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# Comparison of Infrastructure Costs for Alternatives

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The Draft Preliminary  
State  
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## TV, COMPARISON OF INFRASTRUCTURE COSTS FOR ALTERNATIVE CONCEPT PLANS FOR NEW JERSEY

### METHOD

Infrastructure needs assessed here are those expected to be generated by new growth projected under the plan in the form of population, households, and jobs. The assessment method described here was used to identify infrastructure costs associated with new growth under each of the three alternative concept plans.

In order to determine on-site and immediately site-related infrastructure development costs for local and minor collector roads, storm water management, local parks, etc., it was necessary to determine the total area that would be developed under the plan in each tier\* This was achieved through a series of steps.

Based upon information which the consultants were able to obtain regarding development that had received preliminary approval as of January 1, 1986, set out in Appendices C and D to this report, and described in Part I, WRT was able to distinguish among characteristics of new development occurring in each tier. Characteristics for which distinctions were made by tier includes:

ratio of single family to one family dwelling units,  
single family dwelling unit densities multi-family  
dwelling unit densities, commercial floor area ratios  
office floor area ratios industrial floor area ratios

Ratios of square feet of floor area per commercial, office, and industrial employee were developed based upon factors used by MSM obtained by RS6A. Ratios of persons per household type and vacancy rates are discussed by HSGA in their Technical Memorandum.

These factors, representing characteristics of growth occurring at present in each of the eight tiers in New Jersey were applied to projected population and jobs by tier through the year 2010 as follows,

#### **1986-2010 NON-RESIDENTIAL AND RESIDENTIAL ACRES DEVELOPED**

Acreage in Non-residential use under the alternatives was determined as follows;

1. For each scenario, the incremental change in total employment

(1985-2010) was multiplied by a factor to determine the number of commercial office, and industrial employees in each tier. These multipliers were based upon the ratio among estimated commercial, office and industrial employees in the "pipeline" in each tier, that is, non-residential development for which preliminary approval had been granted as of January 1, 1986.

2. For each employment category (Commercial, office and industrial), a ratio of square feet per employee was multiplied by the number of employees in each category to determine the number of square feet of new employment space required. These square feet per employee ratios were based upon ratios determined by MSH, and were constant through all tiers.

3. A ratio of land area to floor area based "pipeline" ratios for each tier was applied to these values for each employment category. These land consumption factors gave the total number of additional acres of land required in each employment category.

Note: 2010 employment projections by County were supplied by the Office of Demographic and Economic Analysis, Division of Planning and Research, New Jersey Department of Labor and Industry, June, 1987.

These data were sorted by tier, to give the projected employment for each tier.

Acreage in Residential use under the alternatives was determined as follows:

1. For each scenario (Trend, Maximum Concentration, and Corridors/Nodes,) the incremental population change (1985-2010), was multiplied by single family/multi-family ratios to determine the portion of the incremental population change housed in each housing type in each tier. These ratios were based upon single family, multi-family ratios in "pipeline" residential development for which preliminary approval has been granted as of January 1, 1986.

2. The single family and multi-family populations were then divided by person per household factors provided by HSGA to determine the total number of dwelling unit types for each tier.

3. The numbers of dwelling units of each type (single or multi-family) were then multiplied by density factors based upon densities in "pipeline"<sup>1</sup> residential development for which preliminary approval has been granted as of January 1, 1986 to determine the number of additional acres required for single family and multi-family dwelling units for each tier.

## ON-SITE AND SITE-RELATED COSTS

Development or on-site and site-related cost factors per acre by tier were then applied to the sum of the estimates of future increments of residential and non-residential acreage through the year 2010 to obtain estimates of on-site and site-related development costs by tier. On-site and site-related cost factors were assumed to be as follows: Tier 1, \$44,160; Tier 2, \$38,640; Tier 3, \$55,200; Tier 4, \$60,720; Tier 5, \$66,240; Tiers 6-8, \$5,520. The basis for these on-site and site-related cost factors by tier and discussed by HSGA in their Technical Memorandum.

## OFF-SITE COSTS

Information regarding estimated characteristics of future development by tier were applied to the determination of infrastructure need and costs as follows:

### 1. Major Collector and Minor Arterial Roads

It was determined that no new major collector or minor arterial roads would be required to serve new development under the plan in Tiers 1, 2, 7 or 8, over and above the major collectors and minor arterials already in place or planned and programmed for construction, because of the highly developed character of Tiers 1 and 2 and the very low existing and projected densities of Tiers 7 and 8. For Tiers 4, 5, and 6, the cost of construction of additional major collectors and minor arterials was estimated by applying cost factors developed on the basis of information obtained by HSGA and described in their Technical Memorandum to the number of single family and multi-family dwelling units projected to be added to each of these four tiers. Minor arterial construction costs were assumed to be \$5,070 for single family dwelling units and \$4,225 for multi-family dwelling units. Major collector construction costs were assumed to be 41,085 for single family dwelling units and \$2,092 for multi-family dwelling units. In Tier 3, 50% of the costs of construction of additional major collectors and minor arterials in Tiers 4, 5, and 6 are applied per dwelling unit, in recognition of the extensive road system already in place in that tier.

### 2. Schools

Using the ratio of 0.74 pupils per dwelling unit for single family dwellings and 0.24 pupils per dwelling units for multi-family dwellings, numbers of pupils per tier generated by new development were calculated. These numbers were divided by 27 to obtain an estimate of the numbers of new classrooms required by tier, it was assumed that in Tiers 1-4, required

improvement would entail renovation of existing classrooms at an average rate of \$66,000 per classroom, while in Tiers 5-8, required improvements would consist of construction of new classrooms at an average rate of \$338,000 per classroom.

### **3. Sanitary Sewers**

Sanitary sewer improvement requirements of new development were based upon an assumed generation of 308 gallons per day by single family dwelling units, 174 gallons per day by multi-family dwelling units, 16 gallons per day by commercial employee, 24 gallons per day by office employee, and 400 gallons per day per industrial employee, total gallons per day by tier were derived on this basis, and used to obtain an estimate of sanitary sewer treatment costs generated by new development in each tier, using treatment cost information provided by HSGA.

### **4. Public Water**

Public water system improvement requirements of new development were based upon assumed water requirements per day of 385 gallons per single family dwelling unit, 174 gallons per multi-family dwelling, 16 gallons per commercial employee, 24 gallons per office employee, and 400 gallons per industrial employee. Total gallons per day per tier were calculated on this basis, and used to obtain an estimate of water treatment costs generated by new development in each tier, using treatment cost information provided by HSGA.

### **5. Open Space**

Based upon open space goals set out in the 1984 State Open Space and Recreation Plan a goal was identified of establishing new County open space lands equivalent to 7%, and State open space lands equivalent to 10% of the additional lands developed for housing, office, commercial, and industrial use under the plan. Using estimates of total acreage developed under the plan in each tier, acres of County and State open space land requirements were derived. On the basis of information provided by the New Jersey Department of environmental Protection, Division of Parks and Forestry, representative open costs per acre were assigned by tier as follows: Tier 1, \$45,000; Tiers 2 and 3, \$25,000; Tiers 4 and 5, \$15,000; Tier 6, \$10,000; Tier 7, \$4,500; and Tier 8, \$1,200. Application of these costs to total County and State open space acreage requirements by Tier yielded total County and State open space costs by tier.

## RESULTS OF THE ANALYSIS

Application of "the infrastructure evaluation model to the alternative concept plans yields the following results in terms of "on-site and site-related" costs and "off-site" costs.

1. Total "on-site and site-related" infrastructure costs including costs of local and minor collector roads, stormwater management and local open space are \$8.5 billion for Trend, \$5.0 billion for Maximum Concentration, and \$6.4 billion for the Corridors and Nodes Alternative.

2. "Off-site" costs associated with development under the alternative concept plans are as follows:

a. Total costs for construction of Major Collector and Minor Arterial Roads required by new development are \$1.7 billion for Trend, \$1.6 billion for Maximum Concentration, and \$1.8 billion for the Corridors and Nodes Alternative.

b. Total costs for provision of new or renovated classrooms for pupils generated by new development are \$2.5 billion for Trend, \$693 million for Maximum Concentration, and \$1.4 billion for the Corridors and Nodes Alternative.

c. Total costs for provision for sanitary sewage treatment required by new development are \$503 million for Trend, \$619 million for Maximum Concentration, and \$578 billion for the Corridors and Nodes Alternative.

d. Total costs for water treatment required by new development are \$53 million for Trend, \$62 million for Maximum Concentration and \$59 million for the Corridors and Nodes Alternative..

e. Total costs for County and State open space required by new development are \$556 million for Trend, \$406 million for Maximum Concentration, and \$482 million for the Corridor and Nodes Alternative.

Total "off-site" infrastructure costs are \$5.3 billion under Trend, \$3.4 billion under Maximum Concentration, and \$4.2 billion under Corridors and Nodes Alternative.