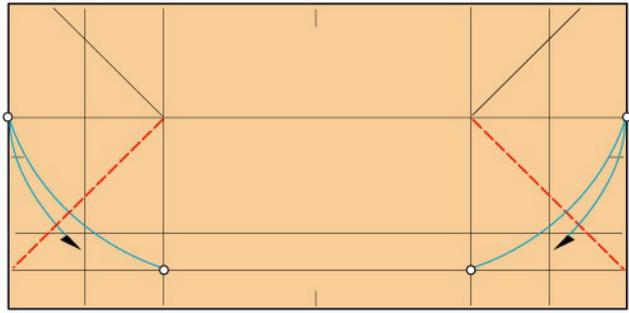
2 pieghe a monte

5



2 pieghe bisettrici a monte

6



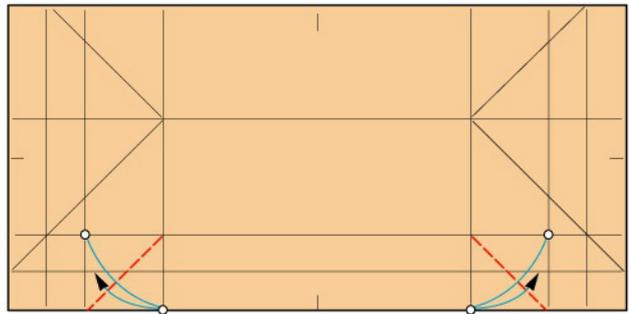
2 pieghe diagonali a valle

7



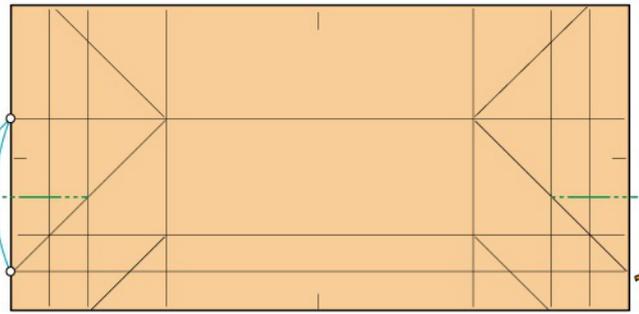
2 pieghe a valle

8



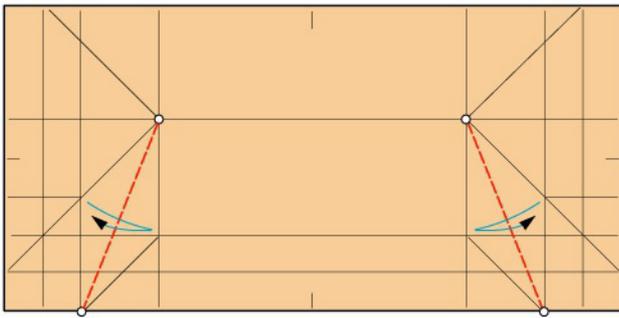
2 pieghe diagonali a valle

9



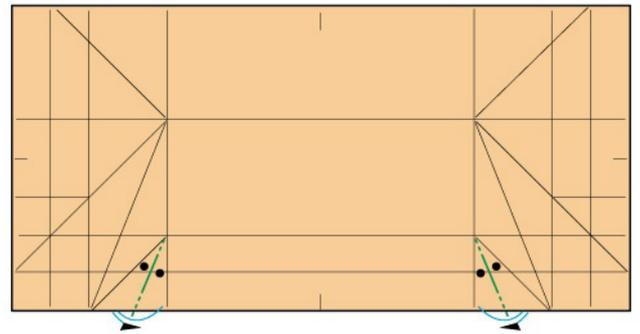
2 pieghe a monte

10



11

2 pieghe a valle



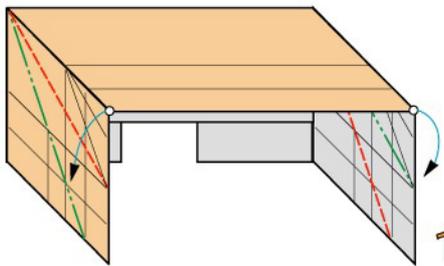
12

2 pieghe bisettrici a monte



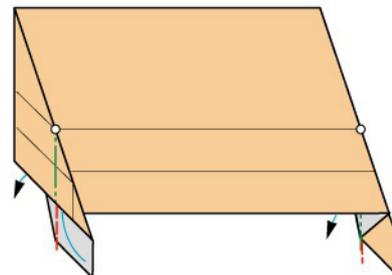
13

Ripiegando a valle a monte modellate 3D



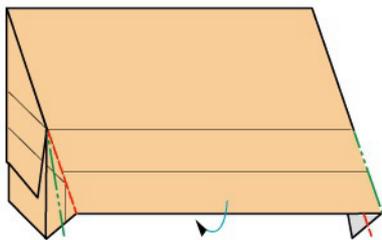
14

Ripiegate a valle a monte



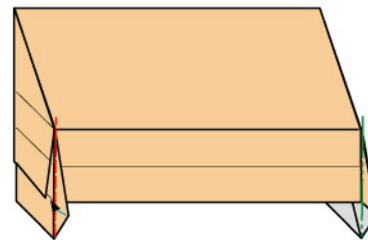
15

2 pieghe rovesce interne



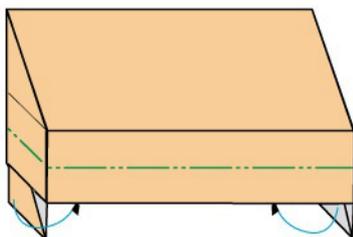
16

Ripiegate a valle a monte



17

Intascate ripiegando a valle



18

Piegate i bordi all'interno



19

Scuderia ultimata

CORTINA BASTIONATA

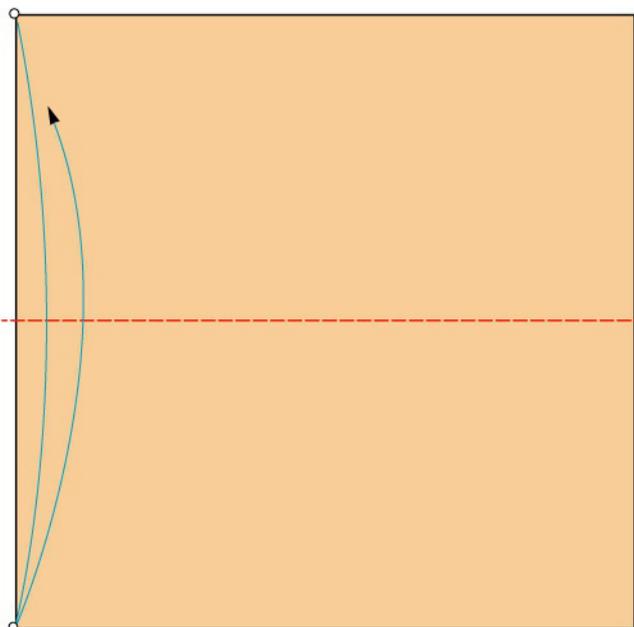
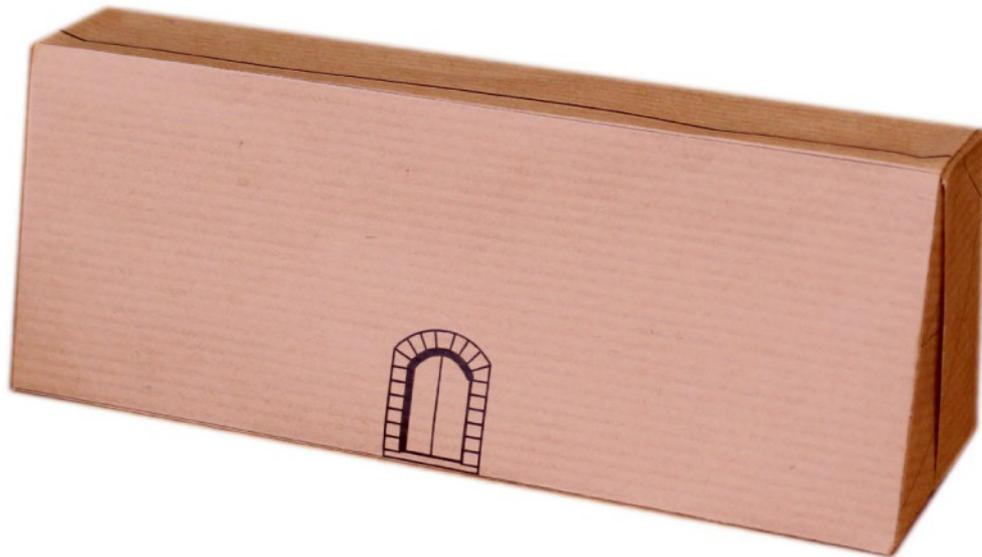
BASTION CURTAIN

CORTINA DE BASTIÓN

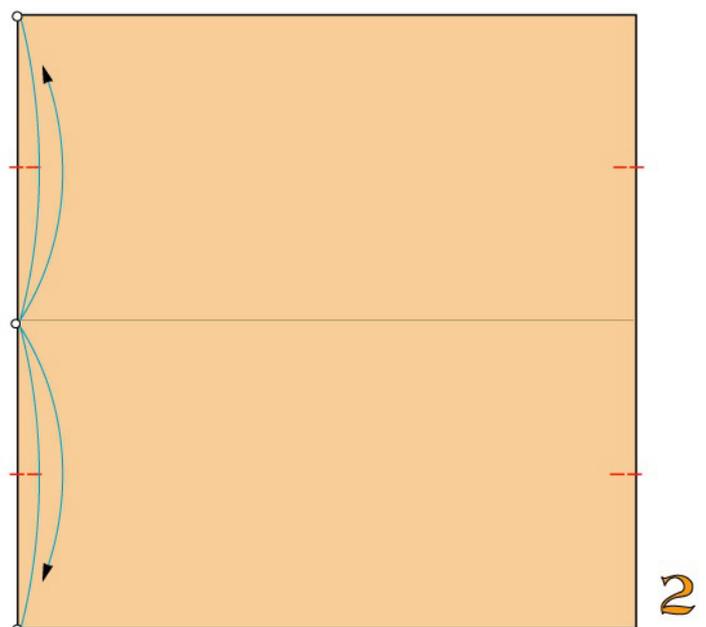
Formato "A"

Si noti la parete scarpata e il notevole spessore.

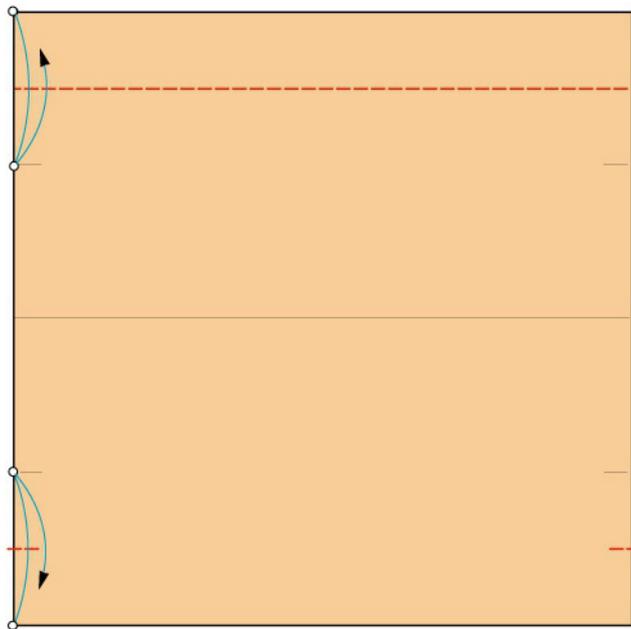
Note the scarp wall and the considerable thickness.



1 piega a valle

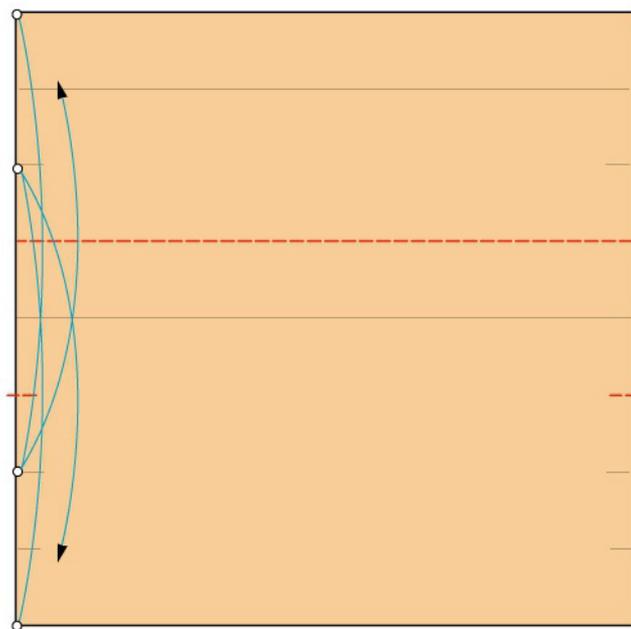


4 piccole pieghe a valle



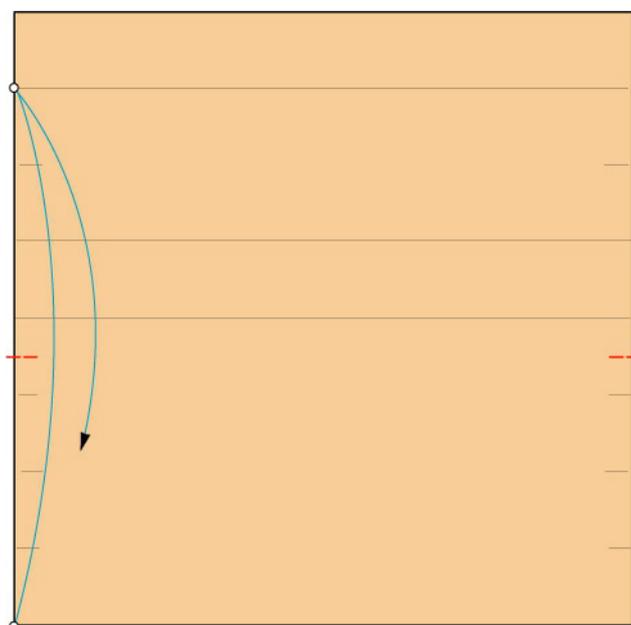
1 piega a valle

3



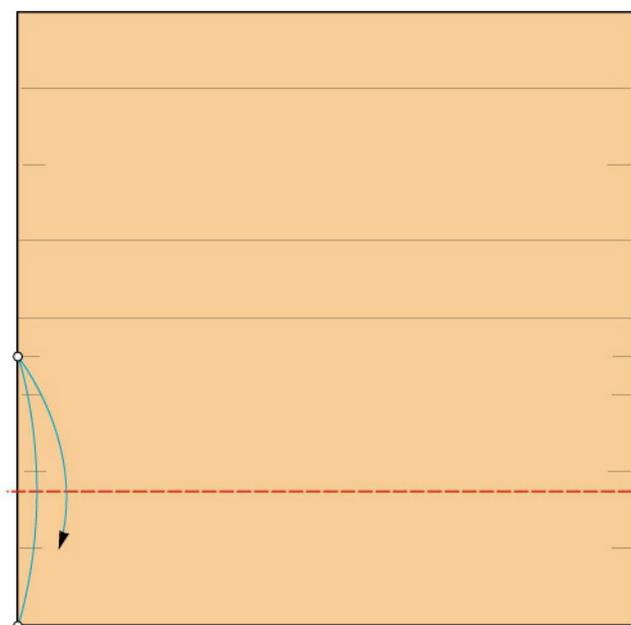
3 pieghe a valle, di cui 2 piccole

4



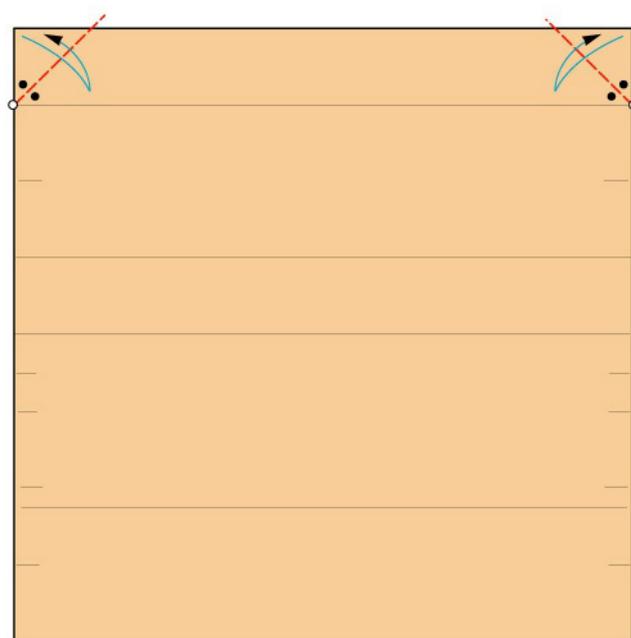
2 piccole pieghe a valle

5



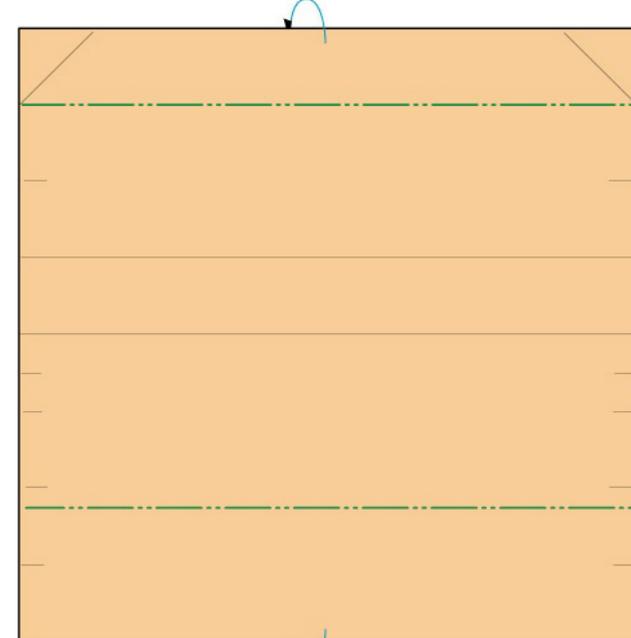
1 piega a valle

6



2 pieghe bisettrici a valle

7



Ripiegate 2 volte a monte e ribaltate

8



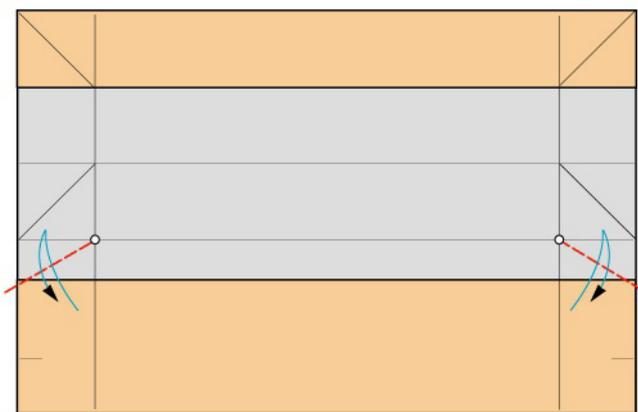
2 pieghe bisettrici a valle

9



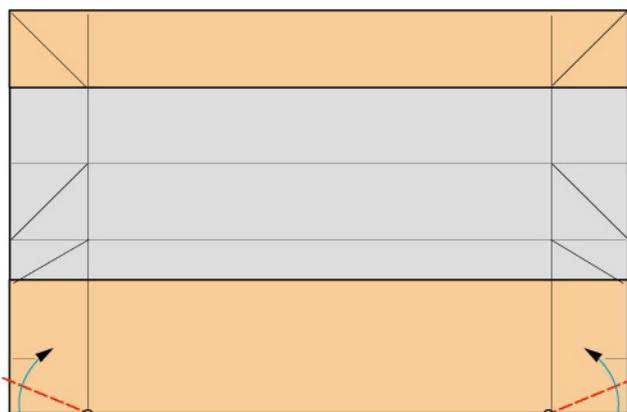
2 pieghe bisettrici a monte

10



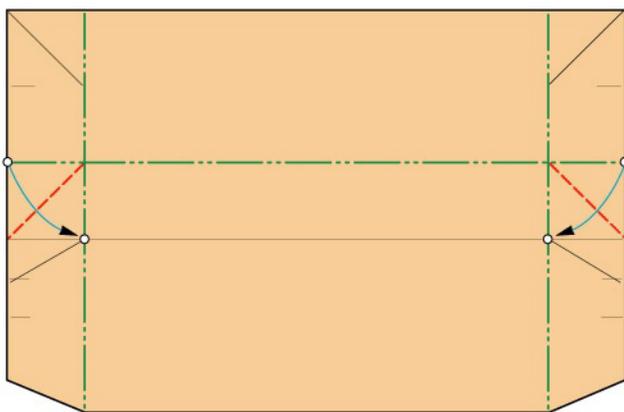
2 pieghe a valle

11



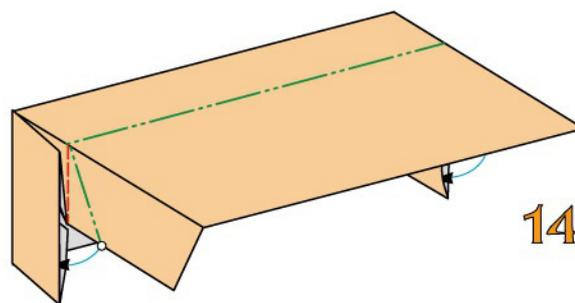
2 pieghe a valle e ribaltate

12



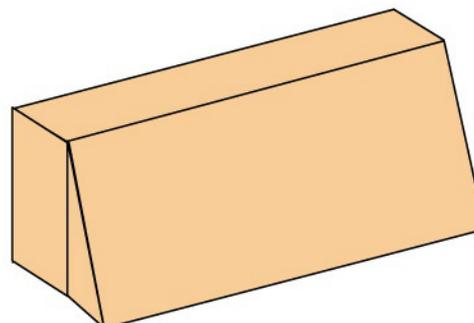
Ripiegando a valle e a monte modellate 3D

13



14

Ripiegando a valle e a monte intascate



15

Cortina bastionata ultimata

BASTIONE

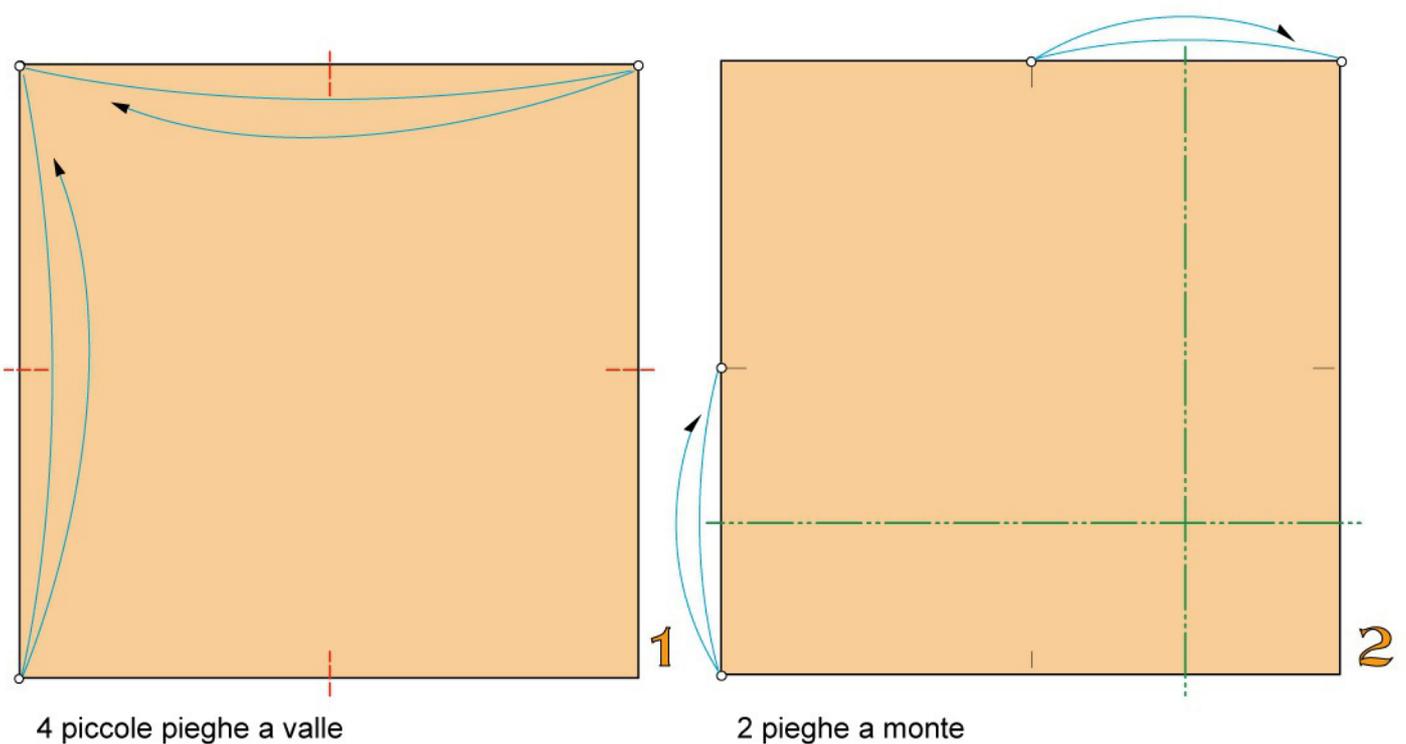
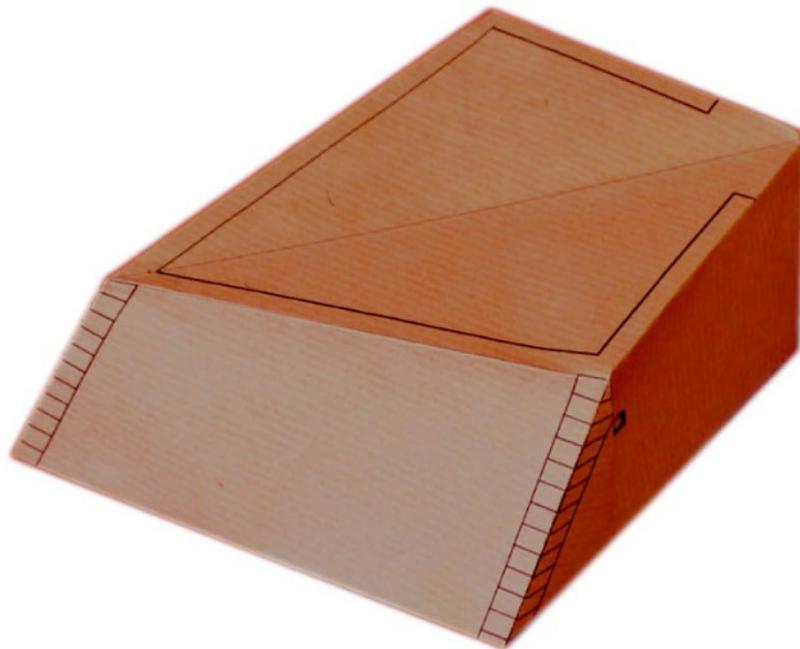
BASTION

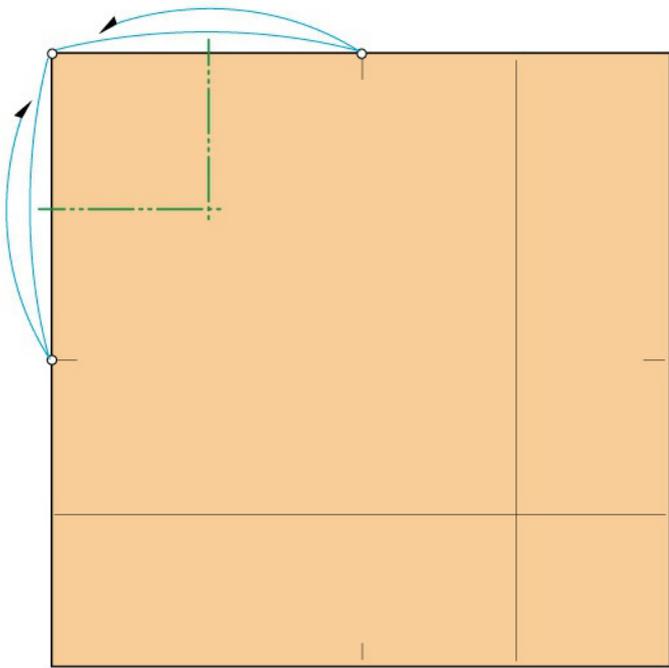
BASTIÓN

Formato "A"

Elemento architettonico sostitutivo della torre medioevale.
Si notino le pareti scarpate e le finestre laterali per il tiro di fiancheggiamento.

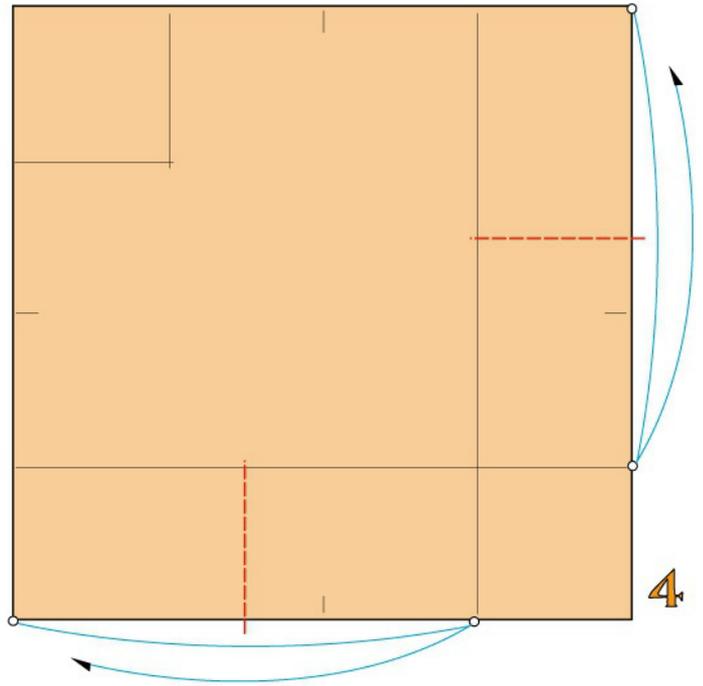
Substitute architectural element of the medieval tower.
Note the escarpment walls and the side windows for flanking fire.





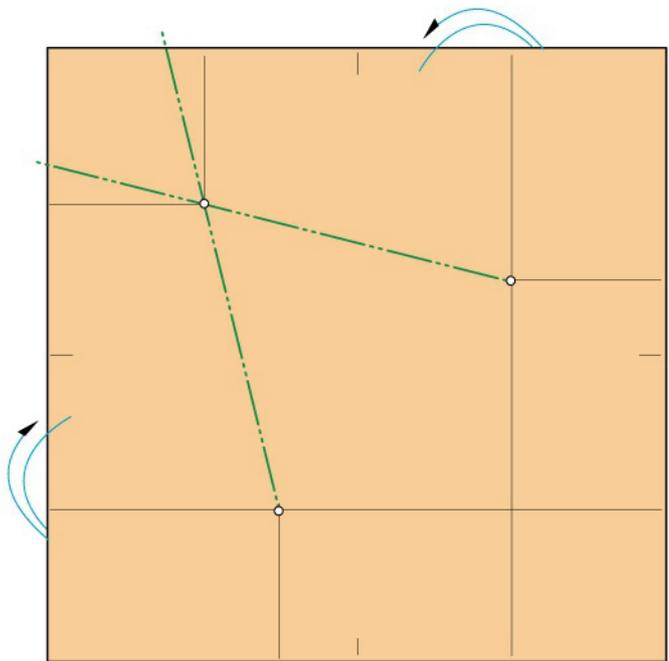
3

2 pieghe a monte



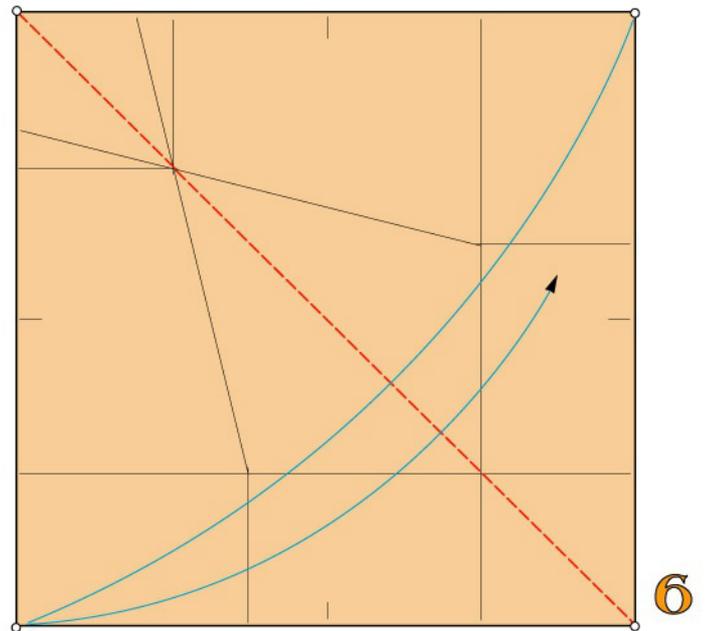
4

2 pieghe a valle



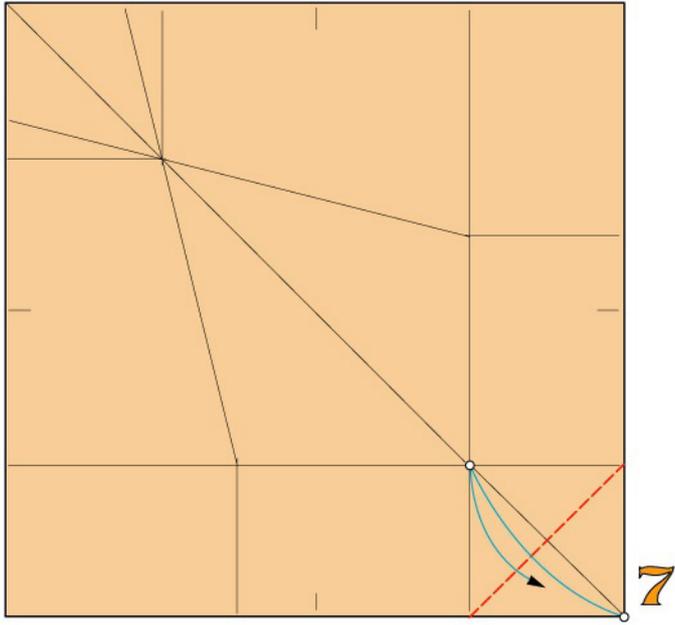
5

2 pieghe a monte

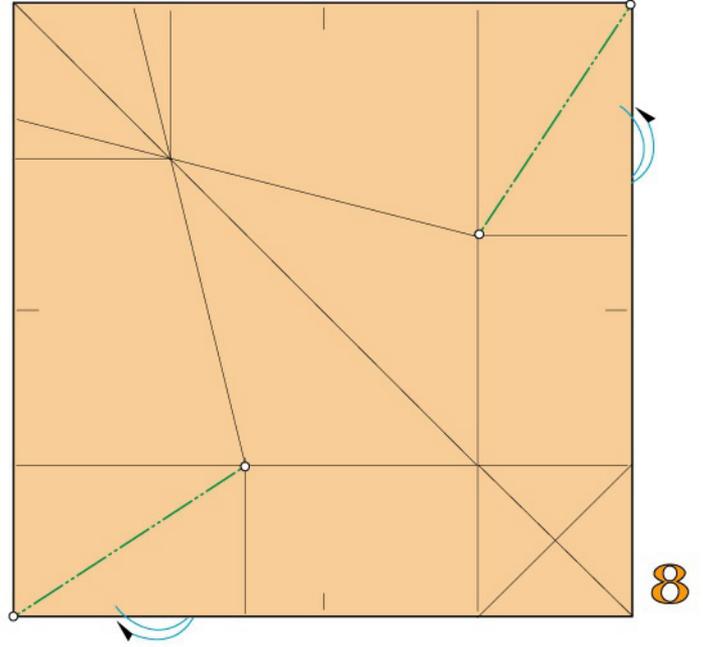


6

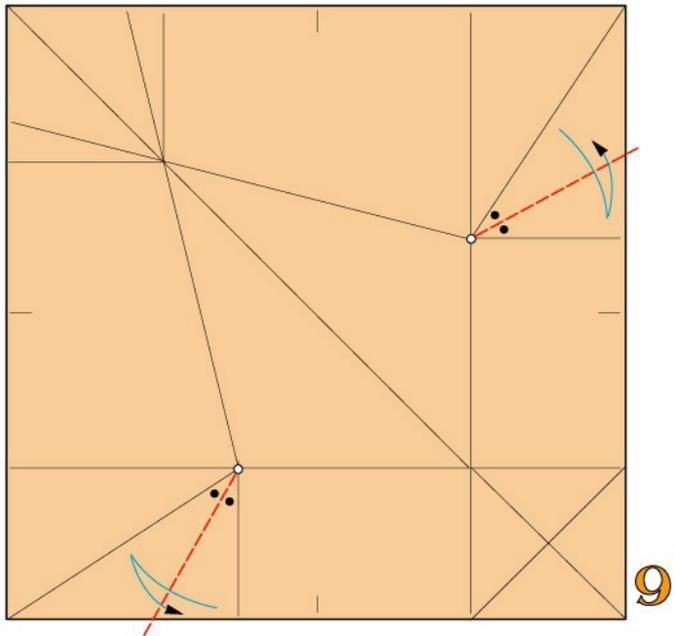
1 piega diagonale a valle



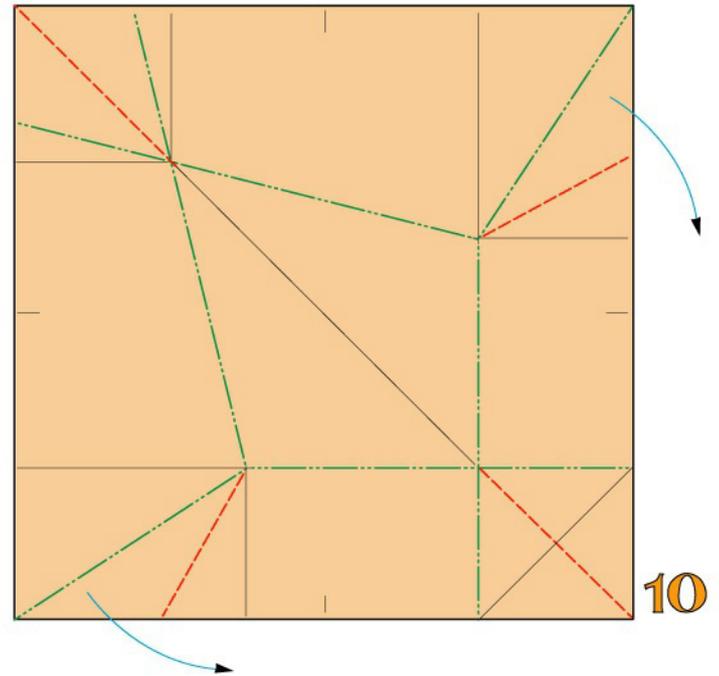
1 piega diagonale a valle



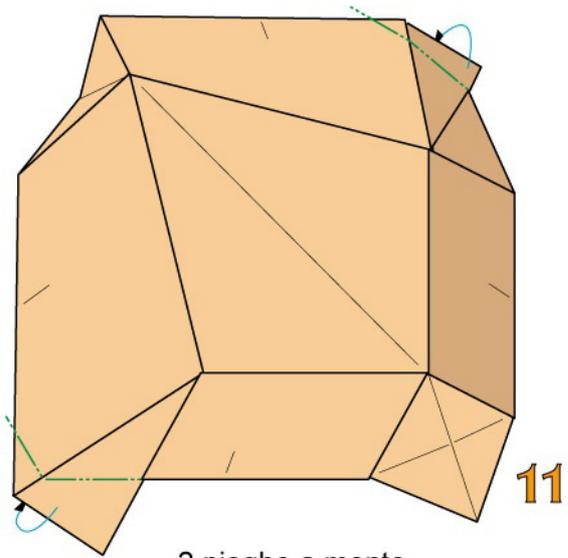
2 pieghe a monte



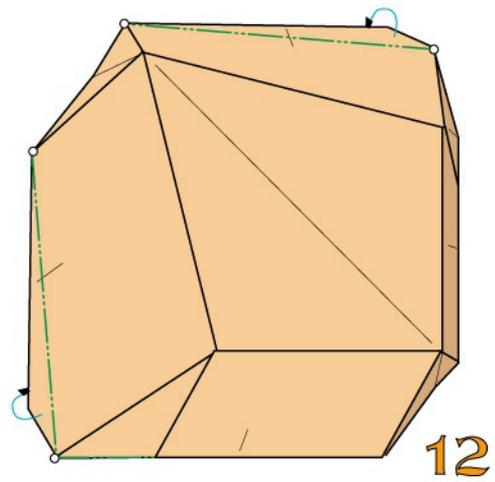
2 pieghe bisettrici a valle



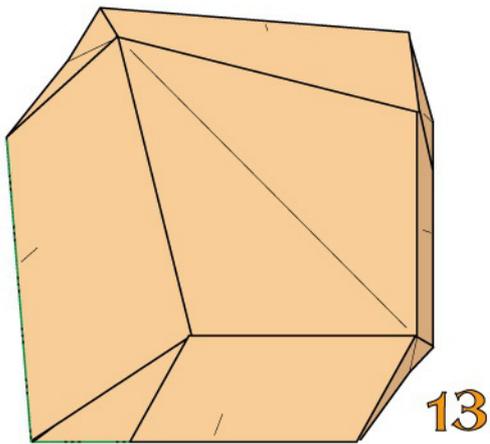
Ripiegando a valle e a monte modellate 3D



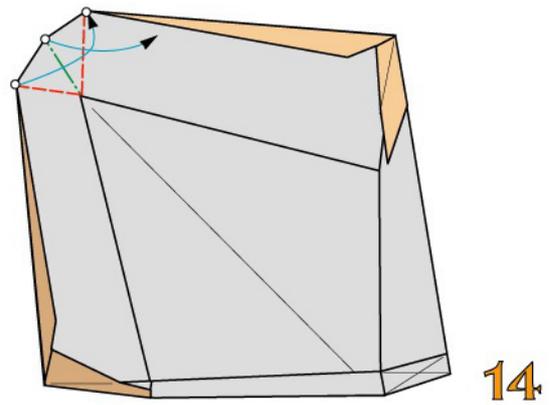
2 pieghe a monte



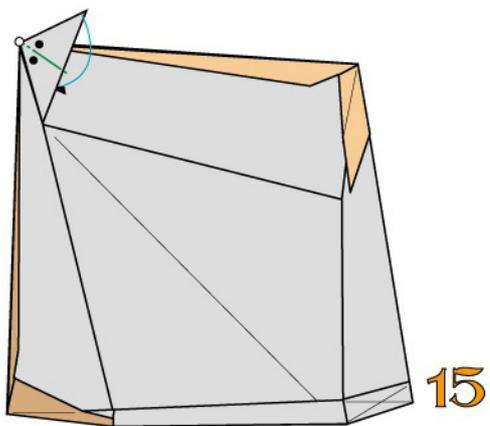
2 pieghe a monte



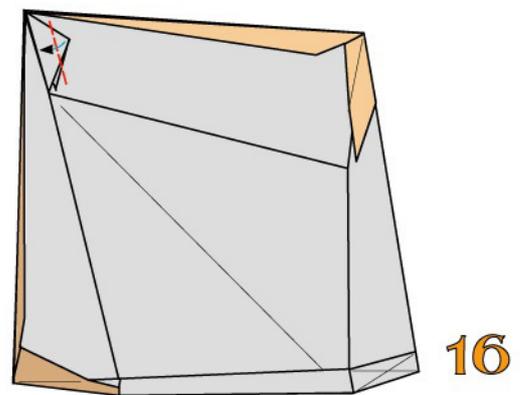
Ribaltate



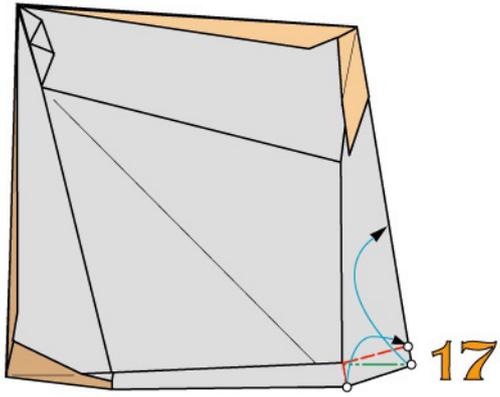
Ripiegate a valle a monte



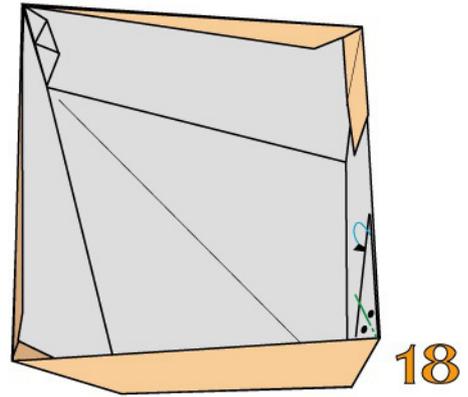
1 piega bisettrice a monte



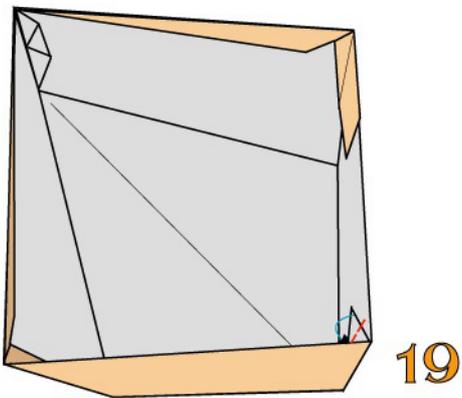
1 piega a valle



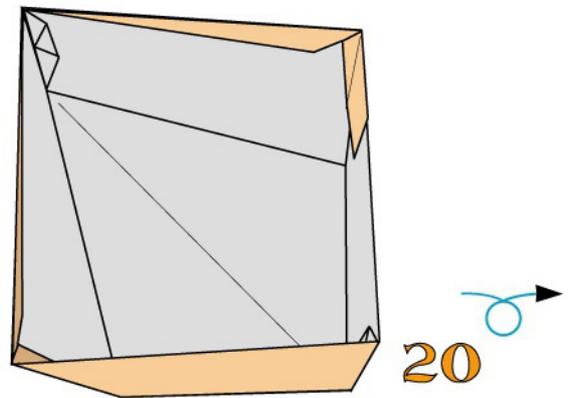
Ripiegate a valle a monte



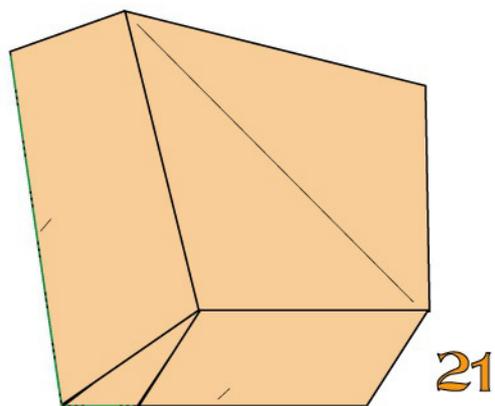
1 piega bisettrice a monte



1 piega a valle



Ribaltate



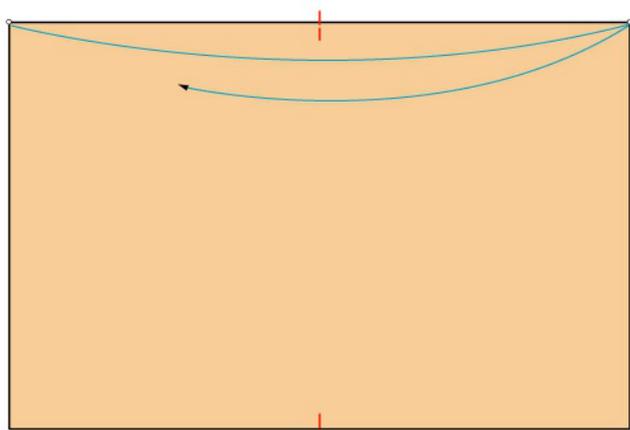
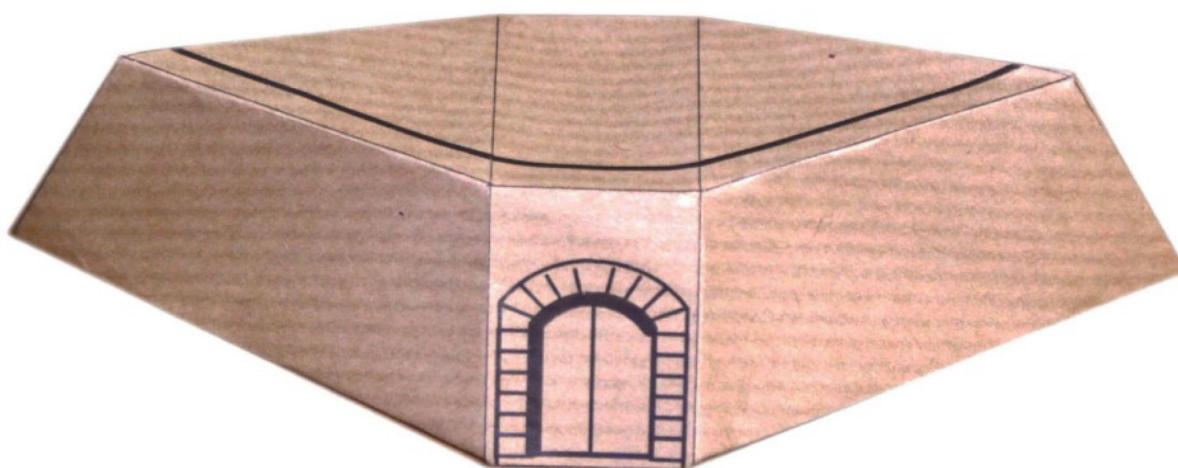
Bastione ultimato

RIVELLINO BASTIONATO

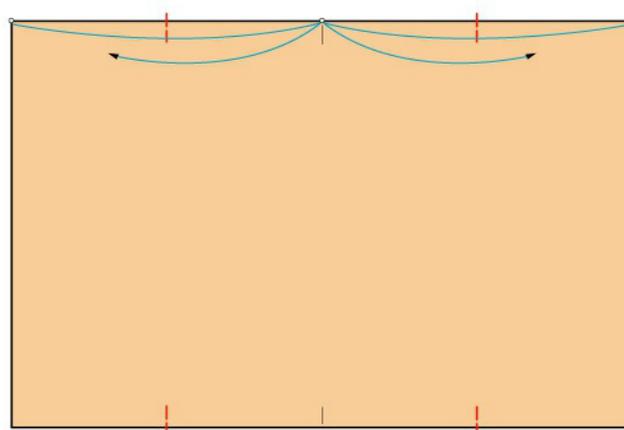
RAMPARTED RAVELIN
REVELLÍN AMURALLADO

Formato E 10x15cm

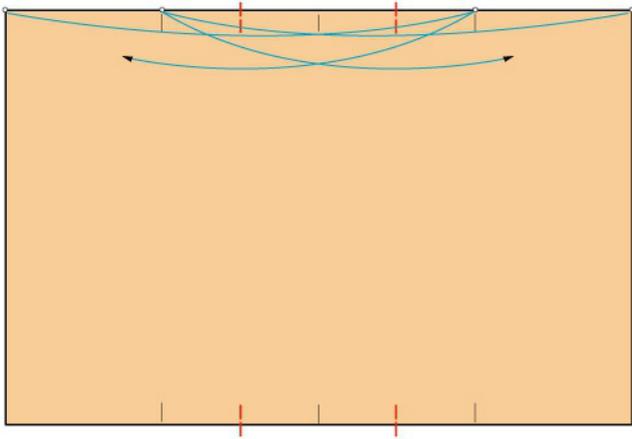
Si noti la parete scarpata e il notevole spessore.



2 piccole pieghe a valle

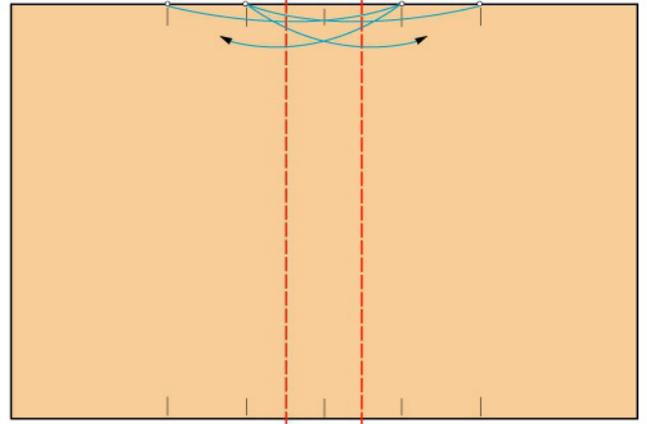


4 piccole pieghe a valle



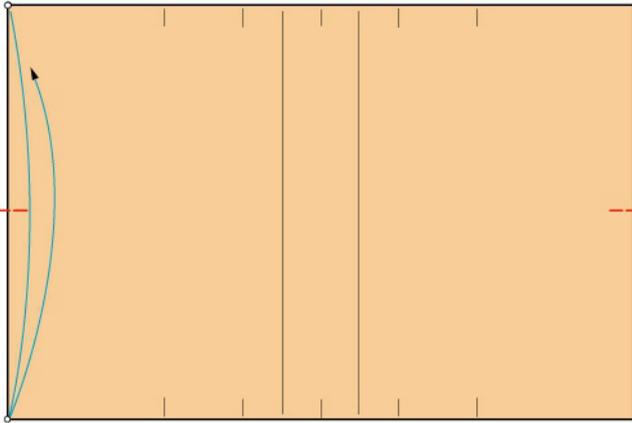
3

4 piccole pieghe a valle



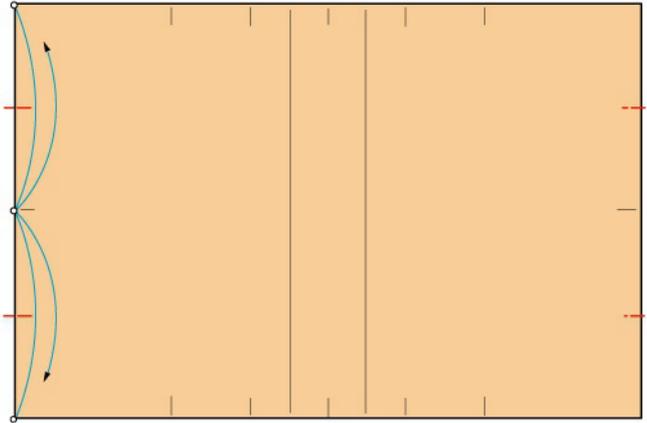
4

2 pieghe a valle



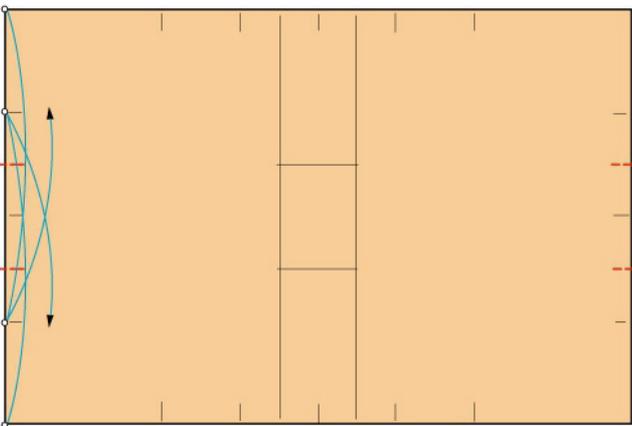
5

2 piccole pieghe a valle



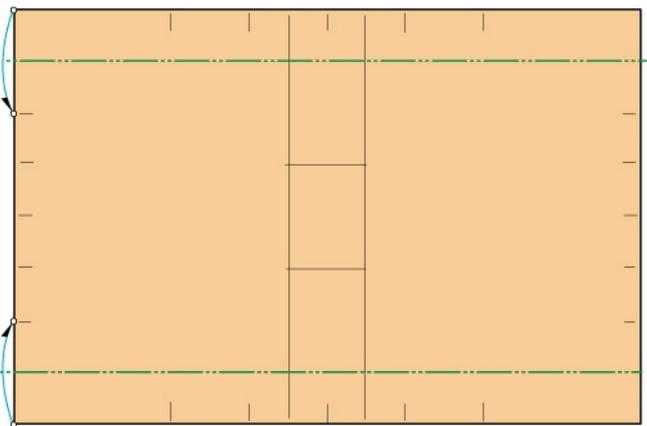
6

4 piccole pieghe a valle



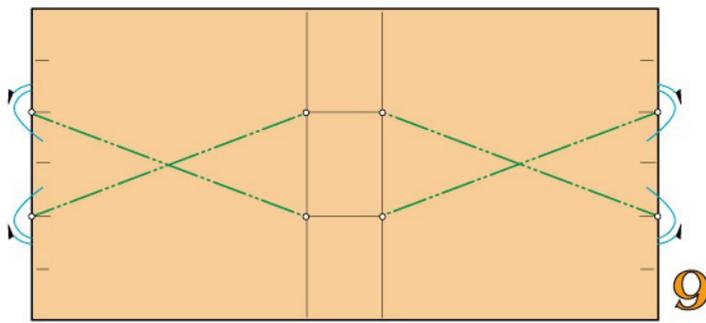
7

4 piccole pieghe a valle

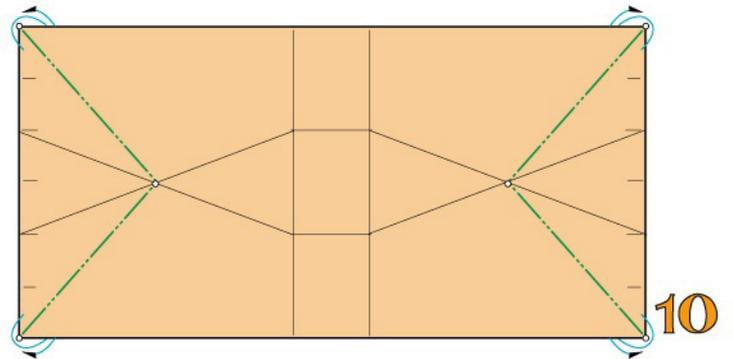


8

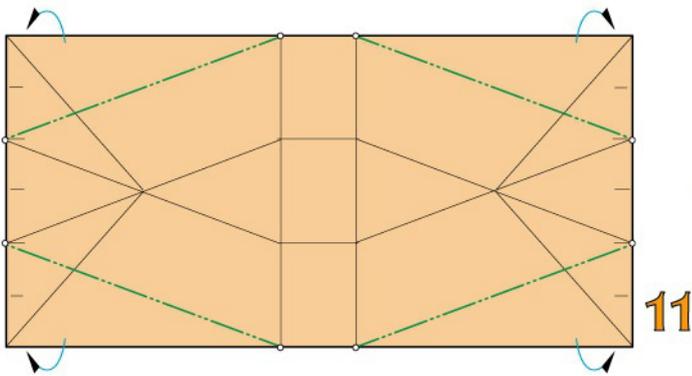
2 pieghe a monte



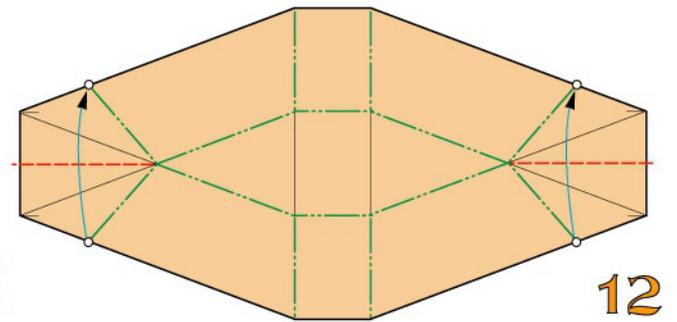
4 pieghe a monte



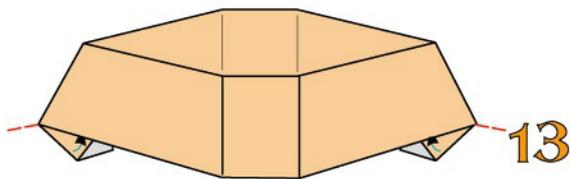
4 pieghe a monte



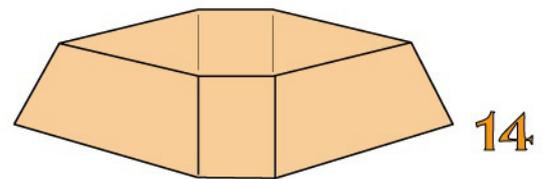
4 pieghe a monte



Ripiegando a valle e a monte modellate 3D

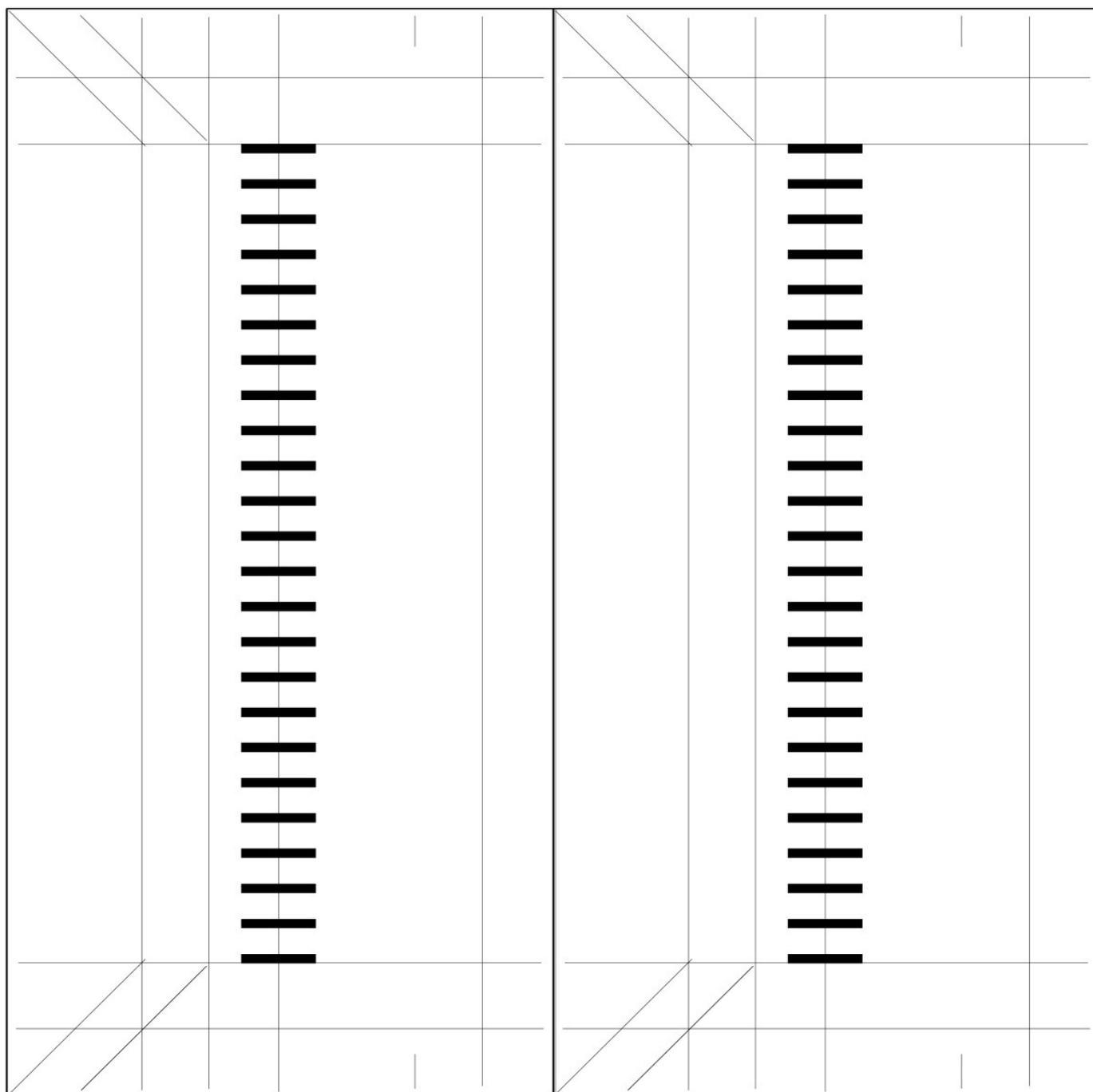


2 pieghe a valle bloccando il modello



Rivellino bastionato ultimato

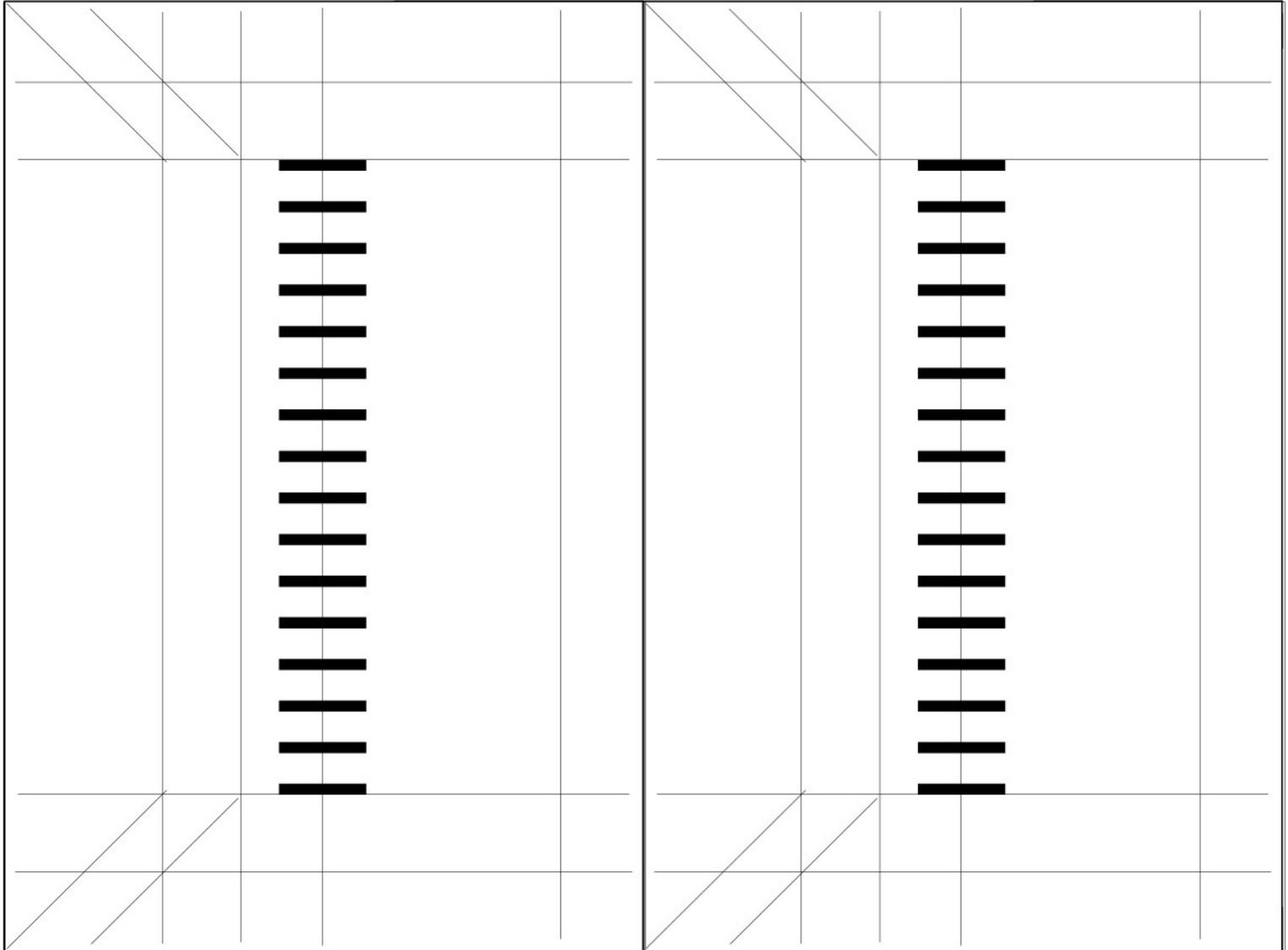
CORTINA BASSA formato "C"



CORTINA BASSA CORTA

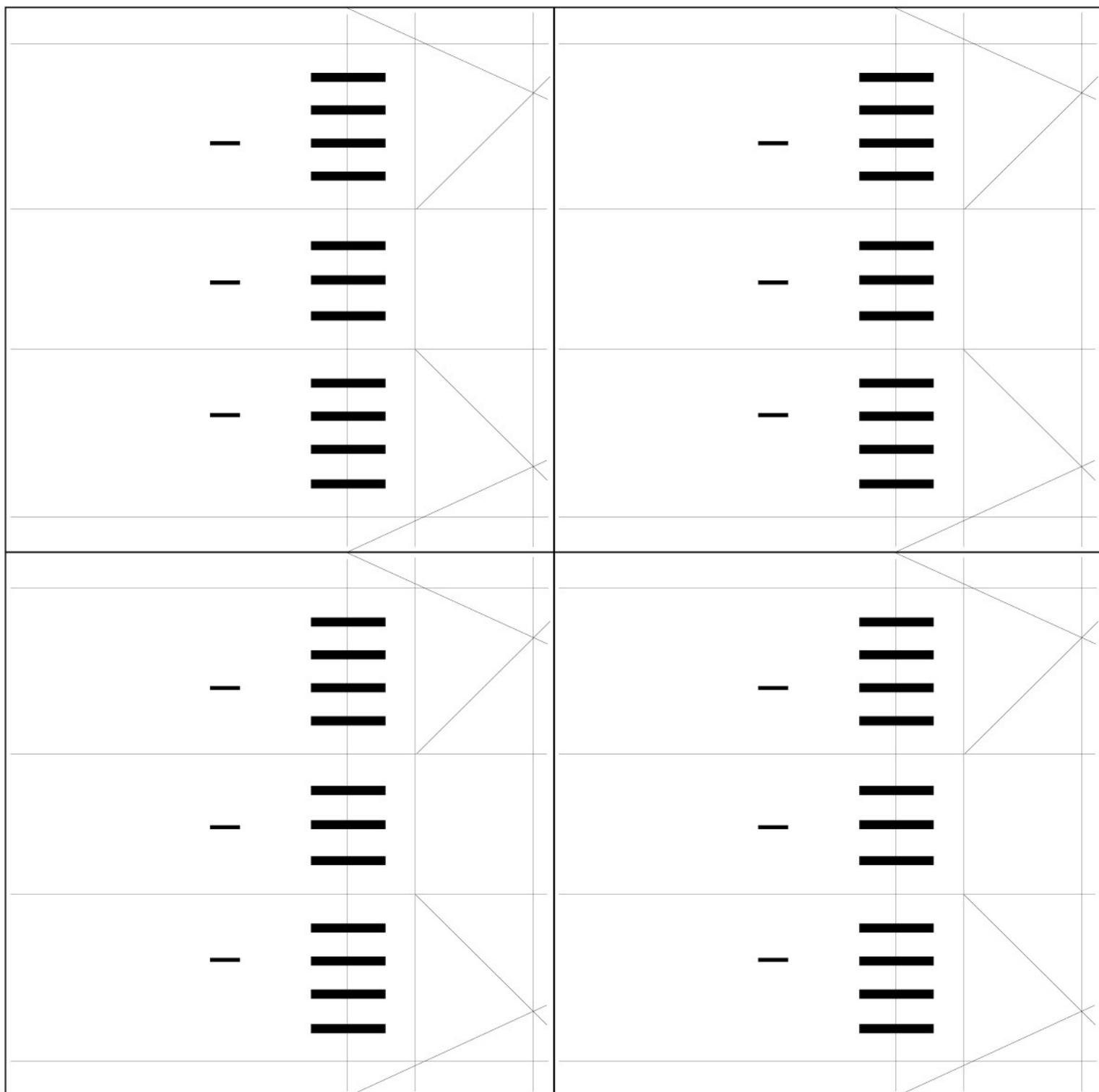
formato "E" 10x15 cm

Rigatura del foglio
Lined Sheet



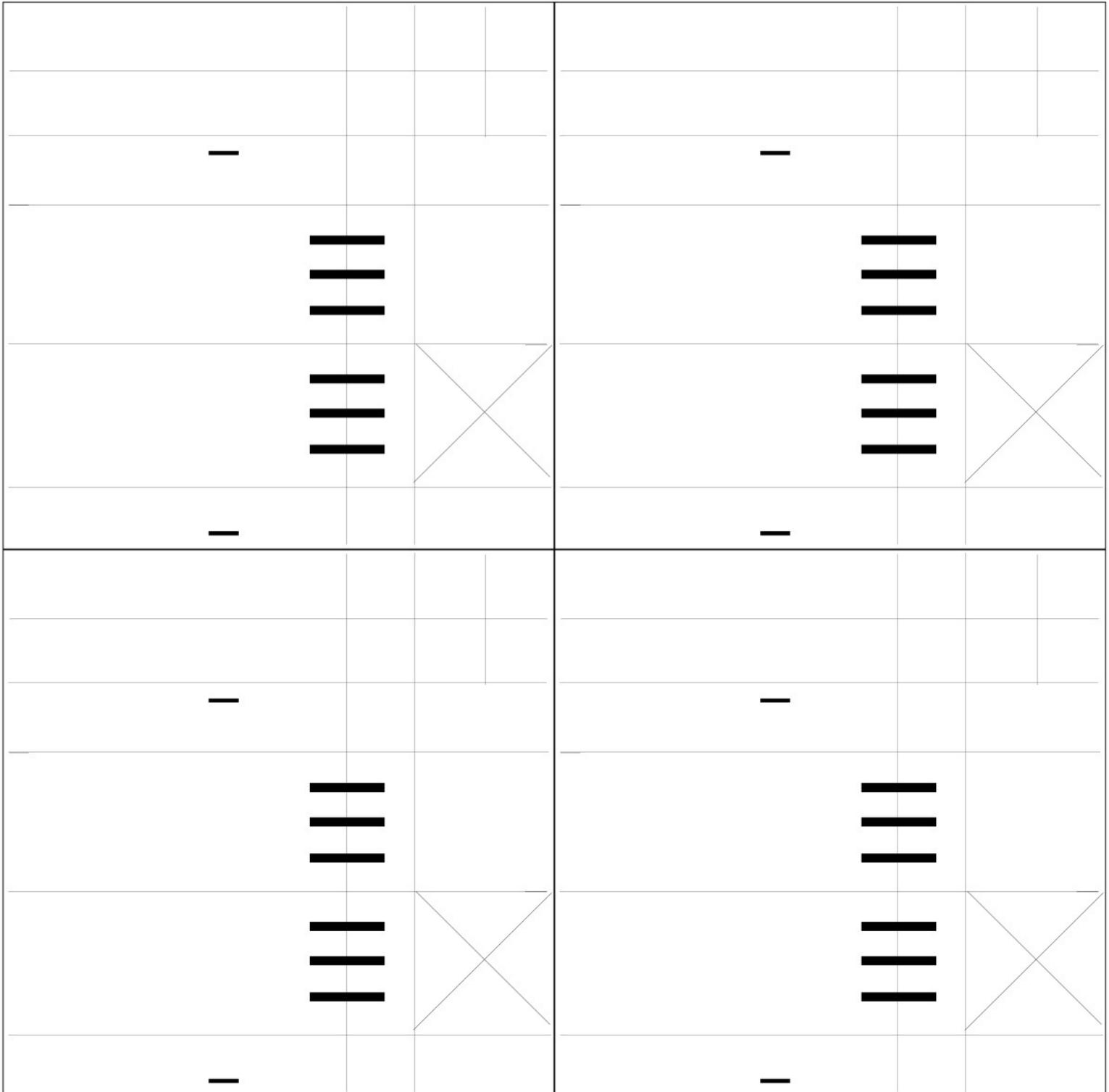
TORRE APERTA

formato "G" 10x10 cm



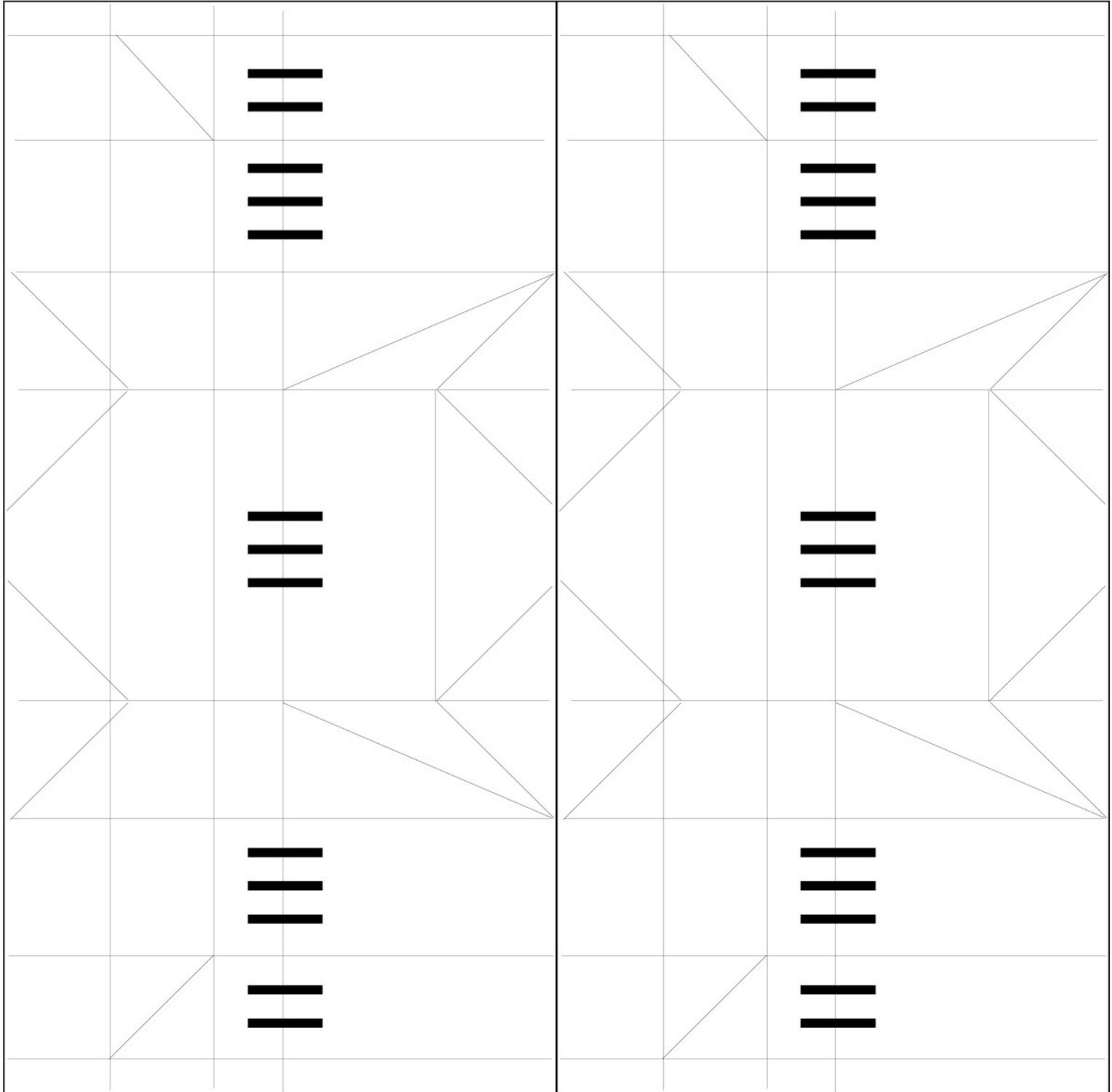
TORRE APERTA D'ANGOLO

formato "G" 10x10 cm



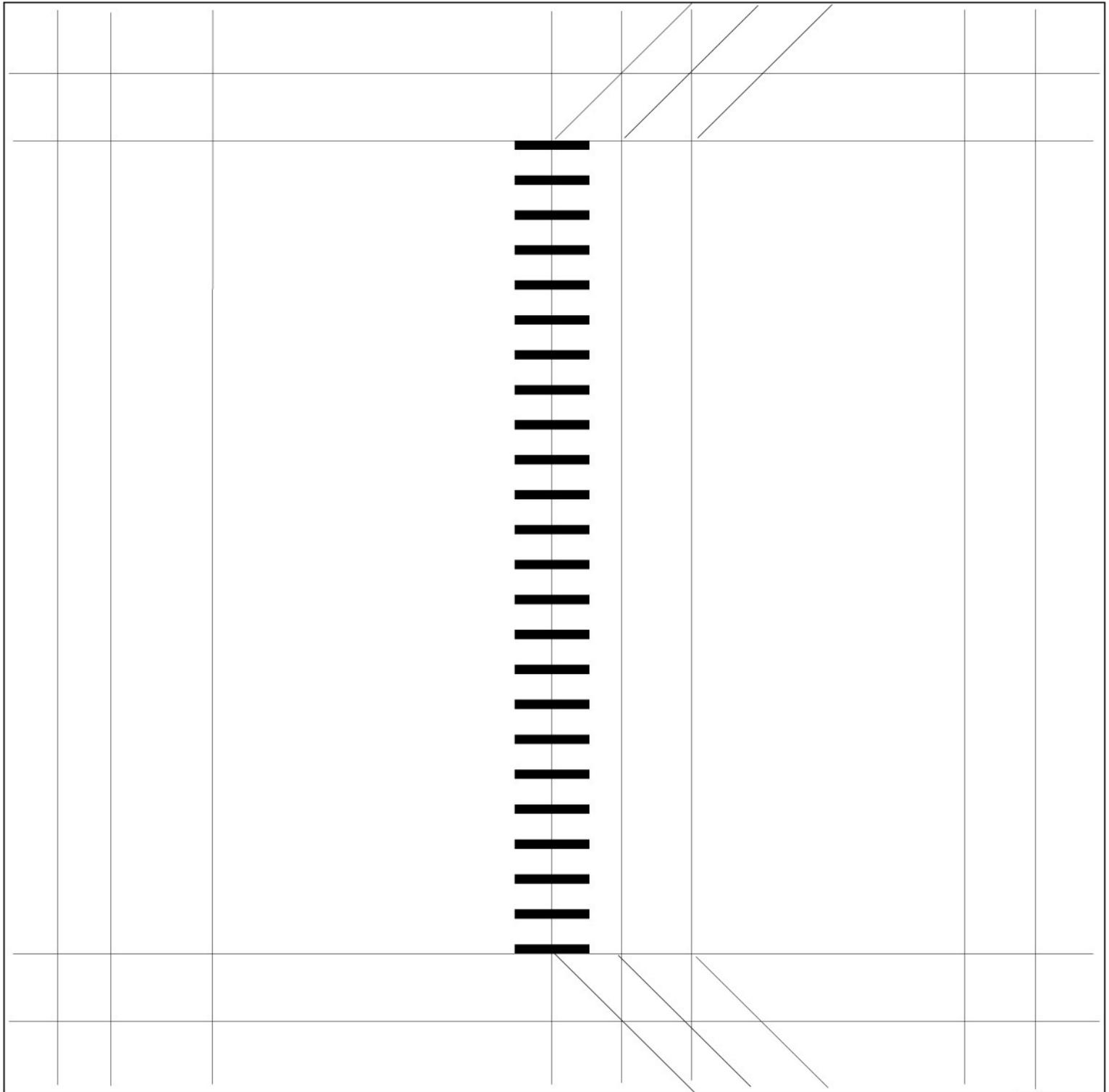
PORTA SU TORRE APERTA

formato "C" 10x20 cm



CORTINA ALTA

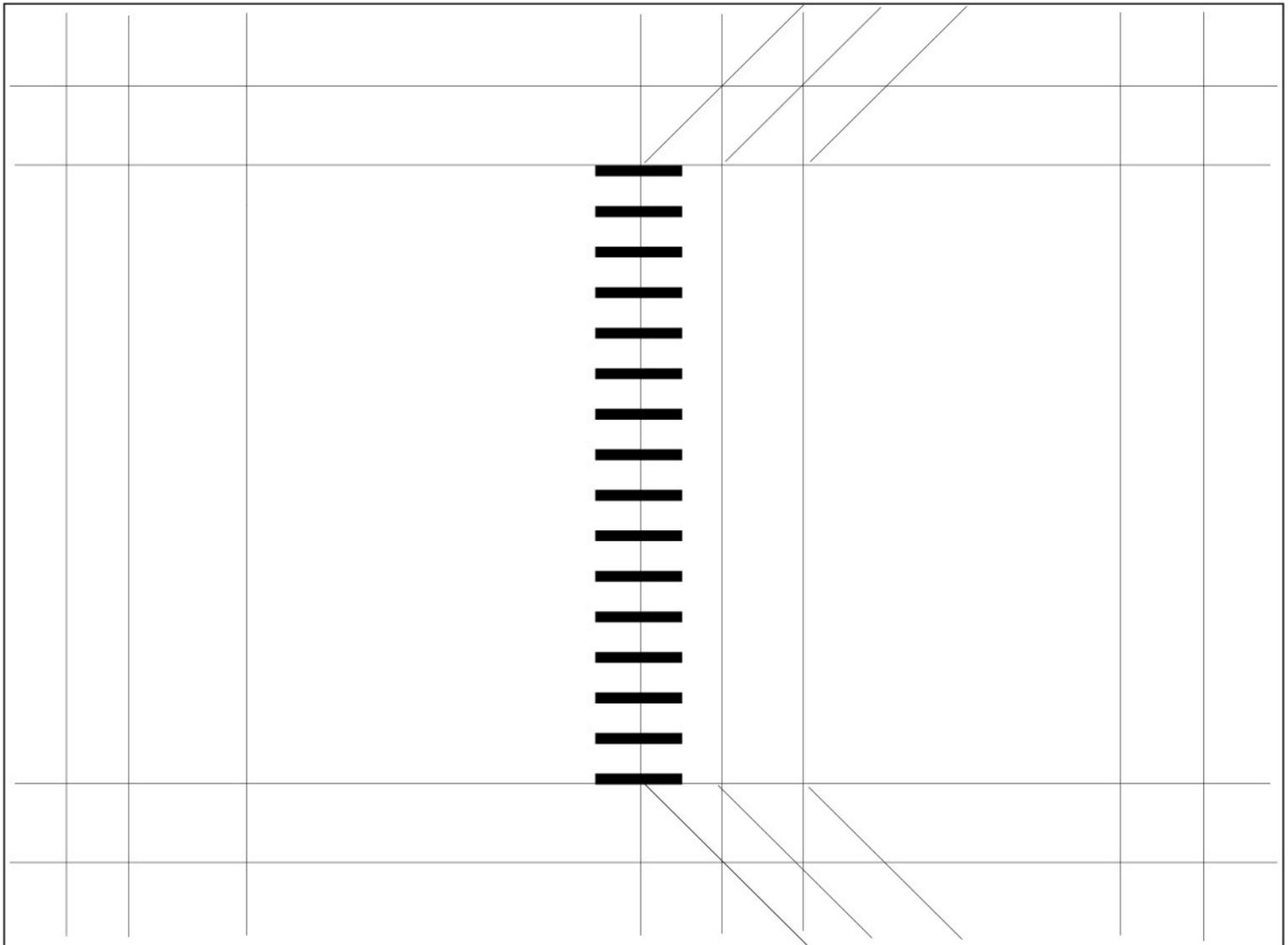
formato "A" 20x20cm



CORTINA ALTA CORTA

formato "B" 15x20cm

Rigatura del foglio
Lined Sheet



TORRE CHIUSA

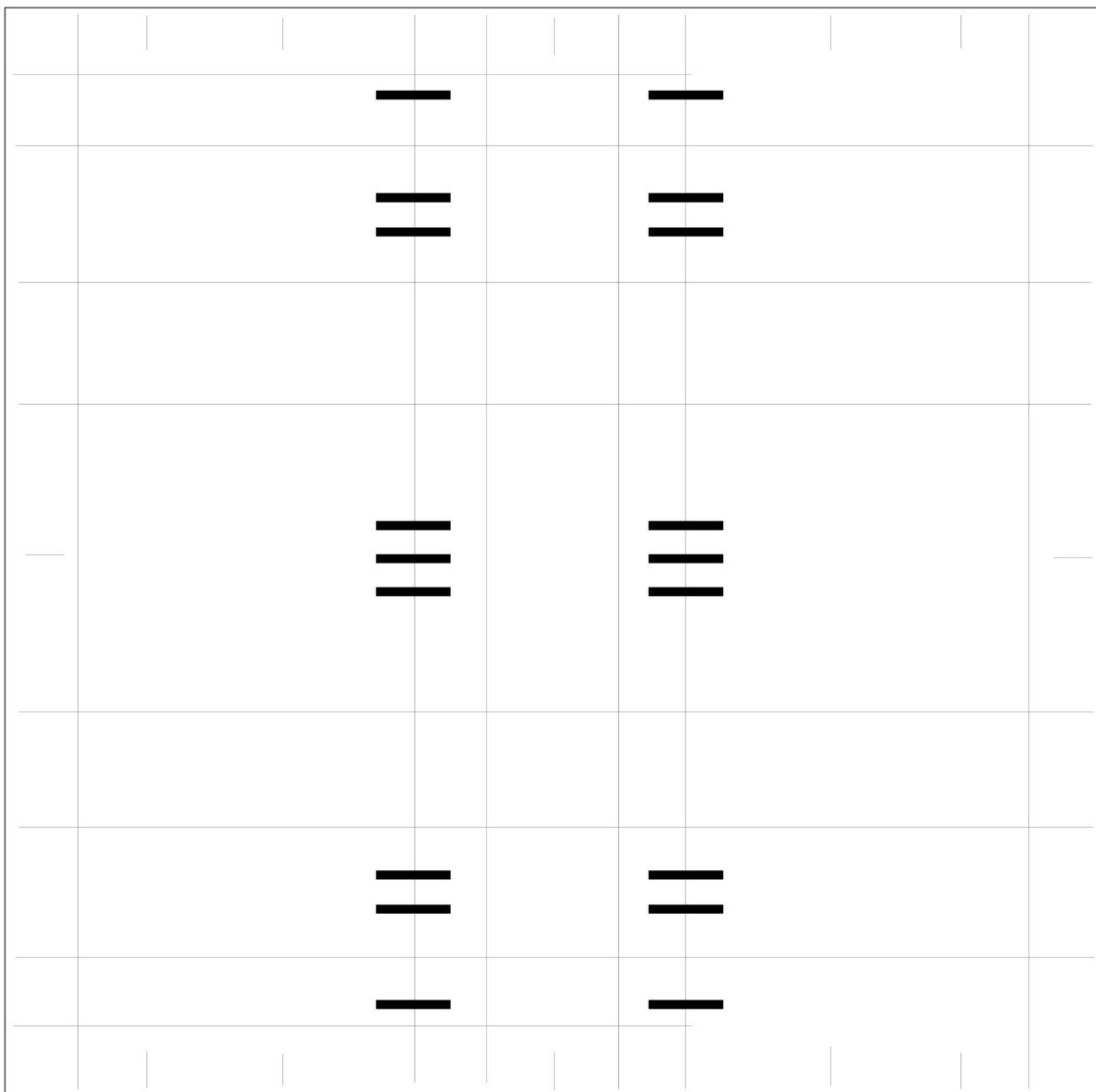
formato "F" 5x15 cm



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PORTA SU TORRE CHIUSA

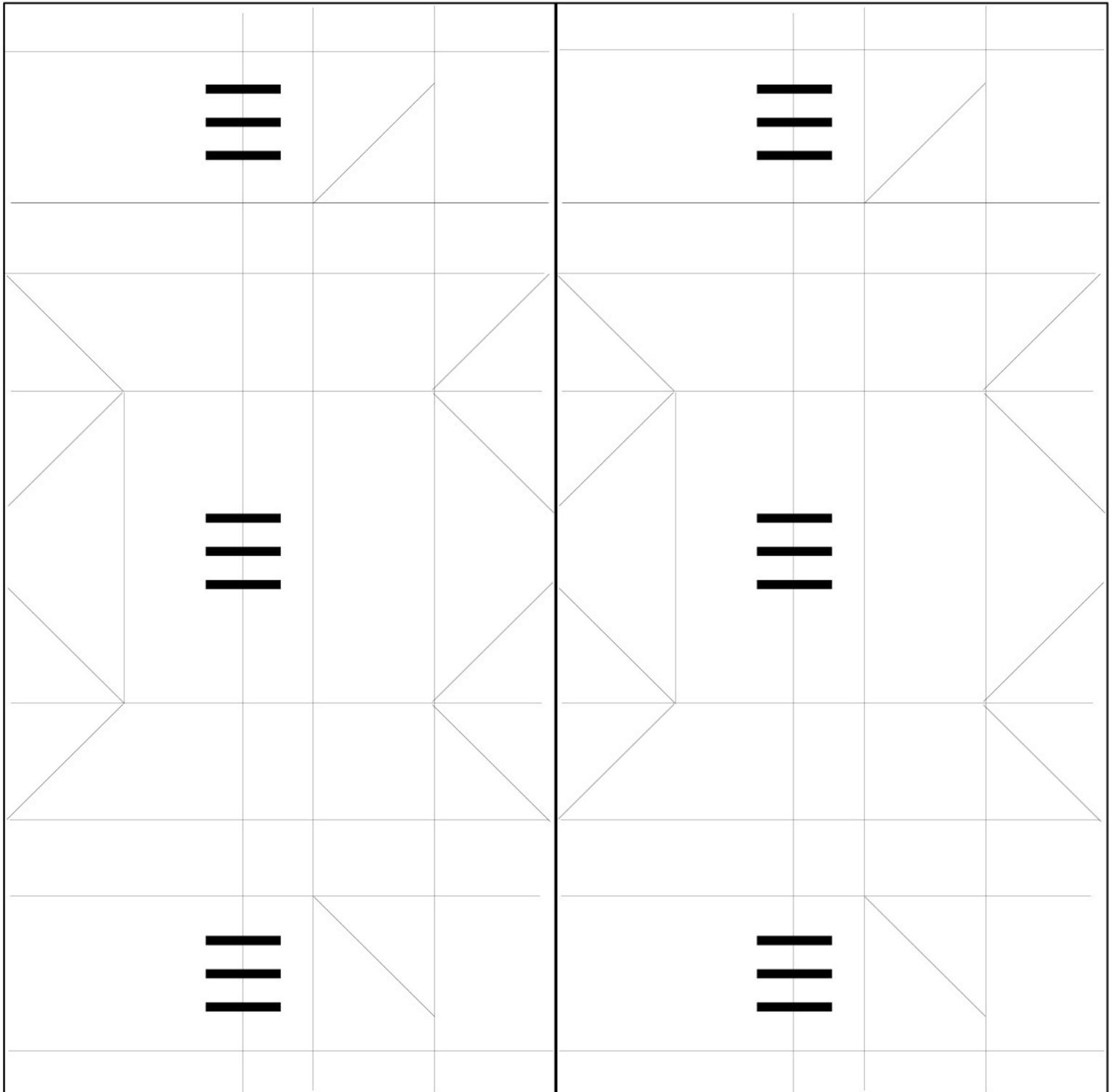
formato "A" 20x20



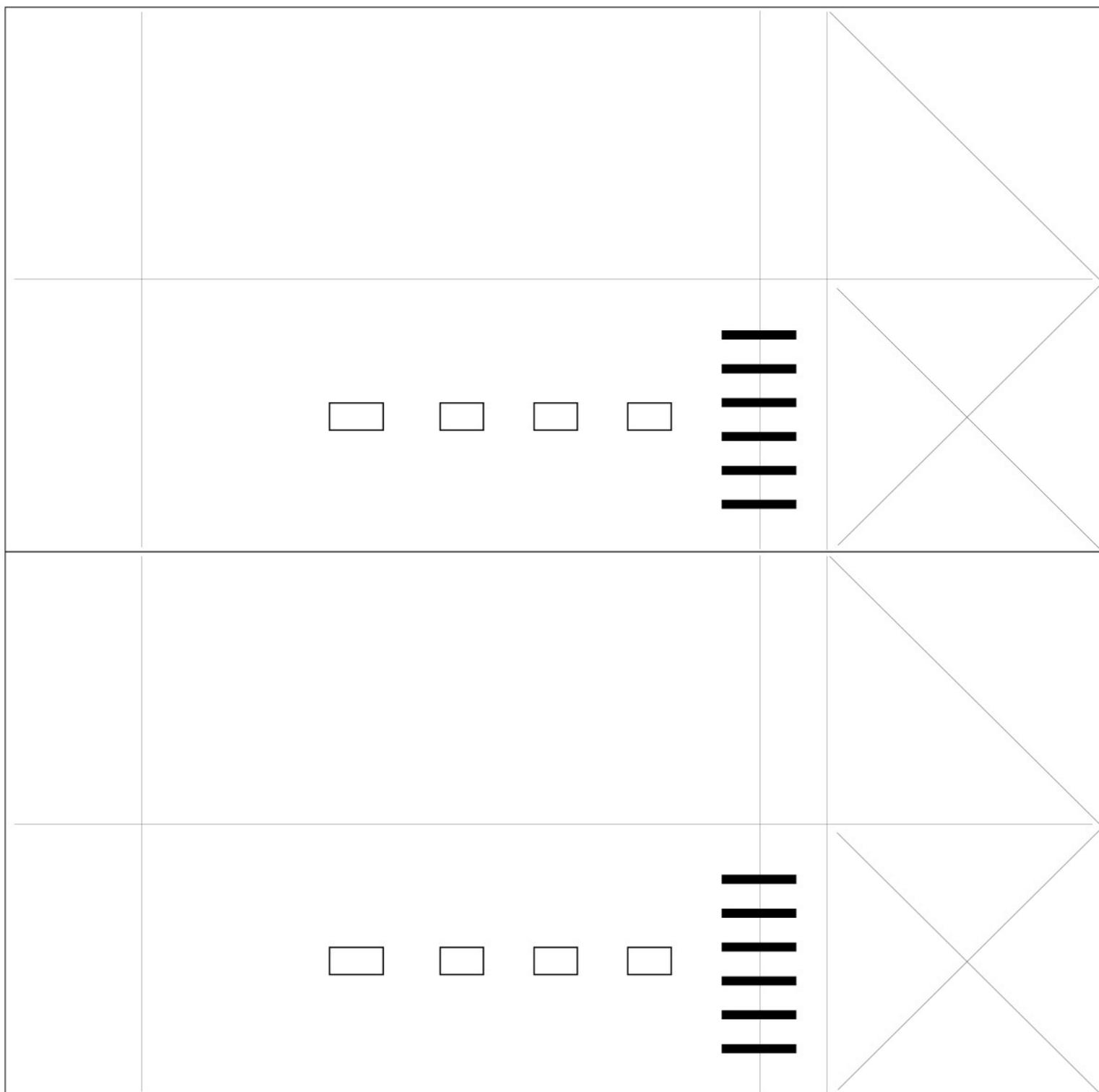
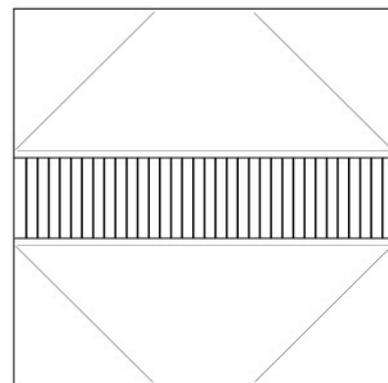
RIVELLINO

formato "C" 10x20 cm

Rigatura del foglio
Lined Sheet



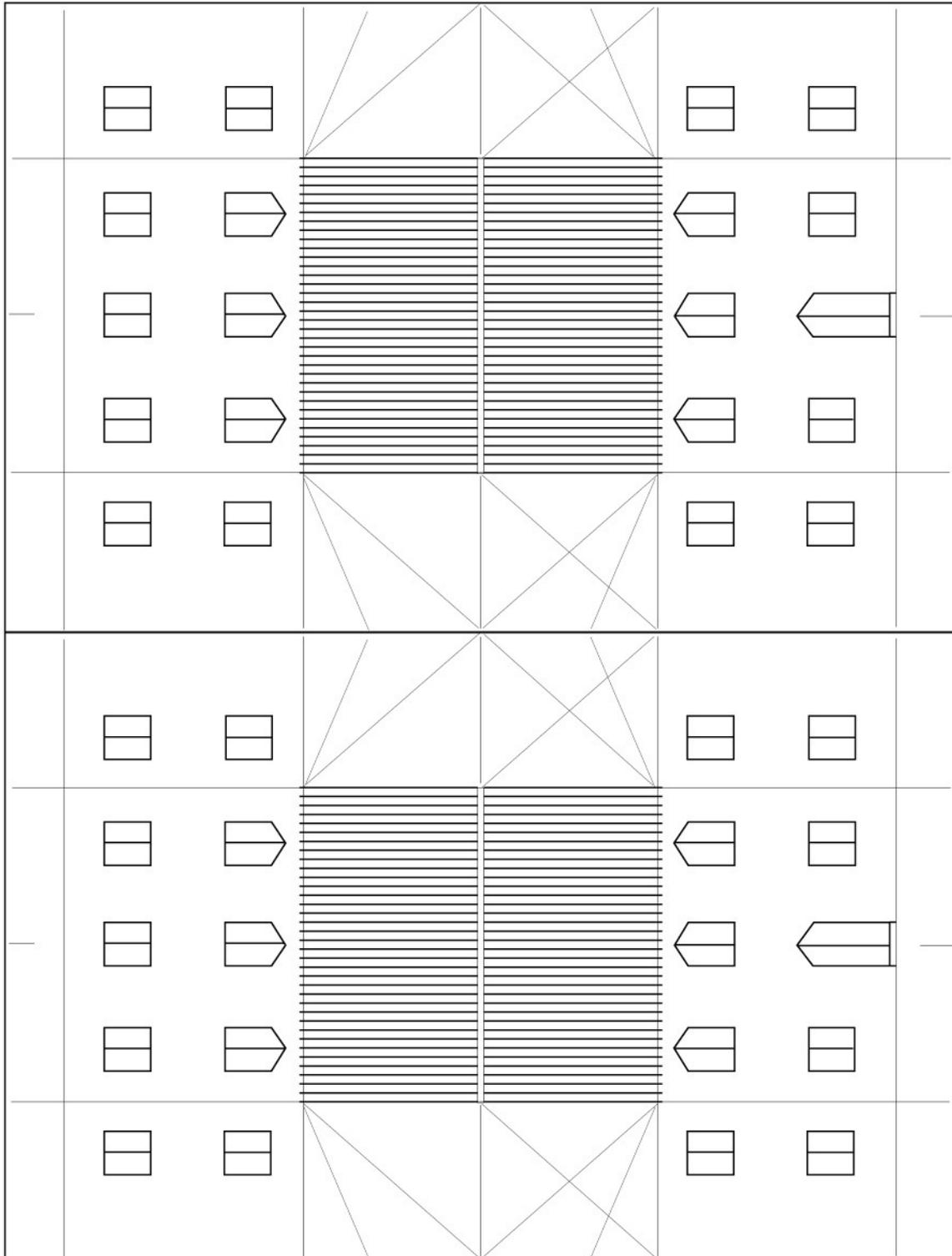
MASTIO formato "C"



CASA GRANDE

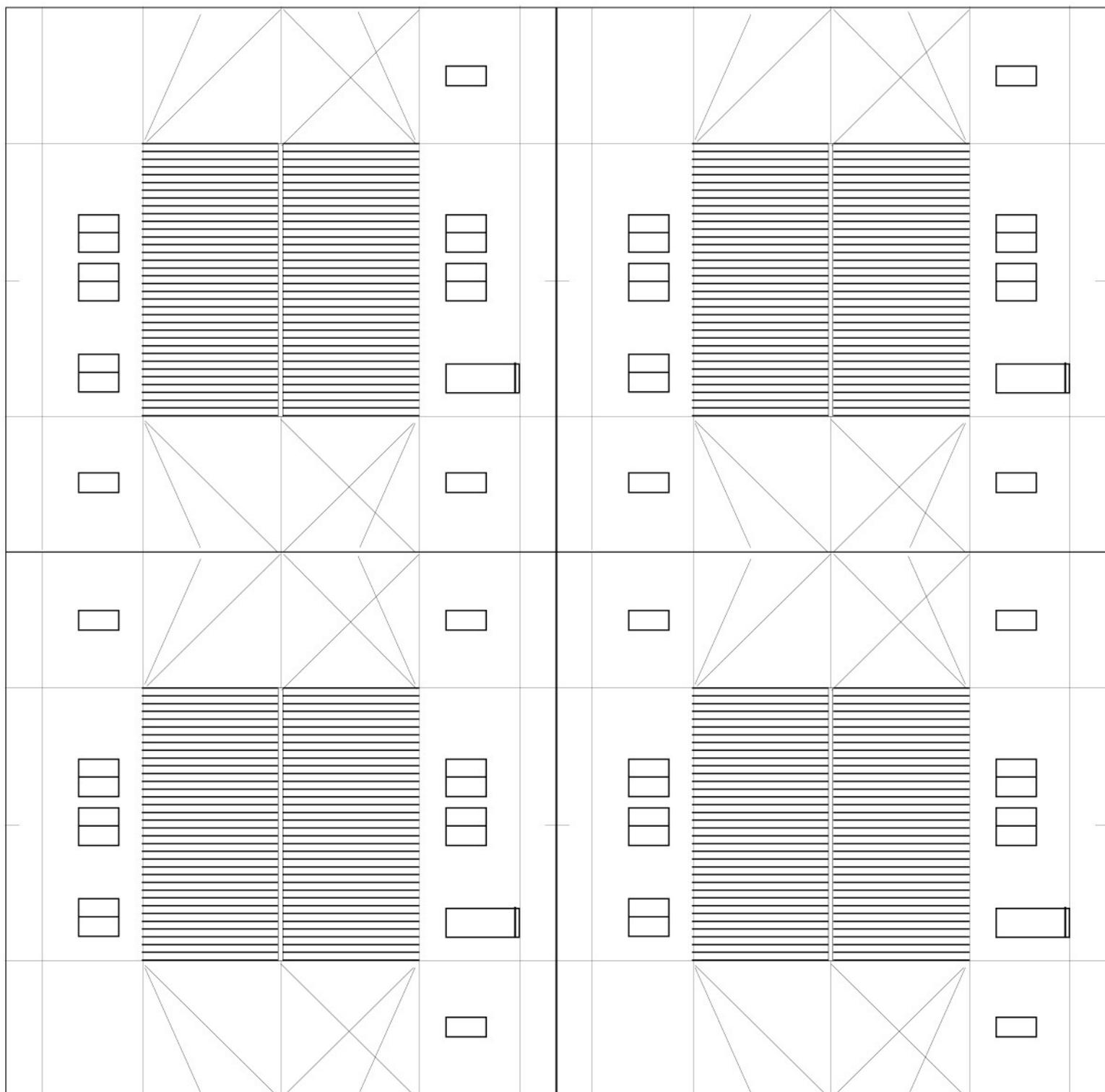
formato "E" 10x15

Rigatura del foglio
Lined Sheet



CASA PICCOLA

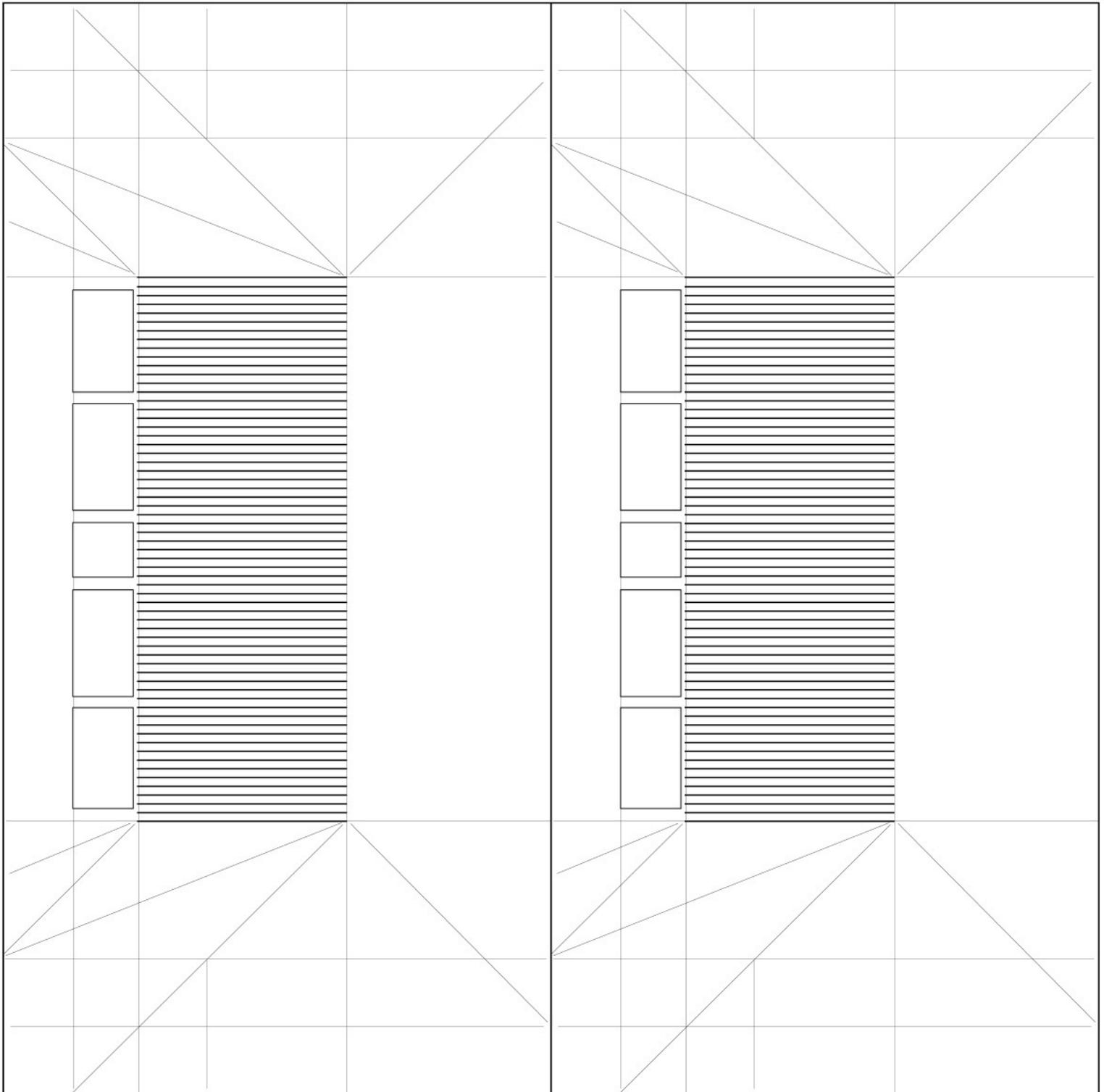
formato "G" 10x10



SCUDERIE

formato "C" 10x20

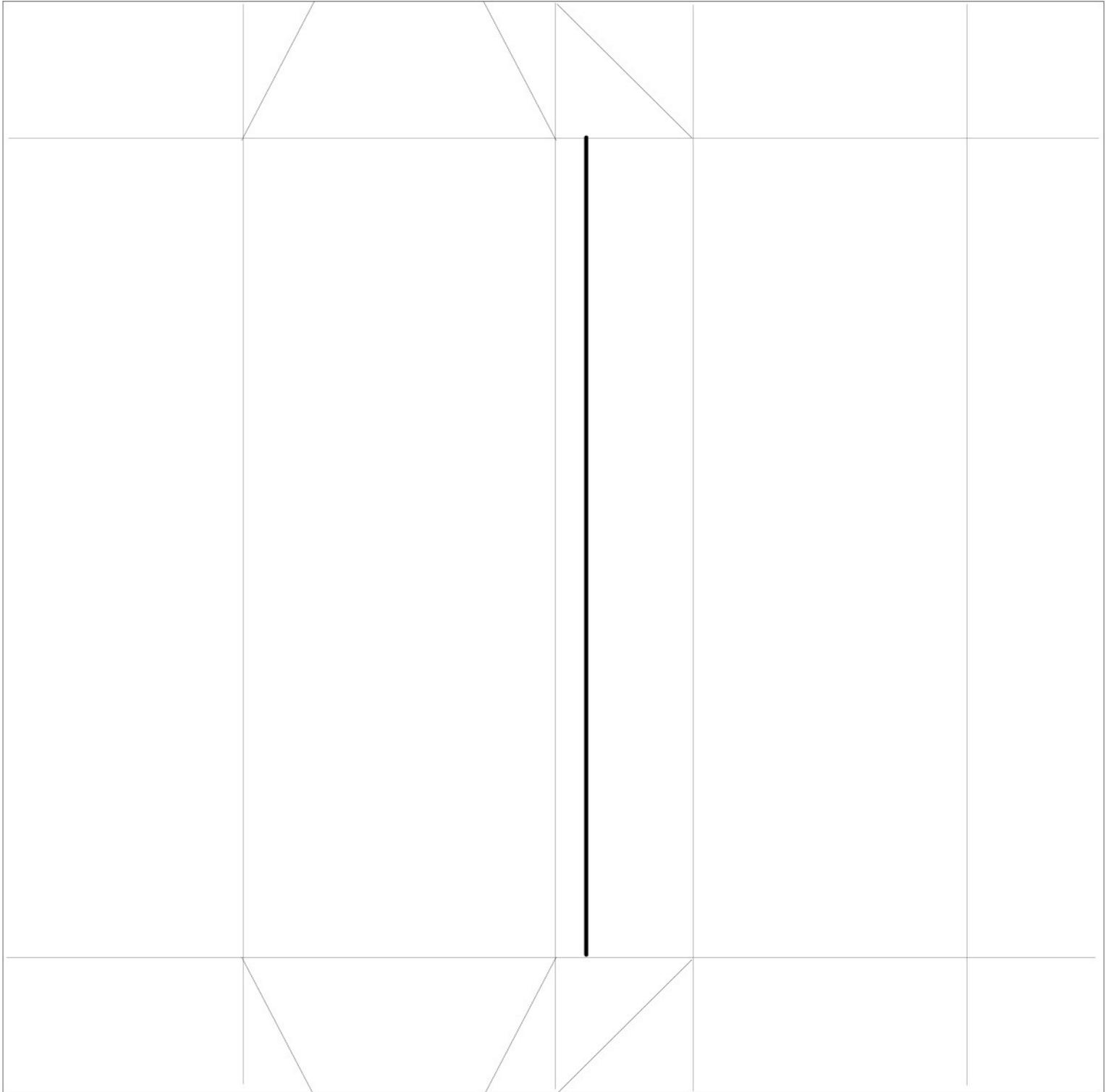
Rigatura del foglio
Lined Sheet



CORTINA BASTIONATA

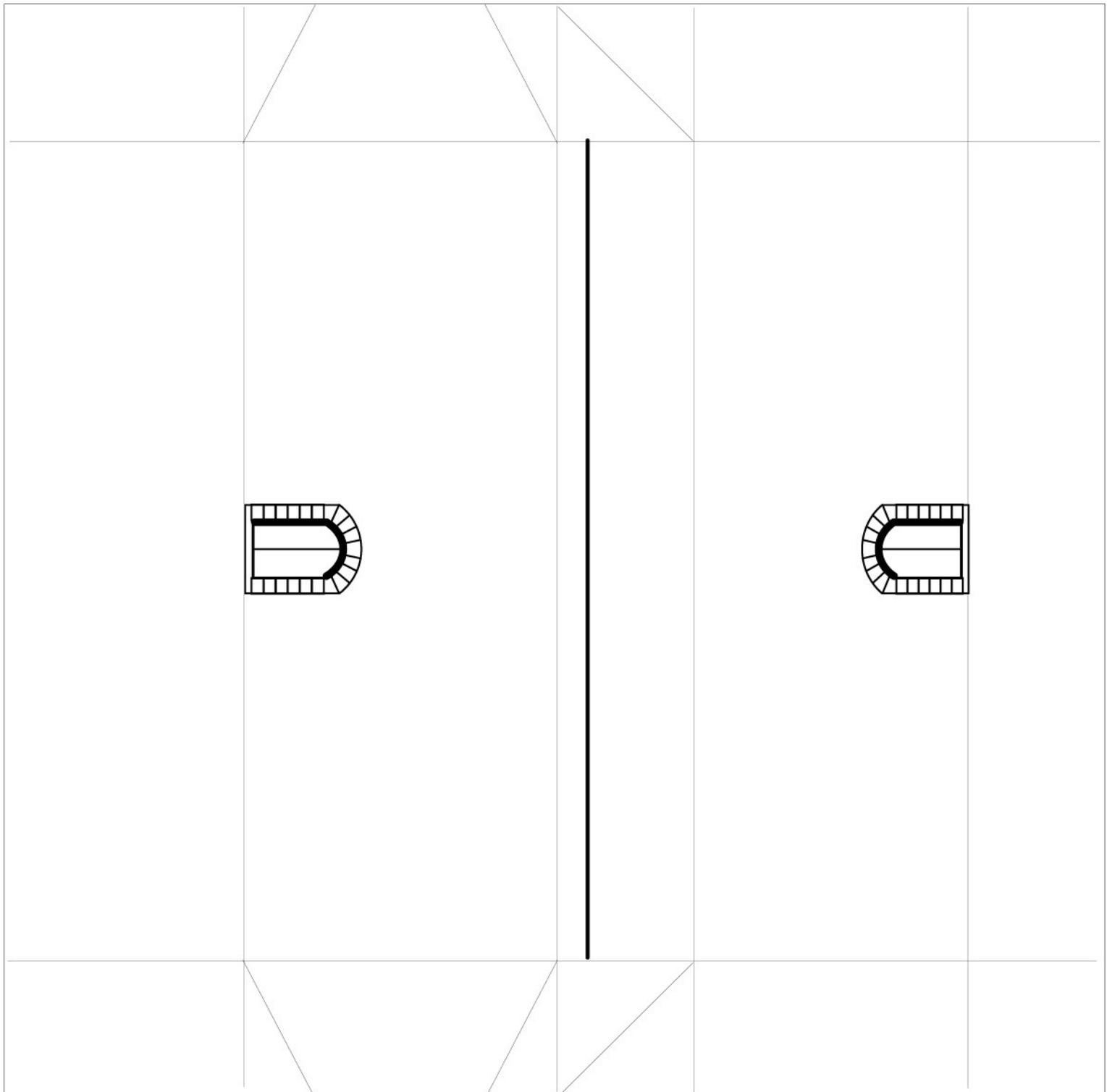
Formato "A"

Rigatura del foglio
Lined Sheet



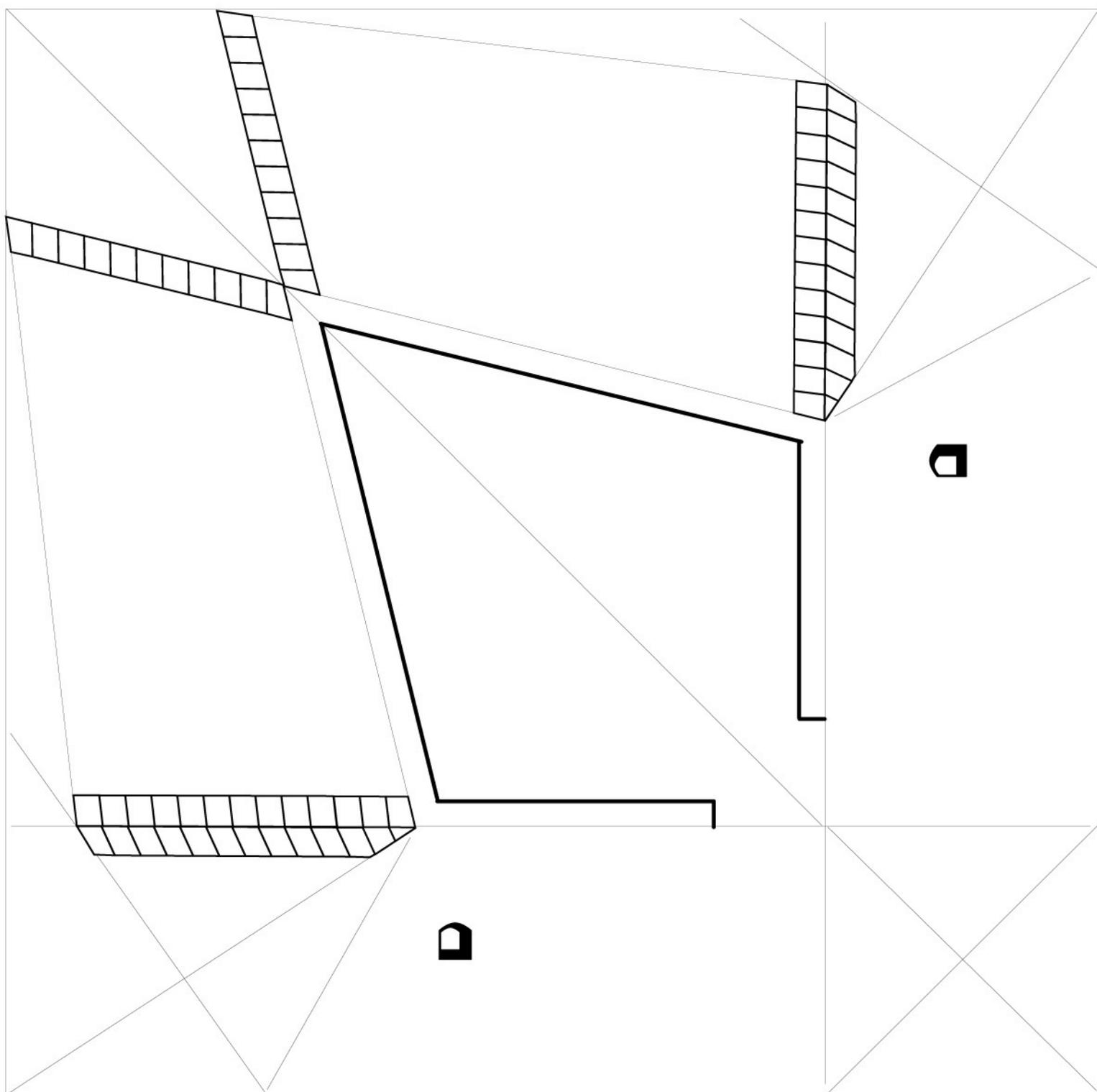
CORTINA BASTIONATA CON PORTA Formato "A"

Rigatura del foglio
Lined Sheet



BASTIONE

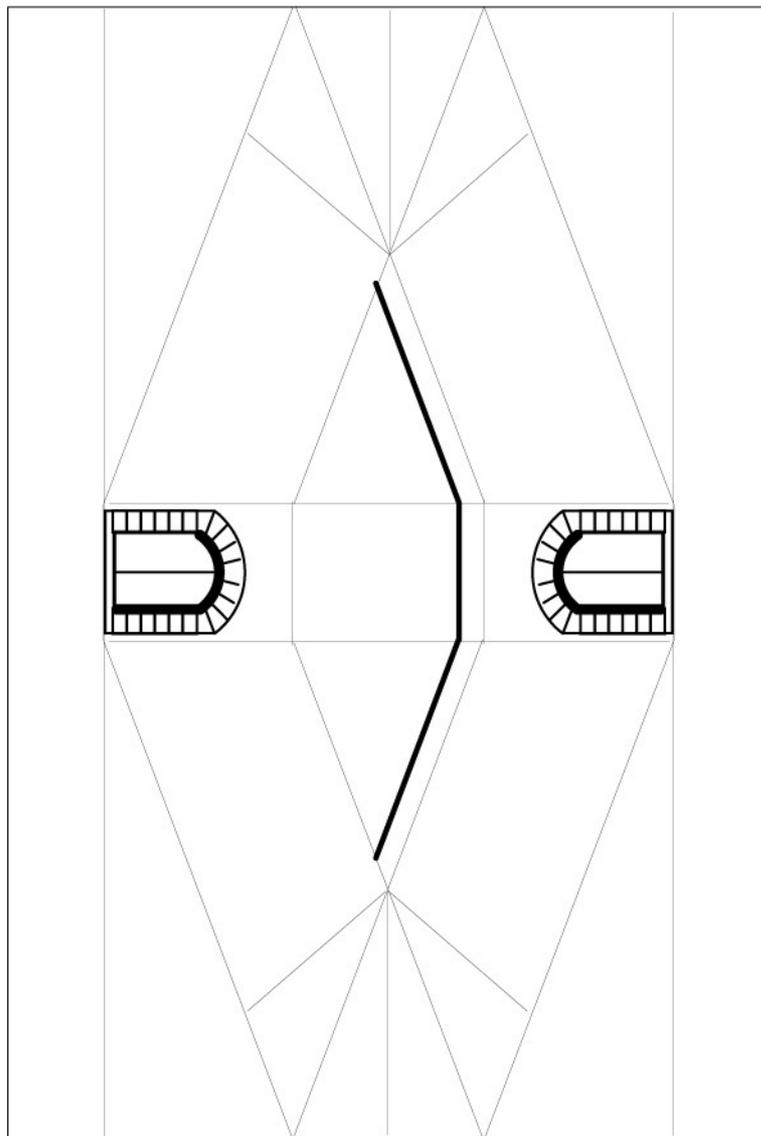
Formato "A"



RIVELLINO BASTIONATO

formato "E"

Rigatura del foglio
Lined Sheet



PUBBLICAZIONI DI FRANCO PAVARIN

Aerei , jet ed astronavi di carta volanti	IL CASTELLO	1986
Origami animati	"	1987
Origami maschere animate	"	1988
Decorazioni modulari con origami modulati	"	1989
Origami motoscafi navi barche e velieri	"	1990
Origami scatole e contenitori	"	1990
Pieghe forme e colori	"	1994
Aerei e navi di carta	FABBRI	1996
Fold and fly Paper airplanes	STERLING PUBLISHING	1998
Manuale rapido di aerei di carta volanti	FABBRI	2000
Aerei di carta 17 modelli volanti inediti	IL CASTELLO	2001
Aviones voladores	TUTOR S.A.	2003
17 modelos ineditos de aviones voladores	"	2004
Naves voladoras	"	2006
Quaderni Quadrato magico n.20 e 48	CDO	
Maschere, elmi e copricapi	web	2010
Maschere trasformabili	web	2011
21 nuovi aerei origami volanti	web	2014
Maschere origami 3D volume 1	web	2014
Maschere origami 3D volume 2	web	2015
Legorigami 1 -Q.Quadrato Magico n.56	CDO	2015
Composizione modulare 1	web	2016
Manuale dell'architetto origamista	web	2016
13 moduli origami aggregabili	web	2017
Alfabeti origami	web	2018
21 Elmi e strani copricapi origami	web	2019
Animaletti semplici origami	web	2020
Origami per giocare	web	2020
30 nuovi origami volanti	web	2021
Contenitori 1	web	2021
Contenitori 2	web	2021
Contenitori 3	web	2022
Contenitori 4	web	2022
Volti scolpiti origami 1	web	2018
Volti scolpiti origami 2	web	2019
Contenitori 5	web	2022

Manuale di arredamento	web	2022
Composizione modulare 2	web	2023
Castelli e fortezze componibili	web	2023

