A NEIGHBORHOOD

for

Richmond, Virginia

by

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August, 1951

Blacksburg, Virginia
A NEIGHBORHOOD

PRESENTED BY HAIGH JAMGOCHIAN
"A city should be built so as to give its people security and happiness."

—Aristotle
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To Professor Clinton H. Cowgill, Head of the Architectural Department, whose personal discussions helped stimulate the work.

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# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title Page</td>
<td>1</td>
</tr>
<tr>
<td>Frontispiece</td>
<td>2</td>
</tr>
<tr>
<td>Maxim</td>
<td>3</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>4</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>5</td>
</tr>
<tr>
<td>List of Illustrations</td>
<td>7</td>
</tr>
<tr>
<td>List of Tables</td>
<td>12</td>
</tr>
<tr>
<td>Maps</td>
<td>13</td>
</tr>
<tr>
<td>Introduction</td>
<td>14</td>
</tr>
<tr>
<td>Part One - Housing in General</td>
<td>16</td>
</tr>
<tr>
<td>History</td>
<td>17</td>
</tr>
<tr>
<td>Summary</td>
<td>35</td>
</tr>
<tr>
<td>Problem</td>
<td>37</td>
</tr>
<tr>
<td>Summary</td>
<td>47</td>
</tr>
<tr>
<td>Solution</td>
<td>48</td>
</tr>
<tr>
<td>Site Selection</td>
<td>62</td>
</tr>
<tr>
<td>Development of Land, Utilities and Services</td>
<td>69</td>
</tr>
<tr>
<td>Planning for Residential Facilities</td>
<td>74</td>
</tr>
<tr>
<td>Provision of Neighborhood Community Facilities</td>
<td>80</td>
</tr>
<tr>
<td>Layout for Vehicular and Pedestrian Circulation</td>
<td>98</td>
</tr>
<tr>
<td>Summary</td>
<td>103</td>
</tr>
<tr>
<td>Part Two - Housing in Richmond</td>
<td>105</td>
</tr>
<tr>
<td>History</td>
<td>106</td>
</tr>
<tr>
<td>Summary</td>
<td>113</td>
</tr>
<tr>
<td>Problem</td>
<td>114</td>
</tr>
<tr>
<td>Summary</td>
<td>118</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solution</td>
<td>119</td>
</tr>
<tr>
<td>General</td>
<td>119</td>
</tr>
<tr>
<td>Program</td>
<td>127</td>
</tr>
<tr>
<td>Design</td>
<td>150</td>
</tr>
<tr>
<td>Community as a Whole</td>
<td>150</td>
</tr>
<tr>
<td>Neighborhood Units</td>
<td>151</td>
</tr>
<tr>
<td>Neighborhood Unit One</td>
<td>152</td>
</tr>
<tr>
<td>Neighborhood Unit Two</td>
<td>153</td>
</tr>
<tr>
<td>Neighborhood Unit Three</td>
<td>154</td>
</tr>
<tr>
<td>Area Served by Nursery School</td>
<td>156</td>
</tr>
<tr>
<td>Dwelling Units</td>
<td>160</td>
</tr>
<tr>
<td>A. Row House Group</td>
<td>160</td>
</tr>
<tr>
<td>B. Detached Dwelling Areas</td>
<td>161</td>
</tr>
<tr>
<td>C. Apartment Units</td>
<td>161</td>
</tr>
<tr>
<td>Interior Neighborhood Provisions</td>
<td>162</td>
</tr>
<tr>
<td>A. Recreation Facilities</td>
<td>162</td>
</tr>
<tr>
<td>B. Nursery School</td>
<td>163</td>
</tr>
<tr>
<td>C. Church</td>
<td>163</td>
</tr>
<tr>
<td>Community Park</td>
<td>165</td>
</tr>
<tr>
<td>Neighborhood Center</td>
<td>165</td>
</tr>
<tr>
<td>Heat Plant</td>
<td>166</td>
</tr>
<tr>
<td>Social Activities Building</td>
<td>167</td>
</tr>
<tr>
<td>Elementary School</td>
<td>168</td>
</tr>
<tr>
<td>Theater</td>
<td>172</td>
</tr>
<tr>
<td>Shopping Center</td>
<td>172</td>
</tr>
<tr>
<td>Summary</td>
<td>184</td>
</tr>
<tr>
<td>PART THREE - HOUSING IN THE FUTURE</td>
<td>249</td>
</tr>
<tr>
<td>Richmond</td>
<td>250</td>
</tr>
<tr>
<td>General</td>
<td>252</td>
</tr>
<tr>
<td>CONCLUSIONS</td>
<td>259</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>261</td>
</tr>
<tr>
<td>VITA</td>
<td>266</td>
</tr>
<tr>
<td>ORAL PRESENTATION</td>
<td>267</td>
</tr>
<tr>
<td>LIST OF ILLUSTRATIONS</td>
<td>Page</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Figure 1. Stone Age - Cave</td>
<td>19</td>
</tr>
<tr>
<td>Figure 2. Stone Age - Glastonbury</td>
<td>19</td>
</tr>
<tr>
<td>Figure 3. Ancient Cities - Kahun</td>
<td>21</td>
</tr>
<tr>
<td>Figure 4. Ancient Cities - Gournia</td>
<td>21</td>
</tr>
<tr>
<td>Figure 5. Greek Classic - Priene</td>
<td>24</td>
</tr>
<tr>
<td>Figure 6. Roman Classic - Rome</td>
<td>26</td>
</tr>
<tr>
<td>Figure 7. Medieval - Noerdlingen</td>
<td>29</td>
</tr>
<tr>
<td>Figure 8. Baroque - Karlsruhe</td>
<td>32</td>
</tr>
<tr>
<td>Figure 9. Colonial - New Amsterdam</td>
<td>32</td>
</tr>
<tr>
<td>Figure 10. Expansion - a. New York</td>
<td>34</td>
</tr>
<tr>
<td>b. Boston</td>
<td></td>
</tr>
<tr>
<td>c. Chicago</td>
<td></td>
</tr>
<tr>
<td>d. Los Angeles</td>
<td></td>
</tr>
<tr>
<td>Figure 11. City Growth</td>
<td>38</td>
</tr>
<tr>
<td>Figure 12. Blighted Cities - Boston and New York</td>
<td>45</td>
</tr>
<tr>
<td>Figure 13. Typical Neighborhood</td>
<td>46</td>
</tr>
<tr>
<td>Figure 14. The Three Magnets</td>
<td>50</td>
</tr>
<tr>
<td>Figure 15. Regional Boundaries</td>
<td>52</td>
</tr>
<tr>
<td>Figure 16. The City Plan</td>
<td>53</td>
</tr>
<tr>
<td>Figure 17. Community</td>
<td>54</td>
</tr>
<tr>
<td>Figure 18. Neighborhood</td>
<td>54</td>
</tr>
<tr>
<td>Figure 19. Early Settlements in Virginia</td>
<td>107</td>
</tr>
<tr>
<td>Figure 20. Physical Barriers of Richmond</td>
<td>109</td>
</tr>
<tr>
<td>Figure 21. Growth of Richmond</td>
<td>111</td>
</tr>
<tr>
<td>Figure 22. Distribution and Growth of Richmond's Population</td>
<td>115</td>
</tr>
</tbody>
</table>
# LIST OF ILLUSTRATIONS

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 23</td>
<td>Blighted Conditions</td>
<td>117</td>
</tr>
<tr>
<td>Figure 24</td>
<td>Circulation System</td>
<td>123</td>
</tr>
<tr>
<td>Figure 25</td>
<td>Transportation Facilities</td>
<td>124</td>
</tr>
<tr>
<td>Figure 26</td>
<td>Transit Facilities</td>
<td>125</td>
</tr>
<tr>
<td>Figure 27</td>
<td>Parks and Schools</td>
<td>126</td>
</tr>
<tr>
<td>Figure 28</td>
<td>The Site</td>
<td>128</td>
</tr>
<tr>
<td>Figure 29</td>
<td>Existing Site Conditions</td>
<td>129</td>
</tr>
<tr>
<td>Figure 30</td>
<td>Topographic Sections of Site</td>
<td>130</td>
</tr>
<tr>
<td>Figure 31</td>
<td>Relationship of Site to Richmond</td>
<td>131</td>
</tr>
<tr>
<td>Figure 32</td>
<td>Relationship of Neighborhood Units to the Entire Community</td>
<td>186</td>
</tr>
<tr>
<td>Figure 33</td>
<td>Highway Improvements at Major Intersections Adjacent to the Community</td>
<td>187</td>
</tr>
<tr>
<td>Figure 34</td>
<td>Major Vehicular Traffic Flow</td>
<td>188</td>
</tr>
<tr>
<td>Figure 35</td>
<td>Neighborhood Unit One</td>
<td>189</td>
</tr>
<tr>
<td>Figure 36</td>
<td>Minor Vehicular Traffic Flow - Unit One</td>
<td>190</td>
</tr>
<tr>
<td>Figure 37</td>
<td>Neighborhood Unit Two</td>
<td>191</td>
</tr>
<tr>
<td>Figure 38</td>
<td>Minor Vehicular Traffic Flow - Unit Two</td>
<td>192</td>
</tr>
<tr>
<td>Figure 39</td>
<td>Neighborhood Unit Three</td>
<td>193</td>
</tr>
<tr>
<td>Figure 40</td>
<td>Minor Vehicular Traffic Flow - Unit Three</td>
<td>194</td>
</tr>
<tr>
<td>Figure 41</td>
<td>Typical Major Intersection</td>
<td>195</td>
</tr>
<tr>
<td>Figure 42</td>
<td>Relative Distances of Neighborhood Facilities</td>
<td>196</td>
</tr>
<tr>
<td>Figure 43</td>
<td>Area Served by Nursery School</td>
<td>197</td>
</tr>
<tr>
<td>Figure</td>
<td>Illustration</td>
<td>Page</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>44</td>
<td>Pedestrian Circulation</td>
<td>198</td>
</tr>
<tr>
<td>45</td>
<td>Interior Neighborhood Provisions</td>
<td>199</td>
</tr>
<tr>
<td>46</td>
<td>Pedestrian Underpass</td>
<td>200</td>
</tr>
<tr>
<td>47</td>
<td>Foot Bridge</td>
<td>201</td>
</tr>
<tr>
<td>48</td>
<td>Nursery School - Plan</td>
<td>202</td>
</tr>
<tr>
<td>49</td>
<td>Nursery School - Perspective</td>
<td>203</td>
</tr>
<tr>
<td>50</td>
<td>Church - Plan</td>
<td>204</td>
</tr>
<tr>
<td>51</td>
<td>Church - Perspective</td>
<td>205</td>
</tr>
<tr>
<td>52</td>
<td>Church Chancel</td>
<td>206</td>
</tr>
<tr>
<td>53</td>
<td>Entrance Patio</td>
<td>207</td>
</tr>
<tr>
<td>54</td>
<td>Row House Group - Plan</td>
<td>208</td>
</tr>
<tr>
<td>55</td>
<td>Row House Group - Perspective</td>
<td>209</td>
</tr>
<tr>
<td>56</td>
<td>Typical Detached Dwelling Area</td>
<td>210</td>
</tr>
<tr>
<td>57</td>
<td>One-Family Detached Dwelling - Plan</td>
<td>211</td>
</tr>
<tr>
<td>58</td>
<td>One-Family Detached Dwelling - Perspective</td>
<td>212</td>
</tr>
<tr>
<td>59</td>
<td>Community Park and Apartment Site</td>
<td>213</td>
</tr>
<tr>
<td>60</td>
<td>Picnic Shelter</td>
<td>214</td>
</tr>
<tr>
<td>61</td>
<td>Park Apartments - Plan</td>
<td>215</td>
</tr>
<tr>
<td>62</td>
<td>Park Apartments - Exterior Perspective</td>
<td>216</td>
</tr>
<tr>
<td>63</td>
<td>Park Apartments - Interior Perspective</td>
<td>217</td>
</tr>
<tr>
<td>64</td>
<td>Neighborhood Center</td>
<td>218</td>
</tr>
<tr>
<td>65</td>
<td>Heat Plant - Steam Distribution</td>
<td>219</td>
</tr>
<tr>
<td>66</td>
<td>Heat Plant - Plan</td>
<td>219</td>
</tr>
<tr>
<td>Figure</td>
<td>Illustration Description</td>
<td>Page</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>67</td>
<td>Heat Plant - Perspective</td>
<td>219</td>
</tr>
<tr>
<td>68</td>
<td>Social Activities Building - Plan</td>
<td>220</td>
</tr>
<tr>
<td>69</td>
<td>Clinic Entrance</td>
<td>221</td>
</tr>
<tr>
<td>70</td>
<td>Social Activities Building - Perspectives</td>
<td>222</td>
</tr>
<tr>
<td>71</td>
<td>Assembly Hall</td>
<td>223</td>
</tr>
<tr>
<td>72</td>
<td>Elementary School - Plan</td>
<td>224</td>
</tr>
<tr>
<td>73</td>
<td>Classroom Storage Units</td>
<td>225</td>
</tr>
<tr>
<td>74</td>
<td>Elementary School - Perspective</td>
<td>226</td>
</tr>
<tr>
<td>75</td>
<td>Classroom Wing</td>
<td>227</td>
</tr>
<tr>
<td>76</td>
<td>Teachers' Lounge</td>
<td>228</td>
</tr>
<tr>
<td>77</td>
<td>Shopping Center and Theater - Plan</td>
<td>229</td>
</tr>
<tr>
<td>78</td>
<td>Shopping Center and Theater - Basement Plan</td>
<td>230</td>
</tr>
<tr>
<td>79</td>
<td>Shopping Center - Perspective</td>
<td>231</td>
</tr>
<tr>
<td>80</td>
<td>Theater - Perspective</td>
<td>232</td>
</tr>
<tr>
<td>81</td>
<td>Food Market - Plan</td>
<td>233</td>
</tr>
<tr>
<td>82</td>
<td>Food Market - Perspective</td>
<td>234</td>
</tr>
<tr>
<td>83</td>
<td>Food Market Meat Service Area</td>
<td>235</td>
</tr>
<tr>
<td>84</td>
<td>Shops - Shoe Repair Shop&lt;br&gt;Beauty Shop&lt;br&gt;Barber Shop&lt;br&gt;Laundry and Cleaner Agent&lt;br&gt;Tailor Shop</td>
<td>236</td>
</tr>
<tr>
<td>85</td>
<td>Shops - Drug Store&lt;br&gt;Children's Wear Shop</td>
<td>237</td>
</tr>
<tr>
<td>86</td>
<td>Drug Store Sales Counter</td>
<td>238</td>
</tr>
<tr>
<td>Figure</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>87</td>
<td>Shops - Variety Shop Restaurant and Snack Bar</td>
<td>239</td>
</tr>
<tr>
<td>88</td>
<td>Restaurant Booths</td>
<td>240</td>
</tr>
<tr>
<td>89</td>
<td>Restaurant Snack Bar</td>
<td>241</td>
</tr>
<tr>
<td>90</td>
<td>Restaurant - Exterior Perspective</td>
<td>242</td>
</tr>
<tr>
<td>91</td>
<td>Elevations of Shopping Center</td>
<td>243</td>
</tr>
<tr>
<td>92</td>
<td>Sections Through Shopping Center</td>
<td>244</td>
</tr>
<tr>
<td>93</td>
<td>Perspective Section</td>
<td>244</td>
</tr>
<tr>
<td>94</td>
<td>Detail Section Through Food Market</td>
<td>245</td>
</tr>
<tr>
<td>95</td>
<td>Detail Section Through Typical Shop Window</td>
<td>246</td>
</tr>
<tr>
<td>96</td>
<td>Duplication of Neighborhood Elements</td>
<td>247</td>
</tr>
<tr>
<td>97</td>
<td>Duplication of Neighborhoods</td>
<td>248</td>
</tr>
<tr>
<td>98</td>
<td>Possible Community Development Sites</td>
<td>251</td>
</tr>
<tr>
<td>99</td>
<td>Decentralization of Eastern United States</td>
<td>254</td>
</tr>
<tr>
<td>100</td>
<td>The Earth</td>
<td>256</td>
</tr>
<tr>
<td>101</td>
<td>Universe</td>
<td>258</td>
</tr>
</tbody>
</table>
**LIST OF TABLES**

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Assumed Family Size and Age Distribution: Selected Data</td>
<td>61</td>
</tr>
<tr>
<td>2</td>
<td>Access Standards for Community Facilities Outside the Neighborhood</td>
<td>67</td>
</tr>
<tr>
<td>3</td>
<td>Recommended Area Allowances Per Family</td>
<td>81</td>
</tr>
<tr>
<td>4</td>
<td>Net Dwelling Densities and Building Coverage</td>
<td>82</td>
</tr>
<tr>
<td>5</td>
<td>Access Standards for Community Facilities Within the Neighborhood</td>
<td>85</td>
</tr>
<tr>
<td>6</td>
<td>Elementary School Capacity Related to Neighborhood Population</td>
<td>87</td>
</tr>
<tr>
<td>7</td>
<td>Elementary School Site Size</td>
<td>88</td>
</tr>
<tr>
<td>8</td>
<td>Neighborhood Playground Size</td>
<td>90</td>
</tr>
<tr>
<td>9</td>
<td>Neighborhood Park Size</td>
<td>92</td>
</tr>
<tr>
<td>10</td>
<td>Neighborhood Shopping Center Size</td>
<td>97</td>
</tr>
<tr>
<td>11</td>
<td>Climate in Richmond</td>
<td>122</td>
</tr>
</tbody>
</table>
INTRODUCTION

The selection of the subject for this thesis was made because much study is needed in the realm of urban development.

People need a place to live. Some want merely a place to keep their belongings while others require all the amenities for gracious living. Unfortunately, there are some who have no choice — they usually exist in areas known as slums.

Because of the importance of rehabilitating blighted and slum areas, this subject has been introduced in the thesis. It demonstrates the immediate need of serious study and work that will assure the improvement of our communities and their future success.

Most of us assume that the planning of our cities is the responsibility of the local government. Seldom do improvement projects, such as rebuilding a city hall or widening a street, develop any other spirit in the public than one of indifferent tolerance, despite the fact that an active interest on the part of everyone is necessary for the proper development of our communities.

Good community planning and housing technique are related to future large-scale city habilitation. This calls for a carefully studied, harmoniously integrated over-all plan of community organization rather than the loosely organized sprawling suburban expansion of the last few decades.
INTRODUCTION

With a comprehensive study of the problem of substandard housing, covering the historical development of the physical form of communities to the congested urban pattern of today, a suggested solution for the development of a neighborhood in Richmond has been presented, not with the intention of formulating the solution, but with the hope of contributing to the search:
PART ONE - HOUSING IN GENERAL
From cave to village

The cave was man's first shelter. When men congregated to form villages, they took the first step toward urbanization. They made huts of boughs and leaves. They cultivated plants, domesticated animals, and introduced agriculture. Possessions were then created in the form of dried grains, livestock, and crude tools. This bred rivalry among tribes for the possession of the more fertile lands. Protection was needed, first, against the elements and later, against nomadic tribes. This need for protection was a driving force that resulted in the establishment of the earliest towns. The friendly groups collected and formed villages located on sites offering the natural protection of elevated terrain, islands, or peninsulas; or they surrounded their villages with barricades and moats.

The quest for a permanent home where life can be lived in comfort, has been another incentive that has influenced man to seek fixed settlements. With the beginning of urbanization, the stronghold of the village became the sanctuary for the altar of man's deity. It provided a place for assembly, a center for trade, and a place for worship. The dependence that man has had on the social group has been a vital factor in the development of civilization.¹

Figure 1 shows a sketch of a plan section of a cave that may be used to illustrate how the cave shelter may have existed.

Evolution of the physical form of cities

Few cities in which great cultures thrived began with a definite plan. They developed as needs became evident; the growth was irregular in form and sensitive to changes due to changes in the people's habits and the economic, social, and political forces of the society. The various patterns of cities have been explained by historians as organic and inorganic, irregular and geometrical, magical and mystical, formal and informal, and medieval and classic; but they obscure rather than clarify the distinctions. The important point to aid in understanding the differences in the city patterns is by the transitions from a slave to a mercantile economy and from slingshot to gunpowder warfare. All of the various patterns, however, can be classified into two basic types, the walled town and the open city.¹

Glastonbury, an early fenced village, where the inhabitants lived in huts of boughs and leaves, is shown in Figure 2.

Ancient Egypt - 3000 B.C.

Early civilizations developed along the valleys of the Nile, Tigris-Euphrates, and Indus Rivers where food, water, and

¹Ibid., p. 4
PLAN OF CAVE SHOWING THE
ENTRANCE AND INTERIOR SPACES.
1 ENTRANCE OPENING
2 INTERIOR

FIGURE 1

STONE - AGE
GLASTONBURY: AN EARLY
FENCED VILLAGE WITH
HUTS OF BOUGHS AND LEAVES.
1 FENCE
2 HUTS

FIGURE 2

STONE - AGE
transportation were at hand. A series of small and great empires rose, waged wars, and fell. Power shifted from one kingdom to another, each adding to the evolution of civilization. The people were the slaves of the ruling class, their lives dedicated to the Pharaoh. The towns were erected by his order. While the rulers had great monuments built in their memory, the people lived in slums spread about the towns. The people lived their urban existence in the shadows of slavery and superstitious religion. The history of the city of the people is limited to the knowledge of an assembly of cells arranged in rectangular blocks to which narrow alleys gave access. The dwelling of the Egyptian was built of sun-dried bricks and plaster, covered with a roof of reeds. Several rooms surrounded a courtyard where the cooking and other domestic activities were performed.\(^1\)

A plan of the city of Kahum and a typical Egyptian house are illustrated in Figure 3.

Aegean culture - 2000 B. C.

On the islands of the Aegean Sea a society was cultivated. The king's palace served as a center of community life in the Aegean culture. The island of Crete offered town sites of natural protection. Walls were not needed for protection; the people

\(^1\)Ibid., pp. 5-6.
AN EGYPTIAN HOUSE
1 COURT
2 SMALL ROOMS

THE SIMPLE DWELLINGS WERE BUILT FOR THE SLAVES; HARDLY MORE THAN AN ASSEMBLY OF CELLS.

FIGURE 3

EARLY CRETAN HOUSE
1 BATH
2 MEGARON (LIVING ROOM)
A PALACE
B PUBLIC SQUARE

THE PALACE OF THE KING WAS AN INTEGRAL PART OF THE TOWN LIFE. NATURAL PROTECTION ELIMINATED THE NEED FOR WALLS.

FIGURE 4

ANCIENT CITIES
enjoyed free access to the sea and entered into trade with other lands. Due to the rugged topography of the sites, Aegean cities were irregular in form. The streets were narrow lanes, but they were paved with stone. Highly developed systems of water supply, sanitation, and drainage for the palace and many of the houses were used. Most dwellings were one-story in height. The towns did not reach great sizes and congestion as did many cities of the Near East.¹

Gournia, a typical early Cretan town, and a Cretan house are shown in Figure 4.

The classic cities (Late Greek and Roman - 5th century B.C. - 500 A.D.)

The Greek from the mainland mingled with the Aegean peoples, merged with their city-states, and gradually absorbed them within the Greek culture. During the early years the Greek city was a maze of wandering, unpaved streets without drainage and sanitation systems. Water was carried from wells and waste was disposed of in the streets. Public buildings were few and simple. There was no distinction between dwellings of the rich and of the poor. Late in the 5th century B.C. an architect named Hippodamus devised a theory to bring order in the city with a science of city-planning. It used

¹Ibid., p. 10.
the "gridiron" street system, a design to serve all the people. Located approximately in the center of the town plan, the agora, or market place, was the center of business and political life.

Building regulations were used at this time. Laws, such as prohibitions against the projection of upper floors beyond the first floor walls, prohibition of window openings directly upon the street, prohibition of water drains to empty into the street, and other regulations were enforced. The population in Athens in the 5th and 4th centuries B. C. was some 150,000. However, most Greek cities were small, their sizes being determined by their facilities, such as water and food supplies. With comfort and privacy as objectives, the Greeks oriented and planned houses for the climate.

During the 4th century B. C. indifferences within the government began to weaken the Greek civilization. The Peloponnesian Wars weakened Athens financially, and corrupt politicians began to gnaw at the moral fiber of the people. Athens became an easy prey for the conquerors, the Romans.¹

The Hippodamus plan, used in the typical Greek city, Priene, and a Greek house are demonstrated in Figure 5.

The Romans grafted the Greek culture onto their own and then excelled in their achievements. They were skilled engineers and aggressive city builders. With inventive genius the Romans solved

¹Ibid., pp. 12-24.
LATE GREEK HOUSE
1 KITCHEN
2 MEGARON
3 ATRIUM
4 SHOPS
5 BATH

A AGORA
B TEMPLE OF ATHENE POLIAS
C THEATER
D STADIUM

FIGURE 5  PRIENE

THIS CITY DEMONSTRATES THE HIPPODAMIAN PLAN
(A RIGID GEOMETRICAL STREET SYSTEM SUPERIMPOSED UPON THE RUGGED TOPOGRAPHY OF THE SITE.)

GREEK CLASSIC
technical problems created by the congregation of great numbers of people in cities. They developed water supply and distribution systems, drainage systems, and methods of heating upon which the health of the masses depended. Great aqueducts for transporting water over great distances, underground sewers, and great highways paved with stone were feats of engineering skill.

The citizen of early Rome saw gracious living. He observed distinction in class among dwellings, but took this for granted because the slave economy was all that he had thus far witnessed in history.

World conquest was the ambition of Rome. Great riches flowed into the capital; monuments, dedicated to great victories, were erected; triumphant generals returned from abroad; and emperors were crowned. The temples and triumphal arches, the theaters and public baths, the private palaces and country estates reflected not only pride of power but also the Roman rulers’ love of luxury, which slowly sapped their strength and contributed to the empire’s downfall. Rome sank to its lowest state. Classic Rome, even more than Athens, was a city built by and for the few. Hidden away behind the ostentation of marble columns was a maze of miserable slums where 900,000 people lived in abject poverty. A city which had begun with freedom and equality ended with despotism and starvation.
The Forum Romanum was the original center of business and political life.

Rome

Roman Classic
HOUSING IN GENERAL

The conquest of the Roman Empire by the barbarians was inevitable. Rome gradually merged with the camp of barbarians from the north, and civilization descended into the Dark Ages.¹

The early city of Rome and a typical house plan are illustrated in Figure 6.

The medieval town – 10th century A.D.

After dark centuries, the barbarians became civilized. Different peoples amalgamated, and a new creative spirit arose. Western civilization was in the period of history known as the Middle Ages, which lasted until the middle of the fifteenth century. During this time, town construction was confined to small fortified communities controlled by local feudal lords. An example of a medieval fortified town is Carcassonne in Southern France. It demonstrates the protection for which it was built. This protection offered by medieval towns attracted people from nearby rural areas and thus increased the population. Many towns developed rapidly as centers of commerce, and medieval life naturally centered around the market place of these towns. Here products of local industry were exchanged for farm produces. The activities of the adjacent town hall, the church, and the guildhalls of the craftsmen were shared by the citizens. Life in the Middle Ages was reflected in the four

¹Ibid., 24-32.
principal elements or symbols of the feudal town: the wall, the
market place, the cathedral, and the castle. The wall was the
bulwark of safety in an insecure world. The market place was the
center of trade. The cathedral, with its lofty spires dominating
both the town and the countryside, symbolized man's belief in a
better life hereafter. The castle represented the military and
political power of the feudal lord.

The pattern of the medieval town was a maze of winding streets
often due to the irregular terrain, but also a method to retard
enemy forces that might break through the walls. The primary reason
for the maze was due to haphazard unplanned growth, proceeding out-
ward from the center of the town and inward from the encircling wall.
So crowded did many walled towns become in the later Middle Ages
that houses of five and six stories were built, the houses almost
touching each other across the narrow alleys that served as streets.
Such extreme congestion, plus the lack of a pure water supply and a
sewerage system, was responsible for epidemics, which frequently
raged unchecked and, at times, virtually depopulated whole towns.¹

The irregular street pattern of the typical medieval town is
shown in the plan of Noerdlingen, Germany, in Figure 7.

¹Ibid., pp. 33-49.
MEDIEVAL HOUSE
TWELFTH CENTURY

1 SHOP
2 KITCHEN
3 COURT YARD
4 WELL
5 PRIVY
6 LIVING HALL
7 SLEEPING SPACE
8 COURT

GROUND
FLOOR

SECOND FLOOR

A CATHEDRAL PLAZA
B MOAT

FIGURE 7
NOERDLINGEN

TYPICAL MEDIEVAL CITY OF THE TWELFTH CENTURY
WITH IRREGULAR STREET PATTERNS AND HEAVY WALLS.
The Baroque city

The number of towns increased rapidly during the Middle Ages, but as long as they remained small, the problems of water supply and drainage were small. However, this situation did not last; growing population, due to world travel and trade, the expansion of the mercantile economy, and the decline of the feudal lords, forced a congestion within the cities. With the increase of population and without any change in the water and sanitation systems, cities reverted to conditions inferior to the days of Rome, a thousand years before.

The invention of gunpowder in the fifteenth century marked the beginning of the end of the walled city. It increased the range of effective attack and forced the building of ramparts beyond the walls to extend the distance between the town and the attacking forces. Military engineering became an important phase in town building. Broad spaces were provided in the new plans to force the enemy into more distant positions for their cannon. The improvement of long range artillery in the eighteenth and nineteenth centuries further allowed alterations of the old city plans. The walls, moats, and ramparts were no longer effective. They were removed and replaced by boulevards and open spaces. This new conception of city planning gripped the city rulers and their designers. They desired more unconfined space. This led to plans symbolizing might and power; the centerline and axis were introduced, and formalism ruled. But
behind the fine facades of the plazas and wide avenues dwelt the congested urban population. The city still lacked sanitation, adequate sewers, water distribution, and drainage. The people to be housed were always a "left-over" in the urban plan.¹

Figure 8 illustrates the symbolizing power in the plan of Karlsruhe, a typical Baroque pattern.

Colonial expansion - America

In the fifteenth and sixteenth centuries courageous explorers extended colonial empires over the face of the globe. People were looking toward the new world in America where they could be relieved of oppression and chaos. With their new freedom, and without restrictions imposed in the medieval cities of Europe, these colonists could build freely and own land and possessions which they could not own in their homelands.

The initial settlement was sometimes irregular in plan. The Wall Street district in Manhattan retains the pattern of the early settlement of New Amsterdam about 1660, and Boston streets meander about the Common. But most of the towns were plotted in advance for the allocation of the land to settlers. The principal occupation was agriculture. The towns were small and the houses were within walking distance of the farm lands about them.

¹Ibid., pp. 40-49.
APARTMENT
EIGHTEENTH CENTURY
1 KITCHEN
2 DINING ROOM
3 LIVING ROOM
4 SLEEPING SPACE

THE CENTERLINE AND AXIS SYMBOLIZED THE MIGHTY POWER OF THE MONARCH.

BAROQUE

FIGURE B

SINGLE

DOUBLE

TYPICAL EARLY LOG CABINS
1 LIVING ROOM
2 SLEEPING SPACE
3 DINING ROOM
4 KITCHEN
5 BREEZE WAY

NEW AMSTERDAM
A WALL
B CANAL
C BROADWAY
D BATTERY
E EAST RIVER
F NORTH RIVER

THE DUTCH SETTLEMENT OF NEW AMSTERDAM WAS BUILT ON THE TIP OF WHAT IS NOW KNOWN AS MANHATTAN ISLAND. IT HAS THE MEDIEVAL STREET PLAN TYPICAL OF THE DUTCH TOWNS IN EUROPE.

COLONIAL
FIGURE 9
These new towns in America were quiet and modest, and the environment was one of beauty in simplicity. The town's center was the meeting house and the Common, and each family had its own dwelling.\(^1\)

The plan of New Amsterdam, sketched in Figure 9, illustrates the typical early American settlement.

The growth of American cities

A great change took place in America, however, from the seventeenth century to the middle of the nineteenth century. Due to the immigration of freedom-seeking people from Europe, the effects of the Revolutionary War, the development of the port cities, and the ever increasing needs for transportation and communications, the new cities were becoming congested just as the cities were in the old homeland. The planning that had been done in the early days proved to be insufficient for the new expansion. The original plans had made adequate space allotments for every settler, but with the continuous flow of people from the homelands, which necessitated further space requirements, revisions in their community scheme had to be adopted. Despite the new needs, however, once the city's plan was set, it remained fixed. Failure in providing adequately for the four basic needs - places to live, places to work, means of transportation,

\(^1\text{Ibid.},\ pp. \ 49-59.\)
RAPID AND UNPLANNED EXPANSION OF AMERICAN CITIES

EXPANSION

FIGURE 10
and facilities for recreation led to an unsatisfactory living environment. The result was that the buildings and the people living in them were overcrowded and congested. Most of the mistakes were the result of rapid, unforeseen, and uncontrolled growth.¹

The growth of four major American cities is shown in Figures 10a, 10b, 10c, and 10d.

SUMMARY

"Man has explored the earth and, after selecting the best locations, has built settlements in which to live and work. Many of these have grown into vast cities, usually because nature made them logical centers for commerce. Around these favored cities cluster many smaller cities and towns. Their people have common bonds of cultural and economic interests with their neighbors in the big city. All are part of one great community."²

Man has come a long way since the cave shelter; he has mastered many things. But neglected in spite of all the great inventions and cultural advances are great numbers of "left-over," poorly-housed people. Through all the years, man has been unable to adequately

¹Ibid., pp. 63-115.

house the entire mass of the population. This great problem of housing threatens the inner structure of civilization and the culture of the people.\(^1\)

\(^1\)Ibid., pp. 26–65.
PROBLEM

Because of the rapid, unplanned, and uncontrolled growth of our cities, blighted and slum areas have developed to a point where the evils that go with them can no longer be ignored.\(^1\) Every consideration of social and economic welfare points to the need for determined efforts and sound methods for their rehabilitation.\(^2\) In analyzing this situation, Henry Wright, pioneer American city planner and housing theorist, explains the growth of our cities with a series of rings, each representing the different stages in the development of the urban pattern. The sketches are shown in Figure 11.

"In 1840, when the industrial era began, only 10.8 per cent of the American people lived in urban communities, and 39.2 per cent lived in rural areas."\(^3\) Today over 65 per cent of the

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\(^{1}\)A blighted area is one existing in a pattern of obsolete and deteriorated structures. With these develop overcrowding of people in dwellings, a lack of open space, and a general lack of amenities, which together become a social and economic liability to the community. A slum is an area in an advanced stage of blight, where dwellings are unfit for human habitation. The delinquency, crime and disease, and the social and economic liabilities in a slum so greatly outweigh assets that all hope for rehabilitation is usually lost.


"Rings of city growth; the typical spread of modern American cities, with increasing areas of blight and slum. First, the primitive city; next, concentric expansion; third, arrested growth at the center due to vertical expansion; and last, shrinkage of central areas, augmented by lessened space needs of machinery." (Source: Henry Wright, Rehousing Urban America.)
American people live in urban areas, and the present trends clearly indicate substantial further urbanization. "This great transformation from an almost purely rural to a predominantly urban nation has been due to rapid industrialization. Since the harnessing of steam and electrical energy, there has seemed to be no end to new inventions, discoveries, and applications of technology to industry and commerce. The internal combustion engine, the use of steel and concrete in the construction of tall buildings, the use of electrically operated elevators, the automobile and the airplane are but a few of the many factors responsible for the extent and form of urbanization."¹

W. E. Reynolds, Commissioner of Public Buildings, made the following statement regarding urban blight and slums before the Public Buildings and Grounds Committee of the House of Representatives in 1944:

"Due to neglect, greed, lack of interest in, and knowledge of, city building, and other causes, our cities have disintegrated until today urban blight and slums, next to the war, constitute the greatest social and economic problem which confronts the American people.

"There is grave danger that devastating blight may envelop entire urban areas. Serious blight has already overtaken approximately one-fifth of the residential area of large urban communities. Unless this tendency is checked, entire urban areas may soon disintegrate to such an extent that the resulting inferior environment will either cause serious

¹Ibid., 1-2.
social disintegration, force the scrapping of billions of dollars' worth of urban property values, or both.\[1\]

Life in blighted areas becomes more and more wretched and intolerable. The health, safety, and morals of millions of Americans are being seriously affected by sub-standard housing, smoke, noise, vermin, dangers, confusion, and sordidness of such areas.\[2\]

It is difficult to distinguish between the causes and results of urban blight and slums, but with the understanding that early defects are aggravating causes of blight - just as the blemish of an apple causes decay which soon destroys the entire apple - the causes of blight and slums can be summarized as follows:

1. Faulty city pattern; poor land subdivision and street pattern.
2. In appropriate land use pattern, such as areas that should be commercial or industrial devoted to residential use, or vice versa; areas subject to floods devoted to residence or other inappropriate uses.
3. High degree of non-conformance. Jumbling of all sorts of uses, including nuisances and illegal uses in single neighborhoods.

\[1\] Ibid., p. 4.
\[2\] Ibid.
4. Lack of appropriate regulatory measures. Lack of or faulty zoning, housing and building regulations, and lack of enforcement of sound regulatory measures.

5. Vertical expansion of business and industry and decentralization made many early zoning ordinances look ridiculous and defeated the speculative hopes of owners of property close-in to central business districts. Erroneous anticipations tended to frustrate appropriate development and rebuilding.

6. Lack of appropriate insulation or protection of residential neighborhoods from inharmonious uses and activities, and lack of planned neighborhood environment.

7. Lack of control or plan to avoid development of shanty-town and squatter colonies in outer fringe areas - jerry-built houses on ridiculously small lots.

8. Marked discrepancy between owner's idea of the value of his property and actual value for any appropriate use.

9. Unwarranted anticipation of a higher use which results in lack of repair and maintenance of existing improvements.
10. Decentralization: People in higher and middle social and economic strata move out to more open areas, leaving only the poor and the weak in the blighted areas.

11. Poverty: Since remaining tenants are unable to pay high rents, owners build another house on the rear of the lot and perhaps one or two between the rear and front dwellings. Moreover, since poverty is one of the causes of blight and slums, the national economy is in some measure responsible for these deplorable urban conditions.

12. Depletion of already inadequate open spaces forces children and adults into streets, alleys, and dens.

13. Lower income from rents results not only in overcrowding of dwellings, and also in less and less maintenance of buildings.

14. Racial and nationality differences, irritations, and prejudices force shifts of population which tend to repeat.

15. Some tenants lack ambition and initiative to improve conditions and they also generally lack civic interest and wholesome neighborhood spirit. Delinquency, vice and low forms of amusement too often
appeal to, rather than offend such individuals.
Such attitudes help to cause neighborhood degeneration and disintegration.

16. Fear of what neighbors might do with their property has prevented many owners from making desirable improvements.

17. Liberal policies of local governments with respect to extension of facilities and provision of more ample recreation facilities in outlying areas caused people to move out to the new and neglect the older urban areas. More convenient transportation and many other factors facilitated this movement of people to new areas.

18. Dilapidation and decay of structures due to age, neglect and faulty construction.

19. Smoke, soot, noise, danger, congestion, lack of sanitation and general lack of amenities.

20. High taxes and the unwillingness of both public officials and property owners to adjust inflated assessments and values to realities. The narrow tax base for local government, is in a large measure responsible for unreasonably high real estate taxes.
21. Public and private neglect of decadent areas
which are no longer able to pay their share of
community costs. ¹

Figure 12 demonstrates the extent that blighted areas are
encroaching upon our cities. The cities of Boston and New York
are used as examples.

Figure 13 illustrates a neighborhood that "just grew." The
lack of planning proves to be a detriment to our cities.

The world is still faced with the most challenging task of
reconstruction in human history. In our country the depression
of the 30's and the World War of the 40's have produced a housing
shortage such as we have never known. It is estimated that in the
United States we must build around a million-and-a-half new homes
a year for fifteen years to compensate for the past interruptions
in home construction and to take care of new families, to balance
losses from fires, demolition and obsolescence, and to clear our
slums.

This problem is a challenge. It offers an opportunity to build
up, to protect, and to save the social and economic structure of
American life from the city slum and rural shack that threaten the
physical and emotional health of their occupants. ²

¹Ibid., pp. 6-9.

²Committee on the Hygiene of Housing of the American
Public Health Association, Planning the Neighborhood (Chicago:
THE DARK AREAS INDICATE THE EXTENT OF BLIGHTED AREAS IN THE PARTICULAR CITIES SHOWN ABOVE. THESE TWO CITIES SERVE AS EXAMPLES OF THE UNCONTROLLED PROBLEM OF AMERICAN CITIES TODAY.

BLIGHTED CITIES

FIGURE 12
A NEIGHBORHOOD THAT "JUST GREW"

EVERY INTERSECTION IS A POTENTIAL ACCIDENT SCENE. ONCE A QUIET RESIDENTIAL STREET — TODAY A TRAFFIC ARTERY CONNECTING THE NORTHERN AND SOUTHERN PARTS OF THE CITY. THERE IS NO ADEQUATE PLAYGROUND, AND TO REACH THE SCHOOL, HEAVILY TRAVELED STREETS HAVE TO BE CROSSED.

TYPICAL NEIGHBORHOOD

FIGURE 13
SUMMARY

Because of uncontrolled growth of our cities, blighted areas have developed to a point where millions of people are exposed to crime, disease, filth, fire and other hazards which make decent living impossible. To prevent the spread of blight to new areas, and to save urban people from social and economic ruin, urban areas must be replanned and redeveloped.
SOLUTION

Before any attempt is made to interpret or explain any one solution to the problem of adequately housing all people, it must be understood that there is no one solution that answers all the problems faced by the unhoused. There are many proposals and ideas for rehabilitating the blighted and slum areas, but there has not yet been any discovery of one solution that answers all the needs. Actually there may never be a solution to the problem because the problem is not static. The problem is ever increasing and moving about; by the time one slum area has been condemned, cleared, and then rehabilitated, there is another area with similar problems to be redeveloped. However, it is not assumed that it is a vain attempt to continue with redevelopment programs and projects. Such an assumption would be unwise, for man has worked steadily for thousands of years to improve his living conditions. For the last two hundred years tremendous changes have taken place: rutted muddy streets have given way to smooth asphalt and concrete, the whale oil lantern has been replaced by electric lights, and the stagecoach which yielded to the railroad is today supplemented by streamlined buses and airplanes. Progress is an endless matter — we cannot afford to stop and be satisfied with what we already have, for that would be closing our minds and hearts to what can be. Our task is to plan always for the future, and by the inquisitiveness and daring of our
thinking, to strive to make ourselves and our cities equal to their destination. "Daniel Burnham, farsighted architect and master designer of the Plan of Chicago, wrote:

'Make no little plans. They have no magic to stir man's blood and probably themselves will not be realized. Make big plans. Aim high in hope and work, remembering that a noble, logical diagram once recorded will never die, but long after we are gone will be a living thing asserting itself with ever growing insistency.'

An interesting attempt to solve the problem as far back as the year 1898 was made by Sir Ebenezer Howard, British social critic, when he wrote the famous book, *Tomorrow*, which was later revised in 1902 and named *Garden Cities of Tomorrow*. The first diagram he used in his book is illustrated in Figure 14.

To help make the forthcoming discussion clearer, the terms region, city, community, and neighborhood will be designated to have the following meanings: a region is a continuous area, determined by a variety of natural and man-made components, which is convenient for planning or administration for specified purposes. It requires a group of people with certain homogeneous attitudes, desires, and wants. The boundaries of a region cannot be precisely and permanently marked. Its extent depends on variables that are constantly changing. The size of a region can be of any magnitude in area and population, and it may include several cities

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1Theodore T. McCrosky and others, *op. cit.*, p. 27.
TOWN - COUNTRY

FREEDOM, CO-OPERATION,
BRIGHT HOMES AND GARDENS, NO SNORE, NO SLUMS,
PURE AIR AND WATER, GOOD DRAINAGE,
FIELD FOR ENTERPRISE, FLOW OF CAPITAL,
LOW PRICES, NO SWEATING,
LOW RATES, PLENTY TO DO,
LOW RENTS, HIGH WAGES,
FIELDS AND PARKS OF EASY ACCESS,
BEAUTY OF NATURE, SOCIAL OPPORTUNITY.

CLOSING OUT OF NATURE,
SOCIAL OPPORTUNITY,
ISOLATION OF CROWDS,
PLACES OF AMUSEMENT,
DISTANCE FROM WORK,
HIGH HOURLY WAGES,
HIGH RENTS AND PRICES,
CHANCES OF EMPLOYMENT,
EXCESSIVE HOURS,
ARMY OF UNEMPLOYED,
FOGS AND DROUGHTS,
COSTLY DRAINAGE,
FOUL AIR, MURKY SKY,
WELL-LIT STREETS,
SLUMS AND GIN PALACES,
PALATIAL EDIFICES.

THE PEOPLE WHERE WILL THEY GO?

LACK OF SOCIETY,
BEAUTY OF NATURE,
HANDS OUT OF WORK,
LAND LYING IDLE,
TRESPASSERS BEWARE,
WOOD, MEADOW, FOREST,
LONG HOURS, LOW WAGES,
FRESH AIR, LOW RENTS,
LACK OF DRAINAGE,
ABUNDANCE OF WATER,
LACK OF AMUSEMENT,
BRIGHT SUNSHINE,
NO PUBLIC SPIRIT,
NEED FOR REFORM,
CROWDED DWELLINGS,
DESERTED VILLAGES.

TOWN COUNTRY

THE THREE MAGNETS

FIGURE 14

(SOURCE: LEWIS HUMFORD, "AN AMERICAN INTRODUCTION TO SIR EBENEZER HOWARD'S, GARDEN CITIES OF TOMORROW")
and towns.\(^1\) Figures 15a and 15b show various criteria as bases for regional boundaries. A city is an area which is located in the confines of the region and where there is a concentration of people and buildings intended to house the functions of dwelling, recreation, work, and having transportation and communication facilities linking it with other cities and towns which are both within and without the immediate region. Briefly, a city is a political, social, cultural, economic, and physical entity. A first class city in Virginia is recognized as having a population of over 10,000 people. Figure 16 illustrates the development of the city plan. A community is an area determined by the physical location and arrangement of several contiguous neighborhoods within the city where the essential organs contribute to the health, education, recreation, and comfort of the inhabitants. Figure 17 shows a schematic diagram of a community. A neighborhood is an area within which residents may all share the common services, social activities and facilities required in the vicinity of the dwelling." It is "a unit which will permit organization of physical surroundings to eliminate the inconveniences and hazards, and which will provide a physical form suitable for the full development of community life."\(^2\)


\(^2\)Committee on the Hygiene of Housing of the American Public Health Association, op. cit., p. 1.

\(^3\)Ibid.
A. Major living zones are shown enclosed within the boundary lines.

**A. Influenced by Climatic Conditions**
- Temperate climate: Favorable to Western Civilization
- Tropical climate: More primitive cultures

**Persons per Square Mile**
- Over 250
- 25 to 125
- 125 to 250
- Under 25

**B. Conceived by Administrators**
(Source: Lewis Mumford, *The Culture of Cities*)

**C. Determined by Metropolitan Areas**

**Regional Boundaries**

(Source: Directive Committee on Regional Planning, The Case for Regional Planning)

**Figure 15**

B. Boundaries designated for administrators' convenience are as arbitrary as the historic divisions between the states.

C. The sphere of newspaper circulation may indicate the range of influence exerted by the metropolitan area.
THE CITY PLAN

SOURCE: SPRINGFIELD PLANNING BOARD, A CITY PLAN FOR SPRINGFIELD, MASSACHUSETTS

FIGURE 16
"The neighborhood is the natural basic planning unit which permits the greatest economy and freedom in the layout of blocks, streets, shopping centers, schools, recreation spaces, houses. It centers around communal interests, whose focal point is the elementary school. Ultimate size of each neighborhood may be measured by the number of families whose children will fill an efficiently-run school. Each neighborhood requires well-defined borders to preserve and protect its unity and special character. Topographical limits or planted areas may determine these."

Figure 18

1. Shops
2. School
3. High school community center
4. Commercial area

"The community is composed of one or more neighborhoods separated by open green spaces, but bound together by secondary roads. The development of a community requires common interests vital to residents. Size depends primarily on predominate interest or need—usually high school community center—and on the most workable and economical organization for that function."

Figure 17

(Source: Marcel Villanueva, Planning Neighborhood Shopping Centers)
In this thesis it is assumed that for planning purposes the extent of the neighborhood will be determined by the service area of an elementary school. The neighborhood is the smallest geographic and integrated planning unit for city development. Figure 18 illustrates a schematic plan of a neighborhood.

In designing the neighborhood it must be recognized that if a high degree of harmony and organic unity is desired within the neighborhood, then all the features of the neighborhood unit, among all the neighborhoods of all the communities and municipalities, unincorporated urbanized areas, and potential urban areas, which together constitute a metropolitan area, must be harmoniously and entirely integrated to produce an organic entity that is capable of satisfying the needs of the people within its boundaries. Obviously, the extent of the metropolitan area cannot logically stop at arbitrary or illogical municipal boundary lines. Plans for the metropolitan area must, therefore, be coordinated with the existing and proposed development of the region, the state, and the nation.¹

Regional, state, and national policies, plans, programs, and projects have an important effect on the physical and social structure of urban areas. For example, highway, railroad, water and air transportation facilities perform regional, state- and nation-wide functions; and their location, size, and design depend more on

¹Sanders and Rabuck, op. cit., p. 22.
these factors than on purely local situations. Police protection facilities also exemplify a planning problem that cuts across political boundary lines. The same applies to health protection, fire protection, sewerage, water supply, and educational facilities. Artificial boundary lines mean nothing to these groups.

The solution to important utility problems should be approached on a metropolitan basis, without regard to political boundary lines. This should be practiced especially for rapid transit lines, high-speed interurban train service, motor-bus routes, telephone, electric light and power and gas services, and the collection and disposal of garbage and refuse. Recreation areas and facilities are also more effective when planned on a metropolitan basis because of their important relation to topography.

Law-enforcing departments in too many cases are unorganized simply because there is no cooperation among the separate political units. It has been known that organized criminal gangs have planned their activities with a view of taking maximum advantage of the lack of integration of the police departments of adjoining local political areas.

"Unnecessary duplication of facilities, lack of adequate facilities, inconvenience and inefficiency in municipal administration can be avoided by having an organized and a complete integration of all the local governments within the metropolitan areas."¹

¹Ibid., p. 25.
The discussion up to this point has proven to be a regional problem and not one of merely local considerations. It must be realized that planning objectives for urban rehabilitation must be resolved through rational studies of the smaller elements (the neighborhood and the community) and be established and used as a guide for the preparation of broad, over-all master plan for the future physical development of the whole region. Through these means, a stable and productive nation may be established.

In making the study of the neighborhood unit, it should be understood that the combined effect of each of the elements - the dwellings, the community facilities and services, and the circulation scheme - must be integrally related. The Committee on the Hygiene of Housing of the American Public Health Association grouped the principal categories of these elements in its 1948 report as follows:

"Residential facilities: buildings and land devoted exclusively to dwelling and directly accessory uses. These include houses and the immediately surrounding space for gardens, drying yards, driveways, garages, etc.

"Neighborhood community facilities: educational, social, cultural, recreational and shopping facilities used in common by families in the neighborhood. The common characteristic of these facilities is that they are used by one member or more of the normal family almost every day.

"Utilities and services: water supply, light and fuel supply, telephone, storm water and sewage disposal, other waste disposal, fire protection and police service."
"Circulation: all the installations required for the surface transportation of persons and goods to and from the dwellings and between dwellings and community facilities. These elements consist primarily of walks for pedestrians and streets for private and public transportation. They include related elements such as parking space, traffic controls and circulation lighting."¹

"The size of a neighborhood is governed by the area required for all its land use components; by the population required to support necessary community facilities and services; by the accessibility of such facilities and by the existence of suitable physical boundaries. Because the neighborhood requires the service of an elementary school, and because other required facilities can be supported by a population even smaller than that for the school, the area and population which can be served by an elementary school form a reasonable basis for the size of the neighborhood . . . . On this basis, neighborhood population will usually fall between 2,000 and 8,000 persons, with a desirable size of about 5,000 persons."²

Careful study has shown that the geographic extent of an urban neighborhood should be limited by accessibility to the school and that a normal neighborhood will range from 50 to 250 acres. In a high density development where the neighborhood area would be about 125 acres, the distance between dwelling and

¹Committee on the Hygiene of Housing of the American Public Health Association, op. cit., p. 2.

²Ibid.
school should be \( \frac{1}{4} \) mile, and the walking distance between
dwelling and a centrally located school within 500 acres should
be \( \frac{1}{2} \) mile.\(^1\)

Boundaries for a neighborhood are often more significant in de-
determining the actual area than considerations of population or over-
all dimensions. Natural boundaries, such as rivers and topographic
barriers, will frequently delimit neighborhoods. Traffic arteries,
parkways, or railroads will also act as boundaries. Other border
forming elements are industrial areas, commercial districts, and
landscaped parks. The boundaries of development areas should be
selected so that physical barriers do not separate its parts and
prevent its proper functioning. The planning should be related to
the whole city and especially to the bordering districts.\(^2\)

Keeping harmony with the city of which a proposed neighbor-
hood area forms a part is not merely physical but includes rela-
tions on the administrative level. Existing zoning regulations
must be recognized. Satisfactory provision, maintenance, and
operation of all public facilities essential to health and wel-
fare must be insured by the local government. A master plan must
be provided to guide the general development of the district with
which the neighborhood should be integrated.\(^3\)

\(^1\)Ibid.
\(^2\)Ibid., p. 3.
\(^3\)Ibid.
Family size and composition are determining factors in numerous planning decisions. Not only must dwelling types be selected to fit the different sizes and types of families but playgrounds, schools, and other community facilities serving specific age groups must be planned in relation to a known or assumed age distribution. Because of birth and death rates and the aging process, there are no absolutes for these figures.

The assumed family size and age distribution of children given in Table 1 represent normal nation-wide urban conditions. These figures are statistical concepts, tools accurate only for a substantial number of families.¹

The following outline for planning a neighborhood, prepared by the Committee on the Hygiene of Housing of the American Public Health Association (1948), may be used as a proposal to solve a typical housing problem based upon the needs of a healthful, comfortable, and safe environment for proper development of the people:

I. Site selection

II. Development of land, utilities, and services

III. Planning for residential facilities

IV. Provision of neighborhood community facilities

V. Layout for vehicular and pedestrian circulation

¹Tbid.
### TABLE 1. ASSUMED FAMILY SIZE AND AGE DISTRIBUTION: SELECTED DATA

| 1) Average Size of Family<sup>a</sup> | ................. | 3.6 Persons |
| 2) Age Distribution of Children Served by Neighborhood Schools and Play Areas | Children per 1,000 Persons | Children per Family |
| **Children by School Age Groups** | | |
| Nursery School | | |
| 2<sup>1/2</sup> through 4 years | 37.5 | .14 |
| Kindergarten | | |
| 5 years | 15.0 | .05 |
| Six-Grade Elementary School | | |
| 6 through 11 years | 90.0 | .32 |
| Eight-Grade Elementary School | | |
| 6 through 13 years | 120.0 | .43 |
| **Children by Play Age Groups** | | |
| Playlot | | |
| 2<sup>1/2</sup> through 5 years | 52.5 | .19 |
| Playground | | |
| 6 through 13 years | 120.0 | .43 |

<sup>a</sup>Assumed family size is equal to the total urban population (1940 U. S. Census) divided by total urban families.
The recommendations of the Committee are summarized below, either paraphrased or quoted, and major headings of the report are used for clarity; the tables, too, are from this report and superfluous footnotes in the tables have been deleted.

SITE SELECTION

Importance of site selection

The success or failure of a neighborhood development depends on the selection of a site, and for this reason site selection assumes critical importance. "The perfect site seldom exists. Judgment must be made . . . as to conditions which wholly preclude satisfactory development . . . and to those site defects which can be brought within satisfactory limits or . . . be accepted as minor but necessary evils."

"Essential Physical Characteristics of the Site"

"Soil and subsoil conditions must be suitable for excavation and site preparation, location of utility connections and for grading and planting."

Water tables must be low enough to protect against basement flooding and interference with sewerage. Swamps and marshes must be absent. Sufficient slope to permit surface drainage of normal rainfall and free flow of sanitary sewers must be present.

"The . . . area should be free from danger of surface flooding by streams, lakes or tidal waters . . . . Ideally, no land should
be included in a development area which has been flooded at any
time of record, unless flood control measures have subsequently
removed the danger."

"Land should not be too steep for satisfactory grading in
relation to dwelling construction."

"Topography should permit adequate vehicular and pedestrian
access to, and circulation within, the development area."

"Land to be reserved for private yards, gardens, playlots,
playgrounds, and neighborhood parks should permit adequate grad-
ing and development . . . ."

"The development area should be free from . . . topographic
conditions which might be a serious cause of bodily accidents."

"Availability of Sanitary and Protective Services"

Water of safe quality must be available in each dwelling
under pressure, and the general supply must be adequate in
amount to provide for fire fighting and other special needs.

Every residence should be connected to a public sewerage
system of sufficient capacity.

The site must have facilities for the effective removal from
the neighborhood of domestic wastes, notably garbage, and of in-
flammable and noncombustible rubbish.

Telephone service and electricity are essential in every
dwelling, but since these services can usually be extended to
any development, provision for the services seldom offers a serious problem. Gas is not considered as an essential utility.

Feasibility of fire and police protection is little affected by location, but they may involve special costs in an isolated neighborhood.

"Freedom from Local Hazards and Nuisances"

"The site should be entirely free from grave hazards to life or health, and as free as possible from minor hazards and nuisances."

"Major accident hazards are collision with moving vehicles, fire and explosion, falls and drowning." It is desirable both for safety and noise protection to avoid housing construction on sites adjacent to heavy street traffic or railroads, airports, bulk storage oil, rifle ranges, dumps, unprotected bodies of water, certain industries, junk yards and so on.

Housing should not be located on sites where excessive and uncontrollable noise regularly occurs, especially at night. Street noise should be considered not only as to volume of traffic but as to traffic congestion, steep hills, or stop-intersections that necessitate gear shifting, braking, or use of horns. Steady noises of moderate intensity, such as those of a highway or major traffic street, can sometimes be brought within tolerable limits
by barrier planting or deep setbacks of dwellings from the source.

The site should be free of odors, smoke, and dust. The most common sources of these nuisances are industrial plants, refuse dumps, streams polluted by sewage, farm animals, fumes from heavy motor traffic, and from coal-burning railroads.

Housing areas should be located outside the range of any substantial breeding places for rodents and insects and of any sizable deposits of refuse which might contribute to the spread of fly-borne or rodent-borne disease.

"Housing areas should not be located so close to an area containing numerous moral hazards that children will be continuously exposed to their influence. The proper distance from such establishments will depend on their type, number and concentration, and whether they lie in the direction of normal pedestrian traffic."

"Access to Community Facilities Outside the Neighborhood"

Certain of the facilities regularly needed by the residents of a neighborhood such as centers of employment, high school, major shopping centers, specialized health services and similar features are to be found in the larger district or city. A tract of land may be definitely unsuitable for residential development if travel to these facilities would entail excessive time, cost
or fatigue. Considerations on the availability of transportation and standards of access to these facilities are as follows:

1. "Automobile Transportation": All residents of the neighborhood should have access to an improved highway system. The convenience and safety of automobile transportation depend on such factors as availability of high speed roads, avoidance of heavy traffic, minimum number of traffic lights and intersections, directness of route, and ease of parking at the destination.

2. "Public Transit": All residents should be no more than 1/4 to 1/3 mile walking distance from the nearest stop of the transit system over well-maintained, lighted, all-weather walks.

3. "Pedestrian and Bicycle Ways": Safe, all-weather walks with protection at major traffic crossings should be provided between the neighborhood and outside community facilities. Paved streets other than major traffic routes are needed by cyclists.

4. "Standards of Accessibility": Standards for access to the major community facilities as suggested in Table 2 may be used as a general guide in site selection.
### TABLE 2. ACCESS STANDARDS FOR COMMUNITY FACILITIES OUTSIDE THE NEIGHBORHOOD

<table>
<thead>
<tr>
<th>District of City Facility</th>
<th>Maximum Desirable Distance or Time (One Way) from Farthest Dwelling</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A Walking: Total Distance</td>
</tr>
<tr>
<td>Secondary School</td>
<td></td>
</tr>
<tr>
<td>Junior High ............</td>
<td>3/4 to 1 mile, or 15 to 25 minutes by public or special transit, without cost to pupils</td>
</tr>
<tr>
<td>Senior High .............</td>
<td>1 to 1 1/2 miles, or 20 to 30 minutes with 1¢ maximum daily fare</td>
</tr>
<tr>
<td>District Center: Shopping, Culture, Religious Worship, Recreation .......</td>
<td>1 to 1/2 miles, or 20 to 30 minutes with 10¢ maximum trip fare</td>
</tr>
<tr>
<td>Employment Centers ......</td>
<td>No standard: B governs 20 to 30 minutes</td>
</tr>
<tr>
<td>Urban Center: Commerce, Culture, Government ... No standard: B governs 30 to 45 minutes</td>
<td></td>
</tr>
<tr>
<td>Outdoor Recreation</td>
<td>No standard: B governs 30 to 60 minutes</td>
</tr>
<tr>
<td>Major Park ..............</td>
<td>1 to 1/2 miles No standard: A governs</td>
</tr>
<tr>
<td>Athletic Playfield .......</td>
<td>Should be available in district or urban center</td>
</tr>
<tr>
<td>Health Services ..........</td>
<td>Should be available in district or urban center</td>
</tr>
</tbody>
</table>
"Essential City and District Facilities"

The following are essential and should be available to the neighborhood site:

1. "Secondary School": "Local school authorities should be consulted to determine whether existing high schools can accommodate the anticipated student body . . . ."

2. "District Center": This includes shopping centers and provisions for indoor recreation, social, cultural, and religious facilities. This center would be located midway between main urban centers and neighborhood centers.

3. "Urban Center": "Facilities belonging generally to the town, city or metropolitan region include commercial centers . . . ; cultural, medical, and entertainment centers; and the departments of government."

4. "Employment Centers": "These may coincide with urban centers or they may be separate concentrations of industry or business such as a factory, wholesale or waterfront district. The adequacy of employment opportunities is an important consideration in site selection."

5. "Outdoor Recreation": "In addition to parks and playgrounds of the neighborhood, residents should have
access to a wider range of outdoor recreational facilities, such as are provided by major city parks and athletic playfields." They are picnicking and camping areas, bridle paths, swimming and boating facilities, horticultural garden, natural areas, zoo and observatory.

6. "Health Services": "Residents should have convenient access at the city or district level to public health services, to practicing physicians and dentists and to general hospital facilities."

DEVELOPMENT OF LAND, UTILITIES AND SERVICES

"General Considerations"

Besides the treatment of surfaces to prevent accident hazards, the development of land for modern living involves also the provision of subsurface and above-ground utilities. "No development area can be considered healthful unless its land is so developed as to eliminate inherent hazards and unless utilities are provided or space is left for their ultimate installation.

"The entire question of utility development must be settled, at least in general terms, at the time of site selection, in order that insoluble problems or needless expense shall not arise later to plague the developer or the families housed." This
problem of utility layout is a highly technical one. It must be solved by experienced engineers at the outset of development, and the work of architects and other professionals must be coordinated at all stages. "Climate and local soil conditions will have far-reaching effects on land development and utility layout." Such problems as flash floods and icing of power lines and so on require extraordinary provisions which the nonspecialist would fail to consider at the planning stage.

"Grading and Surface Drainage"

"Proper grading and drainage of the site are essential to health and safety. Stagnant pools, swamps and marshes are often breeding places for mosquitoes . . . and also are accident hazards, especially for small children.

"Unless storm water is effectively drained from the site, it may flood basements or cellars, damage buildings, inundate roads, walks or recreation areas, disrupt utilities and essential services and cause washouts or landslides. Accumulations of storm water may also interfere with domestic sewage disposal.

"As an adjunct of grading and drainage, the planting of adequate ground cover, shrubs and trees has a significant effect on soil stabilization, erosion control and runoff of rain water. Expanses of dirt may be a serious source of dust unless held in place by grass or other ground cover. Planting is usually the
cheapest and most practical means of preventing erosion or landslides on steep slopes. Generous use of planting, particularly shrubs and ground cover, increases the absorption of storm water."

"Water Supply"

Many diseases are water-borne. For this reason, serious health hazards are associated with contaminated water supplies. It is essential in healthful housing that an adequate supply of safe and potable water, delivered under pressure within the dwellings, be provided.

"Ideally, every building site should have connection to a water supply operated under public supervision." Where connection to a public supply is not possible, provision must be made for the development of an on-site community supply or for the installation of individual wells. In case an on-site supply is planned, integral provision must be made for its maintenance, for failure to plan in advance for upkeep may result in disaster.

"Sewage Disposal"

Collection of sewage from all dwellings and nonresidential structures on the site is an important program. Disposal of sewage may be accomplished by the following means:

"a) discharge to an existing public sewerage system;

b) treatment in a community disposal plant;

c) treatment in individual septic tanks with disposal by absorption field or leaching pit."
Portions of development areas which cannot provide an adequate sewage system should be excluded from use for building. However, these areas may be developed for recreation or other purposes.

The spread of typhoid fever and other intestinal infections can be caused by improper disposal of sewage. To prevent this, every respect should be given to health requirements.

"Removal of Refuse"

Refuse (solid wastes) are usually classified as follows:

a) garbage: kitchen wastes consisting of animal and vegetable matter:

b) combustible rubbish: paper, rags, cartons, floor sweepings, etc. - also tree branches, grass cuttings, leaves, etc.;

c) noncombustible rubbish: metals (cans), glass (bottles), crockery, ashes."

"Poorly handled refuse affects the neatness, cleanliness and appearance of the development. Adequate provision should be made for the storage, collection . . . of garbage and other wastes so that there will be no resultant nuisance or health hazard, and so that breeding places of rodents and insects are not created."

Refuse should be controlled by the provision and proper location of suitable receptacles in public areas, including playgrounds
and parks, and any other place where they will offer maximum service.

"Power, Fuel and Communications"

Electricity is such an essential utility that it is most desirable to have the advice of experienced utility engineers during the planning stage in order to avoid safety hazards due to poorly designed electrical systems.

Gas mains should be designed in such a way that it would be possible to control hazards of gas poisoning or explosions that result from cracked or broken mains.

A telephone in each dwelling is desirable but not essential. It is important, however, that a telephone system be installed for each site development in which there are more than ten families. On all project sites public telephones should be located at convenient places.

"Planting and Landscape Design"

"If housing environment is to create a pleasant atmosphere and to give a feeling of satisfaction, the appearance of residential areas cannot be considered satisfactory unless there is some growing plant life visible from all dwellings. This is not only an aesthetic consideration but a basic psychological need."
"... planting can often help in reducing the level of noise to which residents are subject, in blocking access to streets at points of danger, in the visual screening of objectionable structures ... , in controlling glare of the sun," and in many other useful means.

"Tree roots are a frequent cause of damage to subsurface utilities, and may also play havoc with paved surfaces. Care should be exercised in planting so that these hazards will be controlled to the greatest possible degree."

PLANNING FOR RESIDENTIAL FACILITIES

"General Considerations"

"Residential facilities are the structures and immediately adjoining land devoted to residential and directly accessory services."

Governing factors in residential site planning depend on the provision for:

"a) light and air in the buildings
b) protection against noise
c) outdoor space for daily family needs
d) safety from accidents and fire

The criteria for the selection of dwelling types, the requirements for site design, and the density of residential development
may better be discussed first by classifying the principal dwelling types. They are

"A. By Number of Dwelling Units in Structure"

One-family. A single dwelling unit occupies the structure from ground to roof, with independent access, services and use of land.

Two-family. Two units comprise the structure; one above the other. Independent access and services are widely associated with this type; land is generally but not always used in common.

Multi-family. Three or more units occur in one structure, usually with common access, services and use of land. The height of multi-family dwellings is usually three stories or more.

B. By Physical Relation of Structures

The types above may be built in any of the following forms:

Detached. Each structure has open space on all four sides.

Semidetached. One wall of each structure is a party wall in common with an adjoining structure.

Attached (group or row). Both side walls of all except end structures are party walls."

"Dwelling types selected for a development influence the site plan through their effect upon density and coverage, and through their effect on the allocation of land for private use and on methods of servicing and maintenance . . . . The advantages of various dwellings should be weighed in relation to their suitability for family life and good site planning practice."
The presence or absence of common services, the type of structure, and the height of buildings, as well as density calculations, greatly affect the planning of the site.

"Criteria for Selection of Dwelling Types"

"The range of dwelling types for an entire neighborhood should provide for a normal cross section of the population." Failure to provide a reasonable variety of dwelling types will contribute much to costly and undesired mobility of urban families. Sufficient numbers of dwellings must be provided to house the normal numbers of large families, households with dependent aged members, childless couples, and single persons. A table such as the U. S. Census data for the urban population in 1940, may be used to analyze the size and composition of families when preparing plans to house the population.

The classification of urban households are as follows:

"Per cent

34.8 Families with minor children and without adult relatives or other outsiders;
17.3 Families with minor children and with adult relatives or outsiders;
13.5 Couples of child-bearing age but without children;
 6.2 Couples beyond (presumptive) child-bearing age;
 8.6 Single adults;
19.6 Other households: two or more adults related of unrelated (except couples), couples with adult relatives and other outsiders."
"Dwelling types should be selected with due regard to topography and subsoil conditions of the site. Row houses will ordinarily parallel contours of the site, to avoid costly breaks in floor levels, but where lot cost is not of prime importance row houses at right angles to moderately sloping ground will produce pleasing effects."

"Site Design Requirements"

"Effective residential site planning requires placement of buildings on the site in such a way that each dwelling will be provided with usable outdoor space for daily family needs and that both interior and exterior living space will have satisfactory daylight, sunlight, air circulation, quiet and safety."

Elements of nature, entirely beyond the control of man, act as fixed factors which in a large degree set the requirements of site design. These are the trajectory of the sun, direction and velocity of winds, and generate climate. Included with these are the physical characteristics fixed by site selection, such as ground slope and the presence of off-site noise sources or obstructions to light or air movement. Dwelling type selection also plays a large part in determining site planning requirements.

Conflicts may arise between the treatments desirable for two or more factors under consideration. "For instance, desirable
orientation of dwellings for sunlight may conflict with orientation for summer breezes for dissipation of noise. Factors most important for comfort and livability under the given circumstances must be determined for each particular situation. Generally, the requirements for sunlight and for usable ground area will be the controlling factors in the site plan. These requirements are important because they set the basis for determining residential densities.

"Density of Residential Development"

"The importance of density measurements as a planning tool arises from the fact that densities reflect with a certain degree of accuracy important characteristics of site planning. Densities show the crowding of people and structures on the land and the amount of open space available to the families. For example, the per cent of land covered by buildings reflects in general the amount of open space available for gardens, children's play, outdoor living, the drying of laundry and the like."

"The intensity of land use should not be so great as to cause congestion of buildings or to preclude the amenities of good housing. Specifically, densities should be limited to provide:
a) adequate daylight, sunlight, air and usable open space for all dwellings . . . .
b) adequate space for all community facilities;
c) a general feeling of openness and privacy."

"The intensity of residential use can be expressed by different types of density calculations, showing mathematical relationships between the area of a given piece of land and the population load or building bulk. Area measurements are usually given in acres, population load as number of persons or families, and building bulk in terms of ground area covered or total floor area."

The types of density measurements are as follows:

"Net Dwelling Density: the number of dwelling units per acre of net residential land (land devoted to residential buildings and accessory uses on the same lots, such as informal open space, drives and service areas, but excluding land for streets, public parking, playgrounds and nonresidential buildings)."

"Building Coverage: the proportion of net or gross residential land taken up by buildings."

"Building Bulk (floor area ratio): the total floor area of all stories used for residential purposes, divided by the area of residential land."

Residential densities alone are not an adequate measure of land use in the neighborhood as a whole. Requirements that may be met in terms of residential densities may not be adequate for
schools, playgrounds, streets or other community facilities. Disregard for all the neighborhood elements will lead to serious land crowding.

"A further type of density measurement is therefore needed: Neighborhood Density: the number of dwelling units per acre of total neighborhood land (net residential land plus streets and land used for schools, recreation, shopping and other neighborhood community purposes)."

Recommended area allowances per family with the various dwelling types are shown in Table 3.

Net dwelling densities and building coverage values are given in Table 4.

**PROVISION OF NEIGHBORHOOD COMMUNITY FACILITIES**

"Factors of Need, Selection and Accessibility"

Basic services which cannot be supplied by the individual family in its own dwelling should be provided by the neighborhood community facilities. Playgrounds, for example, would serve those children who are old enough to need more space and equipment for exercise than that obtainable in the dwelling and its yard.
### Table 3. Recommended Area Allowances Per Family

<table>
<thead>
<tr>
<th>Dwelling Type</th>
<th>Lot Size or Equivalent (Feet)</th>
<th>Net Residential Area per Family (Square Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>For One- and Two-Family</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) One-family detached ................</td>
<td>60x100</td>
<td>6,000</td>
</tr>
<tr>
<td>b) One-family semidetached ...</td>
<td>80x100 (for two families)</td>
<td>4,000</td>
</tr>
<tr>
<td>b2) Two-family detached ............</td>
<td>80x100 (for two families)</td>
<td>4,000</td>
</tr>
<tr>
<td>cl) One-family attached (row)..........</td>
<td>20x100 plus 40-foot side yard between each 10 units(^a)</td>
<td>2,400</td>
</tr>
<tr>
<td>c2) Two-family semidetached ...........</td>
<td>48 x 100 (for two families)</td>
<td>2,400</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Height of Building (Stories)</th>
<th>Assumed Gross Floor Area (Square Feet)</th>
<th>Area Covered by Building (Square Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>For Multi-Family</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>870 per family</td>
<td>435 per family</td>
</tr>
<tr>
<td>3</td>
<td>870 per family</td>
<td>290 per family</td>
</tr>
<tr>
<td>6</td>
<td>870 per family</td>
<td>145 per family</td>
</tr>
<tr>
<td>9</td>
<td>945 per family</td>
<td>105 per family</td>
</tr>
<tr>
<td>13</td>
<td>945 per family</td>
<td>75 per family(^b)</td>
</tr>
</tbody>
</table>

\(^a\)Figures are for two-story houses; for one-story, 25-foot minimum lot width is recommended.

\(^b\)Approximately
TABLE 4. NET DWELLING DENSITIES AND BUILDING COVERAGE
Recommended Standard Values, by Dwelling Type

<table>
<thead>
<tr>
<th>Dwelling Type</th>
<th>Net Dwelling Density (Units per Acre of Net Residential Land)</th>
<th>Net Building Coverage (Per Cent of Net Residential Land Built Over)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard: Desirable</td>
<td>Standard: Maximum</td>
<td>Standard: Maximum</td>
</tr>
<tr>
<td>One- and Two-Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-family detached ..........</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>1-family semidetached)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>2-family detached</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-family attached (row)</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-family semidetached</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-story</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>3-story</td>
<td>40</td>
<td>45</td>
</tr>
<tr>
<td>6-story</td>
<td>65</td>
<td>75</td>
</tr>
<tr>
<td>9-story</td>
<td>75</td>
<td>85</td>
</tr>
<tr>
<td>13-story</td>
<td>85</td>
<td>95</td>
</tr>
</tbody>
</table>

*a Coverage should generally not exceed 30 per cent; on lots of the recommended sizes it will normally be below this figure.*
Types of neighborhood community facilities are as follows:

"Educational
   elementary
   kindergarten
   nursery school
   adult education

Outdoor recreation
   playground
   park

Indoor social and cultural
   church
   library
   assembly and recreation space

Neighborhood shopping
   food and drug stores
   miscellaneous services

Health service
   access to medical and dental service
   participation in official and voluntary health services"

"To a limited extent, the type of facility to be provided will depend on the degree to which needs may be met in the dwellings or by private facilities. For instance, in suburban neighborhoods where living space within the dwelling is ample, there is little need for small community recreation rooms. On the other hand, in low-income, high-density areas where living space within the dwelling is at a premium, such community rooms become extremely important."

"Standards for accessibility are based on avoidance of fatigue, protection from traffic and other accident hazards, and positive encouragement to use of the facilities."
Access standards for community facilities within the neighborhood are given in Table 5.

"Education"

A nursery school, kindergarten, elementary school, and some types of adult education facilities should be supplied within the neighborhood, but junior and high schools should be provided on a district basis. "The kindergarten and nursery schools should be included in the neighborhood because they give the child broad contacts and guidance in group activity during the formative years from 2 to 6. They have additional value in releasing part of the mother's day for less confining activity than child care."

The combination of schools and related facilities for multiple use may be more practical in the design of some neighborhoods. In such instances, the following combinations are used:

"Combination of elementary school and kindergarten: eliminates need for private kindergarten facilities; offers no complications where school authorities will provide facilities.

Combination of elementary school and playground: saves duplication of facilities and space. Requires coordination between local recreation and school authorities . . . .

Use of elementary school for adult education and indoor social and cultural activities: most economical way of providing activity space. May require some special office space, storage, etc . . . ."
### TABLE 5. ACCESS STANDARDS FOR COMMUNITY FACILITIES WITHIN THE NEIGHBORHOOD
Recommended Distance, with Maximum Limit

<table>
<thead>
<tr>
<th>Neighborhood Facility</th>
<th>Walking Distance (One Way) From Farthest Dwelling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursery School</td>
<td>1/4 mile</td>
</tr>
<tr>
<td>Kindergarten</td>
<td>1/4 to 1/2 mile</td>
</tr>
<tr>
<td>Elementary School</td>
<td>1/4 to 1/2 mile</td>
</tr>
<tr>
<td>Playground</td>
<td>1/4 to 1/2 mile</td>
</tr>
<tr>
<td>Park</td>
<td>1/4 to 1/2 mile</td>
</tr>
<tr>
<td>Shopping Center</td>
<td>1/4 to 1/2 mile</td>
</tr>
<tr>
<td>Indoor Social, Cultural and Recreation Center</td>
<td>1/2 mile</td>
</tr>
<tr>
<td>Health Center</td>
<td>1/2 mile</td>
</tr>
</tbody>
</table>
Facilities, other than classrooms, included in the elementary school and kindergarten are an auditorium, gymnasium, playrooms, library, workshop, and arts and crafts facilities.

The capacity of elementary schools related to neighborhood population is given in Table 6.

The site size for elementary schools related to neighborhood population is given in Table 7.

"Outdoor Recreation"

Outdoor recreation facilities are classified as active, which include neighborhood playgrounds, district playfields and city wide or regional facilities like swimming pools, beaches, golf clubs, etc., and passive, which include neighborhood parks, large urban parks, regional parks, and various special types of city parks.

Neighborhood parks should be planned to serve all age groups, with special emphasis on serving mothers with babies, the aged and whole families. "These groups need outdoor recreational facilities close to home much more than older children and working adults who are less bound to the neighborhood."

Multiple uses of outdoor facilities may be combined in the following ways:
### TABLE 6. ELEMENTARY SCHOOL CAPACITY RELATED TO NEIGHBORHOOD POPULATION

Assumed Maximum Population Served, by Type of School

<table>
<thead>
<tr>
<th></th>
<th>Minimum&lt;sup&gt;d&lt;/sup&gt;</th>
<th>Average&lt;sup&gt;d&lt;/sup&gt;</th>
<th>Maximum&lt;sup&gt;d&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>School</td>
<td>School</td>
<td>School</td>
</tr>
<tr>
<td>Classrooms&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6 or 8</td>
<td>13 or 17</td>
<td>25 or 33</td>
</tr>
<tr>
<td>Pupils&lt;sup&gt;c&lt;/sup&gt;</td>
<td>180 or 240</td>
<td>390 or 510</td>
<td>750 or 990</td>
</tr>
<tr>
<td>Families</td>
<td>550</td>
<td>1,200</td>
<td>2,300</td>
</tr>
<tr>
<td>Persons</td>
<td>2,000</td>
<td>4,250</td>
<td>8,250</td>
</tr>
</tbody>
</table>

<sup>a</sup>Assumed: 15 pupils per school year per 1,000 total population; will vary locally.

<sup>b</sup>Number of classrooms and pupils is given for 6- and 8-grade elementary schools. The number of grades in the school affects the number of pupils but not the total population required to provide these pupils. Each grade added will supply a new age group from total population ...

<sup>c</sup>Assumed: maximum of 30 pupils per classroom.

<sup>d</sup>Minimum school - 1 classroom per grade.

Average school - 1 classroom per semester-grade \( \neq 1 \).

Maximum school - 2 classrooms per semester-grade \( \neq 1 \).
<table>
<thead>
<tr>
<th>Component Uses</th>
<th>Neighborhood Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,000 persons</td>
</tr>
<tr>
<td></td>
<td>275 families</td>
</tr>
<tr>
<td></td>
<td>90 pupils</td>
</tr>
<tr>
<td>1) Covered by building: square feet</td>
<td><em>a</em></td>
</tr>
<tr>
<td>2) Service lawn and parking: square feet</td>
<td><em>a</em></td>
</tr>
<tr>
<td>3) Margin for expansion (20 per cent of 1 plus 2)</td>
<td><em>a</em></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Area</td>
<td><em>a</em></td>
</tr>
<tr>
<td>4) Acres</td>
<td></td>
</tr>
<tr>
<td>5) Acres per 1,000 persons</td>
<td><em>a</em></td>
</tr>
<tr>
<td>6) Square feet per family</td>
<td><em>a</em></td>
</tr>
</tbody>
</table>

*a*Elementary school not recommended for neighborhood of less than 2,000 persons.
If conditions warrant provision of school, use figures indicated in next column.
Playground with elementary school: makes unnecessary the need for separate shelter or sanitary facilities at the playground.

Playground and park: "park can be located to provide noise buffer between playground and residences. Many facilities can be located interchangeably and greater flexibility is provided."

Since the neighborhood playground is the chief outdoor center for elementary school children, it should provide most of the following facilities:

- a) small space for preschool children
- b) apparatus area for older children
- c) open space for informal play
- d) surfaced area for court games such as tennis, handball, paddle tennis, shuffleboard, volleyball
- e) field for games such as soft ball, modified soccer, touch football, mass games
- f) area for storytelling, crafts, dramatics, quiet games
- g) spray pool or other water activity area
- h) shelter building with toilets, washbowls
- i) drinking fountains (may be in combination with h)

Neighborhood playground sizes are shown in Table 8.

The chief requirements for the neighborhood park are shade, walks, benches, and pleasant views. "Adequate protection against topographic hazards should be provided. Paths should be well lighted
<table>
<thead>
<tr>
<th>Playground Area</th>
<th>Neighborhood Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,000 persons</td>
</tr>
<tr>
<td></td>
<td>275 families</td>
</tr>
<tr>
<td>Acres: Total</td>
<td>2.75</td>
</tr>
<tr>
<td>Acres per 1,000 persons</td>
<td>2.75</td>
</tr>
<tr>
<td>Square feet per family</td>
<td>435</td>
</tr>
</tbody>
</table>
for nighttime safety, especially if there are steps or steep slopes. No major streets should traverse the park." The park may include land surrounding the community center buildings and other areas in the development. An informal, free-flowing design of park space, with finger parks connecting the various residential areas with community activities areas are definitely desirable. Families may enjoy walking through the park on their way to various activities.

Neighborhood park sizes are shown in Table 9.

"Indoor Social and Cultural Facilities"

The following services and organizations are recommended for the convenience of a neighborhood:

"Social Service: vocational and employment guidance, child guidance, family and marriage problems, girl scouts, boy scouts, consumer groups, parent-teacher association, Community Chest organization.

Religion: adult worship and religious training of youth . . .

Literature and the Arts: library, art exhibits, lectures, noncommercial movies, musical programs, groups or classes for participation in the arts.

Recreation: dances and parties . . .; indoor sports and games."
<table>
<thead>
<tr>
<th>Type of Development</th>
<th>Neighborhood Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,000 persons</td>
</tr>
<tr>
<td></td>
<td>275 families</td>
</tr>
<tr>
<td>One- or Two-Family Development</td>
<td>With private lot are per family of:</td>
</tr>
<tr>
<td></td>
<td>1/4 acre or more</td>
</tr>
<tr>
<td></td>
<td>Park: no neighborhood requirement</td>
</tr>
<tr>
<td></td>
<td>Less than 1/4 acre</td>
</tr>
<tr>
<td></td>
<td>Park: total acres</td>
</tr>
<tr>
<td></td>
<td>Park: acres per 1,000 persons</td>
</tr>
<tr>
<td></td>
<td>Park: square feet per family</td>
</tr>
<tr>
<td>Multi-Family Development</td>
<td>Or other predominantly without private yards</td>
</tr>
<tr>
<td></td>
<td>Park: total acres</td>
</tr>
<tr>
<td></td>
<td>Park: acres per 1,000 persons</td>
</tr>
<tr>
<td></td>
<td>Park: square feet per family</td>
</tr>
</tbody>
</table>
"In order to meet the space requirements for the social and cultural activities listed above, most of the following types of general facilities will usually be desirable:

a) small rooms for meetings and classes
b) assembly room with stage for large meetings, movies, . . . musical performances and indoor recreation . . .
c) small game room, including equipment for indoor games such as ping-pong, chess, checkers, card games, etc.
d) reading and exhibit room
e) kitchen for preparation of refreshments and for cooking classes
f) workshop for classes in arts and crafts . . .
g) office and storage space for organizations participating in activities"

To avoid duplication of facilities, the schools and recreational buildings may be combined into a single community center.

"Neighborhood churches may play an important role not only in the religious, but also in the social and cultural life of a community, serving in part as recreational and educational centers."

"Neighborhood Shopping"

Neighborhood shopping facilities are those stores and service establishments which are used frequently by all families. The
enterpriser, whether it be a chain store, a department store, an individual shopkeeper, or a cooperative society, has no effect on space standards. The chief planning considerations are to include the proper types of facilities, and to preserve the architectural and other amenities of the neighborhood. These shopping facilities should be as easily accessible to the home as possible.

Experience has shown that normally it requires a minimum of about 500 families to support a small shopping center. With this nucleus, a maximum of about 10 stores should be considered. For the various sizes and types of shopping centers that are possible for different developments, a list of 30 store types, arranged in the general order in which they should be established, are given below:

- Drug store
- Cash and carry grocery
- Cleaner and dyer shop
- Beauty parlor
- Filling station
- Bakery
- Shoe repair
- Laundry agency
- Variety store
- Barber shop

The next ten businesses which should be added as the center becomes larger are in order of importance:
Service grocery
Florist
Milliner
Radio and electrical shop
Five-and-ten-cent store
Children's shoes
Gift shop
Candy and nut shop
Lingerie and hosiery
Liquor store

Further enlargement of the center would demand
these additional stores in order of importance:

"Fix-it" shop - repairs, etc.
Dress shop
Theater
Frozen foods
Cafe or drive-in restaurant
Book and stationery shop
Dentists and physicians
Baby and toy shop
Haberdashery
Athletic goods

These should be considered as the 30 most important neighborhood stores. Grouping of these stores within the center with relation to their merchandise and type of service is an extremely important factor in the success of the shopping center. Certain stores complement each other and should be located together, while others tend to injure adjacent stores. "For instance, shops catering to women should be close together; service,

grocery, and five-and-ten-cent stores complement each other; garages, filling stations, and auto sales rooms should be related; service and repair shops should be grouped; and such types as hardware, electrical repair, and furniture are supplementary.¹

The figures in Table 10, compiled by the Committee on the Hygiene of Housing of the American Public Health Association, give assumed sizes for neighborhood shopping centers for a range of neighborhood population, ranging from 0.8 acre to 3 acres. "The total space includes building coverage, service and customer parking and circulation space, but does not include special buffer strips which may be needed for protection of nearby residences."

The three types of circulation - pedestrian shoppers, shoppers in automobiles, and vehicles servicing the stores - should be designed to prevent congestion and accident hazards.

Neighborhood community facilities as a whole should, if possible, be grouped together in the direction of the major traffic flow from the development area to the outside, for such grouping will encourage the use of all facilities. Also,

¹Ibid., p. 137.
### TABLE 10. NEIGHBORHOOD SHOPPING CENTER SIZE
Assumed Component Uses and Total Area, by Population of Neighborhood

<table>
<thead>
<tr>
<th>Shopping Center</th>
<th>Neighborhood Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,000 persons</td>
</tr>
<tr>
<td></td>
<td>275 families</td>
</tr>
<tr>
<td>Component Uses</td>
<td></td>
</tr>
<tr>
<td>1) Ground area of bldgs: sq. ft. ..</td>
<td>9,000</td>
</tr>
<tr>
<td>2) Customer auto parking: sq. ft. ..</td>
<td>18,000</td>
</tr>
<tr>
<td>3) Gas service station: sq. ft. ....</td>
<td>-</td>
</tr>
<tr>
<td>4) Circulation, service and setback: sq. ft. ...</td>
<td>6,800</td>
</tr>
<tr>
<td>Total Area</td>
<td></td>
</tr>
<tr>
<td>5) Square feet</td>
<td></td>
</tr>
<tr>
<td>6) Acres</td>
<td></td>
</tr>
<tr>
<td>7) Acres per 1,000 persons</td>
<td></td>
</tr>
<tr>
<td>8) Square feet per family</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shopping Center</th>
<th>Neighborhood Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,000 persons</td>
</tr>
<tr>
<td></td>
<td>275 families</td>
</tr>
<tr>
<td>Total Area</td>
<td></td>
</tr>
<tr>
<td>5) Square feet</td>
<td>33,800</td>
</tr>
<tr>
<td>6) Acres</td>
<td>.80</td>
</tr>
<tr>
<td>7) Acres per 1,000 persons</td>
<td>.80</td>
</tr>
<tr>
<td>8) Square feet per family</td>
<td>125</td>
</tr>
</tbody>
</table>
"the existence of a physical center of the neighborhood stimulates the growth of community relationships and the acceptance of community responsibilities by the residents."

LAYOUT FOR VEHICULAR AND PEDESTRIAN CIRCULATION

"The Functions of Circulation"

"Functionally, circulation provides access not only for the residents but for all those who serve the development area. Physically, the circulation pattern, linking residential structures to each other, residences to neighborhood community facilities and the neighborhood to centers of business and employment, results in the definition of land use areas of limited shapes and sizes because streets act as boundaries and barriers."

In designing the circulation system, it is of prime importance to consider the users, the methods of circulation, and the locations where access is required.

"The elements of the circulation system may be classified as follows:

Types of Uses

1. For residents: in all daily activities

2. For deliveries and collections: including fuel, furniture moving, mail, garbage
3. For protective services: fire, police, ambulance, hearse

4. For maintenance and repair: utilities, grounds and structures (including snow removal)

Circulation Routes

1. Access from the outside to the neighborhood
2. Access to dwellings
3. Access to neighborhood community facilities

Means of Circulation

1. Pedestrian
2. Automobile, truck and motorcycle
3. Public transit
4. Other (bicycle, roller skates, baby carriage, etc.)

Circulation Ways

1. Streets
2. Walks
3. Driveways (to garages, parking areas and service courts)
4. Parking areas"

The circulation system should provide safe and convenient access and maximum land utilization. A variety of outlook and pleasant vistas should also be planned in the layout.
"Organization of the Circulation System"

The circulation system of a development area cannot in itself be considered complete. The volume of traffic, the usability of land, and the convenience of access are all directly affected by the city and regional highway systems. The street layout should be developed in coordination with these larger components.

When the traffic scheme of a development area is planned with that of the city-wide pattern, the following considerations must be taken into account by those who are responsible for the control of street layout:

a) future traffic loads should not require locating new traffic arteries within the neighborhood;

b) future traffic loads should not cause the use of neighborhood streets for through traffic;

c) adequate rights of way should be provided along neighborhood boundaries for any anticipated widening of the streets;

d) street layouts of contiguous areas should readily be coordinated with the proposed layout;

e) the proposed layout should not result in odd-shaped or leftover areas serving no particular purpose;
f) existing structures and land uses should be incorporated into the proposed development or another suitable neighborhood.

Street types are classified as

“Residential Service Street: providing direct access residential structures; serving only a comparatively small number of dwellings.

Neighborhood Feeder Street: connecting service streets to each other, to community facilities and to minor traffic arteries; serving only neighborhood traffic.

Minor Traffic Street: connecting feeder streets to major traffic streets and to district centers. Preferably outside or bounding the neighborhood; serving district traffic.

Major Traffic Street: connecting cities and major districts of a single city; serving large volumes of comparatively long-distance, fast moving traffic (including highways, freeways, etc.).”

Through traffic within the neighborhood should be prohibited. "Where minor traffic streets within the development are unavoidable, dwellings should not face them but should have access from service streets."

Parking spaces of adequate size and suitably located are desirable in the circulation system. Not only does parking along streets slow down traffic but it is a serious accident hazard at intersections and along curves. In cases where parking is permitted directly below dwelling windows, there
is often the complaint that noise and odors are objectionable. Parking spaces must necessarily be provided for residents, visitors, and service vehicles in connection with community facilities and dwellings.

Because of the inevitable noise of buses and trolleys, public transit facilities should be routed on boundary streets just outside the neighborhood.

"Walks from all dwellings should provide convenient and safe access to elementary schools, shops, playgrounds, and other chief pedestrian objectives." They may be classified into three types:

"Entrance walks: to individual dwellings or to entrances of multiple dwellings;

Service walks: serving a group of residential structures, connecting entrance walks to major walks;

Major walks: direct pedestrian connection between main parts of the neighborhood, to neighborhood community facilities, to public transit facilities, to main pedestrian thoroughfares outside the neighborhood."

"Circulation Lighting"

"Streets, parking spaces and walks should be lighted to provide safe travel for all vehicles and to prevent pedestrian accidents. This requires lighting throughout the night along all streets and public walks." Lights should be provided especially at intersections, on walks that do not adjoin
streets, and on walks that are broken by steps because of a break in grade level. Besides serving as a protection against accident hazards, street and walk lighting also discourages such crimes as housebreaking and assault.

SUMMARY

The complete solution to the problem of urban rehabilitation cannot be formulated definitely at the present time. However, it is recognized that the logical method of solving the problem is to approach it from a national level. From this viewpoint, it would be possible to prepare over-all master plans for whole regions which would include all the elements of urban and rural habitation. With this master plan, the elements necessary for life, dwellings, community facilities and services, and circulation system, could be integrated to form a harmonious entity which in turn would establish a stable and productive nation.

A study of the smaller elements, the community and the neighborhood, should be the basis of forming planning units as a guide for the preparation of the master plan. From the study of the neighborhood unit, it is concluded that the location of the neighborhood elements should be related to one another so as:
"a) to meet the standards of convenient and safe access between dwellings and neighborhood community facilities;
b) to encourage the fullest use of all community facilities by the residents;
c) to create a focal point in the neighborhood which will stimulate the growth of vital community relationships and give stability to the neighborhood;
d) to avoid nuisances and hazards to residences;
e) to produce the most efficient and economic land use pattern, and to avoid unnecessary duplication of facilities."
PART TWO - HOUSING IN RICHMOND
Information and illustrations on Richmond's past and existing conditions have been compiled from The Preliminary Report, a series of investigations conducted in 1941 by the City Planning Commission of the city of Richmond.

HISTORY

Heritage

In 1607 an exploring party from Jamestown sailed up the James River to the site of the present City of Richmond and planted a cross on one of the islands. Two years later Captain John Smith purchased the land in this vicinity from the Indians and founded a settlement. In 1645, Fort Charles was built to defend the frontier site. Finally, in 1737, Colonel William Byrd acquired the area and founded Richmond. This settlement was named Richmond probably because it was so similar to the English town, Richmond, on the Thames River.

Figure 19 indicates the location of the early settlements in Virginia with reference to Richmond, Jamestown, Williamsburg, and other settlements.

When the British armies threatened Williamsburg, the Capital of the Commonwealth, the public records were rushed to Richmond, where they remained; and Richmond therefore became the capital.
EARLY SETTLEMENTS IN VIRGINIA

FIGURE 19

SCALE

MILES

FIRST POINTS OF SETTLEMENT

1600 - 1800
1800 - 1850
1850 - 1870
1870 - 1890
1890 - 1910
1910 - PRESENT

EARLY SETTLEMENTS IN AMERICA
Moreover, it became the chief city of the South during and following the Revolution. Patrick Henry made his famous speech there in St. John's Church in 1775.

When the South withdrew from the Union in 1861, Richmond was made the Capital of the Confederacy. At this time the population was about 38,000. Because of the city's importance, it became a target for the Federal armies and took a big loss in destruction of property and possessions. Although a third of the city was left in ruins, Richmond not only recovered but has grown both in size and in commercial and industrial importance.

Housing development

Richmond, just as the other early American cities, did not attempt to adopt a well designed plan for its growth. Furthermore, Richmond grew so slowly during much of the nineteenth century that its need for planning was not realized. The physical barriers, consisting of the Shockoe Valley and Gillies Creek, imposing barriers to northward and eastward growth, and the James River, impeding expansion southward, prevented the original community from developing into a regular pattern. These physical factors affecting the urban expansion are illustrated in Figure 20. With the establishment of the railroad and industrial development along the natural locations in the valley, the physical conditions were further aggravated and
PHYSICAL BARRIERS
OF RICHMOND

FIGURE 20
prohibited, even more, the possibilities of expanding northward. The trends of piecemeal development of parks and cemeteries also added to the confusion. With the absence of physical barriers in the western section of the city, expansion was stimulated and encouraged in this direction, which today is the most desirable location for housing development. Figure 21 shows the trend of this westward expansion. The area encompassed prior to 1870 consisted of subdivisions of narrow lots, tightly and haphazardly knitted together. The area was densely populated because it was necessary that there be only a short distance for the inhabitants to commute from their homes to work. Their means of transportation were either the horse and buggy or by foot. After 1870, when mass transportation was introduced by horse drawn carriages, and finally about 1890, the electric street car, the effective radius of the city was expanded.

With the aid of the new transportation facilities, residents in the older, central districts moved out to wider areas and made room for the growing demands for the workmen's quarters. This is the period when two distinct levels of population density developed; the new single family areas were around the outskirts of the city and the old multiple housing closely surrounded the central core of the city.
GROWTH OF RICHMOND, VIRGINIA

FIGURE 21
After the modern automobile finally became available to private families and individuals, the population spread and dispersed into the countryside. Since that time, there has been a continuous building of new homes on the periphery of the existing city.

While the population was moving outwardly from the central area of the city, the expansion of commerce and industry filled the areas thus left vacant, and no serious problem was immediately created. However, the practice of this same procedure began to decrease by 1930. Yet, the people continued to build new homes in the suburbs of the city; thus, the abandoned central core was left as an expense to the city.

In spite of the disorder and uncontrolled growth, Richmond has made remarkable progress in both industry and trade. The diversification of manufacturing among tobacco products, paper and printing, iron and machinery, and a wide variety of other products give promise of future economic health. This condition offers unlimited opportunities for the city to gain control of the present development and to guide it into a pleasing and prosperous future.
SUMMARY

Richmond has been in the process of development for over two hundred years. Within these years it has received unusual distinction because of its rich heritage. For over a century Richmond grew slowly, as did many other American cities, but in the more recent years its growth has been so rapid that it has resulted in a haphazard, piecemeal, and uncontrolled development. These mistakes may be corrected by the city's preparation of future plans for development through the use of its economic strength.

THE WIDESPREAD SCATTERING OF COMMERCE, INDUSTRY, AND APARTMENTS THROUGHOUT THE CITY HAS ALSO BEEN INJURIOUS TO RESIDENCES.
DISTRIBUTION AND GROWTH OF RICHMOND'S POPULATION

FIGURE 22
This intermingling of incompatible urban uses has been a strong factor in the deterioration of environmental values in the older areas of the city. Actually, no conscious direction was ever given to the development of housing (until recently) either toward meeting the different needs of different population groups or toward controlling and coordinating the physical design and location of this growth. Consequently, the present condition of Richmond's housing is a patchwork of individual projects, which bear little relation to a unified and integrated structure of neighborhoods and communities. This depreciation of neighborhoods is driving the inhabitants away from the city in search of more attractive spaces. The abandoning of the existing improvements and services is an extravagant waste, for paved streets, utilities, schools, and other facilities have to be provided for the new uncoordinated developments.

The problem of substandard housing still remains, however. Overcrowded dwellings; lack of running water and sanitary facilities; narrow lots with inadequate light, air, and sunshine; insufficient and poorly located parks, schools, and playgrounds; traffic hazards, smoke, dust, and noise — all contribute to a poor environment which is a strong factor in the dissolution of
THE AREAS MARKED INDICATE THE EXTENT OF BLIGHT IN RICHMOND. THESE CONDITIONS SERVE AS EXAMPLES OF THE UNCONTROLLED PROBLEM.
character and in the increase of delinquents, criminals, and disease. These pathological conditions and poor housing factors are marked in Figure 23.

SUMMARY

Similar to the mistakes made by many other cities in the United States, or even in the world, Richmond's failure to coordinate and control the various elements comprising the urban community has brought about depreciated and unsatisfactory neighborhoods, a waste in the provision of essential urban services, and, in some cases, disease and crime breeding slums.
SOLUTION

General

The object of the discussion of the solution to the problems of substandard housing presented in PART ONE of this thesis is to accent the fact that although the complete solution cannot be definitely formulated at the present time, it does not mean that the present efforts in this field are unsatisfactory. On the contrary, the work that has been done has proven to be successful. In the Solution of PART ONE, it was explained that the future possibilities of adequately rehabilitating our blighted areas and preserving our present new developments depended upon our ability to properly administer and plan on a national level. It also pointed out that the smaller elements, the community and the neighborhood, are the major considerations in preparing the over-all master plan. Therefore, the solution to Richmond's problem will be presented by a comprehensive plan of a neighborhood which will be harmoniously integrated with the proposed master plan of the city.

The master plan should determine the development of the city with respect to locations and areas of the various districts intended for dwelling, for work, for recreation, and for traffic networks. The plan should provide means for new developments to remain confined to the area allotted to prevent a scattered future
growth. Adequate protection should be provided for new residential areas so that they will continue to be desirable places and thus prevent further shifting of their population. Finally, gradual rebuilding of the older blighted districts and slums should be provided in the plans.

Evidence of the work that is in progress to solve the problem is presented in a statement from the Virginia Zoning Enabling Act, which reads in part as follows:

"Regulations shall be made in accordance with a comprehensive plan, and designed to lessen congestion in the streets, to secure safety from fire, panic and other dangers, to promote health and the general welfare; to provide adequate light and air; to prevent the over-crowding of land; to avoid undue concentration of population; to facilitate the adequate provision of transportation, water, sewerage, schools, parks and other public requirements.

"Such regulations shall be made with reasonable consideration, among other things, to the character of the district and its peculiar suitability for particular uses, and with a view to conserving the value of buildings and encouraging the most appropriate use of land throughout the city or town."

Population density and distribution, and the housing situation were presented in Figures 22 and 23 to illustrate Richmond's present undesirable conditions. By studying these illustrations one may readily understand the need for comprehensive planning mentioned in the Enabling Act. Before the Program for the
Neighborhood is presented, further conditions of the city should be made familiar. Climatic conditions in the city of Richmond are presented in Table 11. This represents a record of over a fifty year period. The circulation system, which is as important as the arteries and veins in one's body, is given in detail in Figure 24. In addition to this, transportation and transit facilities are explained in Figures 25 and 26. Present and proposed park and school facilities are given in Figure 27. The combination of information offered in these illustrations greatly aids in the selection of sites for the development of proposed projects that will insure effective and harmonious integration with the master plan.
### TABLE II. CLIMATE IN RICHMOND

<table>
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<tr>
<th>Month</th>
<th>Average Temperature</th>
<th>Precipitation</th>
<th>Relative Humidity</th>
<th>Sunshine</th>
<th>Wind Speed</th>
<th>Velocity</th>
<th>Hourly Hours</th>
<th>Total Per Cent</th>
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</table>

- Less than one day, T - Trace

(Source: Richmond Chamber of Commerce, Richmond, Virginia)
Circulation System

Figure 24
a. Railroad Facilities and Property

b. Grade Separations

c. Proposed Improvements on Grade Separations

d. Areas Zoned for Industry

e. Truck Terminals

f. Airport Sites

Transportation Facilities

Figure 25
TRANSIT FACILITIES

FIGURE 26
A. RECREATIONAL FACILITIES
   □ WHITE
   □ NEGRO

B. WHITE SCHOOLS
   ○ ELEMENTARY AND JUNIOR HIGH
   ● SENIOR HIGH

C. NEGRO SCHOOLS
   ○ ELEMENTARY
   ● SENIOR HIGH

D. PROPOSED SYSTEM OF SCHOOLS AND NEIGHBORHOOD PARKS
   ○ SCHOOLS
   □ PARKS

F. LARGE PARKS AND PLEASURE DRIVES
   □□□□ EXISTING
   □□□□ PROPOSED
   □□□□ EXISTING TO BE USED AS PLEASURE
   □□□□ PROPOSED PLEASURE

PARKS AND SCHOOLS

FIGURE 27
Program

The tract of land to be used in the study for development is shown in Figures 28, 29, and 30. This area was suggested by the Richmond City Planning Commission for the study because it has been designated for housing purposes in the master plan of the city. The boundaries of the site are Parham Road on the northwest, Three Chopt Road on the southwest, the proposed pleasure drive on the southeast, and Broad Street Road on the northwest.\textsuperscript{1} Within these boundaries are approximately 2,700 acres of gently rolling land with many fine trees, ponds and streams. The few residences located in this area do not present a problem, for they may well be integrated with the proposed development.

The relationship of the suggested area to the city is shown in Figure 31. The area is located in the northwestern section of Richmond known as Westhampton. Two regional highways (illustrated in Figure 24e) are easily accessible from this area: Broad Street Road leading directly to the downtown district and Three Chopt Road connecting with a proposed regional highway which by-passes the central core of the city. Two and a half miles north is the suggested Laurel Airport, and seven and a half miles south is the suggested Robious Airport (indicated in Figure 25f.), both

\textsuperscript{1}The proposed pleasure drive, which will eventually encircle the entire city, is indicated in Figure 27f.
EXISTING SITE CONDITIONS

FIGURE 29
TOPOGRAPHIC SECTIONS OF SITE

FIGURE 30
RELATIONSHIP OF SITE TO RICHMOND

FIGURE 31
readily accessible from this area. Transit routes and interurban bus lines (shown in Figure 26.) can be extended to serve this area. The area is free from railroad and industrial nuisances and hazards as indicated in Figure 25. Municipal sanitary and protective services are available which means that this area, either before development begins or after its completion, would become a part of the city. With this assumption the utilities and services for water supply, sewage disposal, refuse removal, and power, fuel, and communications would be the responsibility of the city.

The community will be composed of people who commute to Richmond daily for work. This population will consist of heterogeneous age groups. The Westhampton area is constituted mainly of the middle class; so to continue the harmony which now exists, the proposed development should conform with its surrounding character.

The area suggested for development will include three neighborhood units, each containing approximately 5,000 people, and a central community center which will include shopping, recreational, educational, social, health, administrative, service, and utility facilities.

The essentials for the full development of the neighborhood have been discussed in the outline for Planning a Neighborhood arranged in PART ONE of this thesis. The site selected for this study meets the standards required in the previous general outline. With judgment
established concerning conditions which entirely affect planning, the following program has been devised for the development of the neighborhood:

Proposed Requirements

The general over-all development of the community should create:

1. A well organized system of traffic arteries and general circulation between the neighborhoods.

2. Integration of the various service and utility facilities.

3. Harmony among the recreational, educational, social, and residential facilities.

4. The best use of existing facilities, and minimize the duplication of any of the facilities among the neighborhoods.

The community being divided into three neighborhoods provides approximately 900 acres per neighborhood, a density of 0.18 person per acre or an average of 0.65 acre per family. These figures may vary from time to time in each of the given neighborhoods due to the changes in the number of inhabitants caused by births, deaths, or general shifting of residences, but with a flexible plan, the density fluctuations should not present a major problem.
The following elements will be provided in the neighborhood unit:

I. Circulation Provisions

A. Streets and Highways

1. Arteries
   a. Freeways
   b. One- and two-way

2. Systems
   a. Grid pattern
   b. Curvilinear pattern
   c. Radial pattern
   d. Cul-de-sac section
   e. Loop section

3. Intersections
   a. Braided or "T"
   b. Simple grade separation
   c. Simple interchange
   d. Cloverleaf interchange

4. Right of ways

B. Parking

1. On- and off-street

2. Garages

C. Walks

1. Bridges, ramps and stairs

2. Over- and under-passes

3. General walks and paths
D. Safety Measures

1. Green belts
   a. Around highways
   b. Around bodies of water

2. Buffer strips
   a. Around noisy zones
   b. Between various activities

3. Lighting
   a. Intersections
   b. Points of grade differences
   c. Over- and under-passes

II. Residential Facilities

A. One-family Detached Dwelling

1. Entrance area
2. Living space
3. Dining space
4. Kitchen space
5. Utility space
6. Toilets
7. Sleeping space
8. General storage space
9. Outdoor living and dining space
10. Recreation and gardening provisions
11. Carport and tool storage
12. Heater room
B. One-family Attached Dwelling

1. Entrance space
2. Living area
3. Dining area
4. Kitchen area
5. Utility area
6. Toilets
7. Sleeping area
8. General storage space
9. Heater room
10. Outdoor provisions

C. Multi-family Attached Dwelling

1. Entry
2. Living area
3. Dining area
4. Kitchen and utility area
5. Toilet
6. Sleeping area
7. General storage space
8. Outdoor provisions
III. Educational Facilities

A. Nursery School

1. Entrance
   a. Lobby
   b. Cloak area

2. Play rooms
   a. General
   b. Project

3. Teacher's room and toilet

4. Kitchen

5. General storage space

6. Toy storage space

7. Heat plant and mechanical equipment

8. Children's toilet

9. Outdoor play area
   a. All weather surface area
   b. Sand pit
   c. Small garden
   d. Grass and flower area
   e. Paddling pool and spray
   f. Playground equipment
   g. Provisions for pets
   h. Drinking water fountain

B. Elementary School

1. Entrance
   a. Lobby
   b. Lounges

2. Administrative offices
   a. Principal
   b. General record offices
   c. Conference and guidance room
   d. Teachers' lounge
3. Library and exhibition area
   a. Control point
   b. Sitting areas

4. Health clinic

5. Auditorium
   a. Seating
   b. Circulation and exits
   c. Stage
   d. Back-stage facilities

6. Public toilets

7. Gymnasium
   a. Athletic office
   b. Equipment room
   c. Toilets

8. Work shop
   a. Shop office
   b. Material and tool room

9. Cafeteria
   a. Kitchen
   b. Refrigerator
   c. General office
   d. Seating and tables
   e. Toilets

10. Classrooms
    a. Kindergarten
    b. First grade
    c. Second grade
    d. Third grade
    e. Fourth grade
    f. Fifth grade
    g. Sixth grade

11. Class storage space

12. Special classrooms
    a. Arts and crafts
    b. Music
    c. Projects
    d. Audio visual
13. General circulation space
14. General storage space and janitor closet
15. Student toilets
16. Mechanical equipment and duct space
17. Outdoor class areas
13. Outdoor recreation areas

C. Adult Provisions

1. Entrance
   a. Lobby
   b. Lounge

2. Meeting rooms
   a. Discussions
   b. Activities

3. Storage space

4. Public toilets

IV. Recreational and Entertainment Facilities

A. Outdoor Provisions

1. Passive
   a. Parks
   b. Picnic areas
   c. Lakes
   d. Amphitheater

2. Active
   a. Playgrounds
   b. Playfields
   c. Swimming and boating
B. Indoor Provisions

1. General meeting and game rooms

2. Assembly room
   a. Seating space
   b. Stage space
   c. General storage space
   d. Kitchen

3. Public toilets

4. General circulation space

5. Mechanical equipment and duct space

C. Movie Theater

1. General public space
   a. Foyer
   b. Lobby
   c. Lounges
   d. Concession

2. Ticket booth, office and control point

3. Projection booth
   a. Rewinding room
   b. Film vault

4. General display areas

5. General storage space

6. Public lounes and toilets

7. Auditorium
   a. Seating arrangement
   b. Aisles and exits
   c. Storage and screen

8. Mechanical equipment space
V. Social and Cultural Facilities

A. General Health Services

1. Reception area
   a. Lounge
   b. Control desk

2. Doctors' offices
   a. General office
   b. Examination room
   c. X-ray room
   d. Storage space
   e. Toilet

3. Waiting space

4. General circulation space

5. Public toilets

B. Cultural Provisions

1. Main entrance
   a. Lobby
   b. Lounge
   c. Telephone booth

2. General library
   a. Control desk
   b. Sitting areas
   c. Tables and stacks
   d. Exhibition space

3. General meeting rooms

4. Administrative and counselling offices

5. Assembly room
   a. Stage space
   b. General storage space
   c. Kitchen

6. Public toilets
7. General circulation space
8. Outdoor lounging and recreation areas
9. Mechanical equipment and duct space

C. Church Building

1. Entrance
   a. Lobby
   b. Lounge
   c. Cloak space

2. Church
   a. Entrance foyer
   b. Nave
   c. Chancel
   d. Choir and organ

3. Chapel
   a. Lobby
   b. Nave
   c. Chancel
   d. Organ

4. Fellowship hall
   a. Seating
   b. Stage
   c. Kitchen
   d. Toilets
   e. Storage

5. Sunday school
   a. Nursery class
   b. Kindergarten class
   c. Primary class
   d. Junior class
   e. Intermediate class
   f. Senior class
   g. Young peoples' class
   h. Young couples' class
   i. Adult class
6. Club rooms
   a. Scouts
   b. Special clubs

7. Minister's office group
   a. Minister's study
   b. Record office
   c. Lounge

8. General storage area

9. General circulation space

10. Public lounges and toilets

11. Mechanical equipment and duct space

12. Outdoor lounge and recreation areas

VI. Shopping Facilities

   A. Food Market

   1. Main entrance and exit area
      a. Checkers and cash counters
      b. Area for buggies
      c. Turnstile controlled area

   2. General sales (self service) area
      a. Breads, cakes, crackers, etc.
      b. Canned goods
      c. Household goods
      d. Beverages, etc.

   3. Service sales areas
      a. Meats
      b. Dairy
      c. Vegetables
      d. Delicacies

   4. Stock space
      a. General storage of goods
      b. Cold rooms
      c. Machine room
5. Loading platform for service trucks

6. Manager's office

7. Workers' locker rooms and toilets

B. Drug Store

1. General sales area
   a. Drugs
   b. Toiletries
   c. Tobaccos
   d. Magazines, etc.
   e. Public telephones

2. Prescription area
   a. Sales counter
   b. Work area: refrigerator, sink, etc.
   c. Storage and display shelves

3. Fountain service area
   a. Counter, stools, etc.
   b. Back-bar and display

4. General storage space

5. General display and show window areas

6. Workers' locker rooms and toilets

C. Laundry and Cleaner Agent

1. Public waiting space

2. Service counter

3. Office

4. Storage space

5. Workers' toilets
D. Tailor Shop

1. Public waiting space
2. Service counter
3. Office
4. Work area
   a. Hand work
   b. Cleaning and pressing
5. General display and show window areas
6. Steam control room
7. General storage space
8. Workers' toilets

E. Children's Wear Shop

1. General sales area
   a. Child apparel
   b. Shoe sales area
   c. Infant wear
2. Sales counter
3. Fitting rooms and toilets
4. General display and show window areas
5. General storage space
6. Workers' toilets

F. Variety Shop

1. General sales area
   a. Toys
   b. Hardware goods
   c. Candies and nuts
   d. Children's books
2. Sales counter
3. General display and show window areas
4. General storage space
5. Workers' toilets

G. Barber Shop

1. Public waiting area
2. Barbering area
   a. Barber chairs and supply bar and cash register
   b. Shampoo sink
   c. Manicure table
3. Display window areas
4. General storage space
5. Workers' lockers and toilets

H. Beauty Shop

1. Public waiting area
   a. Lounge
   b. Cash counter and display
2. Drying area and manicure
3. Booths with water basins
   a. Shampooing
   b. Setting
4. Window display areas
5. General storage space
6. Public and workers' toilets
I. Shoe Repair Shop

1. Public waiting area
   a. Display space
   b. Cash counter

2. Work areas
   a. Stitching
   b. Finishing machine
   c. Shoe shine booths
   d. Hat cleaning
   e. Hat case and shoe case

3. Show window space

4. General storage space

5. Workers' toilets

J. Restaurant and Snack Bar

1. General public space
   a. Sitting areas
   b. Booths
   c. Dining tables
   d. Snack bar and stools
   e. Public telephone booth
   f. Outdoor dining space

2. Work areas
   a. Kitchen
   b. Serving counter
   c. Dish washing
   d. Snack back bar

3. Window display areas

4. General storage space

5. Public toilets

6. Workers' lockers and toilets
K. Mechanical Equipment and Duct Space

L. Parking Facilities
   1. Automobile stalls and driveways
   2. Pedestrian walkways
   3. Circulation lighting and planting areas

VII. Utility and Service Facilities

A. Protective Provisions
   1. Fire fighting
      a. Water distributing system
      b. Chemical means
   2. Police protection

B. Sanitary Provisions
   1. Water supply
   2. Sewage disposal
   3. Refuse removal
   4. Storm sewers

C. Conveniences
   1. Power
      a. Electricity
      b. Steam
   2. Fuel
      a. Gas
      b. Oil
      c. Coal
3. Communication
   a. Telephone
   b. Radio
   c. Television

Design

A drawing is worth a thousand words. The illustrations presented in the succeeding pages demonstrate the procedure that was used to gain as much freedom as possible in the realm of aesthetics, as well as in the function of the buildings and areas. This task of planning was aimed to insure a cooperative, functioning community—one that can be a stimulating influence upon the inhabitants and make them desire a high moral, healthful, and beautiful place to live.

With the research on communities presented in PART ONE of this thesis, and with a study of the anticipated needs of communities and neighborhoods for the future, the planning for the particular study area designated in this thesis was conducted as follows:

The Community as a Whole

As indicated in Figure 32, the proposed site is an ideal setting for housing; and, with Nature's provision of the three topographic boundaries, three neighborhood units are logically located around an adequate sized area for the development of a community center.

The drainage system is ideal for the three units because all the land slopes toward the three neighborhood boundaries, then toward the center, and then out of the site area through Upham Brook. The community could have its own sewerage purification system at the low point (elevation 200') where all the drainage settles, and from there
it can either be pumped to the James River (elevation 100') or simply piped with gravitation as its means of motive action.

Vehicular access to the site from the surrounding areas is good. However, with the assumed increase of 15,000 inhabitants in this area of 2,700 acres, the capacity of transportation facilities had to be improved. This was accomplished in the design with the use of freeway intersections around the major arteries of the development site. Figure 33 illustrates a typical improvement of some of the major intersections, including Monument Avenue, Three Chopt Road, Patterson Avenue and the proposed pleasure drive.

Interior major traffic arteries were minimized by following the natural boundary lines. This pattern simplifies the high intensity of traffic flow by making multiple use of the natural boundaries which already exist. (Figure 34.) The existing secondary roads within the designated boundaries of the community site were eliminated because they did not conform with the new road pattern that makes use of the natural topographical conditions. The construction of these existing roads is not of high quality which further justifies their elimination.

The Neighborhood Units

Detail studies of the neighborhood units proved to be interesting because of their individual characteristics. The three road patterns
used were: the grid artery system with cul-de-sac service streets for Neighborhood Unit One; the curvilinear artery system with loop service streets for Neighborhood Unit Two; and the radial artery system with cul-de-sac service streets for Neighborhood Unit Three. (Figures 35, 37, and 39.)

Neighborhood Unit One:

The grid artery system was found to be the simplest to orientate to summer and winter winds and to the solar system. The longer streets are orientated to carry the summer breezes from southwest to northeast, and the short streets stop the winter winds coming from the northwest. The system is also orderly, and to locate a street or house number would be very simple. However, interior parks, recreation areas and schools are completely surrounded by streets, thus causing indirect access for the inhabitants to these provisions. The grid system is also monotonous and boring, for the central city is based on the grid system; and, when one leaves the city, he wishes to see a more informal and free residential area. Figure 36 indicates the vehicular flow on the minor traffic arteries. Congestion is possible around the neighborhood central area. The provided cul-de-sac service streets are desirable because a series of these streets grouped together create a favorable freeway for pedestrian circulation. It has its limitations in that service vehicles must return to the feeder...
streets rather than continuing on the service streets as it is practiced in the typical grid pattern neighborhood in most cities.

Neighborhood Unit Two:

The curvilinear artery system is used frequently for housing developments, and many interesting vistas are created by this street pattern. Individual character is great here because no two areas look alike. Its limitations are many, however. There is little order, and some service streets are difficult to locate. As it may be observed in Figure 37, the limitations of free access to neighborhood facilities prevail as in the grid artery system. There are many intersections at uneven intervals which create more potential accident hazards than in the grid artery system where the intersections with evenly distributed streets offer a certain rhythm which aids in the alertness of traffic movement for walkers and especially drivers. Congestion is more probable at the neighborhood center with this system than with the others. (Figure 38.)

The use of loop service streets provide continuous drives for service vehicles, but the disadvantage is that freeways for pedestrian walks are broken.
Neighborhood Unit Three:

The radial artery system was found to have many advantages and is highly desirable when neighborhood activities (especially provisions for children) are considered as the basic and foremost functions of the development. With reference to Figures 39 and 40 one can readily see these advantages. The vital consideration of vehicular traffic flow has been restricted to the peripheral boundaries around, and not through the interior neighborhood areas. This design feature also minimizes the actual road surface area which in turn eliminates many major intersections in the neighborhood unit. There are only eight major intersections in this neighborhood as compared with forty-four major intersections in Neighborhood Unit One and as many as fifty-one in Neighborhood Unit Two.

To assure continuous flow of traffic within and without the neighborhood units, freeway intersections have been used at the entrance junctions to all neighborhood units and major highways. A typical intersection of this type is illustrated in Figure 41. A typical street lighting arrangement is also illustrated showing the possibilities of the use of fluorescent lamps for the improvement of visibility for night drivers.

In addition to these features, the radial artery pattern provides a complete system of free-ways for pedestrian walks. These
walks connect directly to all interior neighborhood facilities and provisions without the need of any street crossing for the inhabitants. Although these walks are direct and simple, many fine vistas are created from the surrounding natural wooded areas, landscaping and architecture. The areas allowing these fine views are varied in size and character to obtain the individual quality that a proud community desires.

Street naming or numbering would be very simple with this system which, in turn, provides strangers simple directions for locating their destinations.

Neighborhood Unit Three was selected as the area for further study and final development; it was divided into three major sections: the residential area, the neighborhood center and the community park. The neighborhood center, containing shopping facilities, social and recreational provisions and an elementary school was designed to serve the entire neighborhood. (Figure 64.) The residential area was further divided into three subdivisions, each being similar and served by a nursery school and a church. Provisions for active and passive recreation are also included in each section. These are indicated in Figure 43. Figure 59 illustrates the plan of the community park, the area connecting Neighborhood Unit Three with the community center and the two other neighborhood units. This area is
coordinated with similar park areas in the other neighborhood units which gives a feeling of oneness to the over-all development of the entire community. Figure 42 illustrates the distances of these neighborhood areas and facilities in relationship to one another.

At this stage of the design, where definite sections of the neighborhood were allotted for specific purposes, final detail study of the following was introduced:

Area Served by Nursery School

Since this subdivision, one-third the area of the residential section, was similar in size and character to the other two-thirds of the residential area, it was developed with the idea of creating features that would logically function in any of the three subdivisions. This being the assumption, only this one subdivision is illustrated in Figure 43, while the other two subdivisions are shown merely as to their size, shape and location in the over-all plan of the neighborhood. (Figure 39.)

Further study of pedestrian circulation (Figure 44) shows that the inhabitants have safe access to any of the allotted areas in the interior neighborhood. One exception to this freeway is the entrance to the neighborhood center where an underpass is provided for pedestrians at the minor vehicular traffic artery.
The dwellings and residential facilities were designated as to type, number and arrangement from a study of the inhabitants concerning family size and composition, their activities, and their needs. Final conclusions of this study were used as the criteria for the design of these facilities. A record of this study is presented below.

Family size and composition:

| Number of people per neighborhood | 5,000 |
| Average family size               | 3.6   |
| Number of families per neighborhood| 1,375 |

Types of households: Per Cent

a. Families with minor children and without adult relatives or other outsiders 34.8
b. Families with minor children and with adult relatives or outsiders 17.3
c. Couples of child-bearing age but without children 13.5
d. Couples beyond (presumptive) child-bearing age 6.2
e. Single adults 8.6
f. Other households: two or more adults related or unrelated (except couples), couples with adult relatives and other outsiders 19.6

Types of dwellings designed to be provided for the various types of households:

Elevator Apartments
1. Single individual
2. Young couple (No children)
3. Bachelor couple
HOUSING IN RICHMOND

(Design) SOLUTION

Row Houses
1. Bachelor couple
2. Old couple (No children)
3. Young couple with baby

Detached Dwellings
1. Old couple (With relatives)
2. Young couple with children
3. Invalids
4. Others

Combination of the above figures:

<table>
<thead>
<tr>
<th>Type Household</th>
<th>Per Cent</th>
<th>Hypothetical Percentages</th>
<th>Type Dwellings</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>34.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>17.3</td>
<td>70%</td>
<td>Detached dwellings</td>
</tr>
<tr>
<td>f.</td>
<td>19.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>13.5</td>
<td>20%</td>
<td>Row houses</td>
</tr>
<tr>
<td>d.</td>
<td>6.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e.</td>
<td>8.6</td>
<td>10%</td>
<td>Apartment units</td>
</tr>
</tbody>
</table>

Total number of families per type dwelling:

<table>
<thead>
<tr>
<th>Apartment Units</th>
<th>Row Houses</th>
<th>Detached Dwellings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1375</td>
<td>1375</td>
<td>1375</td>
</tr>
<tr>
<td>x.10</td>
<td>x.20</td>
<td>x.70</td>
</tr>
<tr>
<td>137.5</td>
<td>275.0</td>
<td>962.5</td>
</tr>
<tr>
<td>= 1375 (No. of families)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Hypothetical number of families per type dwelling)

| 130.0 | 275.0 | 970.0 | = 1375 (No. of families) |
The 275 row house units and the 970 detached dwelling units were designated to be located in the interior residential area. Of the 970 detached dwelling units, 687 were calculated to contain families with elementary school aged children, and 283 units to contain families with either all adults or with children of secondary or collegiate ages. Further breakdown of these figures resulted when the area served by the nursery school was considered. The figures divided by three left ninety-two row house units, 229 detached dwelling units with minor children, and ninety-four detached dwelling units with mature families.

The ninety-two row house units were designated to be housed in sixteen buildings, fourteen containing six dwelling units, and two containing four dwelling units. These row house units and the 229 detached dwelling units were placed in the area immediately around the nursery school site. The ninety-four detached dwelling units were allotted to the area beyond the neighborhood feeder streets. This left the families with minor children within close contact of the nursery school, and at the same time provided a desirable distance from all the dwellings to the neighborhood center.

The 130 apartment units for the entire neighborhood were designated to be housed in one elevated structure, thirteen stories with each level containing ten dwelling units. This building
was allotted to the community park area where more space was available. Reference to Figures 43 and 59 will help clarify the explanation of the distribution of these dwelling units.

Dwelling Units:

The dwelling units were given special attention to assure the inhabitants the amenities that make life pleasant. This necessitated adequate provisions for privacy; daylight, sun, and air; quiet and safety; and much outdoor space for various activities.

A. Row House Group

Row houses are desirable for families of moderate means who can comfortably afford a small unit and small outdoor space. This group was arranged close to the neighborhood center because the smaller units generate a higher density of inhabitants which demands priority on close contact to the facilities offered in the center.

Figure 54 illustrates the typical row house group where adequate facilities are provided for parking, clothes hanging, gardening, recreation, sitting and walking. These dwelling units are orientated off the feeder streets for quiet and safety and are provided with privacy on the living side of the building and space for services and utilities on the service street side. Figure 55 gives a view of the living side of the structure.
B. Detached Dwelling Areas

A typical detached dwelling area presented in Figure 56 shows the spacious provisions for recreation, gardening, and outdoor living. Similar to the street layout illustrated in the row house group, this area also provides 40 foot wide feeder streets and 26 foot wide service streets. These street dimensions allow large vehicles such as refuse collection trucks, fire trucks, moving vans and ambulances to readily reach any dwelling safely. The 90 foot diameter loops at the end of the cul-de-sacs provide easy turning space for these large vehicles. In addition to these conveniences, a combination rolled curb and gutter (illustrated in Figure 56) has been provided along the streets. These are designed to permit location of driveways at any point without breaking the curb.

Privacy prevails in these dwelling areas as in the row house groups where dwellings are located off the heavily burdened feeder streets. Figure 57 illustrates further details of a typical detached dwelling. A view of this dwelling unit is shown in Figure 58.

C. Apartment Units

The relative position of the elevator apartment is shown in Figure 59. From this building, many fine views of the park may be observed. Also, the occupants of this building have the advantages of maximum services and inexpensive rentals. Efficient
use is made of the mechanical equipment and structural system here, indicated in Figure 61. The flexibility of the plan enables the change of one bedroom units into two bedroom units or efficiency units for the changing needs of the occupants.

The community center, the neighborhood center, and the community park are easily accessible from this site, which makes it highly desirable for bachelors and young couples who have time to participate in many activities.

A general view of the building is shown in Figure 62, and Figure 63 illustrates the comfortable provisions for the occupants.

Interior Neighborhood Provisions:

A. Recreation Facilities

Both passive and active recreation is provided for children and adults of all ages. The various activities are marked in Figure 45 showing their relationships to one another and to the vehicular traffic arteries. A view of the underpass providing free access to the neighborhood center is illustrated in Figure 46. Because of the streams and branches passing through this area, foot bridges have been provided for the pedestrians. One of these bridges representing the typical bridge structure used throughout the neighborhood is shown in Figure 47.
B. Nursery School

The nursery school has been provided with indoor and outdoor facilities for thirty children. With reference to Figure 42, it can be seen that the area served by the nursery school is within a radius of 1/4 mile. This area is a comfortable walking distance from the 229 detached dwelling units that may possibly contain nursery school age children. The elements incorporated in the plan of this school are listed in Figure 43, and the appearance of the structure is illustrated in Figure 49.

C. Church

Adjacent to the active recreation area and connected by natural wooded areas and pedestrian walks, is the quiet and pleasant area used for passive activities such as walking, sitting and small picnics. At the far end of this area is the location of the church. This site was selected for this building because of its central location relative to the subdivision, and because of its elevated position.

The plan of the church (Figure 50) indicates the importance of the nave, and from the main approach to this building (Figure 51) one can visualize the power of Man's faith symbolized by the towering structure of the church. The huge rocks and boulders used around the base of the building symbolize the mighty foundation of the Church Eternal. These natural forms were used in place of commercial
building materials to give the structure an appearance of natural growth from the earth. The smooth surface and light color of the stone used for the facing material of the nave was used to give the appearance of cleanliness and purity in contrast to the rugged elements at its base.

An interior view of the chancel is presented in Figure 52. It can be noticed in this view that the choir is not visible to the congregation. This detail in the design has been provided to promote a more sincere worship environment for the people rather than a place for spectatorship. It can also be noticed that there is an absence of memorial plaques which exist in many church buildings and which appear to be a series of billboards attracting the attention of the passer-by. By avoiding these less important features of the church, the design of a simple interior with natural surroundings has been attained. The windows have been placed above the eye level so that the attention of the congregation is not distracted by outside activities - only the sky and tops of trees can be observed.

The fellowship hall, Sunday school classes and the minister's study are accessible from an entrance patio illustrated in Figure 53. This entrance has been developed into a lounging area to express its informal character. The outdoor recreation area has been orientated on the sunny side of the building. This area has been provided to promote cooperative games and activities among the members and visitors of the church.
Community Park

Although this park area is within the neighborhood boundaries, it is designated as the "Community Park" because it is actually connected to the park areas of the Neighborhood Units One and Two. The illustration "Duplication of the Neighborhoods" (Figure 97) indicates how the position of this area offers equal opportunity in the use of its facilities by the inhabitants of Neighborhood Units One and Two, and how the park areas of these adjacent neighborhoods are equally accessible to Neighborhood Unit Three.

Activities offered in this area vary from active to noisy games as soft ball and touch football to quiet, leisurely gatherings for picnic and sociable walks and talks. A view of a typical picnic shelter is illustrated in Figure 60, suggesting its inviting character to the visitors.

Neighborhood Center

Because of the multitudes of people anticipated to patronize the neighborhood center, major study was conducted to reach a plan that would assure adequate separation of the pedestrian and automobile traffic. One device used to accomplish this was the avoidance of excessive street surface area and intersections. Another was to provide each group of buildings with its own parking field immediately adjacent. A final provision to assure against any unusual potential
accident hazards was the use of pedestrian underpasses. The facilities at the service of the entire neighborhood located here include a social activities building, an elementary school, a theater and a shopping center. The plan of this group (Figure 64) signifies the vastly different character and superior circulation system as compared to the usual shopping street. The advantage of this scheme is that the physical presence of the center would create a focal point in the neighborhood which should stimulate the growth of vital community relationships. The strong relationships between the inhabitants should in turn produce a stable neighborhood.

Heat Plant:

The schematic diagram illustrated in Figure 65 represents the method of steam distribution adopted through the neighborhood center for heating provisions in the buildings. Figure 66 indicates the plan of the plant and fuel storage yard. Delivery of fuel and collection of refuse to and from this area could be accomplished without interrupting neighborhood activities or marring the beauty of its surroundings.

With the use of induced draft, the stack height could be constructed low enough to be hidden by landscape, and by introducing high tension electrical devices in the stack, the remaining exhaust would practically be negligible. A sketch of this plant (Figure 67)
HOUSING IN RICHMOND

(Design) SOLUTION

illustrates the acceptable view it produces in contrast to the
dilapidated heat plants managed in many commercial production areas.

Social Activities Building:

In this building are provided facilities for a general health
clinic, a library, meeting rooms, administrative and counselling
offices, and a large assembly room. Relationship of these various
elements is indicated in Figure 68.

The health clinic facilitates the provisions of general health
check-ups, x-rays and special emergency services for the neighborhood
inhabitants. It is designed to accommodate several operations simulta-
neously. The entrance patio (presented in Figure 69) is meant to
give the visitor (especially children) a feeling of relaxation and
freedom rather than a feeling of being a patient with an illness.

From the main entrance (presented in Figure 70) one has direct
access to the various social facilities in the building.

The library would offer literature mainly for adults because the
elementary school would be supplied with books and information that
attract most young children.

Meeting rooms are provided for neighbors to occupy when dis-
cussing community activities and affairs. Formal and informal
organizations would also be encouraged to utilize these facilities.
HOUSING IN RICHMOND

From these rooms the occupants have direct access to an outdoor lounge area where meetings can be conducted in the summer months.

The administrative and counselling offices would be open to the neighborhood inhabitants for various social services such as vocational and employment aid or direction, family and marriage problem discussion, and other similar problems.

An assembly hall with kitchen facilities is provided for all age groups. This hall could be used for lectures, meetings, movies, dances and various other activities. Outdoor provisions are also offered for these recreational affairs. A view of this section of the building is presented in Figure 71.

Elementary School:

The orientation of this structure makes optimum use of the solar system and the winter and summer winds as do the other buildings in the neighborhood center. From a study of the plan (illustrated in Figure 72) one can see how the summer breezes from the southwest pass between the classroom wings and how the winter winds from the northwest are blocked. All the classrooms receive adequate light from the north, and receive all the needed sunshine and air when classes are conducted in the outdoor areas adjacent to the respective rooms.
Provisions for classroom storage and general facilities are indicated by the sketches presented in Figure 73. Compartment units have been arranged to furnish the space needed to store supplies, books, toys and other items used in the routine of daily class programs.

The open design of this building (indicated in Figures 74 and 75) was based on the demand for adequate space, light and air, and also on the psychological effect that such a design would have on the occupants - children! Children love to run and play. They can play all day and never seem to lose a drop of energy. After observing the plan of this school, one would say that the important elements such as the auditorium, cafeteria and gymnasium should be centrally located to expedite direct accessibility. It has been observed that children do not want direct accessibility - only the old folks want that. So it has been provided for the happiness of the children - a long walk (or run) to the various activities. This structure is also flexible in that classrooms may be removed or added whenever the occasion demands.

The figures used as the criteria for the design of this structure were based on the accommodations necessary for 600 children. The figure of 600 children was arrived at from the following study:
From Table 6, PART ONE, an assumption was made that fifteen pupils per school year per 1,000 total population would be an adequate sized school to serve the neighborhood. With this method of calculating, the result was a plant to provide for 525 students. However, after an investigation of the figures involving the schools in Radford, Virginia, the conclusion of providing for 600 children was adopted. The investigation of the figures from Radford is presented below:

Population in Radford in 1950 9,026
Total children from 1 to 19 years of age 2,675
Total children from 7 to 19 years of age 1,637
Total children in school, ages 6 to 19 1,650
Total children ages 1 to 19:

<table>
<thead>
<tr>
<th>Age</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year</td>
<td>130</td>
</tr>
<tr>
<td>2 years</td>
<td>196</td>
</tr>
<tr>
<td>3 years</td>
<td>213</td>
</tr>
<tr>
<td>4 years</td>
<td>142</td>
</tr>
<tr>
<td>5 years</td>
<td>145</td>
</tr>
<tr>
<td>6 years</td>
<td>162</td>
</tr>
<tr>
<td>7 years</td>
<td>178</td>
</tr>
<tr>
<td>8 years</td>
<td>166</td>
</tr>
<tr>
<td>9 years</td>
<td>154</td>
</tr>
<tr>
<td>10 years</td>
<td>129</td>
</tr>
<tr>
<td>11 years</td>
<td>121</td>
</tr>
<tr>
<td>12 years</td>
<td>138</td>
</tr>
<tr>
<td>13 years</td>
<td>105</td>
</tr>
<tr>
<td>14 years</td>
<td>117</td>
</tr>
<tr>
<td>15 years</td>
<td>118</td>
</tr>
<tr>
<td>16 years</td>
<td>118</td>
</tr>
<tr>
<td>17 years</td>
<td>106</td>
</tr>
<tr>
<td>18 years</td>
<td>101</td>
</tr>
<tr>
<td>19 years</td>
<td>86</td>
</tr>
</tbody>
</table>

In the year 1950, there were:

450 students in the high school grades (8 through 12)
750 students in the first through fourth grades
450 students in the fifth through seventh grades.
There were approximately 2,300 families in 1950, and 1,650 children in school ages six through nineteen, or about 0.6 of a child per family in school. There were a little more than 3.1 persons per family.

(Source: F. E. DeHaven, Superintendent of Radford City Schools.)

There were 1,143 children between the ages 5 and 12 years in 1950 (kindergarten through sixth grade.) This figure is approximately one-eighth of the total population. One-eighth of 5,000 (population of the proposed neighborhood in this study) equals 625.

Averaging 625 (the more recent figure) and 525 (from Table 6 - an early figure - 1949), but allowing more emphasis on the first figure, the figure 600 was arrived at for the study.

Twenty general classrooms have been provided, each with a capacity of thirty students. Four special classrooms, a gymnasium, work shop, cafeteria, auditorium and outdoor recreation areas are also included in the plant.

The main entrance gives direct access to the administrative offices, clinical facilities, library, auditorium, lobby, and public toilets. A view of the teachers' outdoor lounge area, which is included in this wing, is illustrated in Figure 76.
Theater:

The central position of the movie theater creates a center of interest among the buildings in the neighborhood center. It has been tied with the shops by direct connection into the roof slab of these smaller structures. This treatment creates an interesting effect as well as simplifies the structural system. This roof slab is also used as a means of escape in case of emergency from the exit provided at the second floor level of the theater. These details are indicated in Figures 77 and 78. A view of the theater front is presented in Figure 80.

Shopping Center:

The composition of the shopping center is illustrated in Figure 77. The main areas have been indicated in this plan to demonstrate the utilization of space, such as grouping of utility rooms, lockers and toilets. Circulation of vehicular and pedestrian traffic has been kept simple and direct to create easy access to the shops from either the parking lot or the walks. Once shoppers are at the center, they are free to do all their shopping under cover, for all the shops are flanked with covered sidewalks. In addition to this, each shop is located so that its entrance is protected from bad weather by an arcade. These features bring the scale of the structure down to human proportions, and with the introduction of
scattered trellises and openings in the roof areas, a touch of gaiety and charm is achieved.

The differences in elevation of the shops are due to the topographic conditions of the site (marked in Figure 92), but these conditions were utilized advantageously in that the slope of the land permits adequate drainage of the entire group arrangement as well as attains interesting proportions for architectural purposes. Elevations of the shopping center indicating the mass proportions, forms, and material uses are illustrated in Figure 91.

The structural scheme adopted for this building permits the possibility of many shop arrangements. This plan offers shop owners the opportunity to expand or contract the size of their shops by making only minor and inexpensive alterations. A perspective of a typical section through this structure is presented in Figure 93. Further details showing a section through a shop window is illustrated in Figure 95. These sections represent the simple and straightforward use of materials and construction methods for the purpose of achieving the advantages of low cost and greater flexibility.

In Figure 95, element 7 is a steel rod (tension member) that supports the entire weight of the canopy (element 16); thus, eliminating the need of bulky compression members below the canopy and in line with the window mullions. The steel rod is, in turn, incased
in a compressive member to insure against any movement of the canopy during wind storms. The entire canopy is securely anchored at each column. With the use of this system, the maximum of glass front is feasible, leaving much space for the display of store items. The use of heavy masonry on the exterior bulkheads combined with aluminum window sections eliminates the problem of maintenance almost completely. The canopy provides adequate protection from rainfall and summer heat as well as produces architectural distinctiveness.

Off-sets in the shop arrangement have been avoided completely because of the complexity of its form and function. Any unfunctional feature would only disturb the simplicity of the structure, and possibly confuse the customer. It has also been found that partly hidden shops, due to recesses and awkward shapes, have adversely lost their values.

Steps and ramps have been avoided at the shop entrances because of the hazardous effects they produce for pedestrians. However, because of the irregular topographic conditions, slight slopes on the exterior walks have been unavoidable. These do not create a major problem, for the slopes are minimum, and with the interesting proportions gained from these differences in levels, one may appreciate the slight climb.
To further insure and enhance the character and attractiveness of the center, advertising signs and billboards have been eliminated. The indiscriminate use of signs in conjunction with poor architecture is one of the features that has disgraced the business districts of many American cities.

The basement plan (Figure 78) indicates the spaces provided for mechanical equipment and storage for the various shops. The additional cost of providing basement space is relatively low, and with the possibilities of the need not only for expansion for heating or cooling equipment, but also for actual store expansion, makes this addition worthwhile. The integration of steam tunnels and conduit raceways are also presented in this figure.

Second floor provisions were avoided because they are relatively undesirable business locations.

A general view of the shop group is illustrated in Figure 79.

Shops:

The number, type and capacity of shops required for neighborhoods vary with particular localities. It is difficult to recommend the exact requirements for a neighborhood that is hypothetical, but there are some things that are definitely needed in daily family life. Two major items are food and medicine. These would require a food market and a drugstore. Less important, but desirable facilities
would include a barber shop, shoe repair shop, beauty shop, laundry and dry cleaning service and several other types of businesses.

The U. S. Census Bureau has gathered information concerning the number of people required to support different types of retail stores. Eleven typical cities (Atlanta, Baltimore, Denver, Fargo, Kansas City, Providence, San Francisco, Seattle, Springfield, Syracuse, and Chicago) have been selected to represent the average figures for this study. The population requisite per store of these cities is as follows:

<table>
<thead>
<tr>
<th>Kind of Business</th>
<th>Inhabitants per Store</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art and antique</td>
<td>13,371</td>
</tr>
<tr>
<td>Automobile</td>
<td>6,673</td>
</tr>
<tr>
<td>Automobile accessory</td>
<td>3,270</td>
</tr>
<tr>
<td>Bakery</td>
<td>2,548</td>
</tr>
<tr>
<td>Boot and shoe</td>
<td>3,346</td>
</tr>
<tr>
<td>Building material</td>
<td>6,960</td>
</tr>
<tr>
<td>Cigar and tobacco</td>
<td>2,071</td>
</tr>
<tr>
<td>Clothing and furnishing, men's ready-to-wear</td>
<td>2,397</td>
</tr>
<tr>
<td>Clothing, women's</td>
<td>4,063</td>
</tr>
<tr>
<td>Confectionery, ice cream, soft drink</td>
<td>1,017</td>
</tr>
<tr>
<td>Custom tailor</td>
<td>4,245</td>
</tr>
<tr>
<td>Dairy and poultry products</td>
<td>11,772</td>
</tr>
<tr>
<td>Department</td>
<td>53,486</td>
</tr>
<tr>
<td>Drug</td>
<td>1,545</td>
</tr>
<tr>
<td>Dry goods and notions</td>
<td>2,065</td>
</tr>
<tr>
<td>Electrical appliance and supply</td>
<td>9,057</td>
</tr>
<tr>
<td>Florist</td>
<td>2,510</td>
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<tr>
<td>Fur and fur clothing</td>
<td>19,118</td>
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<tr>
<td>Furniture and house furnishing</td>
<td>2,388</td>
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<tr>
<td>Gasoline and oil</td>
<td>1,613</td>
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<tr>
<td>General</td>
<td>90,569</td>
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<td>Grocery, delicatessen</td>
<td>325</td>
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<tr>
<td>Hardware</td>
<td>2,748</td>
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<tr>
<td>Hat and cap - men's and boy's</td>
<td>26,638</td>
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<tr>
<td>Jewelry</td>
<td>4,958</td>
</tr>
</tbody>
</table>
## Housing in Richmond

<table>
<thead>
<tr>
<th>Category</th>
<th>Area (sq ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junk</td>
<td>36,131</td>
</tr>
<tr>
<td>Meat - poultry and fish</td>
<td>1,189</td>
</tr>
<tr>
<td>Millinery and artificial flowers</td>
<td>6,136</td>
</tr>
<tr>
<td>Motorcycle and bicycle</td>
<td>57,565</td>
</tr>
<tr>
<td>Musical instrument and sheet music</td>
<td>12,239</td>
</tr>
<tr>
<td>Office equipment</td>
<td>15,473</td>
</tr>
<tr>
<td>Optical goods</td>
<td>26,995</td>
</tr>
<tr>
<td>Paint, oil, varnish and glass</td>
<td>11,772</td>
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<tr>
<td>Photographic supplies and camera</td>
<td>63,483</td>
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<tr>
<td>Plumbing and heating fixture and supply</td>
<td>9,447</td>
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<tr>
<td>Radio</td>
<td>18,306</td>
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<tr>
<td>Restaurants</td>
<td>813</td>
</tr>
<tr>
<td>Sporting goods</td>
<td>44,985</td>
</tr>
<tr>
<td>Stationery, books, magazines, etc.</td>
<td>6,402</td>
</tr>
<tr>
<td>Toys and games</td>
<td>83,860</td>
</tr>
<tr>
<td>Trunks and leather goods</td>
<td>21,227</td>
</tr>
<tr>
<td>Typewriting and calculating machines</td>
<td>40,193</td>
</tr>
<tr>
<td>Variety</td>
<td>18,610</td>
</tr>
</tbody>
</table>

*Source: Community Builders' Council of the Urban Land Institute, The Community Builders Handbook.*

In addition to this information, a knowledge of area requirements for these stores is desirable. Figures of average usable areas for types of retail stores in large suburban centers have been taken from existing stores of recent construction and compiled into a list. Although it is acceptable to use such a list as the criteria for final design of a shopping center, it must be understood that there is no single method to scientifically meet the various requirements. The following list of store areas may be considered reasonable to assume as design figures:
<table>
<thead>
<tr>
<th>Store Type</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Super market</td>
<td>24,000 sq. ft.</td>
</tr>
<tr>
<td>Food market (chain)</td>
<td>12,500 sq. ft.</td>
</tr>
<tr>
<td>Theater</td>
<td>10,000 sq. ft.</td>
</tr>
<tr>
<td>Food market (independent)</td>
<td>5,000 sq. ft.</td>
</tr>
<tr>
<td>Department store</td>
<td>5,000 sq. ft.</td>
</tr>
<tr>
<td>Five and ten (chain)</td>
<td>5,000 sq. ft.</td>
</tr>
<tr>
<td>Drug store (chain)</td>
<td>4,000 sq. ft.</td>
</tr>
<tr>
<td>Variety - junior department</td>
<td>3,150 sq. ft.</td>
</tr>
<tr>
<td>Ladies' wear</td>
<td>3,000 sq. ft.</td>
</tr>
<tr>
<td>Drug store (independent)</td>
<td>2,700 sq. ft.</td>
</tr>
<tr>
<td>Restaurant and bar</td>
<td>2,500 sq. ft.</td>
</tr>
<tr>
<td>Shoes</td>
<td>2,500 sq. ft.</td>
</tr>
<tr>
<td>Bank</td>
<td>2,250 sq. ft.</td>
</tr>
<tr>
<td>Hardware</td>
<td>2,100 sq. ft.</td>
</tr>
<tr>
<td>Furniture</td>
<td>2,100 sq. ft.</td>
</tr>
<tr>
<td>Meat market</td>
<td>1,750 sq. ft.</td>
</tr>
<tr>
<td>Men's wear</td>
<td>1,750 sq. ft.</td>
</tr>
<tr>
<td>Ladies' hat shop</td>
<td>1,750 sq. ft.</td>
</tr>
<tr>
<td>Tea room, etc.</td>
<td>1,250 sq. ft.</td>
</tr>
<tr>
<td>Liquor store</td>
<td>1,250 sq. ft.</td>
</tr>
<tr>
<td>Post office</td>
<td>1,250 sq. ft.</td>
</tr>
<tr>
<td>Jewelry (watch repair)</td>
<td>1,125 sq. ft.</td>
</tr>
<tr>
<td>Bakery</td>
<td>1,050 sq. ft.</td>
</tr>
<tr>
<td>Dry cleaning and dyeing</td>
<td>1,050 sq. ft.</td>
</tr>
<tr>
<td>Laundry (pick-up)</td>
<td>1,050 sq. ft.</td>
</tr>
<tr>
<td>Delicatessen</td>
<td>1,050 sq. ft.</td>
</tr>
<tr>
<td>Radios and repair and electric</td>
<td>1,050 sq. ft.</td>
</tr>
<tr>
<td>Candy and ice cream</td>
<td>1,000 sq. ft.</td>
</tr>
<tr>
<td>Florist</td>
<td>750 sq. ft.</td>
</tr>
<tr>
<td>Barber</td>
<td>750 sq. ft.</td>
</tr>
<tr>
<td>Beauty parlor</td>
<td>750 sq. ft.</td>
</tr>
<tr>
<td>Cigar and tobacco</td>
<td>750 sq. ft.</td>
</tr>
<tr>
<td>Book and stationery store</td>
<td>600 sq. ft.</td>
</tr>
<tr>
<td>Shoe repair</td>
<td>500 sq. ft.</td>
</tr>
<tr>
<td>Gift shop</td>
<td>450 sq. ft.</td>
</tr>
</tbody>
</table>

(Source: Community Builders' Council of the Urban Land Institute, The Community Builders Handbook.)
A successful shopping center is one which works - one which, in the end, supplies the needs of its particular community. Only until this is achieved may a center be considered successful.

From the study of the above and other related information the group of shops considered capable of adequately serving this particular neighborhood, and being easily supported by the neighborhood population, has been designated to be the following:

<table>
<thead>
<tr>
<th>Store Type</th>
<th>Area (Main Floor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food market</td>
<td>14,500 sq. ft.</td>
</tr>
<tr>
<td>Drug store</td>
<td>3,300 sq. ft.</td>
</tr>
<tr>
<td>Barber shop</td>
<td>750 sq. ft.</td>
</tr>
<tr>
<td>Beauty shop</td>
<td>900 sq. ft.</td>
</tr>
<tr>
<td>Shoe repair shop</td>
<td>850 sq. ft.</td>
</tr>
<tr>
<td>Laundry and cleaner agency</td>
<td>1,050 sq. ft.</td>
</tr>
<tr>
<td>Tailor shop</td>
<td>1,100 sq. ft.</td>
</tr>
<tr>
<td>Children's wear</td>
<td>2,300 sq. ft.</td>
</tr>
<tr>
<td>Variety shop</td>
<td>2,000 sq. ft.</td>
</tr>
<tr>
<td>Restaurant</td>
<td>3,250 sq. ft.</td>
</tr>
<tr>
<td><strong>Total floor area</strong></td>
<td><strong>30,000 sq. ft.</strong></td>
</tr>
<tr>
<td>Customer parking space</td>
<td>50,000 sq. ft.</td>
</tr>
</tbody>
</table>

A. Food Market

The treatment of the food market (Figure 81) provides simple circulation for the customers, enabling them to serve themselves freely with the minimum amount of effort. The checkers have complete control over the incoming and outgoing customers at the main entrance. By inspecting the plan, one can easily note the circulation route from entrance, through turnstile, to buggies, to general sales area, return to checkers, and then to exit.
An interior view of the market is presented in Figure 82. The simple decoration and structure creates a feeling of cleanliness and airiness - a feature very desirable in a food store.

The detailed section through this store (Figure 94) indicates the various elements incorporated in the design. The lighting system with the lowered "egg-crate" louvered ceiling produces a well lighted interior. For special food displays and after hours night lighting, several detachable spotlights have been provided with the ceiling arrangement. Air conditioning ducts, unit heaters and conduits are completely hidden above the suspended ceiling, thus leaving the main customer area with a refreshed appearance.

A detailed element of the meat service area is illustrated in Figure 83. The combination of the space required for the display case, scale, slicer, paper rack and refrigeration compressor has been minimized for the benefit of the clerk as well as the customer. This feature prevents the excessive lost motions that are usually practiced in grocery stores. With this organized design scheme, the clerk could serve a customer completely with the minimum number of steps, if any at all.

Facilities near the loading platform at the rear entrance have been provided for truck drivers. These drivers need toilet facilities, which in many cases are not available.
B. Shoe Repair Shop

Provisions for shoe repair and hat blocking and cleaning are grouped into an efficient and attractive space, shown in Figure 84.

C. Beauty Shop

Figure 84 illustrates the layout of the requirements for this shop. A comfortable waiting area is provided for the patrons at the shop entrance.

D. Barber Shop

The open plan of this shop (Figure 84) will prevent its becoming a "hang-out" as many barber shops do. This arrangement combined with its simple design will insure against its ever becoming a sore spot in the center.

E. Laundry and Tailor Shop

These two shops (Figure 84) employ similar service counters and waiting areas. The services are somewhat alike except that the tailor performs all the work in the shop while the laundry is an agency that sends all the work to a central plant established in the city. The entrances to these shops are located under the arcade which also covers the entrances to the shoe repair shop, beauty shop and barber shop.
F. Drug Store

Sales counters and show cases have been informally arranged to form interesting patterns for merchandise displays. (Figure 85.) It is a known fact that handsome displays will sell goods almost as readily as will salesmen. With this point in mind, a simple and direct series of display shelves have been designed for the purpose of this store. An illustration of a typical set of shelves is shown in Figure 86 indicating the many arrangements of display that are adaptable to this composition.

Generous space has been allotted to the prescription counter and work area because of its important position as servant to the neighborhood. A smaller area with a soda fountain facilitates the people who may wish a cold drink or a bite to eat. The fountain service area has been arranged for minor occasions, for the restaurant located a short distance from the drug store provides more adequate facilities for serving foods and drinks.

G. Children's Wear Shop

A compact lay-out of this shop (illustrated in Figure 85) was used because of the many small items that have to be available for infants and small children. An out-of-the-way corner where the customers may sit while fitting shoes, is used for footwear. Another corner area situated away from the main circulation is used for
clothes fitting. Dressing stalls have been located near the workers' toilet in case of emergencies for small children. A triple mirror arrangement is also provided for the customers purchasing in this area.

H. Variety Shop

General merchandise is supplied here including toys, hardware, children's books, candies and nuts. The gaiety that constitutes this type of shop is further supplemented by the free treatment at its entrance indicated on the plan in Figure 87.

I. Restaurant

Four types of services are provided including booths, a snack bar, indoor dining tables and outdoor dining tables. The outdoor dining facilities are grouped around a pool creating an intimate and pleasant spot. This area can be served directly from the kitchen with minimum circulation. Figure 87 shows the arrangement of the relationship of these elements.

Special features of the booths have been provided for the convenience of the customers and the owner. From the illustrations in Figure 88, one may understand how the legless furniture creates additional space for free movement and offers unusual comfort for the occupants. These seats have an especially clean appearance
because of the absence of the joints where trash usually accumulates. The work involved in mopping the floor area under the booths has been minimized greatly because the supporting obstacles have been eliminated.

Another interesting detail included in the restaurant decoration is a handleless clock mounted on the mirrored wall over the back bar of the snack bar. With the use of plexa-glass disks instead of the usual hands, an illusion of floating markers about the numerals is created. The design of this item is illustrated in Figure 89.

An exterior view of the restaurant is presented in Figure 90.

SUMMARY

Care was taken to provide as many of the desirable amenities and standards discussed in PART ONE as possible. Orientation for sunshine, breezes, and topographic slopes were major considerations in the development of dwellings and residential areas. Recreation areas were located on the flatest land, major traffic arteries were entirely excluded from interior neighborhood areas, and the most efficient and safe pattern of street layout was used.

The neighborhood center, facilitating the daily needs of the inhabitants, was developed as a closely knit group to create as direct and safe an access as possible for a maximum number of automobiles and pedestrians with the minimum driving or walking requirements. These centrally located neighborhood buildings also serve as
a focal point of architectural interest and residential activity, as well as promote multiple use of the facilities.

Open spaces and parks were provided to create interesting as well as healthful environmental factors. These parks also act as connecting elements, tying the entire neighborhood together and producing a feeling of a continuous open park throughout the development.

As a means of further explanation of the integration of the various elements in the neighborhood, a presentation has been made of the entire neighborhood area showing these relationships. (Figure 96.)

A final step has been taken to explain the complete development of the over-all community organization by an additional illustration. (Figure 97.) This plan shows the continuous park area surrounding the community center and connecting the three neighborhood units creating a oneness in the entire composition.
RELATIONSHIP OF NEIGHBORHOOD UNITS TO THE ENTIRE COMMUNITY

FIGURE 32
1. Braided or "T" interchange
2. Simple grade separation
3. Half cloverleaf interchange
4. Full cloverleaf interchange

A. Three Chopt Road
B. Monument Avenue
C. Patterson Avenue
D. Proposed Pleasure Drive

Highway Improvements at Major Intersections Adjacent to the Community

Figure 33
ENTIRE COMMUNITY

AVERAGE INTENSITY
HIGH INTENSITY

SCHEMATIC DIAGRAM OF

MAJOR VEHICULAR TRAFFIC FLOW

FIGURE 34
Relationship of Allotted Areas in Neighborhood Unit One

Figure 85

Grid Artery System with Cul-de-sac Service Streets

Scale: 600 1000 1600 2000

0 600 1000 1600 2000

Major Traffic Arteries
Minor Traffic Arteries
Neighborhood Feeder Streets
Residential Service Streets
Intersections
Community Center
Shopping Center
Social Center
Elementary School
Nursery Schools
Churches
Parks
Recreation Areas
Attached Dwellings
Detached Dwellings
Green Belts and Buffer Strips
SCHEMATIC DIAGRAM OF MINOR VEHICULAR TRAFFIC FLOW

FIGURE 36
Relationship of Allocated Areas in Neighborhood Unit Two

Figure 37
NEIGHBORHOOD UNIT TWO

AVERAGE INTENSITY
HIGH INTENSITY

SCHEMATIC DIAGRAM OF
MINOR VEHICULAR TRAFFIC FLOW
FIGURE 38
INFORMAL RADIAL ARTERY SYSTEM WITH CUL-DE-SAC SERVICE STREETS

RELATIONSHIP OF ALLOTTED AREAS IN NEIGHBORHOOD UNIT THREE

FIGURE 29
NEIGHBORHOOD UNIT THREE

SCHEMATIC DIAGRAM OF MINOR VEHICULAR TRAFFIC FLOW

FIGURE 40

AVERAGE INTENSITY
HIGH INTENSITY
Typical Lighting Unit

"Standard supports four large fluorescent lamps in vertical position, set behind reflector, vanes designed to increase the horizontal light spread. A unit of this type might be used to light up the landscape area on either side of the road, thus decreasing the contrast ratio between the pavement and its surroundings and improving visibility, as well as making night driving more interesting and attractive."

(Source: "Street and Highway Lighting for 194x," Architectural Forum, October 1943.)

Typical Major Intersection
Figure 41
RELATIVE DISTANCES OF NEIGHBORHOOD FACILITIES

FIGURE 42
AREA SERVED BY NURSERY SCHOOL

FIGURE 43
FREE ACCESS TO NEIGHBORHOOD FACILITIES

SCHEMATIC DIAGRAM OF PEDESTRIAN CIRCULATION

FIGURE 44
1. Pedestrian Walks
2. Pedestrian Underpass
3. Vehicular Circulation

Active Area
4. Nursery School
5. Softball
6. Tennis
7. Shuffleboard
8. Croquet
9. Horse Shoe
10. Field Hockey
11. Volleyball
12. Soccer
13. Swimming
14. Bicycle Riding
15. Equipment Shelter

Passive Area
16. Church Building
17. Picnic Shelters
18. Amphitheater
19. Sitting & Walking

Scale: Feet

Interior Neighborhood Provisions

Figure 45
ELEVATION

PLAN

UNDERPASS DETAILS

"SAFE ACCESS TO NEIGHBORHOOD CENTER"

PEDESTRIAN UNDERPASS

FIGURE 46
NURSERY SCHOOL

FIGURE 49
1. Entrance
2. Lobby
3. Lounge
4. Cloak Space
5. Stair to Balcony
6. Church
7. Nave
8. Chancel
9. Lobby & Lounge
10. Nave
11. Chancel
12. Organ

13. Seating
14. Stage
15. Kitchen
16. Toilets
17. Storage
18. Office Group
19. Study
20. Records
21. Lounge

Sunday School
21. Nursery Class
22. Kindergarten
23. Primary Class
24. Junior Class
25. Intermediate
26. Senior Class
27. Young People
28. Young Couples
29. Adult Class
30. Club Room

General Storage Area
31. Circulation Space
32. Public Toilets
33. Outdoor Lounge
34. Recreation Area

Scale
0 25 50 75 100 Feet
CHURCH

FIGURE 81
ENTRANCE PATIO

FIGURE 53
1. Venicular & Pedestrian Lighting
2. Fire Water Protection
3. Children’s Play Area
4. Adults’ Recreation Area
5. Vegetable Gardens
6. Utility Yards
7. Outdoor Living Space
8. Parking
9. Service Street
10. Feeder Street

Scale: Feet

First Floor
1. Entrance Space
2. Living Area
3. Dining Area
4. Kitchen

Second Floor
5. Sleeping Space
6. Toilet
7. General Storage Space
8. Heater Room

Typical Row House Group

Figure 54
"COOPERATIVE LIVING"

ROW HOUSE GROUP

FIGURE 55
AVERAGE INCOME

1. ENTRY
2. LIVING SPACE
3. DINING SPACE
4. KITCHEN SPACE
5. UTILITY SPACE
6. SLEEPING SPACE
7. TOILETS
8. GENERAL STORAGE
9. HEATER ROOM
10. OUTDOOR LIVING & DINING SPACE
11. RECREATION & GARDENING PROVISIONS
12. CAR PORT & TOOL STORAGE

TYPICAL DETACHED DWELLING

FIGURE 87
ONE-FAMILY
DETACHED DWELLING

FIGURE 58
COMMUNITY PARK
AND APARTMENT SITE

FIGURE 59

1. NATURAL WOODS
2. PICNIC SHELTERS
3. OPEN SPACES
4. SITTING & WALKING
5. KITE FLYING
6. BOAT HOUSE
7. COMMUNITY CENTER
8. APARTMENT BUILDING
9. PARKING
10. VEHICULAR CIRCULATION
PICNIC SHelter

FIGURE 60
TYPICAL FLOOR PLAN
1 ONE BED ROOM UNIT
2 TWO BED ROOM UNIT
3 EFFICIENCY UNIT
4 VERTICAL CIRCULATION
5 PUBLIC PASSAGE
6 PRIVATE OUTDOOR SPACE

SCALE FEET
0 25 50

ONE BED ROOM UNIT
2 LIVING AREA
3 DINING AREA
4 KITCHEN & UTILITY AREA
5 SLEEPING AREA
6 TOILET
7 OUTDOOR LIVING AREA

TERRACE

PARK APARTMENTS

FIGURE 61
"NEIGHBORHOOD LANDMARK"

PARK APARTMENTS

FIGURE 62
SERVING THE ENTIRE NEIGHBORHOOD

1. SHOPS
2. THEATER
3. SOCIAL ACTIVITIES
4. ELEMENTARY SCHOOL
5. RECREATION FIELD
6. HEAT PLANT
7. PARKING
8. FOUNTAIN
9. FLAG
10. PEDESTRIAN WALKS
11. PEDESTRIAN UNDERPASSES
12. VEHICULAR CIRCULATION

NEIGHBORHOOD CENTER

FIGURE 64
FIGURE 65
Schematic diagram illustrating the distribution of steam to the central buildings.
1. Heat Plant
2. Steam Tunnel
3. Theater
4. Shops
5. Social Building
6. Elementary School

FIGURE 66
Heat Plant
1. Entrance
2. Boiler Room
3. Stack
4. Maintenance Room
5. Lockers & Toilet
6. Fuel Storage
7. Truck Circulation
8. Fence

FIGURE 67
Heat Plant

Serving the neighborhood center.
ASSEMBLY HALL

FIGURE 71
STORAGE UNIT: 1' x 2' x 4'
COAT CLOSET: 6' x 2' x 4'
(SAME TYPE UNIT AS ABOVE)

BACKS OF COMPARTMENT UNITS SERVE AS TACK BOARDS.

SHELF UNIT: 3' x 2' x 4'

TYPICAL STORAGE COMPARTMENT ARRANGEMENT.

FILE CABINET: 3' x 2' x 2'

COMPARTMENT UNIT: 3' x 2' x 9'

CHALK BOARD: 3' x 8'

CLASSROOM STORAGE UNITS
Figure 73
CLASSROOM WING

FIGURE 75
TEACHERS' LOUNGE

FIGURE 76
SHOPPING CENTER AND THEATER

FIGURE 77

0 25 50 75 100
SCALE FT. EAT.

SHOP
1. FOOD MARKET
2. SHOE REPAIR SHOP
3. BEAUTY SHOP
4. CLOTHES SHOP
5. TAILOR SHOP
6. LAUNDRY & CLEANER
7. DRUG STORE
8. CHILDREN'S WEAR
9. VARIETY SHOP
10. RESTAURANT
11. VEHICULAR PARKING BAYS
12. PEDESTRIAN WALKS
13. CIRCULATION LIGHTING

THEATER
1. FOYER
2. LOBBY
3. LOUNGE
4. CONCESSIONS
5. TICKET BOOTH
6. OFFICE
7. LOUNGE & TOILETS
8. AUDITORIUM
9. STAGE & SCREEN
10. STAIRS TO BALCONY
11. FOUNTAIN POOL
12. SCULPTURE PIECES
BASEMENT PLAN OF
SHOPPING CENTER AND THEATER

SHOPS
1. Space for general storage and mechanical equipment
2. Underground space
3. Steam, tunnel, also including communication and electrical conduits
A. Pool market
B. Drug store
C. Children's shop
D. Variety shop
E. Restaurant

THEATER (E)
1. Same as shops
2. Same as shops
3. Same as shops

SECOND FLOOR PLAN
1. Lobby & lounge
2. Emergency exit
3. Balcony seating
4. Projection booth
5. Rewinding room
6. Foyer
7. Space, above.
8. Main floor lobby
B. Space, above.
9. Main auditorium

FIGURE 78
THEATER

FIGURE 80
FOOD MARKET

FIGURE 82
FOOD MARKET
MEAT SERVICE AREA

FIGURE 83
SHOE REPAIR SHOP
1. CASH COUNTER
2. STITCHING
3. FINISHING MACHINE
4. HAT CLEANING
5. HAT & SHOE CASES
6. GENERAL STORAGE SPACE
7. WORKER & TOILETS

BEAUTY SHOP
1. LOUNGE
2. CASH COUNTER
3. DRYING AREA & MANICURE
4. BOOTH WITH WATER BASINS
5. WINDOW DISPLAY
6. GENERAL STORAGE SPACE
7. PUBLIC & WORKER'S TOILETS

BARBER SHOP
1. WAITING AREA
2. BARBERING AREA
3. SHAMPOO SINK
4. MANICURE TABLE
5. GENERAL STORAGE
6. WORKER'S LOCKERS & TOILET

LAUNDRY & CLEANER AGENT
1. PUBLIC WAITING SPACE
2. SERVICE COUNTER
3. OFFICE
4. STORAGE SPACE
5. WORKER'S TOILETS

TAYLOR SHOP
1. PUBLIC WAITING SPACE
2. SERVICE COUNTER
3. OFFICE
4. WORK AREA
5. GENERAL DISPLAY
6. STEAM CONTROL ROOM
7. GENERAL STORAGE SPACE
8. WORKER'S TOILETS

SHOPS

FIGURE 84
DRUG STORE
1 DRUGS
2 TOILETRIES
3 TO BACCOS
4 MAGAZINES, ETC.
5 PUBLIC TELEPHONES
6 PRESCRIPTION COUNTER
7 FOUNTAIN SERVICE AREA
8 GENERAL STORAGE
9 GENERAL DISPLAY & SHOW WINDOWS
10 WORKER'S LOCKER ROOMS & TOILETS

CHILDREN'S WEAR SHOP
1 CHILD APPAREL
2 SHOE SALES AREA
3 INFANT WEAR
4 SALES COUNTER
5 FITTING ROOMS
6 GENERAL DISPLAY
7 GENERAL STORAGE SPACE
8 WORKER'S TOILETS

SCALE  FEET

SHOPS
FIGURE 85
DRUGSTORE SALES COUNTER

FIGURE 86
VARIETY SHOP
1. Sales Counter
2. General Display
3. Toys
4. Hardware Goods
5. Candies & Nuts
6. Children's Books
7. General Storage Space
8. Worker's Toilets

RESTAURANT & SNACK BAR
1. Sitting Areas
2. Booths
3. Living Tables
4. Snack Bar & Stools
5. Public Telephone Booth
6. Outdoor Dining Space
7. Kitchen
8. Serving Counter
9. Dish Washing
10. Window Display
11. General Storage Space
12. Public Toilets
13. Service Entrance

SHOPS

FIGURE 87
RESTAURANT BOOTHs

FIGURE 88
1. Hour Marker
2. Minute Marker
3. Plexa-Glass Disks
4. Mirror
5. Clock Mechanism Secured to Partition Stud
6. Access Panel

Section

Clock Details

Elevation

Restaurant Snack Bar

Figure 89
ELEVATIONS OF SHOPPING CENTER

Figure 71
Figure 92. Section A-A (Columns omitted for simplicity)

Typical section illustrating the flexibility for shop arrangements under the provided structural system.

1. Column
2. Main beam
3. Intermediate beam
4. Spandrel beam
5. Cantilever beam
6. Pan construction roof & ceiling
7. Raftered canopy
8. Roof line
9. Floor line
10. Basement floor line
11. Footings
12. Sidewalk
13. Steam tunnel
14. Steam feeder
15. Condensate return
16. Communication conduit
17. Electrical conduit
18. Water supply line
19. Gas supply line
20. Sewerage system
21. Parking pavement
22. Planting material

Figure 93

Section B-B

Sections through shopping center
DETAIL SECTION THROUGH FOOD MARKET

FIGURE 94
DETAIL SECTION THROUGH TYPICAL SHOP WINDOW

FIGURE 96
PART THREE - HOUSING IN THE FUTURE
One atom bomb could completely destroy the entire city of Richmond. This is possible, and to ignore the question would be unwise.

After the destruction of Hiroshima and Nagasaki, many people have talked and written books on the means that could be adopted to protect against the possibilities of complete destruction of our cities. Some have suggested underground cities while many propose decentralization. A coordinated decentralization program for Richmond would not only offer means for protection, but would present an opportunity to replan and rehabilitate the blighted areas which exist in the central areas.

A thorough study was not made of the various possibilities for such a program, but it was considered and found that much more study would be needed to develop a favorable plan for such a development. One scheme considered was the possibility of continual increase of the type community studied in this thesis. With the introduction of the regional highway system for Richmond, many desirable sites are created for proper expansion of housing accommodations. This conception is illustrated in Figure 98 indicating the areas desirable for site developments.
POSSIBLE COMMUNITY DEVELOPMENT SITES

FIGURE 78
GENERAL

Professor L. Hilberseimer, author and city planner, proposes decentralization on a national level. His theory is that the requirements for healthy living and economic security depend upon an integration of agriculture and industry. In addition to this, his plan calls for a redistribution of population. Hilberseimer points out that regionalism is the solution to the problem. He indicates that our unrestricted use of natural resources and the ill effects of soil exploitation along with our air-polluted and slum-infested cities are showing us the process of disintegration that caused great cities of the past to die.

The blight of our cities is spreading to the countryside, as quickly as the people move to these new areas. If all this is not controlled soon, our cities will experience the disaster that many of the great old cities faced. Regional planning, properly administered, could bring order to the chaos and bring about a way of life that would be healthy and pleasant.

Because of the many advantages we could receive from the results of regional planning, one should question the absence of such an organization. The answer to this is that the job has simply been neglected. Our best opportunities to integrate the neighborhood, community and city with the region have not been
utilized advantageously. In addition to this, no serious program has been developed to integrate the various regions in the nation.

A system of integration and decentralization of cities for free and healthy living could be applied to this country by planning a development of industrial belts along existing railroad lines (illustrated in Figure 99), especially in the southern part, to distribute more evenly the manufacturing industries which are now concentrated in the cities between the east coast and Lake Michigan. Such decentralization would also bring industry into closer relation with agriculture, which would contribute to a solution of some of our social and economic problems. By integrating agriculture and industry, man could spend just half the time on the industrial job and the extra compensation that would then be necessary could be made from the land - from gardens and farms according to what his needs are. This would tend to strengthen the inner market because the purchasing power would be maintained and production would be stimulated.

With the integration of industry and agriculture, the decentralized settlements would merge with the landscape and become a part of it. In addition to the protection against aerial warfare that may be achieved through decentralization, everyone could have land of his own to till and gain the personal independence that only land offers. Man could have all this without losing the advantages of industrial progress.
Through the use of regional planning, then, it may be stated that man could be protected against the depopulation of the land and the overcrowding of cities, which has been shown in history to have been the cause of decay of civilization. Through this new freedom and hope for the future, man will be able to produce and develop creatively.

By observing our earth (Figure 100), we can visualize the many resources with which God has endowed us, and we can also remember how we have misused these gifts. Instead of appreciating all that we have and utilizing these resources in a constructive way, we continually practice our destructive acts. Thinking that we may gain something, we produce miserable wars from our worldly-minded and nonspiritual concerns. It is time for us to recognize the fact that wars between nations will never solve our problems. People can be satisfied if their needs can be fulfilled, but they can never be satisfied with the results that the force of war brings.

If we were able to penetrate space far enough, we could perceive the earth and our entire solar system (Figure 101) and witness its integration with the endless universe, functioning in the pattern that God created. From this experience, we could understand the important need of cooperation and integration of earthly matters if a successful existence is to be achieved. Were we not meant to live peacefully together as the stars and planets do?
We realize that there is a gravitation system which supports
the endless billions of heavenly bodies in their relative positions
in the universe, but we seem to forget that we depend upon this for
life as well as the sun, rain, and atmosphere. We must continually
remind ourselves that we cannot flourish without our surrounding
environments, and that when we destroy these creations, we are
destroying only ourselves. Let us ask ourselves, "Why were we
bestowed with the gifts of natural resources, wealths of knowledge,
and physical strength?" Was it meant to be used to destroy ourselves,
or to produce a better way of life? Let us assume that the latter is
the correct meaning. We can therefore assume that it is God's will
for us to progress - progress beyond the existence on earth - to
commute with other planets and outer systems of life. This implies
that inter-planetary planning will be necessary. Possibly our first
attempt will be a trip to the moon, and then to our superior planets -
Mars first, then Jupiter, Saturn, Uranus, Neptune and later Pluto.
After these experiences, studies on our inferior planets, Mercury
and Venus, can be accomplished; and finally we may be prepared to
explore our neighboring solar systems and still further - - .

There must be a concentration on world organization, and
wasteful wars must cease!
CONCLUSIONS

Concerning the physical and material development of the neighborhood:

Neighborhood and community circulatory systems were given special attention because proper and smooth functioning of the entire development depends upon this component.

Basic considerations such as sunshine, breezes and topographic slopes were adopted as criteria for the orientation of the dwelling units to insure the inhabitants of a healthful and pleasant environment.

Parks and recreation facilities were provided throughout the whole community to fulfill the demand for leisurely activities.

Community educational, cultural, social and shopping facilities regarding structure and relative positions were designed to adequately serve the entire population with the assurance of comfortable walking distances and safety.

Concerning the inhabitants of the neighborhood:

It is concluded that this design of the neighborhood is adequate for efficient living, but it may be asked, "Is this design sufficient?" Will the neighborhood actually function successfully merely as the result of an efficient design? While it is true that an efficient layout of a neighborhood may help greatly to solve the problems of neighborhood life, life in essence is something beyond material and physical factors. Design alone will not solve the ultimate problems of neighborhood life. A well organized and properly constructed circulation
system, adequate provisions for leisure time activities, well designed housing, appropriate community facilities and all the other physical and material conveniences are not alone the answer to a sufficient neighborhood life.

There is a quality of life beyond the physical and material aspects of life — this quality being the spiritual segment of man's existence. All of the fine advantages of a well designed neighborhood are eliminated in cases where poor human relationships exist.

Although the solution offered in the design of the neighborhood may be deemed successful for the area considered, no claim may be made for the discovery of the unusual and unique since the solution has made use of ageless natural laws and materials placed here by God in his concern for man's happiness and rights as an individual. Neighborhoods similar to the one presented in this thesis have not been numerous because individuals who control such factors as land financial support, government control, etc., are not unselfishly interested in the welfare of their fellowmen.

The solution to the problem — whether concerning the neighborhood, the region or the world, or even progress toward the solution of the problem — then depends not solely upon our material progress, great political and military systems, but upon the degree to which we can solve the problems of human relationships. These problems of mankind can be solved only through love of God and love of our fellowmen. This love and only this love shall produce a successful, efficient and sufficient neighborhood and world life.
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Professor Clinton H. Cowgill, Head
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Professor Charles S. Worley
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Professor John F. Poulton
Department of Architectural Engineering
Virginia Polytechnic Institute

Mr. Charles A. Pearson, Jr., Architect
American Institute of Architects

Mr. Foy E. DeHaven, Superintendent
Radford City Schools

Mr. Frank H. Hill, Jr.
M.F.A. Architecture
ORAL PRESENTATION

August 31, 1961

VISITING CRITICS:

V. A. Meyer, Jr.
Pastor, Christ Lutheran Church
Radford, Virginia

B. D. Bisset
Recreation Director
Radford, Virginia

Tom Price
Architect
Galveston, Texas
ORAL PRESENTATION

August 31, 1951

VISITORS:
General Discussion:

Cowgill: Explained to the jurors and critics that the subject of the thesis was originally intended to be the study of a shopping center, but after many considerations concerning the necessary research involved in preparing a logical design for shopping facilities, the subject was expanded into the study of the development of an entire neighborhood which related to a community integrated with the city of Richmond; hence, the design of the shopping center became merely one of the many elements presented in the entire composition.

Some of the criticisms and questions introduced by the jury members and visiting critics after the oral presentation were recorded as follows: (Answers to some of these questions are also recorded.)

DeHaven: Will the school children (elementary) be exposed to poor weather when circulation from the classrooms to the auditorium and gymnasium is required? (Corridors are covered and may also be completely closed in if desired.)

Cowgill: (Referred to Figure 23, page 117.) Does a blighted area necessarily include all the shortcomings of adequate housing? Does the existence of one aspect of blight cause social blight?
(A majority of the blighted conditions would cause social blight. It should be understood that the negro population, indicated in Figure 23e, is not a blighted condition, but that this population exists in the areas that are marked as being blighted.)

Pearson: Why has the post office been omitted from the neighborhood design?
(This facility is provided in the community center, along with many other facilities such as the fire protection station, junior high school, etc.)

Poulton: What mental process was employed to determine the pattern of the curvilinear artery system for Neighborhood Unit Two?
(The major reason for the design of the street pattern was the influence of the topographical conditions.)

Worley: To what extent is this system advocated by authorities?
(Very little - this system is practiced mostly by land speculators.)

Cowgill: Are the street patterns of the other two neighborhoods equally adjusted to the topographical conditions?
(All the neighborhoods have been logically developed in relation to the contours.)

Poulton: Do the dead-end streets located at the lower portions of Neighborhood Unit Three create a drainage problem? Would
the cost involved in the installation of large underground drains be justified?
(The branch cul-de-sac service streets are assumed to carry most of the drainage burden.)

Price: Were the possibilities of continuing the secondary traffic arteries to the neighborhood center considered in the radial system?
(Provisions for child safety outweighed other conditions; this eliminated a continuous flow traffic pattern.)

Cowgill: On what basis were the major clover leaf intersections employed? When are they deemed advisable?
(Provided at points of greatest traffic flow and where safety precautions are demanded.)

Poulton: There are only seven clover leaf intersections constructed between Lynchburg and Richmond; how can as many as four and one-half clover leaf intersections be justified in this one development?
(The concentration of traffic flow to and from the new development before and after working hours in addition to the traffic that would concentrate on the pleasure drive—especially on Sundays—would compare with the traffic flow on the heavily burdened super-highway.)

DeHaven: Is the plan of this community practical, concerning the cost of the project?
(Cost is not the question. The major factor is the peoples' desire - whether they want such a community.)

Worley: How can the people be convinced that this concept of community development is a solution to their needs, and how can such a project be advanced to become a reality?

Pearson: This question cannot be answered directly. The question is a matter of time - people gradually learn the necessities of life and from their understanding of these needs, provide the facilities to fulfill the requirements.

DeHaven: It would be ideal to begin such community developments, merely for the sake of getting them under way, even if many years were required to complete one project.

(If people were as conscious of the needs of themselves and their fellowmen as they are acquainted with the name Coca-Cola, there would probably be more adequate housing than exists at the present.)

Poulton: How are the areas for pedestrian circulation owned, controlled, and maintained?

(These areas are treated as a group of finger parks connecting directly to the central parks.)

Pearson: How does the elementary school lend itself from the administrative viewpoint?
DeHaven: Very well - the various age levels could be grouped together and segregated play areas would be easy to supervise. The added expense and maintenance would also be justified.

Hill: Much attention has been given to the topographical conditions in this study - how would the development of a flat area be conducted?

(Drainage would be a greater problem on a flat area. However, the road patterns would not vary considerably because a focal point would remain a desirable feature in the development.)

Pearson: What are the humanitarian aspects of this development?

Moyer: There should be more churches in the neighborhood development.

(Provisions for future church developments are possible in the community center. Also, the sites designated for churches in each neighborhood are adequate for the construction of additional church buildings.)

Bisset: (Referred to Table 11, page 122.) With temperatures as high as 80° and 90°, facilities for night recreation should be provided. Are there lighting facilities for this? Also, are the positions of the ball fields orientated for the time of day and the sport? Have recreational facilities for the various working classes been provided?
(It was discovered that further study should be made of the recreational facilities and areas.)

**Worley:** Why would the inhabitants of the community be required to commute with central Richmond? Are the industrial areas stabilized in Richmond or are they spreading? (Industrial areas are spreading in Richmond. This allows the inhabitants to secure jobs closer to the development site, but the study for the development of the community was based on the assumption that the inhabitants would commute to central Richmond for work.)

**Poulton:** Explain the typical window detail section shown in Figure 95, page 246.

(Discussion of this detail proved the detail to be inefficient. Further study of this structural system should be made.)

**Bisset:** (Referred to page 167.) The Radford librarian pointed out that the children would be without books during the summer-time if the school library was closed.

**DeHaven:** Arrangement should be made to operate schools continually during the summer months as well as during the winter. This scheme would solve many social, educational and recreational problems in communities.
At this point Professor Cowgill suggested that the jury retire to the library for judgement.