### **Ahmedabad: Land Use Issues & Recommendations**

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#### Summary

A fallacious and costly planning concept prevails in many cities of India and in Ahmedabad in particular. Urban planners are convinced that concentration creates congestion and that as a consequence densities and therefore FSI should be uniform throughout urban areas. This concept is very costly for the economy of the city and for the efficiency of its infrastructure. In addition it results in lower air quality and longer distance to work.

A higher FSI would require a better performing infrastructure. However, coupling impact fees with an increased FSI could generate the revenues needed to upgrade existing city services. This increased in FSI will result in higher land prices in the CBD but it will lower the price to property ratio. It will also tend to slightly lower the sale price of floor space in the area. Land prices in peripheral areas will tend to become lower. The economic gain to the city, in the long run will be extremely large. In addition, raising the FSI from 1 to 4 in the CBD alone will also reduce trip length, improve the efficiency of public transport and decrease air pollution.

### A. The Effect of Perverse Land Use Regulations

- 1. Ahmedabad is an economically dynamic city with an active formal real estate market. However, land use regulations under which the real estate market is currently operating are antiquated and based on fallacious urban planning theories. The grossly inadequate regulatory framework has far reaching consequences for Ahmedabad. First, it slows down the economic growth of the city by mis-allocating land which is the city major asset; second, it promotes a distorted urban shape which increases transport costs and isolates the poor and the middle class in areas farther away from modern sector employment; third, it prevents the private sector from providing the taxes and user fees which could otherwise finance the badly needed modernization of the city infrastructure; fourth, by preventing the recycling of underused urban land, it aggravates environmental problems by expending unnecessarily low density urbanization in adjacent rural area, increasing the air pollution due to increased transport; fifth, by rending illegal what makes economic sense it creates vast possibilities of corruption, criminalizing what would be otherwise legitimate real estate operations.
- 2. We will concentrate here on the reform of the land use regulatory framework which can be conducted at the local level and which could bring immediate results. Reforms of National or State land use law such as the Urban Land Ceiling Act, Rent Control, Industrial Location policy,

etc. should of course still be on the agenda of reformers, but local reforms would be easier to carry out and would have an immediate and visible impact on the local economy and on the urban environment.

#### **Current Regulations Are Based On Fallacious Urban Planning Theories**

3. The obsession with "preventing congestion" is the conceptual base of urban planning theories shaping most Indian cities. Avoiding congestion could be a legitimate planning concern if it leads to an improvement in the management of cities resources and in a more rational spatial distribution of urban services. For instance it could have lead to better traffic management and to a more efficient use of urban land through property taxation. However, the current regulations seems to be based on the pessimistic idea that city cores cannot be improved and as a consequence the dispersion of economic activities is the only mean available to prevent traffic jams and pollution. As a result, land use regulations deliberately contradicts demand for land. Where land is expensive -i.e. where there is a high demand for land and floor space -- regulations prescribe low densities. Where there is little demand, Indian land use regulations would often allow higher densities. But as a principle, current urban land use regulations in Indian cities are trying to maintain a uniform density from the center to the periphery, with the assumption that spreading economic activities and residential densities evenly throughout the city would relieve congestion.

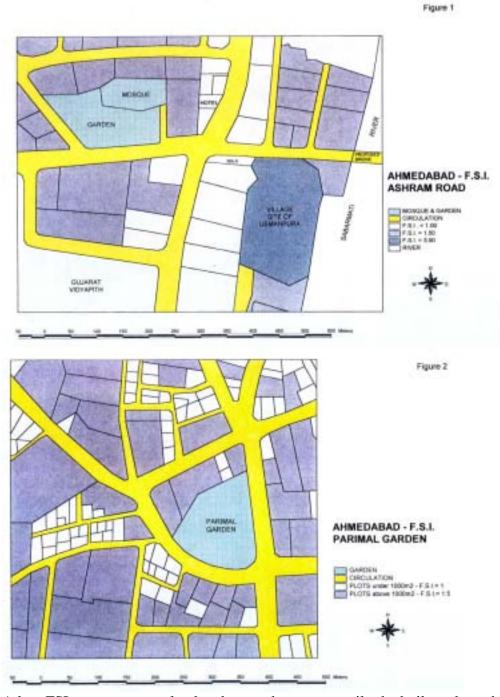
### The regulation of the FSI is the main mean of control

- 4. The control of the Floor Space Index (FSI)<sup>1</sup> is the principal and most effective regulatory tool used by planners in India to control densities. Typically in most large cities of the world the FSI varies by a ratio of 1 to 20 or even 1 to 50 between the CBD and residential suburbs. It is fixed between 5 and 15 in the CBD of most metropolis<sup>2</sup> and typically decrease to around 0.2 in suburban areas. As a rule the decrease of the FSI from the center to the periphery follows broadly the decrease in land prices when one goes farther away from the CBD.
- 5. By contrast Indian planning regulations tend to maintain a uniform FSI barely varying between 1 and 1.5 from the center to the periphery (1.3 in the entire Bombay island city area). Exceptionally, in Ahmedabad the FSI reach 3 in the old city area (in which there is very little demand) and in small village enclaves within the city. A uniform fixed FSI for cities of more than half a million people is unique to India, no other city of the world has such regulation. Figure 1 and 2 shows an example of the variations of the FSI in the CBD of Ahmedabad. Figure 3 shows the variations of the FSI in the CBD of Portland, Oregon. Portland example has

the FSI --called floor area ratio (FAR) in the US-- is the ratio between the area of a land parcel and the total amount of floor space which can be built on it. For instance, on a parcel of 1000 square meters with an FSI of 0.5 a structure with a floor area of 500 square meters would be allowed; if the FSI is 2, a structure with a total floor space of 2000 square meters will be allowed. In the absence of set back and heights requirements, this could be a 2 stories structure covering the entire parcel or, for instance, a 4 stories structure with an area of 500 square meter per floor, or any other combinations which would result in a total floor area equal to product of the land parcel area by the

<sup>&</sup>lt;sup>2</sup> the FSI of the CBD is equal to 15 in Hong Kong, 15 in Portland, Oregon, 10 in Singapore and Jakarta, 6.5 in Washington DC.

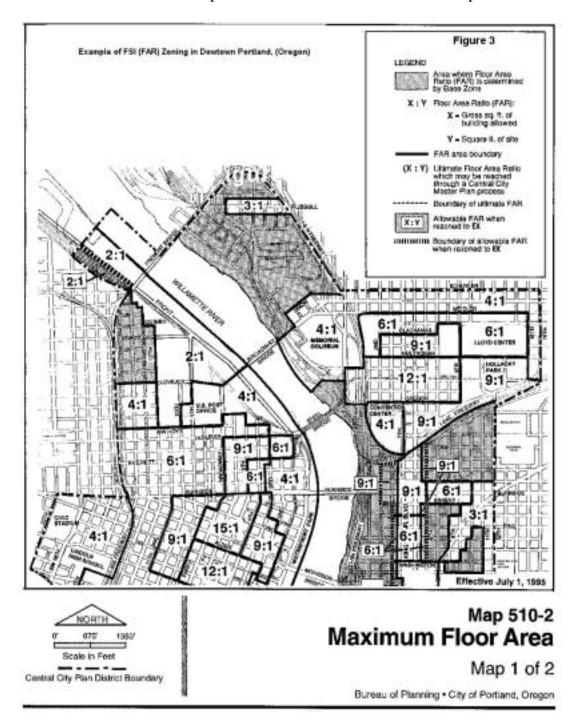
been selected to show a typical variation of FSI in a down town area based on land values and consumers demand. Portland is not a very dense city, nor is it very large. However just within the down town area the FSI varies from 15 to 2. There are indeed very good reasons for adopting large FSI variations between the CBD and the periphery of cities. These reasons are explained below.



A low FSI consume more land and expands unnecessarily the built-up boundaries

6. By keeping the FSI low (1 to 1.5) in areas where land is expensive, planners are forcing development away from the areas preferred by households and firms into areas which are less

attractive. Planners are deliberately contradicting consumers preferences by forcing them to consume more land per square meter of floor space that they would have consumed otherwise. A low FSI increases the consumption of land for the same area of floor space built.



7. One could wonder about what eventually happens to the floor space which would have been built in the CBD of Ahmedabad had the FSI been equal to, say, 3 instead of the current 1

(Ashram Road frontage)? Let us assume that on a downtown land parcel of 1000 m2, a developer estimates that there is a demand in this area for 3000 m2 of retail and office floor space (FSI=3) but the permissible FSI established by urban planners is only equal to 1. What happen to the demand for 2000 m2 of office space which will not be built on the site because of regulations?

8. Obviously demand for office space will not disappear because of the low FSI. Most of this office space will be built somewhere else although in a less favorable location from the point of the view of the user (therefore reducing city productivity). At an FSI of 1 these 3000 m2 of floor space will occupy 3000 m2 of land, 3 times more land than would have been originally required by the end users. Commercial and business areas would then spread and use 3 times more land than would have been otherwise needed. The same would apply for residential buildings. The city would have to expand infrastructure in vacant areas to take care of the overspill created by this additional demand for land. Another possible outcome would be that the lack of accessibility of the available sites outside the CBD reduces the demand for retail. This will be a net loss for the city economy.

### A uniform low FSI increases the cost of land for everybody

9. A uniform FSI, lower than the one sought by the market, increases demand for land as it results in more land requirement for the same amount of floor space built. An increase in the supply of new developed land, which depends on large infrastructure investments and lengthy administrative procedures, is notoriously slow to respond to demand. This increase in demand for land not matched by a supply increase will raise the price of land everywhere in the city<sup>3</sup>. A low FSI will cause an overspill of commercial floor space in less favorable location causing to increase in these areas the demand for land and therefore the land price. A ripple effect will in turn raise the price of land into peripheral areas. Because of the increasing demand for land from high and middle income groups, the poor will be pushed away in less favorable locations, further away from their place of employment and will have to pay a higher price for land. While the poor do not seems to be directly concerned by FSI levels in the CBD, they are in fact eventually hit by a triple "trickle down" negative effect: higher land prices, longer distance to work, less efficient public transport.

A low uniform FSI causes congestion and increases the cost of infrastructure, transport fuel consumption and add to pollution.

10. The original objective of preventing congestion is not achieved by dispersing economic activities and housing over a wider areas. When economic activities are dispersed rather than concentrated, motorized individual transport --private car or motorcycle-- becomes the only feasible mode of transportation. Public transport lines have to be multiplied, but with fewer passengers, hence the necessity to decrease the frequency of services, which in turn makes public transport unattractive to a larger number of people. The shift from public transport to private

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<sup>&</sup>lt;sup>3</sup> this seem paradoxical as it is obvious that in a given location on a limited area a lower FSI will lower the price of land and a higher one will raise it. This is true only if land with higher FSI is available near by. In this case lowering the FSI on one parcel does not affect the overall consumption of land and therefore the effect on price is felt only on the parcel itself which indeed has lost some market value by getting a lower FSI.

transport increases traffic volume and parking space requirements. As a consequence it can be inferred that uniform low FSI increases congestion rather than decreases it.

11. Energy consumption studies of major cities of the world are showing that there is a inverse correlation between density and daily travel time, and as a consequence lower densities increase intra city transport cost, fossil fuel consumption, and pollution.

"More intensive land use shortens the average distances the urban dwellers travel and strengthens urban transit systems. Public transit becomes viable when there are more people per stop; as the number of passengers per kilometer rises, the amount of energy used to move each passenger falls.

Australian scientists Peter Newman and Jeffrey Kenworthy have shown that the amount of energy devoted to transport depends on "activity intensity" - a measure of city land use based on the concentration of residents and jobs per hectare in a metropolitan area. In a global sample of 31 cities, including 10 in the United States, 12 in Europe, 5 in Australia, and 3 in Asia, Newman and Kenworthy found that the average per capita gasoline consumption in the US cities was nearly twice as high as in the Australian ones, over four times the European ones, and over ten times more than the Asian cities of Tokyo, Singapore, and Hong Kong."

### A low uniform FSI in the CBD perpetuates inefficient land use

12. The CBD of Ahmedabad on the West bank of the Sabermati river was once a peripheral area. Many existing building have been built long ago and make a poor use of land, sometime using an FSI below the 1 or 1.5 allowed. They should normally be demolished and the space they occupy rebuilt to reflects the new role of the CBD. However to redevelop a site it is necessary to compensate existing tenants and owners and this can be done only if the difference between the FSI currently used and the legal permissible FSI is large. With the type of FSI practiced in the CBD of Ahmedabad the difference between the FSI used by obsolete, even dilapidated buildings and the permissible FSI is bound to be very small, probably below 1. This would be insufficient to compensate tenants or even to compensate owners of empty buildings for the residual value of their obsolete building. The low FSI in the CBD result in a very high economic cost for the city by preventing the renovation of obsolete buildings in prime location.

A higher FSI would require a better performing infrastructure but, with the introduction of impact fee, raising the FSI could generate the revenues needed to upgrade existing city services

13. The poor state of existing infrastructure in the CBD is one of the main argument against raising the FSI. Admittedly the projected increase in traffic due to a higher FSI would render the existing street situation more chaotic. But to forego millions of rupees represented by the opportunity cost of land in order to "save" thousands of rupees in badly needed infrastructure does not strikes as sound financial management. In the sections below we will evaluate the opportunity cost of land under various FSI in the CBD and a formula for impact fee which would

<sup>&</sup>lt;sup>4</sup> Lester R. Brown and Jodi L. Jacobson. "The Future of Urbanization: Facing the Ecological and Economic Constraints" World Watch Paper #77 May 1987.

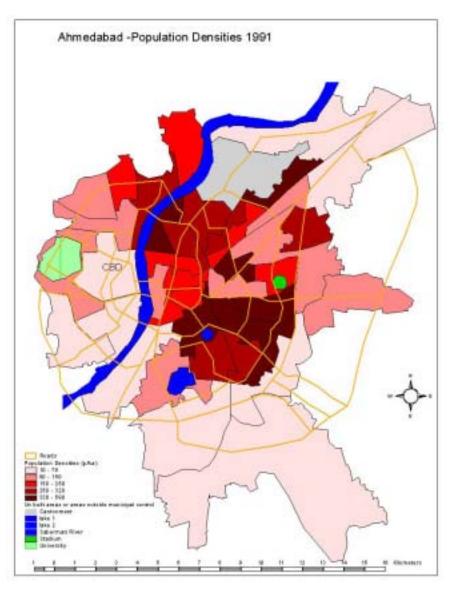
largely defray the city from additional infrastructure costs while keeping all the positive incentive on land redevelopment provided by an higher FSI.

14. The problem of additional parking with increased FSI. One objection against raising the FSI is that it will oblige the city to provide additional parking space. Parking of private vehicles is a private problem and should be solved by the private sector. When the demand for parking becomes large enough, private providers of pay parking will emerge. Free parking should not be allowed along busy public streets, except for loading and unloading. There is no reason for the city to subsidize private cars by providing free parking in areas where land is particularly expensive. Developers will evaluate how much parking to provide for each building based on their knowledge of demand in each type of building and the cost of providing private parking. Cinemas and large shopping centers should not rely on the city to provide parking for their customers. They should contract private suppliers. The city should not regulate one way or another the provision of private parking space. In doing so it would privilege the use of private car over public transport. But in order to encourage a market driven solution to parking it should enforce as much as possible no parking or pay parking rule in every major CBD street. This will have the additional advantage of increasing the speed of traffic flow and of reducing air pollution as a conasequence.

## B. Ahmedabad Urbanization Trends and FSI Regulations

- 1. The city of Ahmedabad is a typical radioconcentric city. However a number of historical constraints have pushed the formal center (CBD) toward the West on the other side of the Sabermati river, while industries and low income housing have been developing in the Eastern suburbs. The traditional center has failed to modernize and was badly affected by the communal riots of 1987. As a result the wealthiest part of the population has moved West across the river, while some of the poorest households have moved toward the Eastern suburbs where they were joined by poor migrants from rural areas. (See **figure 4**:Ahmedabad population density) The decay of the traditional center was further accelerated by the closing of adjacent textile mills which were never reconverted. Note on figure 1 the relatively low density of the old city center (about 150 people per hectare) as compared to adjacent neighborhoods.
- 2. The most prestigious office buildings, commerce and residential buildings have been built in recent years on the western bank of the Sabermati river along Ashram road and .... road, moving the economic hub of the city away from the center of gravity of the city (i.e. the area the most accessible to the labor market ) located around the railway station.
- 3. The land market reflects the above trends (see **Figure 5**: map of land prices): the high demand for land in the modern center is reflected by very high land prices along the main arterial roads West of the Sabermati river. The loss of population of the old city center is reflected in the low land value, in spite of its proximity to the new modern center and good accessibility for the labor market.
- 4. The separation of the labor market center of gravity (the area with the shortest average distance per household) and the economic center (CBD: the area with highest land market value

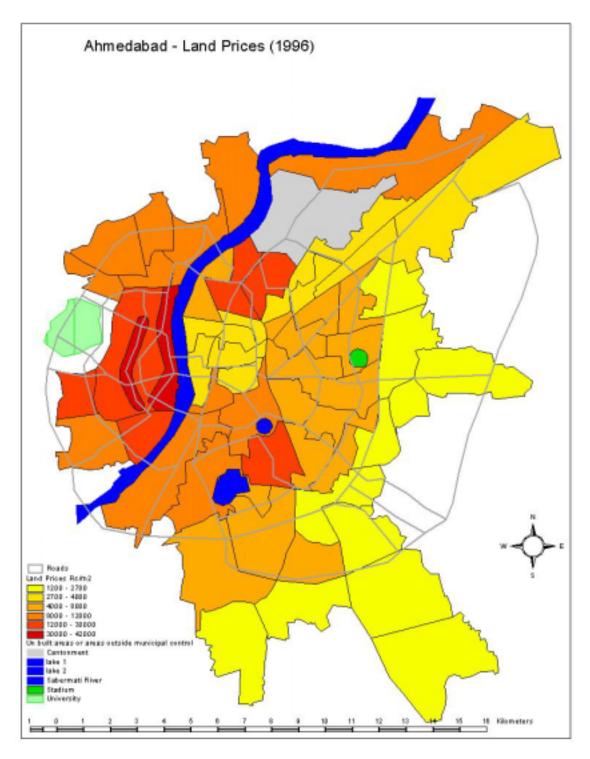
per square meter) is shown more dramatically in **Figure 6**, **7** and **8**. Figure 6 shows the discrepancies between land prices and density. In most cities of the world where the land market is operating reasonably well, there is a close correlation between density gradient and land price gradient, both peak at the same place and have about the same slope. This is not the case in Ahmedabad where the density peak at 6 kilometers from the point where land prices are at their maximum. The discrepancy is shown in a less abstract way on figure 7 and 8 comparing densities and land prices along an East West cross section of the city. The average distance per household to the current CBD is 6.5 kilometers, as compared to 4 km at the labor market center of gravity (around km 5 on figure 7 and 8 which correspond to the location of the railway station)

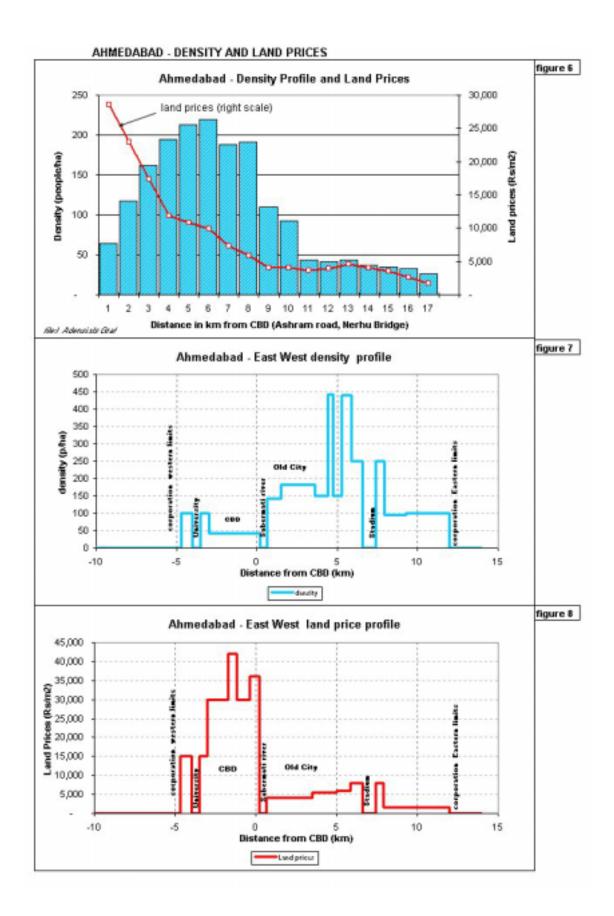


- 5. The main consequences of the displacement of the business center away from the center of gravity of the labor market are, first, a loss of economic efficiency (longer distance to work, labor mobility affected by bad accessibility to economic center) and second, an increase in air pollution produced by more energy use for daily commuting. In addition, low income households having less mobility and locational choice are more affected by this displacement.
- 6. Another negative consequence is that the highest land values are now close to the Western municipal limits, giving a very high economic incentive to develop land under high density outside the city limits. This would have in turn several negative effects: first, the economic center of gravity of the city may move further away toward the west increasing its

distance from the labor market, second, a lot of construction and business will develop in areas where no proper administrative structure exists to provide infrastructure and urban services, and

third, the city will eventually loose important fiscal revenue by having a part of the most expensive commercial and housing stock located immediately outside its boundaries.





# C. A reform program to improve land use efficiency in Ahmedabad

- 1. Many of the problems described above could be corrected or even become opportunities if the city embarked on a regulatory reform program . What is required is a new conceptual framework to guide amended land use regulations. This conceptual framework should contain clear objectives with quantitative benchmarks. The local government reform program would mostly consist in:
  - a) reforming land use regulations taking into account economic considerations,
  - b) providing infrastructure and urban services levels consistent with a demand driven land use, and
  - c) using the land market forces to generate the capital resources which will be required to improve infrastructure.
- 2. One of the main objective would be to make existing infrastructure more effective and in particular to reverse the flight toward the West of the formal CBD. To do so a number of measures could be taken.
- 3. First, the FSI in the current CBD should be raised (see below on the method to calculate the optimum level ) so that the area between Ashram road and ... road continue to absorb most of the growth in office and commercial space, reducing the demand for extension in the western part of the city outside the city boundaries. In addition, raising the FSI on the East Bank of the Sabermati around the main avenues leading to the bridges toward the CBD will also increase land value on the East bank and will bring more new jobs closer to where the majority of the population is located.
- 4. Second, allow the redevelopment by the private sector of the land occupied by the old mills. This will also prevent the shift toward the West of the city economic center and will make better use of existing infrastructure. As the private sector will have to entirely finance this redevelopment and therefore bear the financial risk, it is fair to leave it also to the private sector to decide what this development will be. The city have no particular interest in one economic activity rather than another but it has a strong interest in seeing the area occupied by the mills used as soon as possible. This area is already serviced by an adequate infrastructure and whatever floor space is built there will not be built in the periphery where new infrastructure would have to be provided. The city could specify what it does not want to see replacing the mills, for instance it could specify no polluting industry, etc. But there is no reason to specify one activity --retail, office buildings, workshops, housing, hotels, convention center, factories-rather than another. To be sure that an arbitrary FSI does not reduce economic opportunities, the FSI could be auctioned using the impact fee formula proposed in the section below.
- 5. Third, The reform of the FSI should also include a revision of set back rules and of the maximum plot coverage. This aspect is not covered in this note but could be the object of a special study conducted by local architects and planners. The set back rules and maximum coverage used in the CBD are antiquated and are detrimental to the quality of urban space. For instance, for the first 2 floors a 100% coverage should be allowed in the CBD. This will provide a continuity of commercial frontage, including the possibility of introducing covered and

connected galleries which is impossible under present set back and coverage regulations. It would also reduce building heights --and therefore structural costs--for a given FSI. The major rule to guide a reform of land use regulation is to question the objective of the standard. The main objective of set back and coverage regulations are to provide light and ventilation. Are the current set back and coverage regulation the best way to provide light and ventilation to a building? The answer will invariably be: "it depends on the price of land and the type of building". If the building is sold on the market, consumers themselves will decide what discount or premium --expressed in Rs per m2 of floor space-- they will give to good, medium or poor natural light and ventilation. Local architects and developers would soon develop the best shape of building, set backs and coverage which correspond to demand for natural light and ventilation from various type of consumers in Ahmedabad climate.

- 6. Fourth, develop a program for the purchase of small but well located public open space. Do set back and maximum coverage rules provide usable open space to the general public? the answer --based on site inspection of commercial buildings in use-- is no. Usable open space are created when they are designed and maintained for public purpose in specific locations. The city may decide to acquire well located strips of land at market price to be used as park and open space. The impact fee on FSI could be used partially for this purpose. One hectare of well landscaped and maintained open space will provide more amenities to the public --at a fraction of the cost to Ahmedabad economy-- than 100 hectares of underutilized and badly maintained left over space provided by set-backs and coverage regulations around buildings.
- 7. <u>Fifth, develop a program for reclaiming public space, streets and sidewalks for public use.</u> Some streets of Ahmedabad are quite narrow, but often not even half of the right of way is usable because of various encroachments, heap of building rubles, or simply the bad condition of the sidewalk surface. Reclaiming the full right of way of existing streets would probably about double the street area available for pedestrians and vehicles. Some of this reclamation work is already taking place in Ahmedabad with spectacular results. The impact fee could also be used partially for this purpose.
- 8. <u>Sixth, commission a traffic management study</u> to take full advantage of the existing street network, taking into account the new densities which will be generated by the increased FSI.
- 9. Seventh, the city should contract consultants or the University<sup>5</sup> to monitor systematically land prices, rents, building sale prices, building permits and densities. The real estate market is the only indicator of supply and demand for land in the city. As the city has a major responsibility in influencing both supply and demand through regulations and infrastructure, it should also monitor the outcome of its action. Real estate prices and rents are the most important data to manage and eventually further amend the land use regulations. This monitoring will help also determine to what extend the above reform program has been successful. As explained below, land prices should rise in the CBD and hopefully in some area of the East bank adjacent

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<sup>&</sup>lt;sup>5</sup> The real estate data on which this analysis is based was provided by Dr. Mehta, School of Planning, Centre for Environmental Planning and Technology, Ahmedabad.

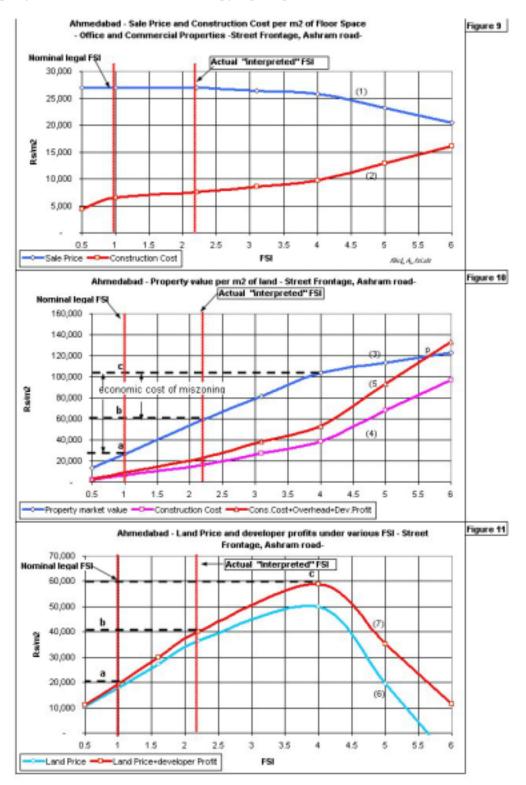
to the CBD, land prices should go down slightly in the periphery of the city. Density --both jobs and population-- should rise in the center and around the CBD.

- 10. To summarize, I believe that the above reforms will make the city more efficient by making full economic use of its land assets, in particular it would:
  - a) maintain the CBD closer to the center of gravity of the labor market;
  - b) reduce future transport costs by making the city more compact;
  - c) remove the contradiction between what is legal and what makes economic sense in the real estate market:
  - d) raise city revenues based on real estate markets to improve infrastructure;
  - e) make full use of existing infrastructure.

# D. By how much should the FSI be raised?

- 1. We have discussed above why the FSI should be raised. It is important to know what would be an optimum value --from the point of view of the city-- for the FSI in various areas. First, it should be agreed that like other cities of the world, the FSI in Ahmedabad should vary widely from one area of the city to another, and that as a rule it should be much higher in the center of the city than in the periphery. The method developed below is applicable to a specific site and to the area immediately adjacent to this site. For different sites of the city the same method could be applied but the input would be different, reflecting the demand for land in this specific area..
- 2. Let us assume a vacant plot of land facing Ashram road in the CBD. We will ask a number of developers what building they would build in this particular location if the FSI was progressively increased, and for several successive values of the FSI what would be the average sale price in Rs per m2 of floor and what would be the construction cost. The developers selected are experienced, and it is therefore assumed that their "guess" for the market value and construction cost of floor space at various FSI is a fair estimate of demand and supply.
- 3. The relationship between the market price of floor space and the FSI in this particular location is plotted on **Figure 9** and is represented by **curve (1)**. The curve obtained shows the potential sale price per m2 of floor corresponding to different FSI values. In another part of the city, the curve (1) may shows a completely different pattern. On the same axis let us plot the cost of construction per m2 (including financial costs and overheads, but excluding profits) which corresponds to the various FSI value ,**curve (2)**. On the X axis it is possible to place a vertical marker corresponding to the FSI regulatory value in the area being studied. In this case -a plot facing Ashram road-- the FSI =1. However during a number of years the FSI rule was "interpreted" and balconies and other exceptions were allowed which resulted in an actual FSI of around 2.2. We will therefore also put a vertical marker on the X=2.2 value of the FSI corresponding to the past practice.
- 4. Let us now calculate the total property value per square meter of land corresponding to various FSI values by multiplying the y values of **curve** (1) (sale price by square meter of floor) by the X value (FSI). We obtain a new **curve** (3), (**Figure 10**) which represents the relationship

between FSI and the market property value per square meter of land, i.e. the total value of the property (land and construction) occupying 1 square meter of land.



- 5. The cost per square meter of land of building floor space at various FSI priced in Figure 9 is obtained by multiplying the unit cost of construction (Rs per m2 of floor) by the FSI. A new **curve** (4) is obtained. If we add a flat developer profit of ,say, 20% to the cost of construction we obtain curve (5). Curve (5) intersects curve (3) at point "p". For an FSI value higher than the x of point "p" (about 5.5 in this example) supply costs are higher than demand prices, therefore there is no supply possible. The range of possible solutions where there is both supply and demand is between an FSI close to 0 (FSI cannot reach a 0 value) and "p" (FSI=5.6).
- 6. If we plot on **Figure 11** the difference between the demand price per square meter of land (curve (3)) and the supply price (curve (5))--eliminating negative values-- we obtain a new curve (6) which represents the market price of land for different value of FSI. In our example this value passes through a maximum (Rs 50,000) corresponding to a FSI =4. In reality the price of land and the profit of the developer should be considered together (curve (7)) as the developer profit is not fixed but depends on negotiation with the land owner, obviously the land owner is not going to part from his/her land for a value close to 0 to maintain the 20% margin of the developer. Curve (7) is therefore the envelope of the developer profit and the price of land.
- 7. The maximum value of property which could be built on a square meter of land correspond to an optimum FSI for the city, the land owner, the developer and the end user, in this case the optimum FSI would be around 4. Indeed the city, having under its jurisdiction a finite amount of land, has an interest in maximizing private investment on this land. Its tax base and ultimately the economic well being of the city will be proportional to the capital investment which takes place within its limits. However we will see below how can the city recover some of the increase in the price of land due to the FSI optimum value to recover the cost of providing a better infrastructure to serve higher FSI values.
- 8. If the city decides to maintain the FSI at 1, the economic cost of doing so is represented by the difference in property value per m2 of land between point (a) and point (c) (figure 10). In this case, the economic loss is around Rs 78,000 per m2 of land. If the city raise the FSI to the interpreted level of 2.2 the economic loss is reduced to (c) minus (b) or about Rs 40,000 per m2.
- 9. If the land owner is well informed about market prices and the land is zoned residential without any FSI constraints he will try to sell around the maximum of the function represented by curve (6) (figure 11) or around Rs 50,000 per m2. If the developer buy at this price he will maximize his/her profit by building dwellings with a FSI =4. However, if the landowner knows that the current FSI=1 is strictly fixed in this area, the landowner will be obliged to sell at around Rs 18,000per m2. However if the land owner knows that the FSI =1 but an "interpreted" FSI=2.2 is tolerated he will not sell land for less than around Rs 36,000 per m2 (figure 11) curve (6). If the original FSI of 1 is suddenly strictly enforced, land price will take time to adjust to the new rule and new development will be halted until land prices adjust lower to reflect the new rules.
- 10. We have seen that raising the FSI in one area while keeping it constant in the rest of the city raise the price of land in the area where the FSI has been raised. It is possible for the city to capture part of this increased value by having a transparent well publicized formula which

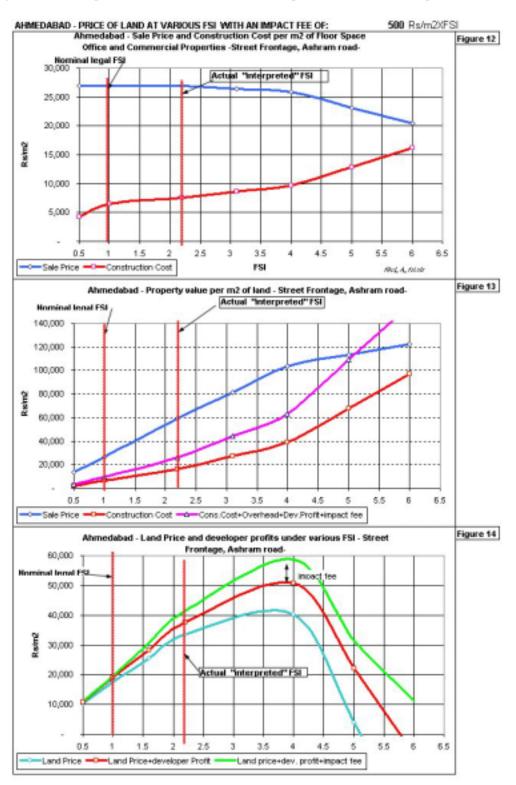
calculate the impact fee that a developer will have to pay to the city as a compensation for the additional cost in infrastructure which would be incurred by the higher FSI. It is important that the formula be transparent and well publicized because only under this condition will land price adjust at a lower levels that would be otherwise the case if the impact fee was not known.

11. <u>Conclusion and recommendation</u>: from the above based on a real case it appears that the city of Ahmedabad could raise the FSI in the area of Ashram road from the current FSI=1 to FSI= 4. On the condition to recover an impact fee as calculated below. This increased in FSI will result in higher land prices in the CBD but lower price to property ratio. It will tend to lower slightly the sale price of floor space in the area. land prices in less favorable areas will tend to become lower. The economic gain to the city, in the long run will be extremely large.

# E. How to calculate the impact fee? how high should it be?

- 1. Let us modify the previous model to include an impact fee recovered by the city at the time of construction. The impact fee will be used to improve infrastructure and services in the areas where it is imposed. After several iteration a base impact fee of Rs 500 seems to be feasible for application in the CBD of Ahmedabad. The impact fee is applied in the following manner. The total impact fee per m2 of land developed is calculated by multiplying the base fee of Rs 500 by the floor area of the building multiplied by the FSI. For instance for a site of 1000 m2 where an FSI of 4 is allowed, the total impact fee would be 500 X 4X 1000 X 4 = 8,000,000 or Rs. 8000 per m2 of land. Or in other words, the impact fee per m2 of land is equal to 500 multiplied by the FSI squared.
- 2. This formula could be used to auction the FSI in selected areas. For instance developer could be asked to bid in 2 possible manners:
  - a) on a floating FSI, i.e. FSI is not fixed but the impact fee is provided by the formula and therefore increase exponentially by m2 of land with the FSI, or
  - b) <u>on a floating base fee</u> i.e. the FSI is fixed but the higher bidder is the one who gives the higher base fee.
- 3. Let us see what happen to land prices when this formula is applied to the impact fee. **Figure 12** reproduces the same demand prices and supply costs for different FSI values. The impact fee has no effect on curve (1) and (2). **Figure 13** shows the new curve (4) which corresponds to the total supply cost+ the impact fee. This curve cross curve (3) at point P1 which x value (FSI) is significantly lower than the value of P in figure 10 (FSI=5 instead of 5.5). The impact fee decreases the range of theoretically feasible FSI, but the decrease is still well above the optimum of 4 which stays about the same with and without the impact fee.
- 4. **Figure 14** shows the new variation in the price of land when the impact fee is imposed (curve (7)). We can see that the land price still rise between FSI=1 and FSI=4 but at a slower pace than on the graph of figure 11. At the optimum (from the point of view of supply and demand) of FSI=4 the price of land is around Rs. 40,000 per m2 as compared to Rs 50,000

without the impact fee. The values of the impact fee per m2 of land when the FSI varies is shown by curve (8) Figure 14. For an FSI of 4 the impact fee is Rs. 8,000 per m2 of land.



5. Conclusion and recommendations concerning Impact fees. Variations could be explored for the formula to calculate the impact fee and the base value of the fee. It appears however that in the CBD area a base value of Rs 500 multiplied by the square of the FSI would be a feasible way to impose an impact fee for values of the FSI higher than 1. The impact fee would not reduce investment, it would only shift part of the increase in market value due to higher FSI from land owners to the city. For other areas of the city, the same exercise could be conducted but with new values corresponding to the demand and supply situation in each neighborhoods. For the moment I recommend that the increase FSI and the impact fee be tested in a perimeter corresponding to the CBD west of the Sabermati river.

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