

# INNOVATIONS IN TALL BUILDING CONSTRUCTION IN TURKEY FROM PAST TO PRESENT

Aysin Sev,  
Mimar Sinan Fine Arts University, Istanbul, Turkey  
[aysinsev@yahoo.com](mailto:aysinsev@yahoo.com)

Aydan Ozgen  
Mimar Sinan Fine Arts University, Istanbul, Turkey

From the first generation in the 19<sup>th</sup> century to the present day, tall buildings have always been a dominant landmark in the cities, visible from far, identifying the skyline and symbolizing the economic power of the community. Although its origin is the North American cities, the boom moved to Asian countries including Turkey in the last decades. This paper tends to give information about the recent trends in the construction of tall buildings, thus presenting tallest commercial and residential high-rises, especially constructed in Istanbul, which is economically the most developed city of the country. In the conclusion the functions which tall buildings commit in the context of Istanbul are discussed.

**KEYWORDS:** tall buildings, skyline, commercial, residential.

## INTRODUCTION

Tall buildings are playing an increasing role in the development of cities. They can be iconic structures for an individual use, signify areas of regeneration and act as symbols of economic activity. Initially it will be useful to define the tall building, since tallness is a relative matter and cannot be defined in terms of height or number of floors. Beedle (1971) defines the term by stating [The multi-storey building is not generally defined by its overall height or by the number of stories, but only by the necessity of additional operation and technical measures due to the height of the building] (Ali and Armstrong, 1995). He also mentions in another publication (1974) that the typology is a building in which tallness strongly influences planning, design and use or a building whose height creates different conditions in the design, construction and use, than those that exist in common buildings of a certain region and period. The definition also depends upon a range of contextual factors. The modern movement and urbanization with the rural exodus resulted in change in many cities, and the 20<sup>th</sup> century witnessed the rapid metamorphosis of urban skylines dressed with tall buildings.

Tall buildings symbolize the dominance of particular cities and cultures over others. They are often seen as beacons of capital and political power (Kostoff, 2001). They have the capacity of capturing the public imagination (Höweler, 2003), and no matter what their function are, they cannot be ignored (Abel, 2003).

Although the origin of the tall building is the North American cities, such as New York and Chicago, in the last two decades the boom moved to Asian countries, such as China, Hong Kong, Japan, Malaysia, United Arab Emirates and Qatar. According to the evaluation by Ali and Moon (2007), about 49% of the world's tallest buildings were located in North America in 1980s. The distribution of tall buildings has changed radically with Asia, recently having the largest share with 32% and North America's at 24%. Also eight of the ten tallest buildings of the world are now in Asia (World's Tallest Skyscrapers, 2008).

Tall building construction, which is occurring at an expanding pace in many cities of the world, is also accelerating in the big cities of Turkey, such as Istanbul, Ankara, Izmir, Bursa, Antalya and Adana. A large number of tall commercial and residential buildings are being planned and constructed in city centres and their periphery. Istanbul, which is economically the most developed city of the country, is the first to stand out with the construction of commercial and residential tall buildings (Table 1). This paper, mostly focusing on Istanbul, presents the development of tall building construction from a historical perspective and gives an idea about the architectural and constructional tendencies from past to the present.

Table 1. Population and number of tall buildings in the big cities of Turkey (Turkey, 2008)

	Population	Number of Tall Buildings
Istanbul	10.121.565	2123
Ankara	3.561.187	417
Izmir	2.515.818	88
Bursa	1.467.072	71
Adana	1.265.782	42
Antalya	777.203	42

## DEVELOPMENT OF TALL BUILDINGS IN TURKEY

The tall building is a relatively new building type for Turkey, when compared with USA, as well as Middle and Far East. The densification of large cities is evident and tall buildings arguably are the inevitable elements as the solution to scarcity of land in city centres. The impact of large-scale buildings on the urban context and their specialized planning requirements present new challenges to designers and engineers. The symbolic power of the tall building is also being recognized in Turkey, thus initiating a race of height.

Istanbul, carrying the banner in tall building construction in Turkey, has its significance of being a historical and traditional city, as well as having a special character of topography, which enhances the skyline (Sev, 2000). It is the world's only city on two continents; Europe and Asia. A narrow water canal, called the Bosphorus, divides the city in two parts, and two suspension bridges link the two parts of the city, as well as linking the two continents. It is also the only city in history, which have been the capital of three great empires; the Roman, Byzantium and Ottoman, and has a well-defined historic core and a silhouette dressed up with Islamic motifs especially on the overlooking hills (Figure 1 and 2). However, from 1950 onwards, administrative efforts in the field of urban development and the increase in national and international, socio-cultural activity restored this immortal city to its prime position in the social and political life of the country. As the city's population grew and its economy expanded, many institutions underwent changes in scale, context and appearance by 1950s. Buildings that reflected technological progress and the fashionable architectural trends of the day endowed Istanbul with a new urban landscape and new image (Batur, 1996). The late 1990s and the introduction of the 21<sup>st</sup> century faced an escalation in the number of tall buildings and the rapid changes in the skyline of the city (Figure 2).



Although most of the tall buildings erected between the period 1990 and 2000 were commercial buildings, the 21st century began with the rapid erection of tall residential buildings in addition to the commercial high-rises, due to the demand for living spaces nearby the working spaces throughout the central business district. In Table 2 the 10 tallest buildings of Istanbul are presented according to the data provided from Emporis.com, and Figure 4 illustrates the escalation in the number of stories based on years. Today 50% of 100 tallest buildings of the city are residential towers, whereas the 40% are commercial and 10% are hotel buildings. Elit Residence (2001), Polat Tower (2001), Metro City Millennium (2003), Sun Plaza (2005) and Sisli Plaza (2007) are the most remarkable high-rise residential buildings of the city, which are recently constructed. When completed, Diamond of Istanbul will be the tallest residential building of the city. Also the Sapphire, Selenium Twins, Flora Residence and Mashatten Towers are the examples of tall residential buildings, which are under construction at the time of writing.

## **TYPICAL EXAMPLES OF TALLEST BUILDINGS OF ISTANBUL**

In this section the selected examples from the tallest buildings of Istanbul are presented according to the architectural and structural features. The examples are mostly constructed with reinforced concrete except for the Diamond of Istanbul, which has a composite structure.

### **Tall Commercial Buildings**

#### **Sabanci Centre 1, 2 and 3 (1993)**

Topped off on November 1993, the Sabanci Centre 1 and 2, is located in the central business district of Istanbul (Figure 5). Within the Centre are the Sabanci Holding and Akbank Headquarters with 34 and 39 storeys respectively. The towers house a 707 person conference room, three multi-purpose conference rooms, restaurants and cafeterias capable of serving 2500 persons, 600 open and closed vehicle parking space, a library, and a command centre which is fully managed by computers. The vertical circulation of the occupants is provided by 24 elevators, and also 2 fire and 8 express elevators which serve during emergency.

The architectural design, performed by Haluk Tumay and Ayhan Boke, was a combination of aesthetic and technological factors. The complex, which is the product of the latest technology, has a monolithic characteristic since it integrates the aesthetic and technology within a structure of this height (Sabanci Centre, 1994). In the design process, accommodating the future needs of the occupants and tenants was the main objective. The office levels are designed to have an open workplace instead of executive office levels. The infrastructure is designed to meet the future needs of these workplaces. When renewals become a current issue, they are provided successfully by the technology installed in the building. Each system is monitored and controlled by a computer-based system. A fully integrated Building Automation System monitors and controls all the mechanical, electrical, plumbing, elevator and lighting systems in the building, providing a well accommodation between all these systems (Sev, 2001). The structural system comprises an outer rigid frame with widely spaced columns on the two sides of the central shear core. The frames consist of four columns of 0.7 m x 1.20 m size and one 0.7 m x 1.5 m size, and band beams connecting the columns to each other and to the shear walls on the edges of the floor plates. The interaction between the outer frame, shear walls and the shear core is provided by a 20 cm floor plate (Uysaler, 1995; Ozgen and Sev, 2000).

Table 2. The 10 tallest buildings of Istanbul (Istanbul, 2008).

	Function	Height [m]	Floors	Year	Status
Diamond of Istanbul	Residential	270	53	2008	Under constr.
Sapphire	Residential	261	54	2008	Under constr.
Isbank Tower 1	Commercial	181	52	2000	Constructed
Sisli Plaza	Residential	170	46	2007	Constructed
Tekstilkent Plaza 1	Commercial	168	44	2000	Constructed
Tekstilkent Plaza 2	Commercial	168	44	2000	Constructed
Sabancı Centre 1	Commercial	158	39	1993	Constructed
Suzer Plaza	Residential +hotel	154	34	1998	Constructed
Polat Tower	Residential	153	40	2001	Constructed
Sun Plaza	Residential	147	38	2005	Constructed

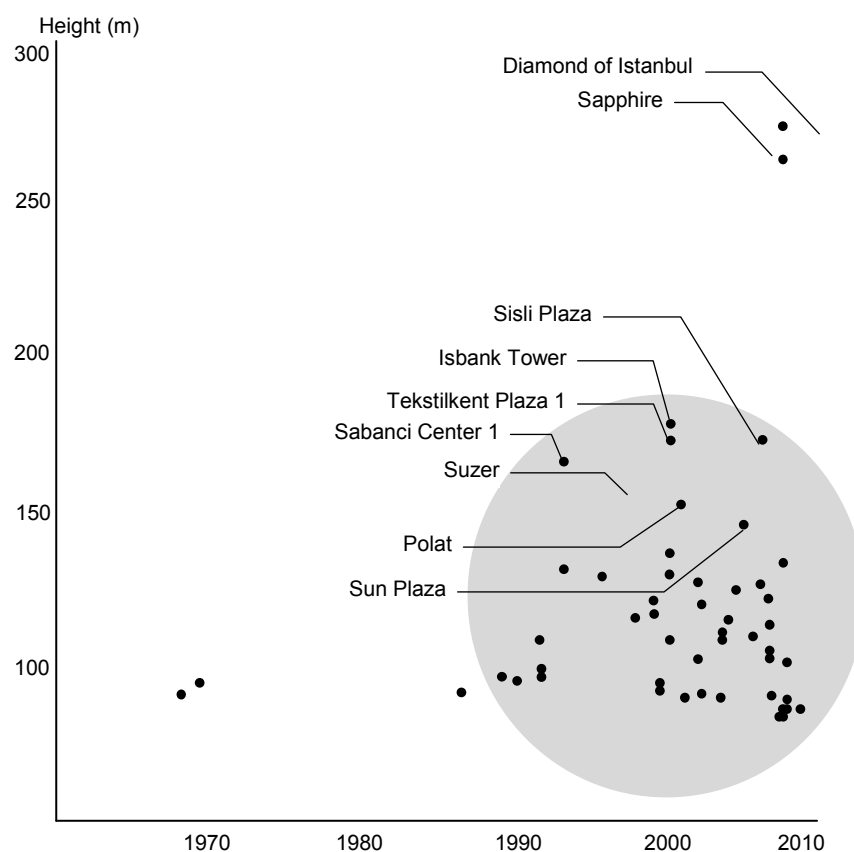


Figure 4: The escalation in the height of tall buildings in Istanbul based on years.

### Isbank Towers 1, 2 and 3 (2000)

Isbank Headquarters Complex consists of a 52-story and two 36-stories tall commercial buildings with a total area of 224 357 sq.meters (Figure 6). Being an integral part of the central business district, the complex is the largest of its kind on the European continent. Designed by architects Dogan Tekeli & Sami Sisa in conjunction with Swanke Hayden Connell Architects, the complex includes a conference hall for 800 guests, parking capacity for 3000 cars under-ground and a 900-seat employee cafeteria. The 52-story, reinforced concrete tower has its own lobbies, cores and entrances for executives and employees. The 36-story towers have a central shopping mall and the bank's main branch office. The heating, ventilating and air-conditioning (HVAC), plumbing, elevator, lighting, fire and life safety systems of the towers are controlled by the building automation system, thus labelling the complex to be intelligent. General public access is limited to the lower two floors, which hold retail space and a food court. Public lounges and visitor rooms accommodate clients and business meetings (Sev, 2001). The structural engineer designed the towers to resist an earthquake magnitude of 9.0 on the Richter scale. The towers resist the lateral loads by a framed tube at the perimeter. The sizes of the columns, spaced 3.5 m on the centres, are 600 x 900 mm on the taller tower, and 600 x 600 mm on the lower towers. The spandrel beams are designed as flat beams with a height of 350 mm, whereas the sizes of the spandrel beams of the lower towers are 600 x 750 mm. The towers also contain inner cores comprising of shear walls and including the vertical service elements (Ozgen and Sev, 2000; Sev, 2001).

### Tekstilkent Plaza 1 and 2 (2006)

Tekstilkent is situated on a site, which is considerably out of the historical core of Istanbul. Being the Europe's largest wholesale retail facility with a total construction area of 927 000 sq.meters, the complex includes two 44-story office towers with a height of 168 m (Figure 7). Designed by OVA Design of Istanbul, the reinforced concrete towers have total construction area of 125 000 sq.meters and gross floor area of 1406 sq. meters. The floors are envisioned to have flexible workspaces, and in the state of demand, the floor area can be divided into four office units and hired out to four different companies. The central core incorporates all the vertical service elements, such as elevators, fire stairs and plant rooms. The towers are supported by a reinforced concrete frame interacting with shear walls located perpendicular to the façade and as well as the shear walls in and around the central core (Tekstilkent, 2008).

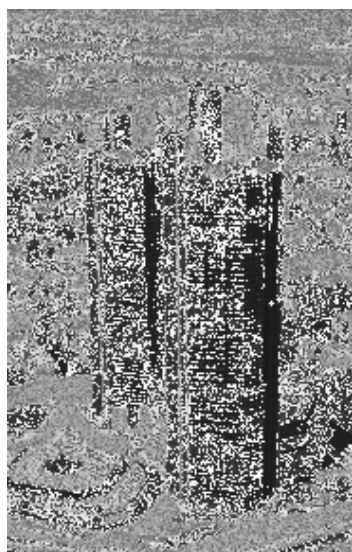


Figure 5: Sabanci Center.



Figure 6: Isbank Towers.



Figure 7: Tekstilkent Plaza.

## Tall Residential Buildings

### Polat Tower (2001)

Polat Tower, which is located in a dense residential and business district, is recently the second tallest residential building in Turkey with 153 meters height and 40 stories (Figure 8). Designed by the architectural office of Polat Construction, the reinforced concrete tower comprises 400 flats on the 33 upper floors of 1300 sq.meters gross area, a heliport on the roof, sports and recreational facilities including a fitness centre, swimming pool, service areas such as a restaurant, a dry-cleaning shop on the lower floors and a parking capacity for 3000 cars under the ground floor. A state-of-the-art automation system serves the building for the security and life-safety of occupants, thus controlling more than 33 000 parts of the building by an advanced computer system. Each flat is also equipped with remote controlled domestic equipment. The tower, with a square plan of 36 meters on sides, has a structural system comprising of inner and outer shear walls arranged in orthogonal directions. In addition to the shear walls two giant columns of 100 cm x 100 cm are located in one side of the plan and linked to the primary structural system with beams of 60 cm x 60 cm size (Sev, 2001).

### Elit Residence (2001)

Elit Residence is built on a 4500 sq.meter site in Sisli, an important business region in Istanbul (Figure 9). Designed by BSB London Architects, the project has been nominated for the MIPIM Award (Marche International des Professionnels de l'Immobilier) 2001 in the Residential Development category. With 61 flats of floor areas varying between 170 and 532 m<sup>2</sup>, the building is designed to create a lifestyle coupled with all the comforts of the 21st century, the high standard of construction and wide range of social and recreational activities help to make it one of the city's most exclusive multi-story residential tall buildings. The tower has earmarked 15 000 sq.meters of indoor facilities to be allocated as residential space. It features sports and recreational facilities including a fitness centre, swimming pool, sauna, steam-room, tennis and squash courts, and service areas such as a restaurant, a dry-cleaning shop and an indoor garage (Sev, 2001). The 35-story residential tower has a structural system comprising of a reinforced concrete frame interacting with shear walls located both in the eccentric core and throughout the elliptical plan in an orthogonal arrangement and perpendicular to the façade. (Elit Residence, 2008; Sev, 2001).

### Sisli Plaza (2007)

The Sisli Plaza project, performed by one of the leader construction corporations of the country, Yapı Merkezi, is built on 15 000 sq.meters site next to the Elit Residence (Figure 10). The complex, with a total construction area of 103 000 sq.meters, consists of two low-rise and a 46-story residential tower, which has a significant impact on the skyline of the city. The reinforced concrete tower is supported by a structural system of rigid frame and shear walls located in and around the elevator core. Reaching a height of 170 m, it has 40 residential floors above the four retail facility floors, and a 2-story radio station on the top. Designed to withstand the major earthquakes, the building is also equipped with the state-of-the-art life-safety and security systems. The plan shape allows most of the occupants enjoy the amazing view of the Bosphorus Strait. Consisting of 4 retail facility, the building also features sports and recreational facilities including a fitness centre, a swimming pool, sauna, steam-room, squash courts, conference halls, and kids club (Sisli Plaza, 2008).

### Selenium Twins (2008)

The Selenium Twins, designed by architects Dogan Tekeli and Serdar Sipahioğlu, are located on a prominent site next to the Polat Tower, and are intended to be a landmark in the skyline of Istanbul when topped out (Figure 11). The project consists of two identical residential towers of 34 stories, and comprises 215 flats of variable floor areas. Equipped with intelligent

building systems, the towers feature sports and recreational facilities including a fitness centre, swimming pool, and a tennis court, as well as service facilities such as house keeping for clean-up. Each tower incorporates a central core comprising of shear walls, an individual shear wall and outer frame of gigantic columns and perimeter band beams as the structural system. Band beams also link the outer frame to the inner core, as well as the individual shear wall (Selenium Twins, 2008).

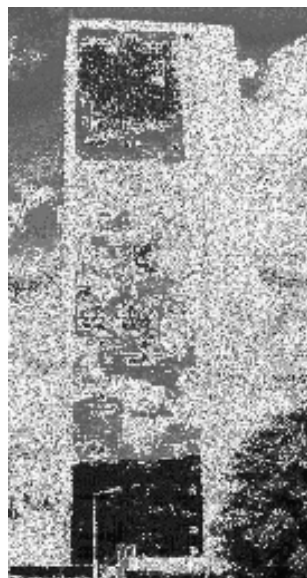


Figure 8: Polat Tower.



Figure 9: Elit Residence

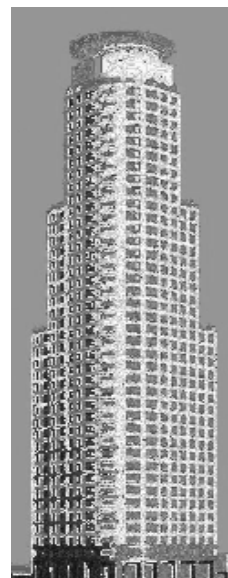


Figure 10. Sisli Plaza

### **Sapphire (2008)**

Designed by Tabanlıoğlu Architects of Istanbul, the 261 m Sapphire is a residential, leisure zone and shopping centre project located on the central business district, and will be the second tallest building of Turkey when topped out (Figure 12). The appearance of the tower tapers slightly as it rises upwards, and fully clad with glass, it provides a sense of lightness and transparency. The lower four floors are designed for high-quality brand shopping, cafes, restaurants and movies, maintaining the integrity of retail and social zones. The façade incorporates two independent glass skins; the inner skin involves storey-height glazing of manually operable by the occupants. The interior spaces are protected from extreme weather conditions by the outer skin, which incorporates opening operated by the building automation system. Labelled as the first ecologic high-rise of the country, the building is planned as four separate housing zones, with a common zone between the sections of indoor gardens, social areas, maintenance and support facilities, and the mechanical systems. In addition, recreational facilities are located on every ninth floor, such as a swimming pool and a mini golf course. Environmentally conscious systems serve the building to ensure low energy consumption during the operation of the tower. Access and parking issues have been solved by the public transport system and under-ground level car park (Istanbul Sapphire, 2008).

### **Diamond of Istanbul (2010)**

Diamond of Istanbul, with a height of 270 m and 53 storeys, will be the tallest building of the country when topped off in 2010 (Figure 13). Its design, performed by Dome Architects and Murat Yılmaz, consists of three wings constructed with steel and connected to the reinforced concrete central core. The single structural body with three wings comprises a 20 000 sq.meters and 300 room luxury hotel, a 18 000 sq.meters residential block, and a 16 000 sq.meters office block. The wings rise from the common podium of a five-story, 35 000 sq.meters shopping mall, 3 above and 2 below the ground level. The complex will also include a large aquarium, a botanic garden, cinemas, and concert halls. 5 of the 8 under-



ground levels will be used for car parking. The 48-storey of hotel wing has two panoramic restaurants presenting unobstructed views of entrances to the Bosphorus Strait. The construction of the tower began in February 2002 with the demolition of an 9-story office building, which has completed its useful lifetime, and recently gained momentum with the start of the steel beams' assembly on December 25th, 2006. Thornton-Tomasetti Engineers of New Jersey and Tuncel Engineering have performed the structural design, and the steel columns and beams of the wings have been produced by Arcelor Commercial Sections S.A. of Luxembourg. (Diamond of Istanbul, 2008).



Figure 11: Selenium Twins.

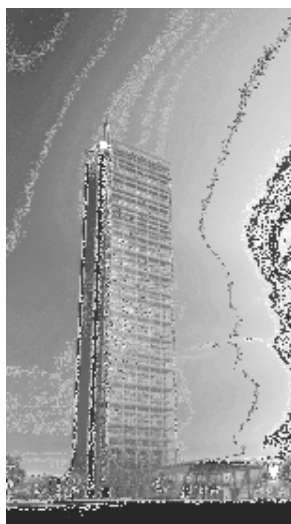


Figure 12: Sapphire.



Figure 13: Diamond of Istanbul.

## LIVING AND WORKING IN THE TALL BUILDINGS IN TURKEY

The gradual proliferation of tall office buildings in the big cities of Turkey is in response to the corporate need for both face to face communication and expansion of business operation. These buildings act a significant source of revenue and a business focus for the entire metropolitan area. People working in these prestigious plazas embrace these high-rises, and feel themselves safe, since they are sure that these buildings are designed according to the state-of-art technology. Most of the public prefer to be in a high-rise building in the case of an earthquake, rather than a low-rise building. However, a proportion of the public is non-supportive of the tall buildings for the reason that they create problems of ventilation and natural light in addition to inadequate number of elevators. Also they believe that they increase traffic congestion and parking problem, since the infrastructure of the big cities in Turkey are not developed yet for tall buildings. Also for a proportion of the public, living in a high-rise residential building is safe as well as being prestigious. From this perspective, high-rise is often seen as an icon of a developed society. However, it is clear that, with more people living in taller buildings, there is a need in research to go beyond the physical and engineering concern to consider liveability and impact of the built environment on its users. High-rise residents are anxious of being trapped by a power failure, unable to escape and fearful of crimes in the lifts, such as robbery and murder. Also a house that is not adequate from the engineering or design dimensions is not considered to be satisfactory by the occupants. The adequacy of the housing unit, the structural quality, the household facilities and other amenities and qualities within the wider housing environment, will influence the extent to which the inhabitant is satisfied with the unit.

## CONCLUSION

The big cities in Turkey, especially Istanbul standing first on the list, have been faced with the rapid increase in tall building construction by the introduction of the 21<sup>st</sup> century. The symbolic power of tall buildings being recognized, a notable phenomenon occurred from the turn of the century. Although commercial buildings have been striking in the skyline of the city until the end of the 1990s, residential and mixed-use construction gained momentum by 2000s. Success of the former projects led many real estate investors to develop mixed-use high-rise. In the context of Istanbul, these buildings serve a number of functions that;

- Create a distinctive skyline that projects a new image for the city,
- Form key landmarks,
- Contribute to a cluster signalling a key area,
- Demonstrate a growing economic position, and
- Set a precedent for maximising densities, and proximity to transport.

## REFERENCES

- Abel, C. (2003). *Sky High: Vertical Architecture*, London: Thames & Hudson.
- Ali, M. M. and Armstrong P. J. (1995). *Architecture of Tall Buildings*, Council on Tall Buildings and Urban Habitat Committee 30, New York: McGraw-Hill, Inc.
- Ali, M.M., Moon, K.S., (2007). “Structural Developments in Tall Buildings: Current Trends and Future Prospects”, *Architectural Science Review*, 50(3), 205-223.
- Balioglu, I. (1999). “The Structural System Project of Is Bank General Headquarters Complex” *Design Construction*, 160, Istanbul, 74-76.
- Batur, A., (1996). *World City Istanbul*, Istanbul: The Economic and Social History Foundation of Turkey.
- Beedle, L. S. (1971). What’s a Tall Building? Preprint no.1553 (M20), ASCE Annual and Environmental Engineering Meeting, St. Louis, Mo., October; American Society of Civil Engineering, New York, N.Y.
- Beedle, L. S. (1974). “On Tall Buildings and the Esthetic Environment”, *Proceedings of Conference on Tall Buildings*, Kuala Lumpur; December 2-5, Institution of Engineers, Kuala Lumpur, 1-6.
- Diamond of Istanbul, (2008), “Diamond of Istanbul”, available at: [http://en.wikipedia.org/wiki/Diamond\\_of\\_Istanbul](http://en.wikipedia.org/wiki/Diamond_of_Istanbul)
- Elit Residence, (2008). “Elit Residence”, available at: <http://www.yapikredikoray.com/en/elit.asp>
- Höweler, E. (2003). *Skyscraper: Designs of the Recent Past and for the Near Future*, London: Thames & Hudson.
- Istanbul, (2008). “High-rise buildings (all)”, available at: <http://www.emporis.com/en/wm/ci/bu/sk/li/?id=100460&bt=2&ht=2&sro=1>
- Istanbul Sapphire, (2008). *Yapı*, 317, Istanbul: The Building and Industry Centre, 68-75.
- Kostoff, S. (2001). *The City Shaped: Urban Patterns and Meanings through History*, London: Thames & Hudson,

Ozgen, A., Sev, A. (2000). *Load-Bearing Systems in Multi-Story High-Rise Buildings* (in Turkish), Istanbul: Birsen Publisher.

Sabancı Center, (2004). *Yapı*, 147, Istanbul: The Building and Industry Centre, 57-64.

Selenium Twins, (2008). "Selenium Twins, Istanbul", available at: [www.emporis.com/en/wm/cx/?id=113561](http://www.emporis.com/en/wm/cx/?id=113561)

Sev, A, (2000). *Impact of Tall Buildings on a City's Skylines*, Proceedings of the Second International Conference on Decision Making in Urban and Civil Engineering, (Ed.) J. C. Mangin and M. Miramond, CUST Clermont-Ferrand LIP& Paris Université de Valenciennes, November 20-22, Lyon, 945-956.

Sev, A., (2001). *Analysis of Tall Buildings in Turkey and at Abroad from the Architectural and Structural Point of Views*. Doctoral Dissertation, Mimar Sinan University, Institute of Science and Technology, Istanbul.

Sisli Plaza, (2008). "Sisli Plaza", available at: <http://www.emporis.info/en/wm/bu/?id=131418>

Tekstilkent, (2008). *Tekstilkent*, available at: [www.tekstilkent.com.tr](http://www.tekstilkent.com.tr)

Turkey, (2008). "Turkey's most active cities in terms of skyscrapers", available at: <http://www.emporis.com/en/bu/sk/st/ma/ct/co/ci/?id=100173>

Uysaler, D., (1995). *Sabancı Center*, International Symposium on Recent Trends in Building Construction, Mimar Sinan University, Istanbul, 3-5 May 1995, 133-148.

Yurekli, H. Yurekli, I. Akpınar, I.,(1992). *The Visual Effect of Buyukdere Avenue to the Skyline of the Bosphorus*, Proceedings of the 2nd National Symposium on Tall Buildings, November 4-6, Istanbul Technical University, Faculty of Architecture, Istanbul, 92-99.

World's Tallest Skyscrapers, (2008). "Official World's 200 Tallest High-rise Buildings", available at: <http://www.emporis.com/en/bu/sk/st/tp/wo/>