

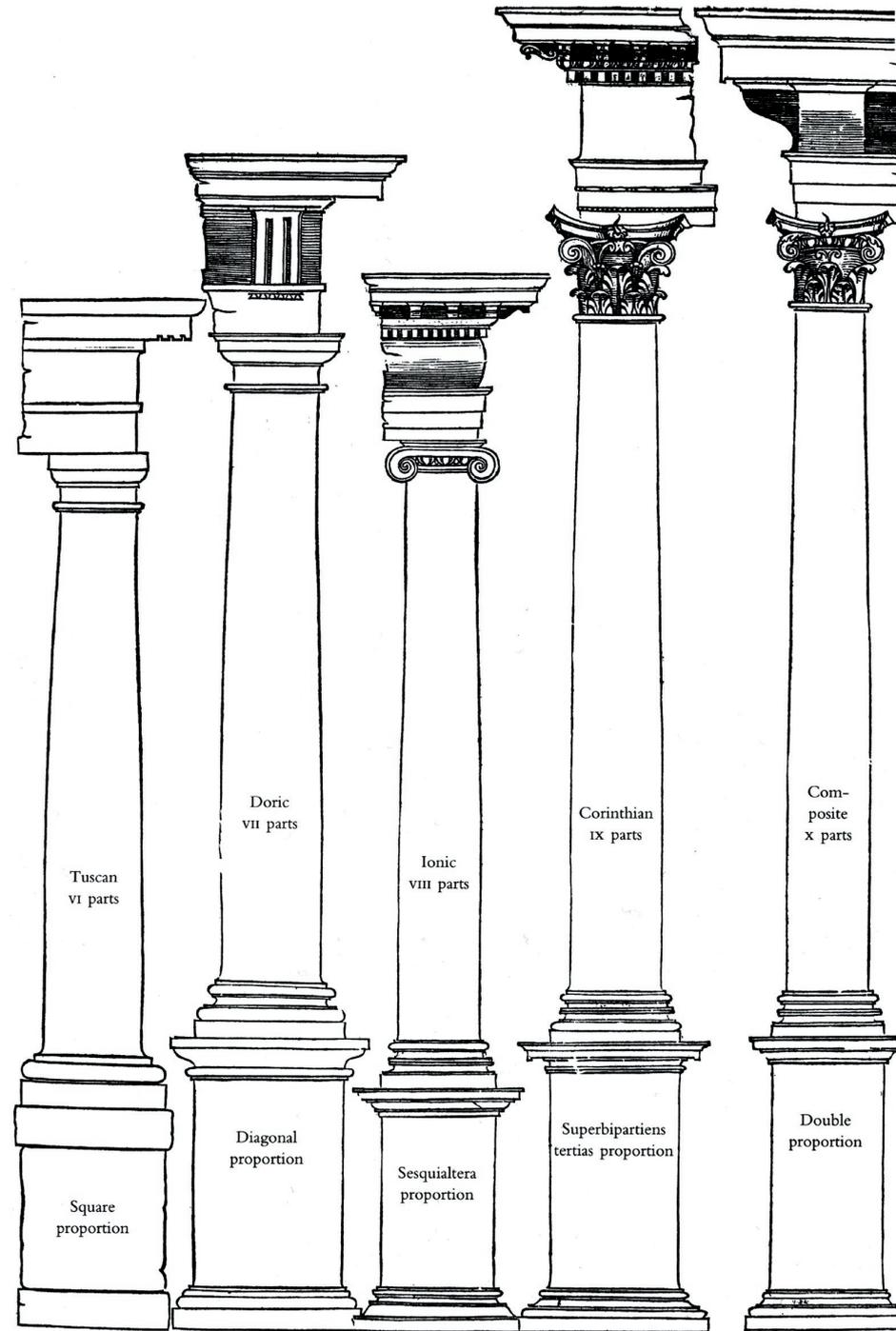
# <säulen/>atlas

The classical Doric and Ionic Order -  
generated from instructions of ten important treatise of theory of architecture

caad arch ethz ch

Bosch / Braach / Schumacher

replay <säulen/>atlas  
März 2004



The idea of this experiment was to translate the constructing-instruction of the historical order of columns into a modern computerbased description language.

Ten treatise of the theory of architecture:

**Vitruvs** *De architectura libri decem* (ca. 30 v. Chr.)

**Leon Battista Alberti** *De re aedificatoria* (1442–1452)

**Sebastiano Serlios** *Regola generali di architettura sopra le cinque maniere degli edifici* (1537)

**Hans Blum** *Von den fünff Säulen* (1550)

**Jacopo Barozzi da Vignolas** *Regola delli cinque ordini d'architettura* (1562)

**Andrea Palladio** *I quattro libri dell'architettura* (1570)

**Claude Perrault** *Ordonnance des cinq espèces de colonnes selon la méthode des anciens* (1683)

**Jean-Nicolas-Louis Durand** *Précis des leçons d'architecture* (1802-1805)

**James Stuart & Nicholas Revett** *Antiquities of Athens* (1881)

**Robert Chitham** *The Classical Orders of Architecture* (1985)



...and one new way to describe them all.

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  <Element name="Gebaelk"/>
  <Element name="Kapitell"/>
  <Element name="Schaft"/>
  <Element name="Basis"/>
  <Element name="Postament"/>
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        <hElement name="Triglyphe" dx="30" xa="5" ya="2.5" typ="1"/>
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    </Element>
    <Element name="Architrav" original="" THz="" THn="" MH="" dySoll="30" dy="" yAbsolut="83" dylST="30">
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        <hElement name="Stein" dx="32"/>
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## Transforming the structure into form.

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- <xsl:stylesheet version="1.0" xmlns:xsl="http://www.w3.org/1999/XSL/Transform">
- <xsl:template match="*">
- <xsl:element name="{name()}">
  <xsl:apply-templates select="@*" />
  <xsl:apply-templates select="*" />
</xsl:element>

</xsl:template>

- <xsl:template match="@*">
- <xsl:attribute name="{name()}">
  <xsl:value-of select="*" />
</xsl:attribute>

</xsl:template>

- <xsl:template match="Element">
- <Element name="{@name}" original="{@original}" THz="{@THz}" THn="{@THn}" MH="{@MH}" TBz="{@TBz}" Tbn="{@Tbn}" MB="{@MB}" dx="{@dx}"
dy="{@dy}">
  <xsl:apply-templates />
</Element>

</xsl:template>

- <xsl:template match="Element[@name='Kyma_reversa']|Element[@name='Kyma']">
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</xsl:template>

- <xsl:template match="Element[@name='Hohlkehle']">
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</Element>

</xsl:template>

- <xsl:template match="Element[@name='Kehle']">
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</Element>

</xsl:template>

- <xsl:template match="Element[@name='Echinus']">
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dy="{@dy}" typ="{@typ}">
  <xsl:apply-templates />
</Element>

```

<säulen/>atlas

<SVG/>

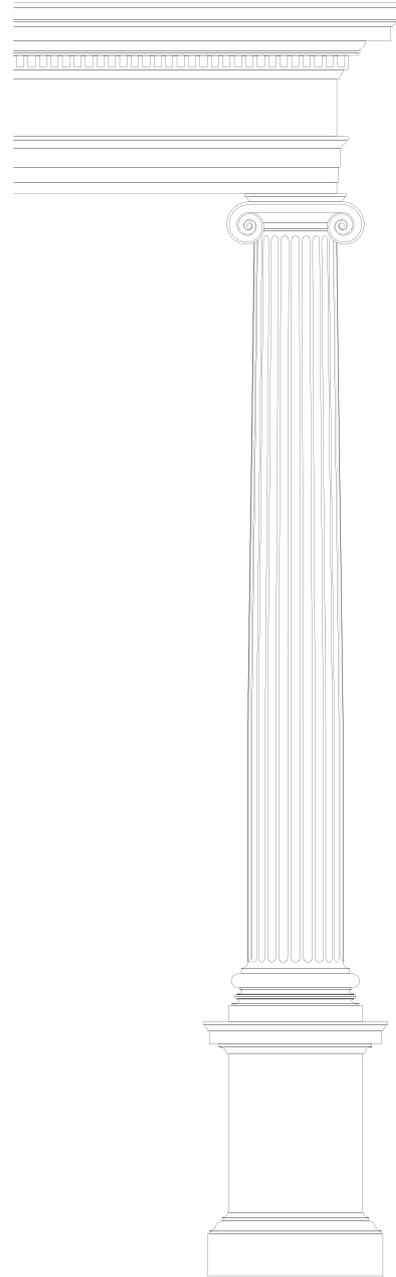
## The document, that renders the form.

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anchor="end">Gesims</svg:text></svg:g><svg:defs><svg:g id="halbeSaeuleLeiste0"><svg:path d="M200,20 h-56.099999999744995 v1.649999999925 h56.099999999744995 stroke="black" stroke-width="0.1"
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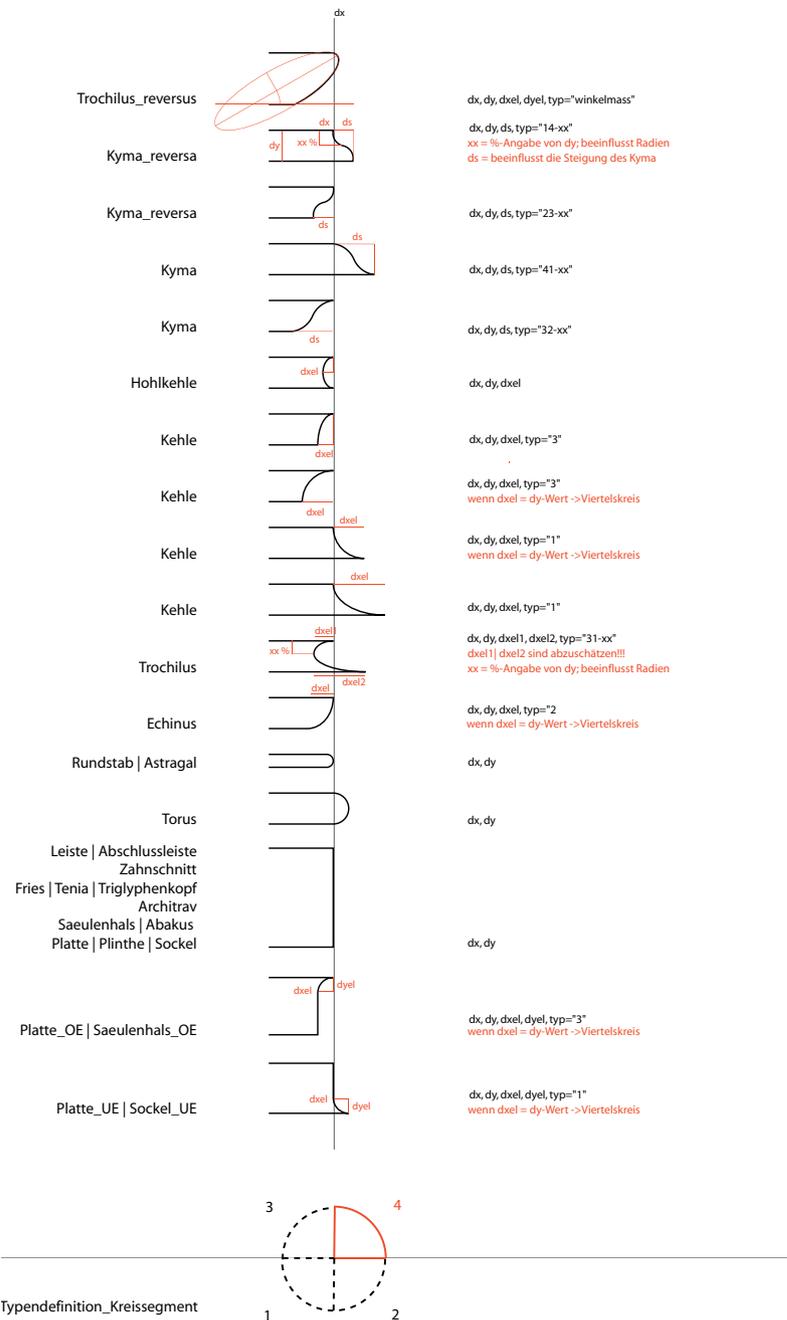
# <säulen/>atlas

# <structure and form/>

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  <Ordnung name="Ionisch">
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          <Element name="Leiste" original="fillet" Thz="3" Thn="40" MH="1" TBz="3" Tbn="10" MB="1" dx="1" dy="1">
          <Element name="Kyma_revers" original="ogee" Thz="3" Thn="20" MH="1" TBz="63" Tbn="20" MB="1" dx="1" dy="1" ds="0.1" typ="23-50"/>
          <Element name="Platte" original="quarter-round" Thz="9" Thn="20" MH="1" TBz="30" Tbn="10" MB="1" dx="1" dy="1">
          <Element name="Echinus" original="ovolo" Thz="3" Thn="10" MH="1" TBz="22" Tbn="10" MB="1" dx="1" dy="1" typ="27"/>
          <Element name="Rundstab" original="astragal" Thz="3" Thn="40" MH="1" TBz="61" Tbn="30" MB="1" dx="1" dy="1">
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            <Element name="dummy" dx="0.1"/>
            <Element name="Zahnschnitt" typ="1" xZH="0.23" yZH="0.36" ybZH="0.075" dx="0.36"/>
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        </Element>
      </Element>
    <Element name="Saeule" original="column" Thz="26" Thn="5" MH="1" TBz="1" Tbn="1" MB="1" dx="1" dy="1">
      <Element name="Kapitell" original="capital" Thz="11" Thn="12" MH="1" TBz="1" Tbn="1" MB="1" dx="1" dy="1">
        <Element name="Abchlussleiste" original="fillet" Thz="1" Thn="12" MH="1" TBz="16" Tbn="10" MB="1" dx="1" dy="1">
        <Element name="Kyma_revers" original="ogee" Thz="2" Thn="12" MH="1" TBz="31" Tbn="20" MB="1" dx="1" dy="1" ds="0.1" typ="23-50"/>
        <Element name="Volute" original="rind" Thz="4" Thn="12" MH="1" TBz="29" Tbn="20" MB="1" dx="1" dy="1" typ="1" band="0.0833" breite="2.9" radius="0.75">
          <Element name="Volute" original="volute"/>
        </Element>
        <Element name="Echinus" original="ovolo" Thz="4" Thn="12" MH="1" TBz="18" Tbn="10" MB="1" dx="1" dy="1" typ="2">
        <Element name="Eierstab" original=""/>
      </Element>
    <Element name="Saeulenschaft" original="shaft" Thz="283" Thn="12" MH="1" TBz="1" Tbn="1" MB="1" dx="1" dy="1">
      <Element name="Astragal" original="Thz="2" Thn="12" MH="1" TBz="15" Tbn="10" MB="1" dx="1" dy="1">
      <Element name="Leiste" original="fillet" Thz="1" Thn="14" MH="1" TBz="14" Tbn="10" MB="1" dx="1" dy="1">
      <Element name="Schaft_OE_UE" original="shaft" Thz="278" Thn="12" MH="1" TBz="83" Tbn="60" MB="1" dx="1" dy="1" dxe1="0.083" dxe2="0.15" dxe3="0.2" dxe4="0.2" saeulenRadius="1.5" kannelurenAnzahl="24" bogenRadius="8" typ="22" hoeheKannelurOben="0.2" hoeheKannelurUnten="0.2" stegAnteil="0.25">
        <Element name="Kanneluren" original="flutings"/>
        <Element name="Entasis" original=""/>
      </Element>
      <Element name="Leiste" original="fillet" Thz="1" Thn="6" MH="1" TBz="17" Tbn="10" MB="1" dx="1" dy="1">
    </Element>
    <Element name="Basis" original="base" Thz="3" Thn="2" MH="1" TBz="1" Tbn="1" MB="1" dx="1" dy="1">
      <Element name="Torus" original="torus" Thz="3" Thn="7" MH="1" TBz="18" Tbn="10" MB="1" dx="1" dy="1">
      <Element name="Leiste" original="fillet" Thz="4" Thn="7" MH="1" TBz="35" Tbn="20" MB="1" dx="1" dy="1">
      <Element name="Trochilus" original="scotia" Thz="12" Thn="7" MH="1" TBz="35" Tbn="20" MB="1" dx="1" dy="1" dxe1="0.07" dxe2="0.16" typ="31-40"/>
      <Element name="Leiste" original="fillet" Thz="2" Thn="7" MH="1" TBz="11" Tbn="6" MB="1" dx="1" dy="1">
      <Element name="Rundstab" original="astragal" Thz="4" Thn="7" MH="1" TBz="19" Tbn="10" MB="1" dx="1" dy="1">
      <Element name="Rundstab" original="astragal" Thz="4" Thn="7" MH="1" TBz="19" Tbn="10" MB="1" dx="1" dy="1">
      <Element name="Leiste" original="fillet" Thz="2" Thn="7" MH="1" TBz="11" Tbn="6" MB="1" dx="1" dy="1">
      <Element name="Trochilus" original="scotia" Thz="12" Thn="7" MH="1" TBz="11" Tbn="6" MB="1" dx="1" dy="1" dxe1="0.066" dxe2="0.233" typ="31-35"/>
      <Element name="Leiste" original="fillet" Thz="4" Thn="7" MH="1" TBz="20" Tbn="10" MB="1" dx="1" dy="1">
      <Element name="Plinthe" original="plinth" Thz="1" Thn="2" MH="1" TBz="21" Tbn="10" MB="1" dx="1" dy="1">
    </Element>
    <Element name="Postament" original="pedestal" Thz="8" Thn="5" MH="1" TBz="1" Tbn="1" MB="1" dx="1" dy="1">
      <Element name="Gesims" original="cornice" Thz="1" Thn="5" MH="1" TBz="1" Tbn="1" MB="1" dx="1" dy="1">
        <Element name="Abchlussleiste" original="fillet" Thz="1" Thn="10" MH="1" TBz="19" Tbn="10" MB="1" dx="1" dy="1">
        <Element name="Kyma_revers" original="ogee" Thz="2" Thn="10" MH="1" TBz="5" Tbn="20" MB="1" dx="1" dy="1" ds="0.1" typ="23-50"/>
        <Element name="Platte" original="square" Thz="4" Thn="10" MH="1" TBz="27" Tbn="10" MB="1" dx="1" dy="1">
        <Element name="Leiste" original="fillet" Thz="1" Thn="10" MH="1" TBz="24" Tbn="10" MB="1" dx="1" dy="1">
        <Element name="Kehle" original="hollow" Thz="2" Thn="10" MH="1" TBz="24" Tbn="10" MB="1" dx="1" dy="1" dxe1="0.233" typ="3"/>
      </Element>
      <Element name="Sockel" original="trunc" Thz="5" Thn="5" MH="1" TBz="1" Tbn="1" MB="1" dx="1" dy="1">
        <Element name="Sockel" original="trunc" Thz="5" Thn="5" MH="1" TBz="21" Tbn="10" MB="1" dx="1" dy="1">
      </Element>
      <Element name="Basis" original="base" Thz="2" Thn="2" MH="1" TBz="1" Tbn="1" MB="1" dx="1" dy="1">
        <Element name="Kehle" original="hollow" Thz="1" Thn="6" MH="1" TBz="64" Tbn="30" MB="1" dx="1" dy="1" dxe1="0.165" typ="11"/>
        <Element name="Leiste" original="fillet" Thz="1" Thn="12" MH="1" TBz="23" Tbn="10" MB="1" dx="1" dy="1">
        <Element name="Kyma" original="inverted_cymaise" Thz="1" Thn="3" MH="1" TBz="23" Tbn="10" MB="1" dx="1" dy="1" ds="0.4" typ="41-50"/>
        <Element name="Leiste" original="fillet" Thz="1" Thn="12" MH="1" TBz="27" Tbn="10" MB="1" dx="1" dy="1">
        <Element name="Plinthe" original="socle" Thz="4" Thn="3" MH="1" TBz="55" Tbn="20" MB="1" dx="1" dy="1">
      </Element>
    </Element>
  </Ordnung>
</Autor>
```



Gesims (cornice)	Gebaelk
Fries (freeze)	
Architrav (architrave)	
Kapitell (capital)	Saeule
Saeulenschaft (shaft)	
Basis (base)	
Gesims (cornice)	Postament
Sockel (trunc)	
Basis (base)	



The columns were divided into several elements. For each element a construction stylesheet was developed.

# <säulen/>atlas

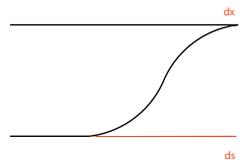
# <elements/>

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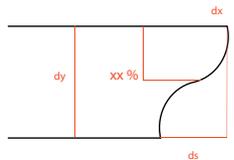
<!-- TYP DoppelSkurve -->
<!-- kyma l typ 41, 32 -->
<xsl:when test="(@name)='(Kyma)'">
  <xsl:call-template name="doppelSkurve">
    <xsl:with-param name="xStart" select="$xStart"/>
    <xsl:with-param name="yStart" select="$yStart"/>
    <xsl:with-param name="dx" select="@dx"/>
    <xsl:with-param name="dy" select="@dy"/>
    <xsl:with-param name="ds" select="@ds"/>
    <xsl:with-param name="typ" select="substring(@typ,1,2)"/>
    <xsl:with-param name="raFaktor" select="number(substring(@typ,4,2)) div (100)"/>
  </xsl:call-template>
</xsl:when>
<!-- kyma_revers l typ 14, 23 -->
<xsl:when test="(@name)='(Kyma_revers)'">
  <xsl:call-template name="doppelSkurve">
    <xsl:with-param name="xStart" select="$xStart"/>
    <xsl:with-param name="yStart" select="$yStart"/>
    <xsl:with-param name="dx" select="@dx"/>
    <xsl:with-param name="dy" select="@dy"/>
    <xsl:with-param name="ds" select="@ds"/>
    <xsl:with-param name="typ" select="substring(@typ,1,2)"/>
    <xsl:with-param name="raFaktor" select="number(substring(@typ,4,2)) div (100)"/>
  </xsl:call-template>
</xsl:when>

<!-- Doppel-S-Kurve -->
<xsl:template name="doppelSkurve">
  <xsl:param name="xStart"/>
  <xsl:param name="yStart"/>
  <xsl:param name="dx"/>
  <xsl:param name="dy"/>
  <xsl:param name="ds"/>
  <xsl:param name="typ"/>
  <xsl:param name="raFaktor"/>
  <xsl:variable name="rbFaktor" select="(1)-($raFaktor)"/>
  <xsl:variable name="raPLUSrb">
    <xsl:call-template name="sqrt">
      <xsl:with-param name="num" select="($dy*$dy)+($ds*$ds)"/>
    </xsl:call-template>
  </xsl:variable>
  <xsl:variable name="ra" select="($raFaktor)*($raPLUSrb)"/>
  <xsl:variable name="rb" select="($rbFaktor)*($raPLUSrb)"/>
  <xsl:variable name="y1" select="($dy*$ra) div ($ra+$rb)"/>
  <xsl:variable name="x1">
    <xsl:call-template name="sqrt">
      <xsl:with-param name="num" select="($ra*$ra)-($y1*$y1)"/>
    </xsl:call-template>
  </xsl:variable>
  <xsl:variable name="y2" select="($dy)-($y1)"/>
  <xsl:variable name="x2">
    <xsl:call-template name="sqrt">
      <xsl:with-param name="num" select="($rb*$rb)-($y2*$y2)"/>
    </xsl:call-template>
  </xsl:variable>
  <xsl:if test="(@typ)='14'">
    <svg:path d="M($xStart,{$yStart}) h-($dx) a($ra,($ra) 0 0,1-($x1,{$y1}) a($rb,($rb) 0 0,0-($x2,{$y2}) h($dx)+($x1)+($x2)"
      stroke="{Sstroke}" stroke-width="{Sstroke-width}" fill="{Sfill}"/>
  </xsl:if>
  <xsl:if test="(@typ)='23'">
    <svg:path d="M($xStart,{$yStart}) h-($dx) a($ra,($ra) 0 0,0-($x1,{$y1}) a($rb,($rb) 0 0,1-($x2,{$y2}) h(($dx)-($x1)-($x2)"
      stroke="{Sstroke}" stroke-width="{Sstroke-width}" fill="{Sfill}"/>
  </xsl:if>
  <xsl:if test="(@typ)='32'">
    <svg:path d="M($xStart,{$yStart}) h-($dx) a($ra,($ra) 0 0,1-($x1,{$y1}) a($rb,($rb) 0 0,0-($x2,{$y2}) h($dx)-($x1)-($x2)"
      stroke="{Sstroke}" stroke-width="{Sstroke-width}" fill="{Sfill}"/>
  </xsl:if>
  <xsl:if test="(@typ)='41'">
    <svg:path d="M($xStart,{$yStart}) h-($dx) a($ra,($ra) 0 0,0-($x1,{$y1}) a($rb,($rb) 0 0,1-($x2,{$y2}) h(($dx)+($x1)+($x2)"
      stroke="{Sstroke}" stroke-width="{Sstroke-width}" fill="{Sfill}"/>
  </xsl:if>
</xsl:template>

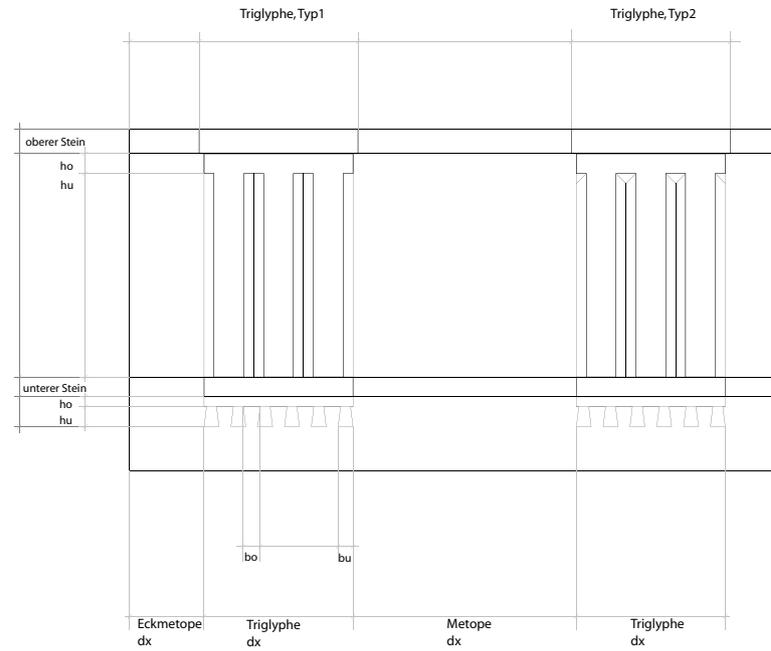
```



Kyma dx, dy, ds, typ="32-xx"



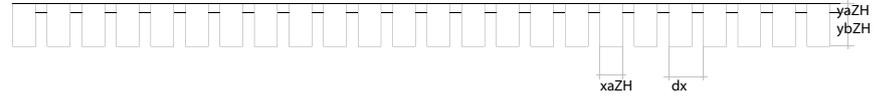
Kyma\_revers dx, dy, ds, typ="14-xx"  
 xx = %-Angabe von dy; beeinflusst Radien  
 ds = beeinflusst die Steigung des Kyma



Zahnschnitt: Typ 0



Zahnschnitt: Typ 1



Eierstab: Typ 0



Eierstab: Typ 1



Band Typ1



Band Typ 2



<säulen/>atlas

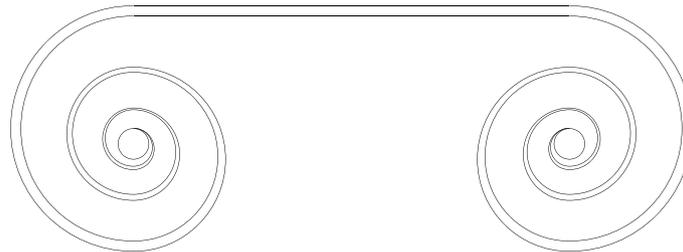
<elements/>



Typ 1 verwendet von: Vitruv, Vignola, Palladio, Perrault, Durand, Stuart u.Revet



Typ 2 verwendet von: Alberti



Typ 3 verwendet von: Serlio, Blum

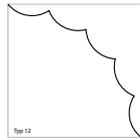


Typ 4 verwendet von: Chitham

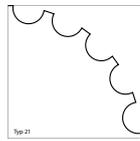


äolische Ordnung  
Vitruv (16 Kanneluren)  
Vignola (24 Kanneluren)  
Palladio (24 Kanneluren)

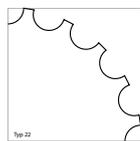
ionische Ordnung  
Vitruv (24 Kanneluren)



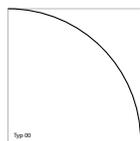
äolische Ordnung  
Purcellen (24 Kanneluren)  
Seslio (24 Kanneluren)  
Blom (24 Kanneluren)



ionische Ordnung  
Seslio (24 Kanneluren)

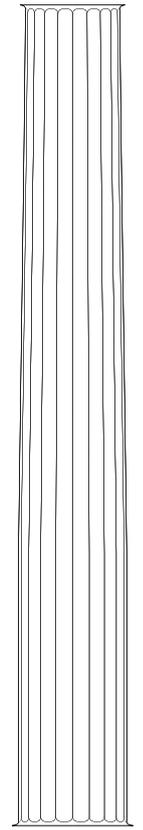
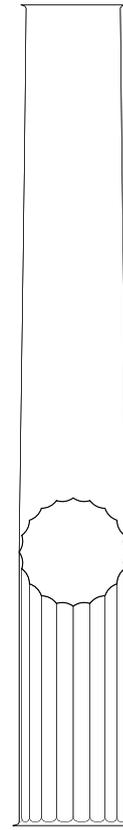
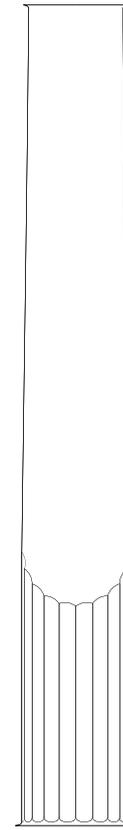
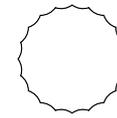
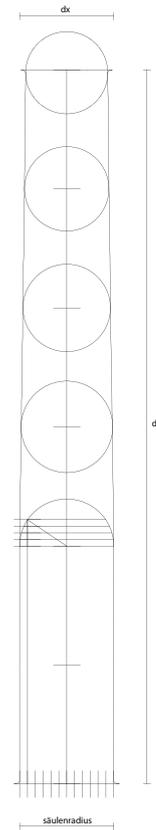
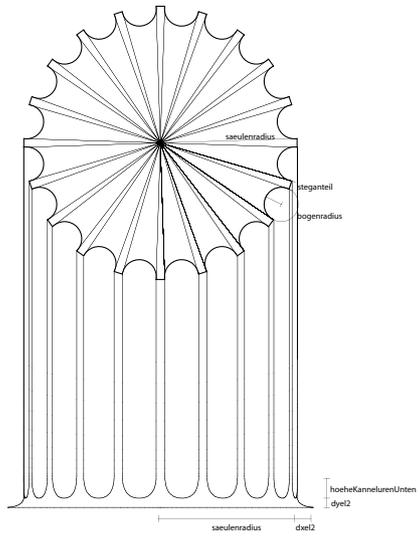
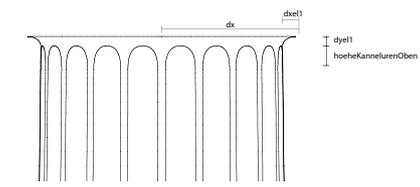


ionische Ordnung  
Enschelsson (24 Kanneluren)  
Alberti (24 Kanneluren)  
Palladio (24 Kanneluren)  
Vignola (24 Kanneluren)



äolische Ordnung  
Alberti  
Charnet  
Chiffart

ionische Ordnung  
Blom  
Charnet  
Chiffart



**structure + elements = form**  
**XML + XSLT = SVG**

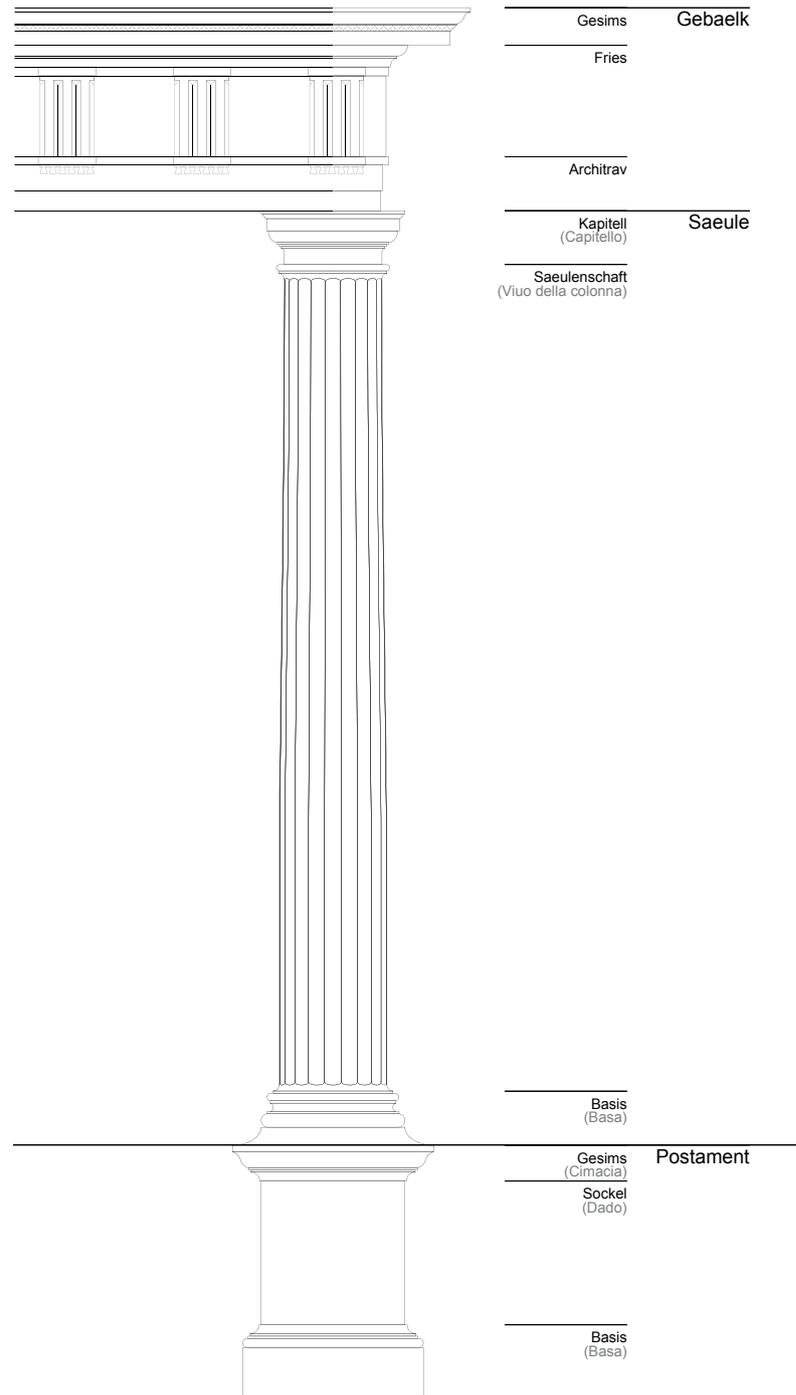
<säulen/>atlas

<different forms of representation/>



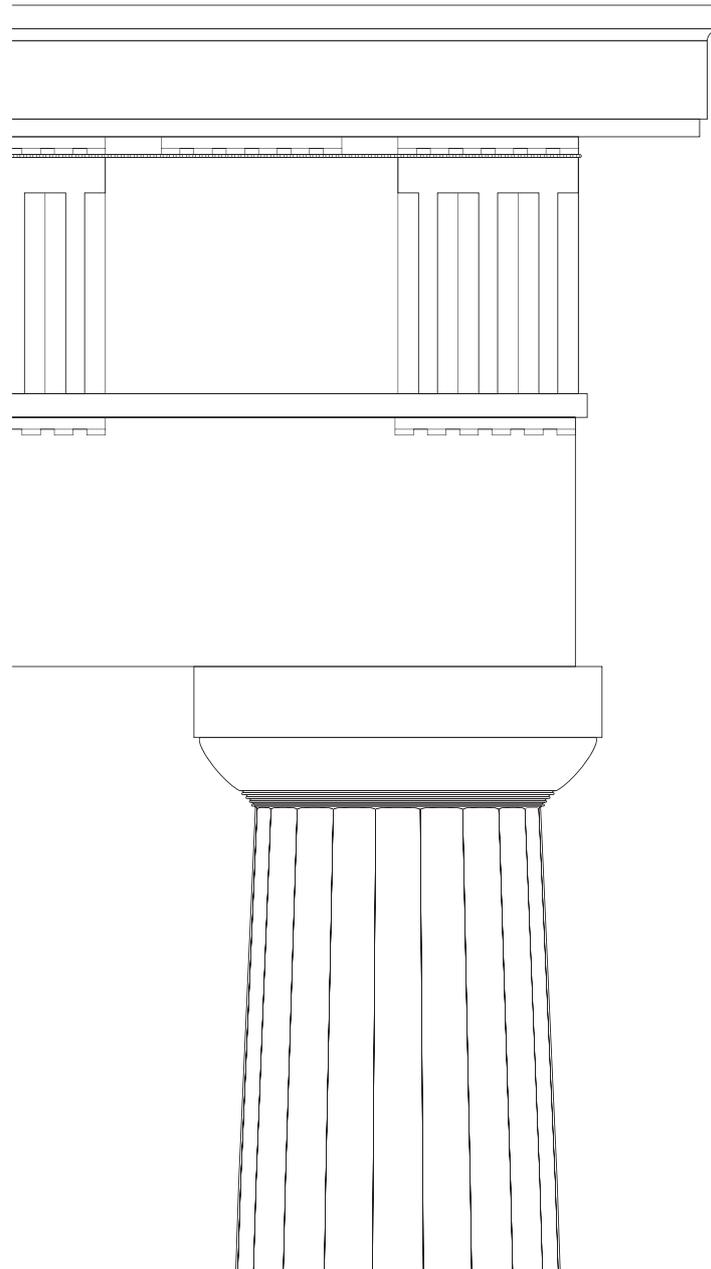
Synopsis Ionic Order

<säulen/>atlas



<different forms of representation/>

<säulen/>atlas



<different forms of representation/>

Abschlussleiste  
Kyma reversa  
Platte (Platte)  
Leiste (Leiste)  
Leiste (Leiste)

Gesims

Rundstab (Astragal / na. Durm)  
Fries (Fries)

Fries

Tenia (Leiste / na. Durm)  
Leiste (Leiste / na. Durm)  
Architrav (Epistylon)

Architrav

Abakus (Abakus / na. Durm)  
Trochilus reversus  
Kehle  
Rundstab (Riemchen)  
Kehle  
Rundstab (Riemchen)  
Kehle  
Rundstab (Riemchen)  
Kehle  
Rundstab (Riemchen)

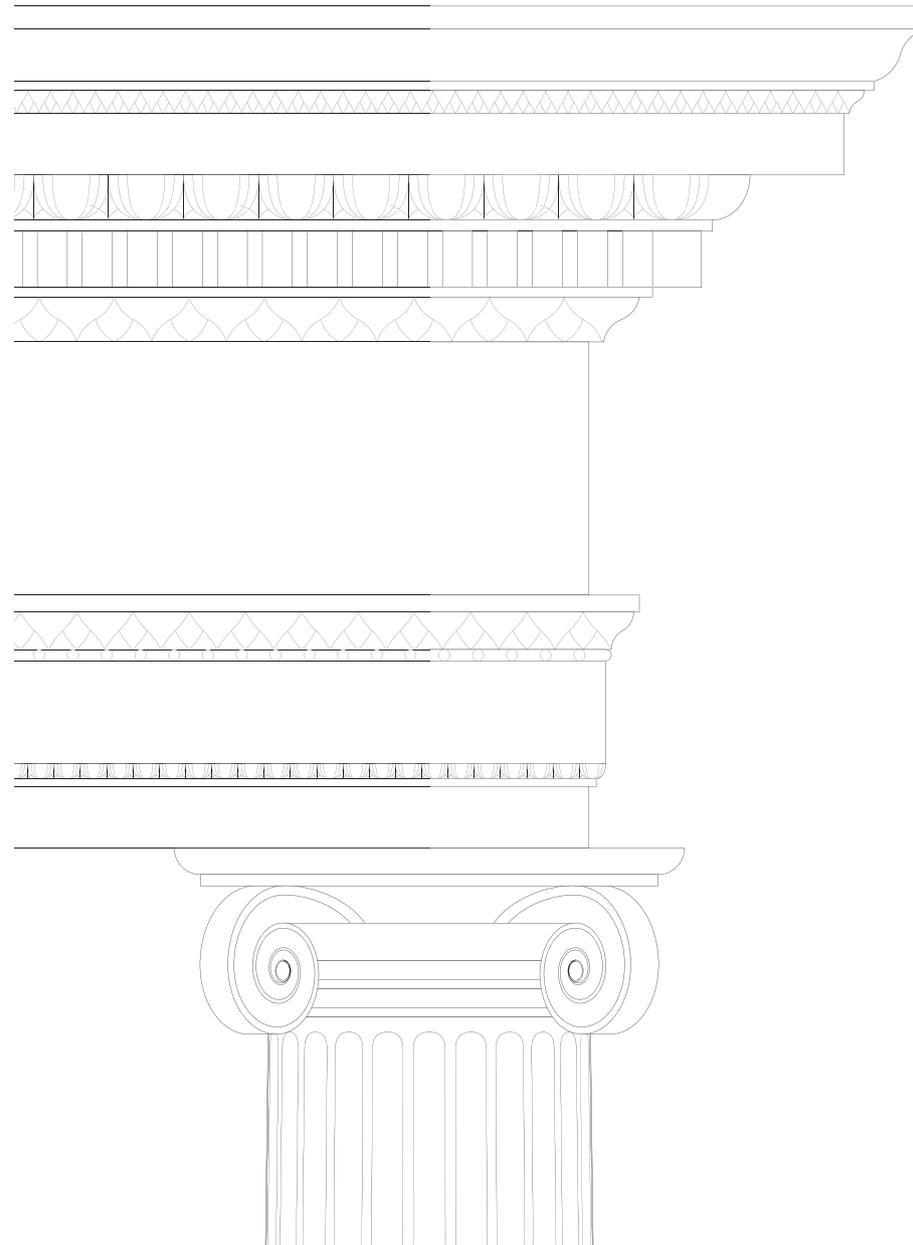
Kapitell

Schaft

Saeulenschaft

<säulen/>atlas

<different forms of representation/>



---

Leiste (Abschlussleiste)  
Kyma (Kyma)  
Leiste  
Kyma reversa (umgekehrtes Kyma)  
Platte  
Echinus  
Leiste  
Platte  
Leiste  
Kyma reversa (umgekehrtes Kyma)

**Gesims**

---

Fries (Fries)

**Fries**

---

Tenia (Taenia)  
Kyma reversa  
Rundstab (Rundleiste)  
Platte (Faszie)  
Echinus  
Leiste  
Platte (Faszie)

**Architrav**

---

Echinus  
Leiste  
Volute  
Echinus (Eierstab)  
Rundstab (Perlstab)  
Leiste

**Kapitell**

---

Astragal  
Leiste  
Schaft (Schaft)  
Leiste (Band)  
Rundstab (Rundstab)

**Saeulenschaft**

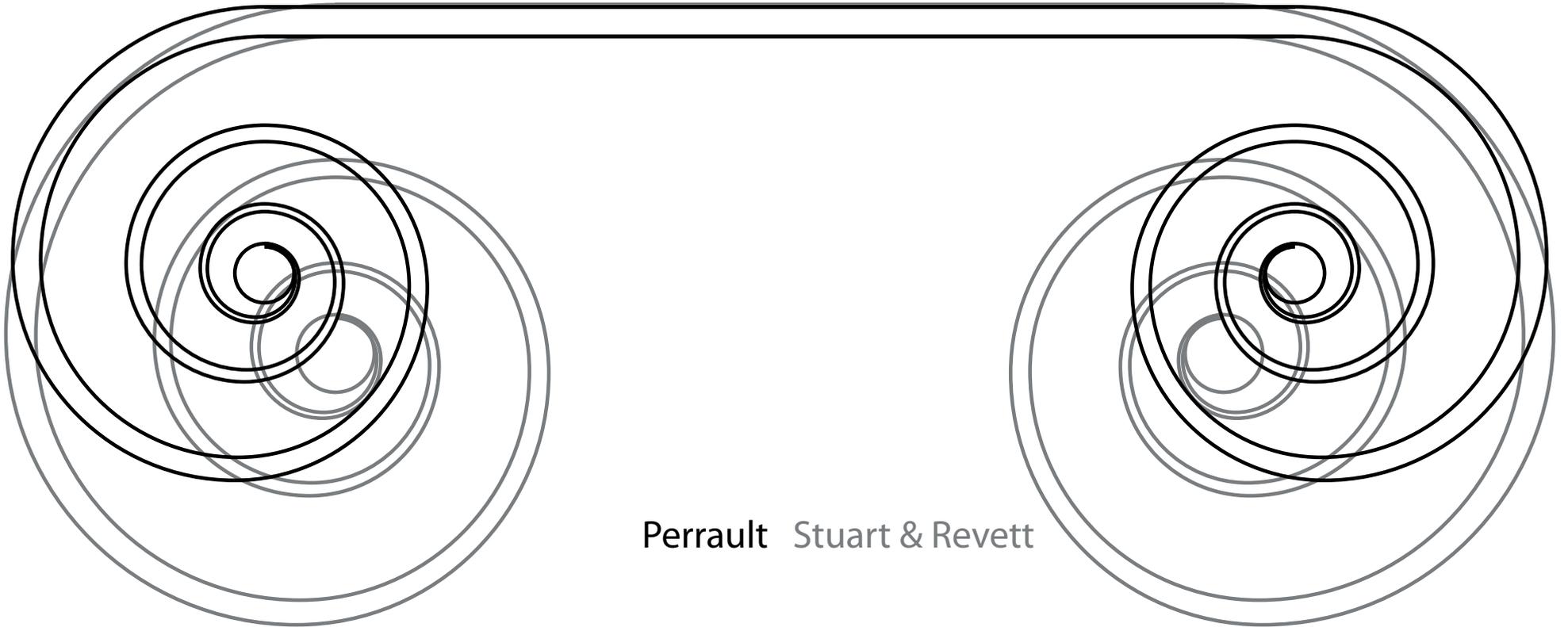
<säulen/>atlas

<different forms of representation/>

Vitruv		Alberti		Serlio		Blum	
Gebaelk		Gebaelk	Gebaelk	Gebaelk		Gebaelk	
Gesims	<b>corona</b>	Gesims		Gesims		Gesims	Corinthia
Leiste		Kyma reversa	Dachtraufe	Leiste		Leiste	Blaettlein
Kyma		Kehle		Kyma	<b>Cymatium</b>	Kyma	Karnies
Leiste		Platte	Haengeplatte	Leiste		Leiste	
Kyma reversa		Kehle	Sims	Kyma reversa	<b>Cyma</b>	Kyma reversa	Karnieslein
Platte		Platte	Mutulen	Platte	<b>Corona</b>	Platte	Ausladung
Leiste		Echinus	Fussboden	Kyma reversa	<b>Cyma</b>	Leiste	
Kehle		Kehle	Sohlbank			Kyma reversa	Karnieslein
Fries	<b>zophorus</b>	Fries		Fries		Fries	Fries
Triglyphenkopf		Leiste	Baendchen	Triglyphenkopf	<b>Capital</b>	Triglyphenkopf	Triglyphenkopf
Fries		Platte	Sparren	Fries		Platte	Fries
Architrav		Architrav	Architrav	Architrav	<b>Epistyle</b>	Architrav	Architrav
Tenia	<b>taenia</b>	Platte	Faszie	Tenia	<b>Tenia</b>	Tenia	Blaettlein
Architrav	<b>epistylum</b>	Platte	Faszie	Architrav	<b>Epistyle</b>	Platte	Architrav
		Platte	Faszie				
Saeule		Saeule	Kapitell	Saeule	<b>Capital</b>	Saeule	Saeule
Kapitell		Kapitell	Sims	Kapitell		Kapitell	Kapitell
Abakus	<b>abacus</b>	Kehle	Sims	Abschlussleiste		Leiste	Blaettlein
Leiste		Platte	Deckplatte	Kyma reversa	<b>Cymatium</b>	Kyma reversa	Karnieslein
Kyma reversa		Echinus	Kessel	Abakus	<b>Plinth</b>	Platte	obere Blatte
Platte		Leiste	Ring	Echinus	<b>Echinus</b>	Echinus	Stab
Echinus	<b>echinus</b>	Leiste	Ring	Leiste	<b>Annulet</b>	Leiste	Blaettlein
Leiste	<b>anulus</b>	Leiste	Ring	Leiste	<b>Annulet</b>	Leiste	Blaettlein
Leiste	<b>anulus</b>	Platte	Saeulenhals	Leiste	<b>Annulet</b>	Leiste	Blaettlein
Leiste	<b>anulus</b>			Saeulenhals	<b>Hypotrachelium</b>	Platte	Fries
Saeulenhals	<b>hypotrachelion</b>						
Saeulenschaft		Saeulenschaft	Saeulenschaft	Saeulenschaft	<b>Astragal</b>	Saeulenschaft	Schaft
Astragal		Rundstab	Ausladung	Astragal		Rundstab	Guertlein
Leiste		Leiste	Einziehung	Leiste		Leiste	
Schaft		Schaft	Schaft	Schaft		Schaft	Schaft
		Leiste	Ausladung	Leiste		Leiste	Blaettlein
		Basis	Basis	Basis	<b>Base</b>	Basis	Schaftgesims
		Torus	Wulst	Torus	<b>Upper Torus</b>	Torus	oberer Stab
		Leiste	Baendchen	Leiste	<b>Collar</b>	Leiste	
		Hohlkehle	Hohlkehle	Trochilus	<b>Scotia</b>	Kehle	Hohlkehle
		Leiste	Baendchen	Leiste	<b>Collar</b>	Leiste	
		Torus	Wulst	Torus	<b>Lower Torus</b>	Torus	unterer Stab
		Platte	Platte	Plinthe	<b>Plinth</b>	Plinthe	Base
						Postament	Postament
						Gesims	oberes Gesims
						Platte	Blatte
						Kyma reversa	Karnies
						Rundstab	Staeblein
						Leiste	

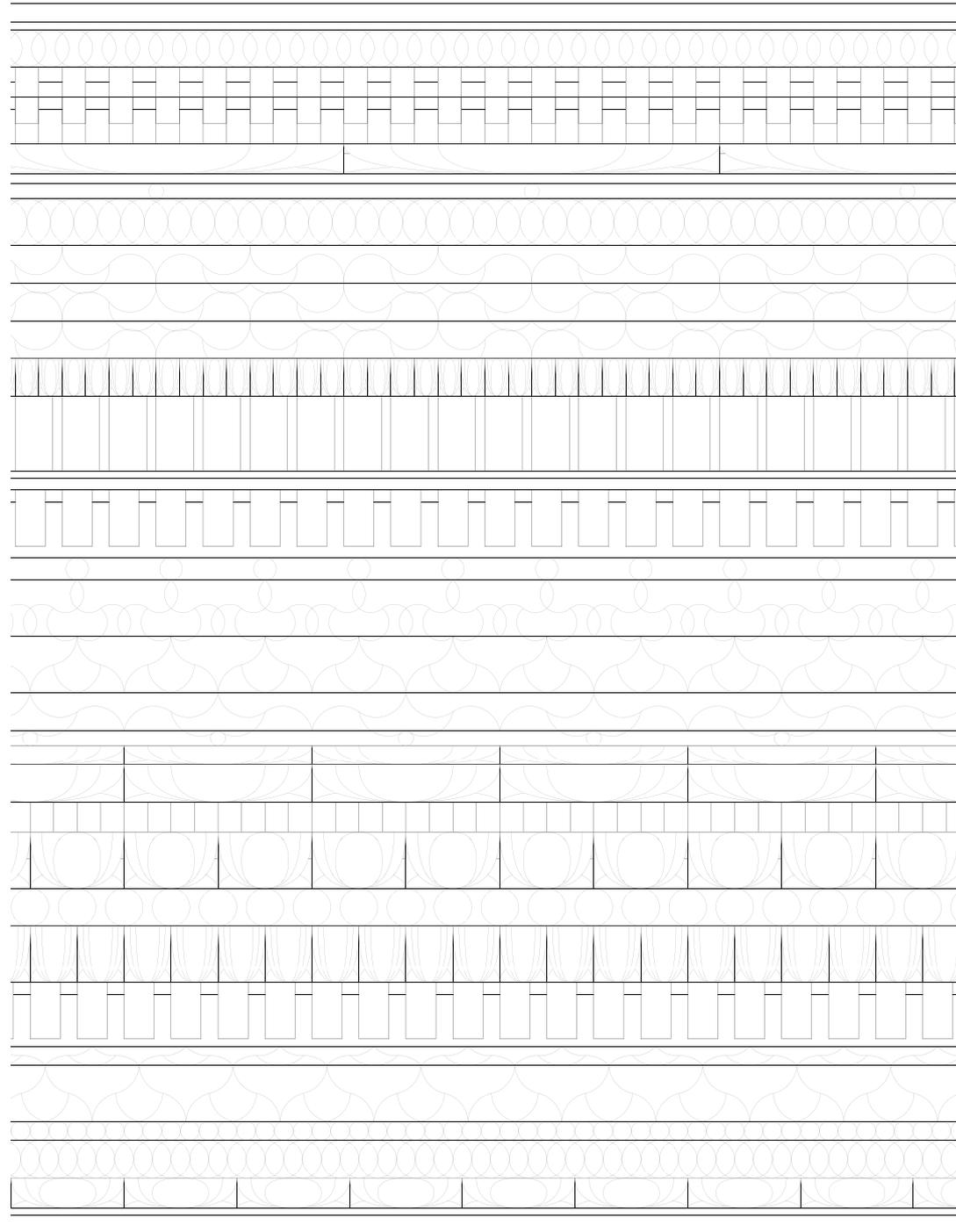
<säulen/>atlas

<comparison/>



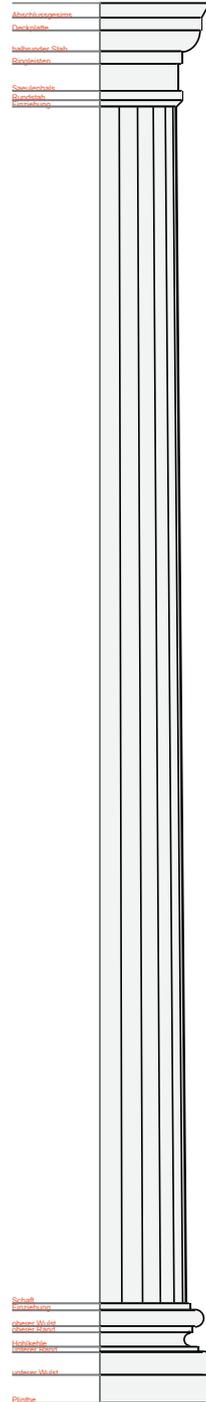
Perrault Stuart & Revett

<säulen/>atlas

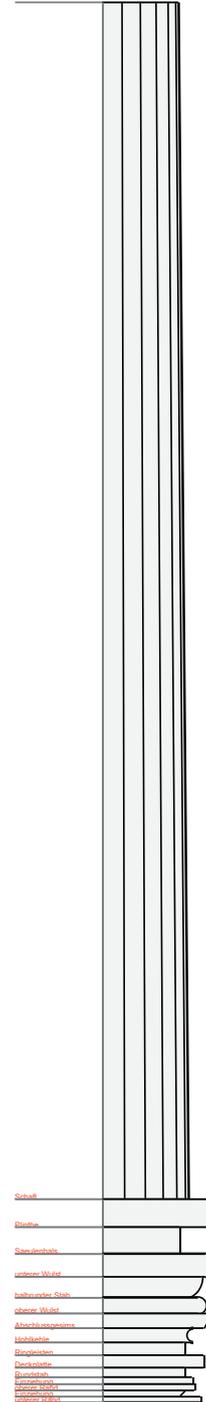


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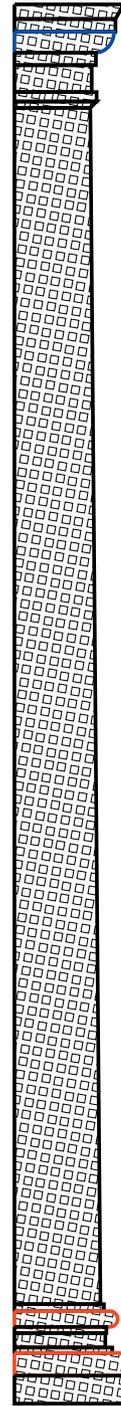
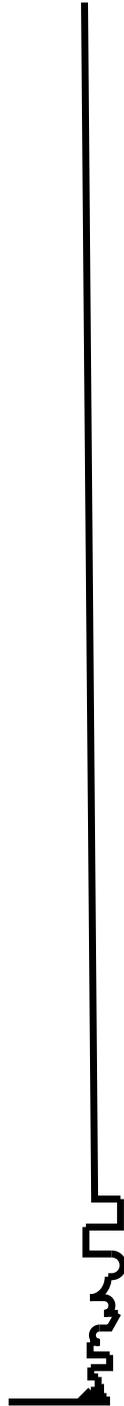
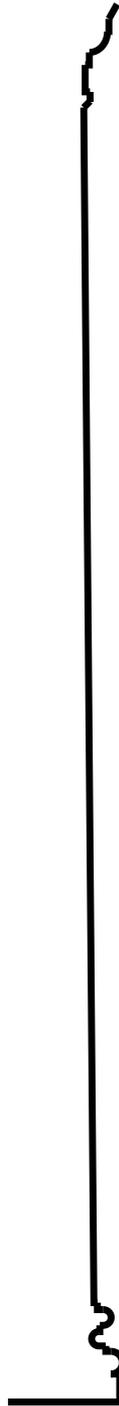
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<outline or filling/>