



Turkish Court of Accounts

Performance Audit Report

COORDINATION OF INFRASTRUCTURE WORKS BY METROPOLITAN MUNICIPALITIES

Summarized Version



July-2008

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SUMMARY

1. Studies towards restructuring local administrations launched in 1980s in Turkey gained an impetus with the adoption of European Charter of Local Self-Government in 1988. In this context, policies directed towards the establishment of Metropolitan Municipalities (MMs) and delegation of provincial duties and authorities to local administrations by central government started to be implemented. The number of metropolitan municipalities initially established in three biggest cities of Turkey with the Law no: 3030 and dated 27 June 1984 reached to sixteen in 2007.
2. Rapid population growth at metropolises as well as dense and planless structuring, especially in İstanbul and Ankara, have led to an increase in demand for utilities services and consequently, in the resources used for the construction and maintenance of utilities. Moreover, in cities with dense population, damages to roads and sidewalks during the construction and maintenance of utilities cause problems in daily life, create financial burden and necessitate effective solutions.
3. Provision of utilities services in a way that is not to interrupt daily life of citizens through efficient and economic use of resources requires an effective planning and coordination. Coordinated planning and operation of infrastructure (water, sanitary sewer, gas, electricity, telephone, etc) and superstructure (asphalt-paved road, sidewalk, etc.) is of great importance in terms of prevention of repetitions, wastage of time and resources, interruptions in vehicle and pedestrian traffic as well as ensuring a smooth and uninterrupted daily life during infrastructure works.
4. In the World and accordingly in Turkey, as a reflection of policies towards expanding the authorities of local administrations' duty to coordinate infrastructure works was assigned to MMs first with the Law No: 3030, which provided for the establishment of an Infrastructure Coordination Center (ICC). Although scope of duties entrusted to MMs was expanded with legal arrangements made later on, sufficient progress could not be achieved in coordination of municipal infrastructure works.

Audit Topic and Scope

5. Due to above-mentioned reasons, audit topic is determined as "*Coordination of Infrastructure Works by Metropolitan Municipalities*". Within this framework, works between the years 2004-2006 of metropolitan municipalities, other municipalities located within the municipal borders, organizations and institutions operating intensively with expanded facilities within municipal boundaries and providing water, gas, electricity and telecommunication services were examined.

6. Audit topic was studied within the following overarching questions:

- Has a proper structure that ensures the coordination of infrastructure works within MMs been established? Within this context, national policies and the policies at the level of MMs were analyzed. Effects of building development plans* underpinning all infrastructure works and information systems, and changes on them on the coordination of infrastructure works were examined; to what extent infrastructure information systems were utilized and facilitated coordination of infrastructure works; and the competency of organizational structure established for coordinating infrastructure works- Infrastructure Coordination Centers (ICCs)- were evaluated.
- Are infrastructure works in MMs coordinated in such a manner that is to ensure cost-effectiveness? Within this context, how infrastructure coordination works were planned, executed and monitored at MMs, whether cost-effectiveness of works was insured were analyzed; and it was examined whether works were executed effectively, efficiently and economically or not.

Audit Purpose

7. The purpose of this audit is to ensure that metropolitan municipalities eradicate defects in implementation, and Ministry of Interior, as administrative trusteeship, improves policies and legal arrangements relating to coordination of infrastructure works to bring in necessary measures with a view to leveraging effectiveness in coordination of infrastructure services at MMs and preventing resource waste.

Audit Methodology

8. Strategic plans, budgets and final accounts, investment programs, annual reports, MMs Council Decisions related to building development, other municipalities audited and investor owned utilities as well as opinions received from institutions, geographic information systems, and documents concerning urban transformation and public housing of MMs were examined. Status of MMs for each activity field was tabled for benchmarking; asphalt/sidewalk expenditures were analyzed through “Trend Analysis” and reflected on the graphics.
9. Moreover, ICC units, whether their funds/accounts were opened, their human resource capacity, level of participation to ICC Council meetings and decisions taken were examined. Whether works notified to ICCs by utilities in their draft programs

* Building development plans refers to a municipal plan controlling development and construction within a municipal boundary and includes all implementation details marked on a map.

were executed in the projected year or not; investment programs sent by utilities and those prepared by ICCs; if any, joint and final program; and information, documents and reports concerning excavation permit and control as well as sharing of revenues obtained from permit fees were evaluated.

10. Within the framework of efforts directed towards solving problems identified in legislation and practices relating to this topic; interviews and consultations were made with relevant authorities from General Directorate of Local Administrations affiliated to Ministry of Interior, State Planning Organization; high management and relevant unit heads of 16 MMs, relevant unit heads from other municipalities, representatives of relevant institutions and organizations invited to ICC meetings as well as academicians and experts. Following consultations with Professional Chambers and through examining City Council's reports, solutions produced at local level with regard to infrastructure coordination were evaluated.

Objectives, Targets and Policies for the Coordination of Infrastructure Works

11. Despite the fact that clear objectives relating to coordination of infrastructure works have not been defined; general policies towards extending authorities and responsibilities of local administrations have been followed and these policies have been reflected on legal arrangements with a view to ensuring effective, efficient and coordinated delivery of local services since 1980s.
12. Arrangements with regard to coordination cover other investor owned utilities delivering services as electricity, water supply, gas, telecommunication, etc to MMs. However, legal arrangements were drafted with an approach that regards all utilities undertaking as public. Considering problems created by statutes and privatization policies of undertakings that were privatized and subjected to private law in the coordination of infrastructure works; new policies have not been developed and no arrangement has been made towards coordination of infrastructure works. (p. 2.1.1-2.1.6)
13. Policy on establishing geographic information systems (GIS) at MMs, and municipalities at provincial and district level, and extending boundaries of MMs was introduced by MMs Law No: 5216. This policy has brought together such risks as failure in the establishment of an information system based on up-to-date and valid data especially in the field of infrastructure information systems and accordingly, waste of resources allocated; failure in the delivery of basic municipal services and effective and efficient coordination of infrastructure works. With Law No: 5216; a lot of unit, even those not competent to be transformed into a municipality were affiliated

to MMs without considering their service provision capacities in areas such as building development plans, infrastructure information systems, etc that have indirect effect on infrastructure coordination as well as other areas. (p 2.1.8 - 2.1.12)

14. Between the years 2004-2006, clear objectives and concrete targets were not set for the effective coordination of infrastructure works; no prioritization was made by any of MMs as in the case of national policies. Works were carried out without a unified plan and in the form of daily coordination of individual works. This situation has led to a lack of a common understanding and awareness with regard to the significance of coordination among undertakings investing in infrastructure and public utility. On the other hand, there is a widespread opinion that it is not possible to establish coordination of infrastructure works among MMs because the investment programs of utilities are not received in time and with a proper content, there are differences in statutes, investment priorities and budgeting systems of investor owned utilities; implementation rates of investment programs are low. (p. 2.1.14-2.1.21)
15. *Policies directed towards strengthening local administrations, enhancing their authority and responsibilities have increased the importance of determining national policies and their priorities to serve as roadmap in the definition of objectives, targets and prioritizations of MMs. For this reason, national policies and unified strategies that are to ensure good coordination and planning of infrastructure works of MMs and guide privatized institutions should be formulated through considering issues having indirect effect on coordination such as building development plans, infrastructure information systems, urban transformation projects, etc; and targets complying to these and priorities should be specified. (p. 2.1.13)*
16. *Policies that comply with national policies relating to infrastructure coordination at MMs that would be adopted by all parties with a unified and participatory approach should be developed; these policies should be transformed into short, medium and long-term concrete targets; and necessary measures for their implementation should be taken. (p. 2.1.22)*

Instruments for the Coordination of Infrastructure Works

17. Use of appropriate instruments such as building development plans shaping urban development for the effective planning, coordination and monitoring of infrastructure works; infrastructure information systems within the scope of geographic information systems (GIS) enabling sound and rapid decision-making and urban transformation projects providing alternative solutions to problematic areas is of great importance. Thus, these issues directly related to coordination of infrastructure works were

examined at sixteen MMs during our audits.

Building Development Plans/Proposed Elevation

- 18.** Since building development plans are documents that plan and shape cities as a whole; they are the starting point of any urban transformation project. With this aspect, it is one of the important instruments in the planning and coordination of technical infrastructure. Effective planning and coordination of technical infrastructure depends on building development plans favorable to physical and demographical features of cities and that they are not changed frequently. On the contrary, in Turkey, building development plans of MMs are not prepared in such a manner that meets necessities in time in relation to development and growth of cities, and directs proper and healthy planning of settlement. Adding to this, development of cities does not match with these plans. Consequently, those plans have become useless within a very short time and changed many times, which has a nature of increasing density and this situation requires repositioning of infrastructure facilities or/and capacity-building. (p. 2.2.2-2.2.7)
- 19.** Due to the fact that boundaries of MMs have been extended and existing plans are inadequate; with law no: 5216, obligation to prepare master plans with a scale of 1/25.000 at latest within two years starting from 07.23.2004 was introduced to MMs. However, 10 MMs cannot finalize their master plans within the specified period. At most MMs, there are shanty settlements the rate of which is above 50 per cent; in accordance with current conditions, current utilities provide service to cover short-term necessities and establish their facilities at different times and independent from one another. Incompliance of current status with building development plans has made it impossible to establish infrastructure facilities securely and in accordance with standards; and required them to be altered and/or displaced in a very short time before their end of life. (p. 2.2.8-2.2.15)
- 20.** When preparing and changing building development plans; data demanded and received from utilities are in the form of information relating to current situation and naturally superficial. Since utilities do not actively participate and have a right to speak, opinions and recommendations do not form a sound basis for a common evaluation and guidance. No MMs have developed any solution and model for the economic establishment and refurbishment of infrastructure according to redevelopment features; no study handling and considering infrastructure as whole has been conducted. When building development plans were drafted and changed; issues such as infrastructure needs, effect of change to infrastructure, timing of

infrastructure investments, financing needs, how and from where resource is obtained were not taken into account. (p. 2.2.16- 2.2.21)

21. Proper Positioning of infrastructure facilities and sound data relating to their coordinates depends on proposed elevation on roads that complies with building development plans. Lack of proposed elevation may lead such problems as increased risk of damages to infrastructure during infrastructure works, changes in data related to locations of lines, difficulties in drainage of rainwater, sewage lines becoming nonfunctional due to wrong beveling. At most metropolitan cities; necessary works with regard to proposed elevation were not made and put into implementation with a unified approach. For this reason, coordinates of infrastructure lines for existing roads cannot be specified properly. Moreover, they face many problems resulted in casualties and loss of property, damages to each other's facilities during infrastructure works. The reason for such problems is that they use the data in their information systems established with high-costs, which have lost their validity, up-to-datedness and reliability since real coordinates of infrastructure lines were lost, there are no data with regard to coordinates of existing infrastructure facilities and/or these data do not reflect the real situation. (p. 2.2.24-2.2.29)
22. *Existing situation of infrastructure facilities and necessities that are to arise in the planned scale should be detected before drafting building development plans. In the establishment, refurbishment and replacement of infrastructure; priorities should be determined through taking redevelopment features into account. Works should be carried out in a coordinated manner. Decisions to make changes on building development plans should be based on works whereby new conditions and decision are evaluated and evidencing the soundness of the decision. Planning (modeling) should also be made on technical infrastructure and building development plans for healthy, secure, livable and sustainable cities where any technical and social infrastructure and superstructure are established properly.* (p. 2.2.22-2.2.23)
23. *Avenues and streets the responsibilities of which are shared among MMs and municipalities falling within the borders of MMs should be handled as a whole. Their road profiles should be prepared and proposed elevation should be determined.* (p. 2.2.30)

Urban Development: Building Permit/Certificate of Occupancy

24. There exist a parallel relation between city's development pace and infrastructure need. In order to monitor superstructural development and to plan infrastructural needs accordingly; building permits and certificates of occupancy are important indicators. However, neither data related to permits are monitored by some of municipalities, nor a planning that is to meet increasing infrastructure need is made. On the contrary, utilities are providing services to those areas where housing has

already been completed; namely, process is vice-versa. However, it is important that MMs jointly evaluates the features of existing building stocks and plans of the region; and coordinate infrastructure works in planning phase for execution of works more economically and not wasting national resources. (p. 2.2.31-2.2.38)

- 25.** *Measures should be taken in order to ensure that infrastructure planning and coordination is made via considering the nature, density and pace of structuring. (p. 2.2.39)*

Urban Transformation Projects

- 26.** Urban transformation projects enable coordinated construction and refurbishment of network infrastructure of old city centers and newly constructed settlement areas. In the period 2004-2006, 11 of 16 MMs carried out urban transformation project, and remaining MMs launched similar works. Also in the draft law on urban transformation, coordination of technical infrastructure at MMs is considered within the scope of Article 8 of Law No:5216. However, it was seen in urban transformation projects lasted until July 2007 that with respect to road and infrastructure works, no joint program was prepared; coordination could not be established and urban transformation projects were not regarded as an instrument due to differences in priorities of utilities and MMs. (p. 2.2.40-2.2.44)

- 27.** *Urban transformation projects should be used as an effective instrument for coordinated construction and refurbishment of infrastructure and arrangements related to this should be subject to provisions of private law and cover privatized institutions. (p. 2.2.45)*

Infrastructure Information Systems

- 28.** For effective and good planning, coordination and monitoring of urban infrastructure; “*Infrastructure Information System*” including up-to-date, complete and integrated information concerning infrastructure facilities and roads, has great importance. At most MMs, regular and up-to-date infrastructure and superstructure data facilitating coordination has not been documented. With legal arrangement made after 2004, municipalities were held responsible for establishing their geographic and city information systems.
- 29.** In our audit work, whether there is Infrastructure Information Systems (IISs) are established at MMs and utilities was examined. It was found that at most utilities, IIS was established as of July 2007. However, establishment of IIS alone is not adequate. In order to obtain expected benefit, IISs must be based on accurate, up-to-date and adequate information.

- 30.** Geographic Information Systems (GIS) is grounded on building development plans prepared in digital environment, which are named also as footing in literature. However, since existing building development plans do not constitute an accurate and reliable ground for GIS; MMs and utilities are obliged to obtain satellite image and air photo individually for their information systems. Conduct of same operation by multiple utilities result in double cost, while establishment of GIS via using different footings leads to problems at coordination of infrastructure works. (p. 2.2.46- 2.2.57)
- 31.** Another important issue for IIS is the data related to infrastructure lines including their coordinates. Infrastructure facilities of MMs, water-sewage administrations, telecommunication and electricity distribution companies established long ago do not have infrastructure information systems in electronic environment and even hardcopies of up-to-date and regular records. Natural gas distribution companies have Infrastructure information system complying with their own needs. Existing infrastructure information systems are far from including up-to-date, valid, reliable, complete and integrated data covering the whole infrastructure within the borders of MMs and are not open to access of relevant institutions. Besides, works on information system were conducted without coordination; interoperability of systems of MMs, other municipalities as well as infrastructure undertakings and data sharing were not taken into account. (p. 2.2.61-2.2.67)
- 32.** *At MMs, a unified infrastructure information system covering also utilities and other municipalities, which is based on up-to-date, valid, reliable and complete database, should be developed in a coordinated manner. In this information system, apart from information on underground lines and municipal road and sidewalk constructions, data related to the type and features of materials used, infrastructure capacity, horizontal and vertical positions with coordinates, date of construction and its life cycle, which are of vital importance for planning of infrastructure coordination, should be placed.* (p. 2.2.75.-2.2.76)

Organizational Structure

- 33.** Coordination of infrastructure works has been the subject of legal arrangements since 1984 when MMs were first established. Within the context of this, both in MMs law no: 3030 and MMs Law No: 5216; an organizational structure that would operate as a committee (ICC) comprised of public institutions, private utilities and non-governmental organizations is envisaged for the coordination of infrastructure works.
- 34.** Nevertheless, organizational structure specified in legal arrangement for the coordination of infrastructure works has not been established in most MMs. ICC

committee has not met regularly and functional decisions for coordinated infrastructure works cannot be taken at committees that have had regular meetings. The unit that serves as Secretariat for the Committee is not established in certain MMs at all. Remaining MMs have such units but with insufficient personnel in terms of number and competency. Even if ICC meetings are held at most of MMs; meetings can not go beyond informing each other about their short-term activities; coordination plan and program cannot be done; decisions taken are not implemented and remain most of the time as mere recommendations. (p. 2.3.1-2.3.7)

- 35.** Functionality of this structure is adversely affected by such factors as development of cities irrespective of building development plans, inadequacy of infrastructure information systems, difficulty in drafting final and joint program from annual draft programs, which make coordination of infrastructure works difficult. In addition to this, according to current legal arrangements, decisions of ICC Committee on joint program are binding for public utilities and not for private utilities; thus it is de facto impossible to prepare and implement a joint investment program. Legal status, budgeting, investment planning, resource allocation processes and priorities of institutions represented in ICC committee vary, which is another negative factor. (p. 2.3.8-2.3.15)
- 36.** Moreover, authorities, duties and job descriptions with regard to planning and implementation of coordination have not been defined in detail. Even implementing regulation has not been prepared in some MMs. Besides, the authority to issue excavation permit that is used as a tool to monitor infrastructure works, prevent double works, and to control excavation is not being exerted by certain MMs. There is no unified approach among MMs with regard to this. (p. 2.3.20-2.3.22)
- 37.** *A process analysis starting from determination of joint targets by utilities with regard to coordination of infrastructure works to planning, execution and monitoring of coordination of multi-year investment programs should be made through considering factors such as building development plans, GIS, etc indirectly affecting coordination. Accordingly, a proper organization structure should be established. (p. 2.3.16)*
- 38.** *An organization structure whereby MMs, other municipalities and utilities operate in coordination should be established. While doing this, liabilities of public and private utilities and investments related to these as well as job descriptions of assigned personnel should be clearly set. (p. 2.3.23)*

Planning Activities concerning Coordination of Utilities

- 39.** Coordination of infrastructure works at MMs depends on good planning of works to be

undertaken. Investment programs of municipalities and utilities are the sources of information that form the basis of coordination plan. Thus, investment programs of mentioned utilities to be realistic and feasible, implementation of programs without material deviation are of great importance for planning of coordination. Planning, execution and monitoring processes with regard to coordination of infrastructure works at metropolitan cities are regulated by Metropolitan Municipalities Law and “Implementing Regulation on MMs Coordination Centers”.

- 40.** According to these arrangements, planning phase of coordination shall start with the notification of draft investment programs for the subsequent year to ICC by utilities and municipalities each year until the end of September. ICC shall gather all infrastructure investments planned to be made in the same year under final program through combining draft programs. Works required to be conducted simultaneously by more than one utility shall be covered in the joint program. (p. 3.1.1- 3.1.3)
- 41.** Investment programs of municipalities and utilities are the sources of information that form the basis of coordination plan in MMs. Thus, in our audit work, whether coordination of infrastructure works had been implemented in planned way or not was evaluated. At the same time, preparation phase of draft programs of all utilities; whether these programs had a proper content for coordination and were sent to ICCs in time or not; what kind of works had been conducted within the scope of coordination; how these works were controlled and whether compliance of these works to standards was ensured or not were examined.
- 42.** Legal status and accordingly, investment program drafting phases of utilities providing sewage, water, electricity, telecommunication and natural gas services at MMs vary. However, these differences are not an impediment to communication of draft investment programs prepared at provincial level to ICC within the period specified in its legislation. Despite this, at most MMs, draft investment programs had not been sent to ICCs regularly and timely. (p. 3.1.11 -3.1.21)
- 43.** The content of draft investment programs as much as its timely submission has vital importance in the coordination of infrastructure works. In the draft programs sent to MMs coordination units, information required for coordination such as time period, starting and completion date of the work to be undertaken, data on coordinates of the area where work is to be carried out, materials and methods to be used, etc are not included. Due to such reasons as significant part of projects prepared by investor owned utilities at provincial levels not included in final investment program, low implementation rates of investment programs, draft programs not being sent timely

and with a proper content; matching infrastructure works with respect to their time and place and thus planning of its coordination cannot be made. (p. 3.1.11 -3.1.24)

- 44.** *For this reason, considering utilities' investment programs' features within the scope of coordination, a draft program format including information that is to ensure planning of coordination should be set and measures should be taken for timely communication of programs to coordination units.. (p. 3.1.25)*
- 45.** Infrastructure undertakings cannot realize significant part of works mentioned in their investment programs and/or make many investments not mentioned in draft program. This situation renders drafting of coordination plan meaningless. Actually, no MMs take these plans as basis and prepare final and joint program that can be named as coordination plan; and while issuing excavation permit, do not seek its compliance to draft program. Consequently, all legal arrangements concerning coordinated conduct of all infrastructure works just remain as paper works.
- 46.** Works carried out by some MMs under joint program were predominantly comprised of such operations as stream improvement, tunnel construction, underpass, flyover junction construction/improvement, road widening and construction of new access roads, etc. Moreover, in the existing laws and regulations, there is no clear explanation concerning such investments that are made under the scope of joint program and comprised of several utilities in terms of those responsible for project and controlling services of works, composition of procurement and accepting commissions, etc. (p 3.1.26-3.1.38)
- 47.** *For the works associated with more than one utility and included in joint program; all processes from procurement, control to provisional and final acceptance; how these processes are to be carried out, and responsibilities should be defined clearly. (p 3.1.39)*
- 48.** In MMs Law No: 5216, there are arrangement concerning allocation of allowances to budgets of municipalities and all other public institutions and organizations for infrastructure services included in the joint program, and transfer of this allowance to infrastructure investment accounts that is to be opened under infrastructure coordination center. However, status of private and privatized companies within the joint program is not clarified. Moreover, among four utilities operating intensively with expanded facilities, only water and sewage administrations affiliated to MMs are in the nature of public institution. Planning and implementation processes formulated in the legislation to coordinate infrastructure works are not fully applied by most of MMs. (p. 3.1.40)

- 49.** *Analyzing current processes of coordination from preparation of draft programs to implementation, a new legal arrangement should be made for improving problematic areas and planning infrastructure coordination through taking characteristics of utilities into account. (p. 3.1.41)*
- 50.** Almost only instrument that has tried to be used in monitoring infrastructure coordination activities and preventing double works in practice is the authority of municipalities to grant excavation permit to utilities. Despite the fact that in arrangement on the coordination of infrastructure works, authority to issue excavation permit and the duty to prevent unauthorized excavations are entrusted to ICCs; there are serious differences between practices of MMs. At most MMs, there is no relation between coordination of infrastructure works and excavation permits; no comparison was made between the draft program of infrastructure undertakings and final coordination program while they were issuing such permits. However, drafting of final program as the planning instrument of coordination and its feasibility depend on realistic draft programs, which are essential for final program and issuing of permits for works that comply with these programs. (p. 3.1.42-3.1.45)
- 51.** *Decision to grant excavation permit to a specific work should be under the discretion of infrastructure coordination committee and permits should be granted after assessing whether excavation does comply with draft program of utility under coordination and final program. Considering their duties within the coordination activities and fields of services, relations among MMs and other municipalities within their borders should be defined clearly. (p. 3.1.46)*
- 52.** For the recovery of costs incurred by road and sidewalk maintenance, Municipalities charge Damage Restoration Fee (DRF) to persons and institutions undertaking excavation. As in the case of excavation permit, there is no unified approach in unit prices, procedures of their accrual and collection among MMs, and sharing of DRF is a problem among MMs and other municipalities. (p. 3.1.47-3.1.52)
- 53.** Ensuring effectiveness in coordination of infrastructure works is strongly associated with conduct of works in accordance with standards and coordination program and their control. To ensure this, one of the appropriate instruments is development of a monitoring system. In general, at ICCs, there is no sufficient personnel for monitoring and no monitoring mechanism that combines activity/cost data. No criminal action has been taken against unauthorized excavations detected due to lack of clear penalties defined in the relevant legislation. (p. 3.1.53-3.1.57)
- 54.** *Clear and net legal arrangement related to criminal sanctions should be made for*

cases where there are unauthorized and non-standard excavations. (p. 3.1.58)

Material, Security, Positioning and Excavation Standards

- 55.** With a view to prolonging economic life of infrastructure and superstructure, and minimizing possible damage to environment; material, security, Positioning and excavation standards that must be observed by all utilities should have been determined. In Implementing Regulation on MMs Coordination Centers published in 2006; only the duty to specify standards for materials to be used by all institutions within city boundary is entrusted to ICC. Standards related to excavation are generally arranged by regulations and directives issued by MMS whereas security and positioning standards are established by Turkish Standardization Institute at national level.
- 56.** During infrastructure works, seeking for compliance to Positioning standards shall contribute not only to secure Positioning of urban underground utilities but also to minimization of damages to utilities lines. In practice, positioning is generally made by the first utility making investment to region in the form of selecting the best place for its facility with respect to characteristics of its work. Other utilities consider remaining areas and existing utilities' facilities while positioning theirs.
- 57.** Measures required by security standards were not taken, which resulted in loss of life and property frequently brought in the agenda. Damages caused by non-standard works are generally subject of remedial actions, and have placed an additional financial burden on municipalities and infrastructure undertakings. (p. 3.1.59-3.1.63)
- 58.** *Excavation, material, Positioning and security standards should be placed in general arrangements and made binding for MMs in order to ensure compliance of urban utilities and underground works with standards and to prevent losses of life and property. Measures should be taken in order to ensure that these standards are binding for all underground works, including asphalt-paved roads, sidewalks, refuge construction, etc. (p. 3.1.64)*
- 59.** Non-standard works (manhole lids left open and above road level; no security measure at excavation sites, etc) and that excavations are not monitored lead to accidents, rapid deterioration of road and sidewalk, increase in fuel consumption and environmental pollution, damage to vehicles, etc, and thus, place a big burden on MMs in particular and to national economy in general. (p. 3.1.65-3.1.66)
- 60.** Utilities and municipalities are giving considerable damages to lines of one another during their works. Some of them do not keep record of such damages caused by another utility; while others either recover damages through settlement or in order not

to disrupt inter-institutional relations, do not raise the issue. For this reason, real cost of such damages inflicted by utilities to each other's lines and burden placed on economy cannot be determined precisely. (p. 3.1.67-3.1.69)

- 61.** *Measures to be taken for specification of security and Positioning standards and observance shall contribute to the minimization of such damages. Thus, infrastructure coordination unit should follow causes of damages together with costs data; and measures should be taken to minimize damages.* (p. 3.1.70)

Alternative Methods in Infrastructure Works: Gallery/Trenchless Technologies

- 62.** Alternative practices such as joint trench, multi-inlet pipe system and gallery systems that enable burial of more than one line with one single excavation instead of separate burial of different utility lines with common features are not used adequately. Use of these systems shall decrease damages to superstructure caused by underground works; facilitate maintenance of infrastructure; prevent interruptions in vehicle and pedestrian traffic and minimize costs. However, instead of this, only short-term installation costs were taken into account while savings in long-term maintenance and improvement costs were ignored or even not considered with the prejudgment that it would be costly. (p. 3.1.71-3.1.75)

- 63.** *Infrastructure should be constructed in coordination after determining best solutions for the city through working on alternative models and in a way that is to minimize damages to superstructure by maintenance and improvement works, and environmental disturbance as noise, traffic density, increase in emissions, etc.* (p. 3.1.76)

Coordination Activities: Cost-Effective Execution and Monitoring

- 64.** Instruments developed for needs and resources planning of infrastructure coordination works at MMs are final and joint programs. However, at none of MMs, final and joint programs are being prepared, which compile draft investment programs of municipalities and utilities, cover also resources and needs planning, and through which saving is made in superstructure works such as excavation, asphalt-paved road and sidewalk improvement. However, obtaining expected benefit from infrastructure coordination depends on multi-year resources and needs planning made through considering time granted for first construction and improvement of infrastructure facilities. (p. 3.2.1-3.2.3)

- 65.** *For above-mentioned reason, it should be ensured that utilities, MMs and other municipalities within the borders of MMs prepare multi-year investment programs and*

through taking these programs as basis, needs and resources planning for coordination should be made. (p. 3.2.4)

ICCs Fund/Account

- 66.** In legal arrangements concerning MMs, creating ICC fund/account for financing of works specified in final and joint programs is envisaged. ICC fund projected to finance coordination of infrastructure works has become ICC account as of 23 July 2004. Main difference of ICC account from previous practice is that real persons and accounting offices are upheld and DRF revenue obtained through excavation permits are recorded as revenue to this account. ICC fund/account created for financing infrastructure coordination has not become functional at any MMs although it is specified in law since final and joint programs are not prepared. (p.3.2.5-3.2.8)
- 67.** *Implementation of works included in joint programs, resource acquisition and utilization procedures, and responsibilities of undertakings should be clearly set and these resources should be monitored at a different account. (p.3.2.9)*

Institutional Shares in Joint Investments

- 68.** Construction works of MMs such as flyover junction, underpass and road widening, etc require displacement of existing infrastructure. Who bears displacement costs has not been standardized and practices at each work and institution vary. In practice, it was observed that either MMs or infrastructure facilities covered the costs or infrastructure facilities supplied only materials.
- 69.** Displacement works has a different nature compared to joint investment stated in legislation. While joint investment programs combine works of institutions at same place but different dates; displacement is seem only an extension of investments made by MMs. However, it has become necessary that utilities also work on that aspect which has been handled by MMs. (p. 3.2.18-3.2.23)
- 70.** *For above-mentioned reason, for displacements, and works included in joint program, principles and procedures on institutional shares should be determined in a way that is to create unity through considering variables such as dates when utility lines are installed and economic life of infrastructure assets. (p. 3.2.18-3.2.23)*

Double and sunk costs

- 71.** Facilities, roads and sidewalks newly constructed and/or not completed their life, shortly after their construction, are being deteriorated due to work of same/different utility. Changes in building development require infrastructure and superstructure works. These all result in double and sunk costs. Significant amount of double and

sunk costs have been incurred by asphalt-paved road and sidewalk constructions. These expenditures constitute significant part of budget and investment expenditures of MMs and other municipalities audited, which is 30-40 per cent. (p. 3.2.25-3.2.29)

- 72.** In 2004-2006, MMs spent approximately 1.428 million YTL (new Turkish Liras) for asphalt-paved road and 420 million YTL for sidewalk constructions. With current municipal work on asphalt-paved roads, all roads would be refurbished every 5 years. Considering that economic life of hot mix asphalt is approximately 15 years; it can be understood that roads were renewed before their end-of-life. Cases where roads and pavements are damaged before their end-of-life for the sake of infrastructure works and excavations is a phenomenon encountered by every citizen in their daily life. However, to what extent improvement need of asphalt-paved roads and pavements has resulted from uncoordinated infrastructure works cannot be detected at any MMs. (p. 3.2.30-3.2.34)
- 73.** Frequent utility excavations in roads, non-standard filling and compressing in patch works impair quality of asphalt-paved roads and sidewalk and decrease their economic life. This situation leads to use of scarce resources for double construction of asphalt-paved roads and sidewalks as well as economic losses; and vehicle and pedestrian traffic is adversely affected. Hence, asphalt-paved roads should not be excavated frequently, necessary measures to maintain integrity should be taken and infrastructure works should be carried out in coordination. (p. 3.2.35)
- 74.** *Such records as construction year, economic life cycle, etc. of asphalt-paved roads and sidewalks should be kept and measures to prevent such damages should be brought in. While coordinating infrastructure works, planning should be made through considering maintenance and improvement periods of roads.* (p. 3.2.36)
- 75.** Routing and width of roads are significantly changed with changes in building development plans. While harmonizing status with development plans, those lines installed before plans must be displaced or reinstalled. In such cases, not only costs related to infrastructure but also asphalt-paved roads and sidewalk costs turn into sunk cost. (p. 3.2.37-3.2.39)
- 76.** Another cost item in the coordination of infrastructure works is infrastructure information system developed as part of GIS. These are carried out completely without planning coordination of infrastructure works and interoperability of GIS. Infrastructure information system can be developed through use of map in digital environment as footing. With this aspect of it, digital maps named as footing are of

vital importance in GIS. At many MMs, each utility prepare its own maps according to its needs and program. GISs are developed by using incompatible footings and thus, these systems can not be used in the coordination of infrastructure works, this in turn leads to double costs and work repetitions. (p. 3.2.40-3.2.50)

77. In order to benefit from GIS in the coordination of infrastructure works, use of same footing by MMs and utilities, its periodic update and interoperability should be ensured. Hence, efforts towards establishing GIS-IIS at MMs should be evaluated within the scope of infrastructure coordination and cost-reducing measures should be taken. (p. 3.2.51)