



## COMPANY PROFILE



[www.troiconsultants.com](http://www.troiconsultants.com)

## NAME, ADDRESS AND LEGAL STATUS



### Troi Consultants

Uluslararası Teknik Müşavirlik ve Danışmanlık Tic. Ltd. Şti.

Atatürk Mah. Ataşehir Bulvarı 36. Ada

Ata 2/3 Plaza Kat: 6 D: 50

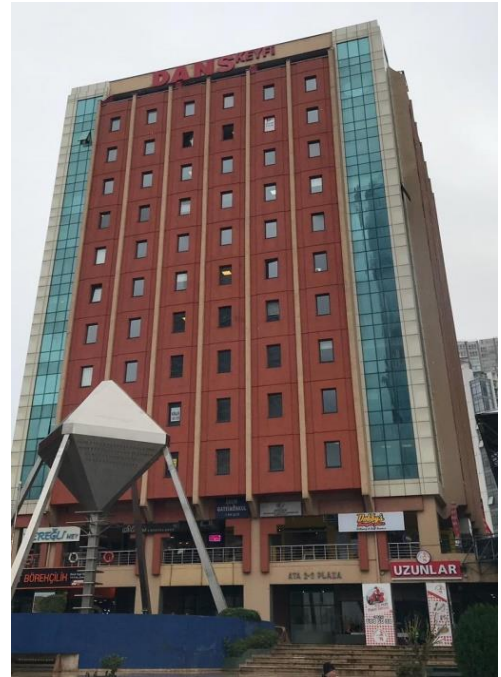
Ataşehir / 34758 / İstanbul / Turkey

Telephone : +90 216 456 48 26

Telefax : +90 216 456 50 26

E-mail : [info@troiconsultants.com](mailto:info@troiconsultants.com)

Website : [www.troiconsultants..com](http://www.troiconsultants..com)



Commercial Registration Number : 144466-5

# TROI at a Glance

Founded in 2018, **Troi Consultants** is an international engineering, management and development consulting firm that helps its clients successfully develop and execute technically demanding infrastructure projects and guiding them through many of the planet's most intricate challenges. The combination of local presence and international expertise ensures that client needs are met. The company is privately owned by the founding experts and is therefore independent. It has no affiliation with manufacturers, suppliers, or financial institutions.

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## What you'll get from us:

### Restless curiosity

We like challenge, change, and to be always learning. We are independent thinkers, constantly curious about the world and how to make it better for everyone.

### Creativity

We bring together the brightest minds to inquire, problem solve, invent, and achieve the best outcomes.

### Human focus

We never lose sight of the human impact of our actions and the responsibility that this entails.

### Respect

We are inclusive, respecting the environment and everyone with whom we work, valuing all people and cultures equally.

### Integrity

We deliver on our promises, behave ethically, and do not tolerate bribery or corruption.

### Care

We put safety at the core of everything we do, with a commitment to harm no one.

### Partnership

We are at our best when we work with you to help define and solve problems, and deliver solutions.

### Leadership

We want to be at the leading edge of everything we do – so you get the best results.

### Collaboration

We develop trust-based relationships that allow us to do our best work.

### Commitment

We aim to turn obstacles into sustainable solutions for you and the lives you touch, by maintaining an unwavering focus on your needs.

## Mission

TROI helps clients in the Energy & Climate Protection, Water & Environment, Transportation and Building & Structures sectors to reach their ambitious goals by

- developing and optimizing sustainable project solutions based on a comprehensive approach
- creatively and diligently working to provide high quality, reliable solutions
- closely interacting with clients and project parties on site
- integrating all concerned parties
- using TROI's pedigree of international experience and competence as well as maintaining TROI's private ownership and complete independence



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*TROI is committed to achieve the highest standard of client satisfaction and to maintaining long-term business relations with its clients.*

*TROI strives to help improve quality of life around the globe.*

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## Beliefs, Values & Ethics

### Beliefs

#### ***Engineering Excellence***

Unlike many competitors, TROI is not seeking growth alone. What matters to TROI is market leadership through quality. TROI is constantly striving to be among the best performers in each of its business areas. This is achieved through:

- a holistic approach to problem solving
- a high level of ingenuity and creativity
- a constant desire for improvement
- a strong motivation and dedication of the TROI team, and
- diligence and great persistence to succeed

This is what **TROI** calls ***Engineering Excellence***.

#### ***Contributing to a Better Quality of Life***

Although it may not always be obvious, the services provided by TROI have a significant impact on people's quality of life.

Whether it is supplying drinking water and electrical energy, building transport systems, or providing gas for heating purposes, the project managers and engineers at TROI deliver solutions.

TROI is passionate about improving quality of life around the globe.

## Values

### Great People

TROI's great people are making the difference! Our highly motivated experts want to excel and contribute to the overall success of TROI. Problems are considered challenges, and finding the best solution is the goal.

Everyone is treated with respect, honesty, reliability, and fairness, regardless of position, ethnicity, religion, or gender. TROI strives for long-term relationships and for employees to see themselves as ambassadors of TROI.



### Seamless Cooperation

In order to best serve their client's needs, TROI's experts collaborate across regionally spread offices to work as one team. Distance, time zones, and cultures are successfully bridged.

Sharing of competence, experience, tools, and capacities is highly important to best serve clients.

### Complete Independence

TROI is fully privately owned and has no obligations to banks, suppliers, or any other third parties.

Actions are always based on purely objective considerations and are in the best interest of the client.

### Responsible Corporate Conduct

TROI prioritizes safety and security as well as the promotion of health and protection of the environment. Applicable laws and regulations are observed.

TROI and their experts are responsible for each other, for society, and for the environment. TROI fulfills its commitments and acts professionally at all times.

## Ethics

Our business is built around fairness, openness and honesty. We have a zero tolerance stance towards bribery and corruption that chimes with our focus on integrity.

We are globally compliant with International Standards for anti-bribery management and gain certification for those parts of the business where it is necessary.

We provide clear guidance on what we expect of every staff member through a core set of communications. These help our experts understand our approach to ethics and how we comply with laws, regulations and company procedures that apply to our activities.

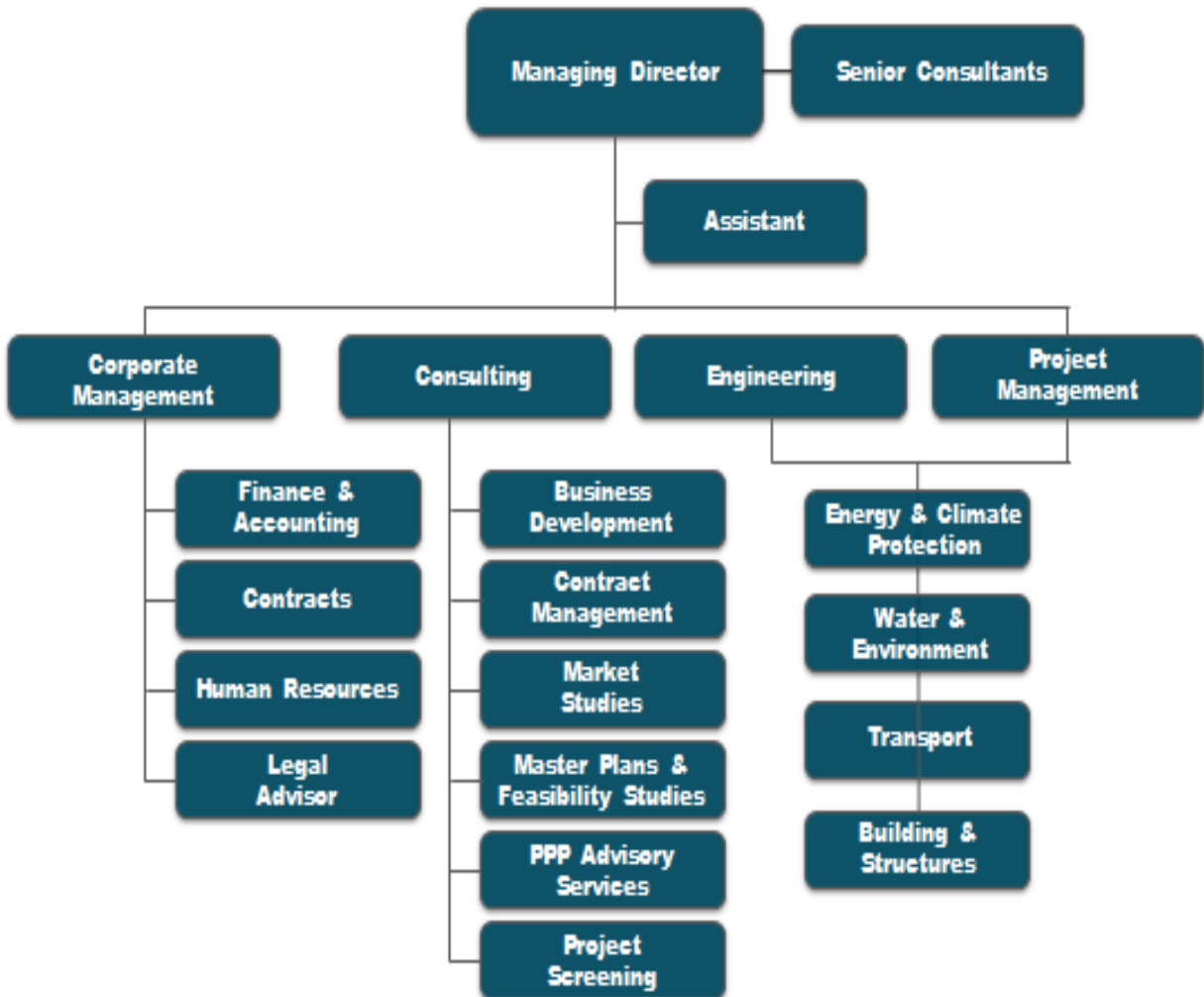


# Organization

We operate via a highly efficient, robust and cross-functional structure that allows for a health and progressive growth in size, skill and quality.

Our Organizational Chart shows the relationship between the company's various divisions and departments. All chart components contribute as required to the overall effort of engineering and construction of any specific project.

It is the policy of TROI Consultants to assign to each of its projects a dedicated team. This team is composed of a group of skilled individuals assigned from various divisions on a full-time basis as required. Team members perform their respective duties in accordance with a set planned schedule and budget. Headed by a Project Manager responsible for directing all project activities, the Project Team is sustained during the project lifetime.



# Management Systems

## Health, Safety, Security and Environment

The protection of the environment and the health, safety, and security of TROI's staff and of third parties take absolute priority in all actions of TROI.

Consequently, health, safety, security, and environmental protection (HSSE) form an integral part of TROI's Integrated Management System (IMS), the backbone of TROI.

The system shall be certified to OHSAS 18001 and ISO 14001 in their latest editions.

## Quality Management

### *Integrated Management System*

TROI strives to achieve market leadership through quality in its main business areas, and therefore the quality of TROI's services is of prime importance.

TROI's Integrated Management System (IMS) involves a Quality Management System to help TROI ensure that the services rendered are of consistent quality and reliability.

The IMS shall be updated on a regular basis in order to optimize TROI's performance level and best serve its clients. The system shall be certified to ISO 9001 in its latest edition.

## Project Management

In its effort to strive for engineering excellence, TROI developed its own project management system for PMC services for investment projects (PMS-PMC). The PMS-PMC is a systematic approach to project management and is based on industry best practices. It is applied to large-scale investment projects anytime clients do not mandate the application of their own management system.

The PMS-PMC can be tailored to the needs of TROI's clients, and it creates the basis for successful project execution.

Project Integration Management		
Scope Mgmt	Quality Mgmt	Communication Mgmt
Time Management	HR Management	Procurement, Contract and Claim Mgmt
Cost Management	Risk Management	Health, Safety, Security and Environment Mgmt
Engineering Management	Management of Permitting and Approval	Management of Land Acquisition
Construction Management	Commissioning Management	Management of Initial Operation

## Knowledge Management

Knowledge management is critical in knowledge based fields like those of TROI. Responsible, competent managers are assigned to all specialist fields of TROI. Their role is to continuously expand the knowledge of TROI in their respective field of expertise, create documentation, and convey it across the entire Company. The competence officers are in-house or independent partners for addressing challenges in their respective areas of expertise.



### ***Recommended Practices***

For different design steps and complementary services, TROI has an extensive collection of its own recommended practices. These document the procedures recommended by TROI for the individual work steps, and they are supplemented by detailed workflows. This promotes the transfer of knowledge from experienced to younger employees. When TROI companies work together, it is very important that the parties involved have the same understanding of the workflows and results in order to work together efficiently. The process descriptions of the recommended practices contribute significantly to achieving this goal.

## Compliance Management

To ensure that the applicable laws and guidelines are observed, all companies of the TROI Group will have compliance management system (CMS) in place adapted to their respective market environment.

Besides checking the pertinent provisions and organizational measures, the respective compliance managers also regularly review the effectiveness of the systems.





# SERVICES

## Consulting

The services provided by TROI target to successfully perform any kind of investment, design and consulting requirements of state authorities, municipalities and private sectors, such as:

➤ *Business Development:*



### **Are your business development efforts delivering the results you need?**

Business development is the lifeblood of any architecture, engineering, and construction firm, whether small or large, growing or just trying to make it through tough patch. An effective business development strategy does more than just bring in new work. It can significantly improve your profitability, dramatically affect the entire culture of your firm, and increase its value. It is the single most important tool you can use to achieve your strategic goals.

To help you achieve your business development objectives, TROI Consultants has assembled a team of experts who can help you develop and carry out a successful Business Development plan that can transform your firm and its future. They can also help you be sure you're going to win that next important proposal opportunity.

TROI's consulting services are completely flexible and tailored to meet the unique needs of each of our clients. A few of the services we offer include:

- ❖ Business development plans and strategies that will win you new work NOW and position your firm for long term success
- ❖ Step-by-step approach to establishing a strong and effective business development program
- ❖ Proposal and presentation team support.

➤ *Contract Management:*



- ❖ Project outcomes and teams can be positively influenced by timely specialist intervention. Our contract advisory consultancy provides the best influence possible. Key services include contractual advice, procurement, project recovery, claims, adjudication, arbitration, dispute management, dispute resolution and expert witness services.
- ❖ Early involvement allows us to have greatest impact with influencing issues and enhances the opportunities for settlement, improving your position.
- ❖ TROI operates across many sectors globally. We provide you with independent, reliable, fact-based advice to assist you in understanding the issues facing your projects. We then deal with, manage and resolve those issues. Our service is totally client focused and built upon a deep understanding and knowledge of the environments in which you operate.

### **What we deliver;**

Early involvement allows us to have greatest impact with influencing issues and enhances the opportunities for settlement, improving your position. Our consultants are highly experienced and trained specialists including non-practicing barristers, arbitrators, adjudicators and quantum, technical and delay analysis experts.

Our clients include employers/purchasers, funders/lenders, insurers, contractors, subcontractors/works contractors and in-house/client appointed lawyers.

Our diverse experience ranges from small works packages, single-house refurbishment projects and disputed accounts to multimillion pound claims, adjudications and international arbitrations. We operate across all sectors including property, education, sport, water, rail, highways, metros, oil and gas, petrochemicals and power projects and cover civil engineering, infrastructure and buildings contracts.

Our consultants are available to visit sites and client offices wherever they are located. We also have teams of consultants seconded to client offices and project sites.

## ➤ *Market Studies:*



Growth strategies are based on increasing competitiveness in a comprehensive market environment. Frequently growth is also the result of the reaction to trends in specific sectors. A market study makes it possible to evaluate markets, competitors, trends, success factors as well as opportunities and risks in the target market. These findings are essential for strategic business decisions, they show companies how to best use their growth potential and help with the budgeting process for planned projects.

### *Market studies typically include the following elements:*

- ❖ General analysis of the relevant business sector or market
- ❖ Supply and demand analysis and forecast
- ❖ Elasticity and sensitivity analysis
- ❖ Competitor analysis
- ❖ Product, quality and technology analysis
- ❖ Price or tariff analysis
- ❖ Benchmarking
- ❖ Legal, social and political framework analyses

### **Role of TROI:**

TROI supports clients in expanding their business activities. By preparing market studies TROI helps clients gain a better understanding of the market environment, thereby providing important input for decision making for their development and growth strategies. In this context, TROI investigates the market potential and makes forecasts for and assessments of potential development scenarios.

The current and predicted macro- and microeconomic conditions relevant for the respective sectors are taken into account. In addition, a thorough review is conducted of the competitive situation and of the regulatory and political boundary conditions likely to affect clients' business prospects. TROI will adapt its market studies to the specific requirements.

### **Benefits to Clients:**

Market studies help clients to thoroughly understand the target business environment and the competitive situation for a specific product, project or business. For these studies, TROI draws on the extensive experience of its experts and on the diverse network with clients and stakeholders in the business areas of Energy & Climate Protection, Water & Environment and Transportation & Structures. TROI offers to leverage this extensive market intelligence to enable clients to make informed decisions on critical investment opportunities.

➤ *Master Plans:*



Master plans point the way and provide guidance. Their development requires the integration of complex strategic, economic, regulatory, technical, social and environmental aspects. Their aim is to develop a strategic approach towards defined objectives, taking into account short-term, mid-term and long-term implementation stages.

**Role of TROI**

Fostering appropriate stakeholder engagement is of major importance when developing a master plan. Such an engagement is decisive for a thorough analysis of the status quo and of the projected political, economic and technical developments relevant to the master plan. The analysis is the starting point for developing the strategic goals and objectives of the master plan.

Together with a vision and mission statement these strategic goals and objectives are developed in workshops together with the client’s representatives and possibly also with external stakeholders. This serves to ensure that the subsequently developed master plan receives broad support and acceptance.

**Benefits to Clients**

The combination of engineering, environmental and economic competence together with its international consulting expertise makes TROI the perfect partner for master plan developments in the business areas of Energy & Climate Protection, Water & Environment and Transportation & Structures.

➤ *Pre-Feasibility Studies:*



Pre-feasibility studies investigate whether a concept satisfies the client’s objectives and the technical, economic, social and environmental constraints for a particular project. The studies also provide first assessments of conditions and assumptions under which a set of solutions is feasible and define the order of magnitude of the costs involved.

**Role of TROI**

TROI has the capability to design well-engineered, economical, environmentally and socially acceptable, and operable solutions that facilitate the feasibility and sustainability of a concept.

With its pre-feasibility studies TROI provides a valuable instrument to support its clients in their decision-making process for project investments.

## Benefits to Clients

TROI combines engineering excellence with economic, environmental and social understanding in order to develop a sound basis for further decisions. For this purpose TROI assembles multidisciplinary project teams that have extensive experience in the business areas of Energy & Climate Protection, Water & Environment and Transportation & Structures.

### ➤ *Lender's Engineer:*



Project financing is a key element of investments in the industry and infrastructure sector. In general, a project developer seeks to finance a significant part of the construction costs by borrowing through a special purpose vehicle, which tends to take the legal form of a limited liability company. For this reason financiers need a comprehensive risk assessment and a well-documented project basis before making any financing decision, and a suitable process to monitor the progress and quality of the project during implementation.

## Role of TROI

TROI provides engineering and management services to enable financiers to evaluate project risks before signing a financing agreement and subsequently until repayment of financing has been completed.

Using the experience gained from planning and executing significant investment projects, TROI's experts make an assessment of the construction budget and schedule and check whether the assumptions of the financiers are reasonable and include sufficient financial reserves.

Additional services rendered by TROI include checking the availability of sufficient financial reserves, previous concepts and the financial model for the baseline scenario (base case).

## Benefits to Clients

TROI has developed a reliable roadmap for the provision of technical advisory services to financiers which comprises pre-defined review and evaluation criteria. This enables TROI to carry out transparent and efficient reviews in keeping with the responsibilities of a technical advisor to a financier. TROI's advisory services will provide a clear understanding and quantification of the major project benefits and risks, and recommendations to improve benefits and mitigate risks. As a result, benefits and risks of a project will become more calculable.

### ➤ *PPP Advisory Services:*



In times of tighter public budgets, alternative models for project delivery gain wider acceptance. In order to meet the present-day challenges posed by complex infrastructure projects, more and more public institutions cooperate with private businesses in Public–Private Partnerships (PPPs). In addition to providing access to private capital, PPPs permit the strengths and capacities of the respective partners to be used in an optimized way. These models require the respective responsibilities and contractual obligations to be thoroughly structured and tasks and risks to be carefully and sensibly divided.

### **Role of TROI**

TROI is able to draw on extensive and long-standing experience in infrastructure projects. The successful implementation of various projects is the result of judicious advice on the structuring of Public–Private Partnerships. By combining the technical, financial, commercial, and legal expertise required with the experience as project developer or shareholder of infrastructure assets, TROI paves the way to an optimized approach and solution. Depending on the overall project setup, TROI may also collaborate closely with other external experts such as legal or financial advisors.

### **Benefits to Clients**

TROI supports Public–Private Partnerships in defining the project organization and in equally dividing the tasks and risks among all public and private partners involved in the project. Structuring the project thoroughly in terms of technical and economic feasibility, financing, budget and schedule is key to ensuring the overall feasibility and the long-term success of the project.

### ➤ *Project Screening:*

Even the best planning and implementation of a project cannot rectify the mistakes made in the preceding screening process. Selecting projects carefully and diligently according to clearly defined goals holds the greatest optimization potential when creating new infrastructure. In order to be able to select the most suitable projects from planned undertakings, goal-oriented criteria have to be defined beforehand. They reflect the different requirements from the different infrastructure areas and the specific challenges.

### **Role of TROI**

TROI gives advice to public and private institutions, banks and investors in all business areas on selecting and defining projects. Together with clients and other stakeholders, TROI develops and ranks relevant criteria to establish sound foundations for decision-making to justify and optimize investments. When implementing projects, TROI uses optimized tools and relies on many years of

expertise gained as consultant in different business areas and on experience gained as developer and shareholder of infrastructure projects.

## Benefits to Clients

TROI helps clients to identify the best project solutions based on decision relevant criteria. A screening process coordinated with clients and other stakeholders early on in the development phase ensures that envisaged project solutions are feasible and that the best possible solution is given preference. Depending on the characteristics of the project, services may range from optimizing the cost-benefit relation to maximizing the entrepreneurial success.



# Engineering

TROI draws on the extensive experience of its experts and solution partners to provide all of the engineering and design services required for the implementation of projects in its business areas. Every project is unique and has requirements specific to the client, business, and country. TROI's regional presence and broad experience makes a detailed understanding of the services to be provided possible.

Successful design and planning comes through a well prepared engineering and design process. Coordination of interdisciplinary interfaces is key, and TROI uses interdisciplinary reviews to ensure top-quality engineering and design.

TROI also provides further services if needed such as acquiring all the necessary permits for a project.

## TROI provides the following services:

- ❖ Pre-concept
- ❖ Conceptual Design
- ❖ Basic Design
- ❖ FEED, Tender Design
- ❖ Permit Application Design
- ❖ Guide Design
- ❖ Detailed Design
- ❖ Construction Design
- ❖ Design Review
- ❖ As-Built Documentation
- ❖ Integrity Assessment
- ❖ Rehabilitation Design
- ❖ Modification Design
- ❖ Decommissioning Planning





# Project Management



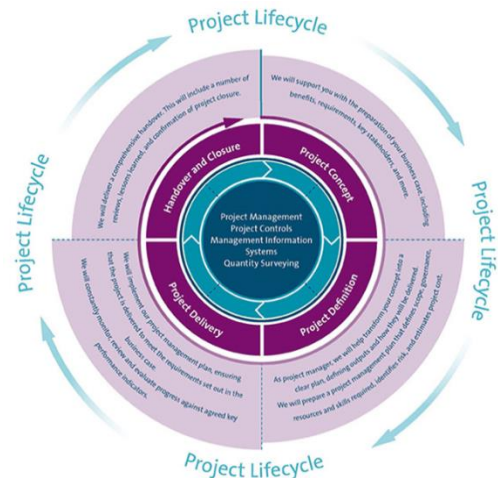
Professional project management is needed to reach project goals regarding time, quality, and cost.

TROI has many years of experience in the preparation and execution of large-scale, interdisciplinary projects. Drawing on this experience, TROI is competent to perform project management tasks as prime consultant.

The efficiency and quality of project execution is increased significantly by streamlining management responsibilities. If desired by the client, TROI assumes full responsibility for the management of projects.

## TROI provides the following services:

- ❖ Project Organization
- ❖ Project Management Consultancy
- ❖ Risk Management
- ❖ Stakeholder Management
- ❖ Project Execution Planning
- ❖ Procurement Services
- ❖ Supply Chain Management
- ❖ Construction Supervision
- ❖ Commissioning Supervision
- ❖ Operation Supervision



## Additional Services

Professional project management is needed to reach project goals regarding time. In complex projects, problems tend to arise at the interfaces between project parties, and coordination needs increase with the number of project parties involved.

TROI strives to cover all competencies needed for complex projects by using in-house specialists to minimize external interfaces.

TROI provides complementary expertise in the following areas:

### ➤ *Urban & Environmental Planning*

The decisive criteria for implementing complex projects are their funding and their likelihood of receiving authority approval. Availability of funding and the ability to gain authority approval determine the feasibility of these complex projects.

A project's environmental compatibility is of special importance. Close cooperation between environmental specialists and engineers in the initial stage of a project ensures environmental compatibility and sustainability are addressed. This stage is also important for early coordination with the approval authorities and their designated experts to ensure a smooth approval process.



### TROI's services in environment and landscape planning encompass:

- ❖ Environmental impact assessment
- ❖ Interdisciplinary value engineering assessment
- ❖ Planning of mitigation and compensation measures
- ❖ Landscape conservation support plan
- ❖ Ecological supervision on construction sites

### ➤ *Environmental & Social Impact Assessments*

Sustainable project realization has become a key aspect for planning and realizing large-scale infrastructure projects. Laws, international conventions, bank standards, and corporate principles demand that the potential negative impacts of a project are identified, addressed, and adequately mitigated.

In order to ensure the environmental and social compatibility of a project, an Environmental and Social Impact Assessment (ESIA) is undertaken to evaluate the potential impacts of a planned project on its physical, biological, and social environment. An ESIA also develops mitigation measures to avoid, reduce, or compensate for these impacts. This assessment is an integral part of a project and provides support to decision makers during project planning.



An appropriate impact assessment assures compliance with legal and lender’s requirements. It also leads to improved corporate reputation, compliance with corporate ethical standards, and more cost-efficient project realization due to reduced non-technical risks. In this context, stakeholder engagement is integral to achieving acceptable results for all involved parties, thereby promoting good corporate citizenship.

### TROI’s services regarding the Environmental and Social Impact Assessment encompass:

- ❖ Project management
- ❖ Project design
- ❖ Permitting
- ❖ Feasibility studies
- ❖ Environmental Impact Assessments (EIA) according to national standards
- ❖ ESIA’s according to international standards
- ❖ Ecological construction supervision and site management

### TROI and its partners:

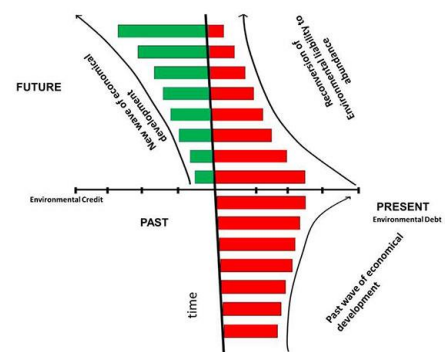
- ✓ offer a global network of experts with long-term experience with the environmental and social sustainability aspects that might arise during the life cycle of a project
- ✓ plan projects with integrated teams of engineering experts as well as environmental and social specialists
- ✓ provide environmental and social assessment and permitting services associated with one-stop shop engineering services throughout the whole project life cycle
- ✓ address and manage significant points of concern at an early stage in the planning phase

### ➤ Sustainability Advisory

In the short to medium term, all industry practices will have to become more sustainability. That is why it is necessary to develop green strategies and sustainability action plans for energy, water, waste, construction, as well as infrastructure and transport businesses.

### Sustainability advisory services typically include the following elements:

- ❖ Sustainability and green strategy and action plans
- ❖ Analyses of energy, water and waste during operation
- ❖ Plans for carbon management during operation
- ❖ Performance improvement and smart design assistance
- ❖ Waste management strategy plans
- ❖ Sustainable procurement strategies
- ❖ Sustainability roadmaps
- ❖ Life cycle assessment and cost analyses
- ❖ Product and corporate environmental footprint analyses
- ❖ Product portfolio analysis and improvement
- ❖ Integrated sustainability performance management
- ❖ Sustainable urban planning and green building advisory services
- ❖ Training on sustainable practices



## Role of TROI

In its fields of activity, TROI helps clients businesses to grow sustainably in accordance with international guidelines and to develop sustainable projects. This will involve developing market strategies, assessing sustainable options over the whole project and product lifecycle, determining the carbon footprint, developing mitigations strategies as well as concepts for waste reduction and “cradle-to-cradle” approaches for material utilization, recycling and disposal.



TROI will investigate the implementation of sustainable practices both in terms of social and environmental impact as well as lifecycle cost assessment recommending short-and long-term solutions based on state-of-the art and future industry development scenarios.

## Benefits to Clients

Public corporations will benefit from the possibility to develop green strategies for their energy, transportation, water and waste management, while developers and contractors can benefit from performance optimizations that TROI will identify based on future technology development, international policies and state-of-the-art industry practice. TROI will tailor its sustainability advisory services to the specific project requirements.

### ➤ *Institutional Strengthening and Technical Assistance*

Lack of technical and human capacity, particularly in developing countries, negatively affect the quality and efficiency of local services. Continuous extension of duties and responsibilities of local governments and expansion of their area of authority to include rural areas call for institutional capacity building at the local level. TROI provides consulting services on the development of institutional capacity, participatory practices and management effectiveness at the local level in order to assure accurate priority setting, increased quality of applications, enhanced efficiency in the use of resources and strengthened development.



## Fields of Expertise:

- ❖ Institutional Strengthening
- ❖ Capacity Building
- ❖ Technical Assistance

# BUSINESS AREAS

## Energy & Climate Protection

The conversion of fossil and renewable energy sources, industrial residues, and municipal waste into electricity and heat is the basis for promoting and safeguarding the quality of life long term. Facilities for energy production form the backbone of modern society. In order to ensure a reliable, sustainable, and environmentally friendly supply of energy, large-scale energy generation and distribution projects have to be implemented.

Design of such facilities and plants, assistance through all construction stages and start-up, and consulting services for plant optimization and modernization are all part of TROI's core competencies.

### ➤ *Solar Power*

Solar energy, while abundant and readily available, did not play a substantial role in the energy supply mix in the past as the costs of converting it into electricity were too high for it to be attractive.

Yet, a growing awareness of environmental pollution and its consequences has sparked interest in photovoltaics as an energy source. Utility-scale photovoltaic installations have emerged and conquered the energy market in the last two decades. Highly competitive Levelized Costs of Electricity (LCOE) reflect the current state of the market.



TROI has entered this rapidly developing solar power market. Over a period of ten years, TROI will become a major player in this sector and has been involved in many utility-scale PV projects, some of them marking a breakthrough in size, complexity and energy costs.

Based on the experience gained in Turkey, TROI will expand its services to other regions strengthening its presence in Middle East, South-East Asia and in Africa.

### Fields of Expertise:

- ❖ Design of complex, large-scale PV und PV hybrid power plants
- ❖ Feasibility studies and FEED
- ❖ Permit application design
- ❖ Tendering, contract management
- ❖ Site supervision during construction and commissioning
- ❖ O&M supervision
- ❖ Due diligence
- ❖ Lender's technical advisory services
- ❖ Project management quality assurance/quality control

### ➤ *Wind Power*

Wind is one of the oldest power sources used by mankind. The wind industry is a large and growing sector with a supply chain that produces thousands of component parts and a service sector that is increasingly advanced in its use of technology to design turbines, set up wind farms,

and map wind potential. The installation of wind farms is increasing in the same manner as that of solar and geothermal plants.

Starting in northern Europe, today many countries around the world are using wind power to supply electricity to their power grids. Wind power is already established as a serious alternative to conventional fuel for electric power production.



### Fields of Expertise:

- ❖ Project development and capacity planning
- ❖ Feasibility studies
- ❖ Grid connection of wind farms
- ❖ Owner's engineering
- ❖ Lender's engineering
- ❖ Technical advisory services
- ❖ Permitting
- ❖ Detail engineering

### ➤ *Hydropower*



The expansion of hydropower as a reliable, sustainable and long-term cost efficient source of energy is experiencing a renaissance in many regions. TROI actively will help to shape this expansion by managing customized projects of any type and size. As a one-stop shop TROI provides integrated, interdisciplinary services for hydropower projects from the initial study, through the design and tender phase to commissioning and start-up.

Emphasis is always placed on developing individual solutions that meet the most stringent quality standards and take complex framework conditions into account.

To optimize projects in terms of economic efficiency, TROI also uses special software and performs financial analyses. The early integration of all relevant stakeholders to increase a project's acceptance and likelihood of approval, and the diligent preparation of Environmental and Social Impact Assessments in line with international standards complement TROI's range of services. Among TROI's clients are public institutions, private project developers, renowned construction companies, and international financial institutions.

### Fields of Expertise:

- ❖ High, Medium & Low-head plants
- ❖ Run-of-river plants
- ❖ Storage power plants
- ❖ Pumped storage plants
- ❖ Dams and weirs
- ❖ River engineering works

## *Thermal Power*

Modern power plants running on fossil fuels transform primary energy sources such as coal, oil, gas, industrial residues, and municipal waste into heat, steam, or electrical energy.

TROI provides ambitious clients with a full scope of services from feasibility studies to start-up and commissioning. Throughout the entire life cycle of a project, TROI supports its clients in designing and implementing key processes that are essential to the success of the project. These services include due diligence studies, general and interdisciplinary project management, conceptual design, environmental impact assessment, procurement documents, basic and detailed design, material procurement, site management (including construction supervision), project completion, and start-up and commissioning.



TROI renders all these services for utility-scale power plants and power generation systems for offshore and onshore facilities along large pipeline systems. TROI has comprehensive expertise in the implementation of privately and publicly financed projects as well as diverse types of models for public-private partnerships.

### **Fields of Expertise:**

- ❖ Conventional power plants for all fuels
- ❖ Combined heat and power plants
- ❖ Waste incineration plants
- ❖ Biomass combined heat and power plants
- ❖ Combined power and desalination plants

### ➤ *Waste to Energy*

The disposal of waste is one of the most challenging problems of modern society. Efforts to minimize the enormous amount of waste produced and to recycle a large portion of the waste collected have to be supplemented by incineration technologies. Converting non-recyclable and non-reusable waste into heat and electricity for commercial use reduces fossil fuel consumption significantly and landfill volume demand up to 90 %.



TROI will be a reliable partner to private investors and public sector operators, providing project development, FEED, EPCM and detailed engineering services in a series of waste-to-energy initiatives. As a consequence, TROI is able to offer integrated, interdisciplinary, one-stop services for all project development stages.

### **Fields of Expertise:**

- ❖ Waste-to-energy plants – grate combustion and circulating fluidized bed combustion
- ❖ Waste-to-energy co-incineration plants (waste with coal, biomass, sludge, slurry, etc.)
- ❖ Fly and bottom ash treatment
- ❖ Refuse derived fuel (RDF) preparation

## ➤ *Power Transmission & Distribution*

Energy is a valuable asset.

Sustainable utilization of this resource is based on two premises: efficient, environmentally friendly energy generation in modern power plants and safe, low-loss transmission of electricity and heat from power plants to consumers using highly efficient transport and distribution systems.



TROI offers optimized, state-of-the-art solutions for a wide array of energy transmission services, from the transmission of electrical power via the energy suppliers' overhead transmission lines to industrial supply systems that place great demands on the system layout and configuration because of special load characteristics.

### **Fields of Expertise:**

- ❖ Overhead transmission lines (OHL)
- ❖ Gas insulated transmission lines (GIL)
- ❖ Cable transmission lines
- ❖ Distribution systems for industrial plants
- ❖ High-voltage transmission systems
- ❖ High- and medium-voltage substations (AIS, GIS, AC, HVDC)
- ❖ Communications and network management systems (SCADA)
- ❖ Power grid studies



# Water & Environment

## ➤ *Water Treatment*

Because of growing water consumption, dwindling water resources and increasing water pollution, using raw water of inferior quality that requires treatment is often the only option to quench the world's thirst.

Appropriate treatment solutions have to be customized depending on raw water quality, intended use, and operational constraints.



TROI's expertise covers the complete range from well proven, low-tech to innovative, high-tech treatment processes such as membrane filtration technologies, with an increasing focus on cost-effective, affordable solutions that make safe water accessible to a rapidly growing population.

Whether it is initial assessments of water demands, feasibility studies for comparison of suitable treatment options, design development for recommended solutions, and/or support during procurement, construction and commissioning of water treatment plants – TROI's water treatment experts are passionate about their contribution to sustaining human life.

### Fields of Expertise:

- ❖ Process engineering including process optimization
- ❖ Water reuse
- ❖ Hydraulic engineering
- ❖ "One-stop shop" design services for all plant components
- ❖ Permit application design
- ❖ CAPEX and OPEX estimates
- ❖ Studies of alternatives including financial modeling
- ❖ Supervision of construction, installation, testing and commissioning
- ❖ Consultancy services for plant operation and maintenance
- ❖ Personnel training

## ➤ *Wastewater Treatment*

Wastewater collection and treatment are some of today's important environmental and social issues. It is only if potential environmental damage caused by the discharge of water pollutants is minimized or even prevented that we stand a chance of protecting the environment and its vital natural water resources. It becomes increasingly important to understand wastewater as a precious resource, to reuse treated effluent for landscaping, agriculture, and industry, to recover carbon, nutrients, etc. and to produce energy from residual solid matter.



Developing tailored treatment solutions for different economic, environmental and operational boundary conditions is TROI's top priority, from harnessing natural treatment systems to employing cutting-edge process technologies.

As an engineering company and leading expert in designing complex wastewater infrastructure projects, TROI have the professional competence to partner with its clients to support them in every step towards achieving their ambitions goals.

### Fields of Expertise:

- ❖ Inlet works and lifting stations
- ❖ Pre-Treatment – screening, grit and oil removal
- ❖ Primary Treatment – primary settlement and filtration
- ❖ Secondary Treatment – carbon and nutrient removal – CAS, SBR, MBR, MBBR, IFAS processes, etc.
- ❖ Tertiary Treatment – physical and chemical processes
- ❖ Disinfection – UV, chlorination
- ❖ Sludge Treatment – dewatering, drying, incineration, aerobic stabilization, anaerobic digestion with co-generation of energy
- ❖ Treated sewage effluent reuse

### ➤ *Water Transmission*

The worldwide demand for water is growing continuously. This is especially the case in arid areas where water has to be transported over large distances to satisfy the needs of the local population and industries. The extremely large quantities of water that have to be pumped



through such pipelines for hundreds of kilometers require complex facilities. Ensuring the cost efficiency and continuous availability of water pipelines is a challenge to be addressed with every project. The optimization of investment and operating costs is one of TROI's core competencies. TROI is committed to become an international market leader in the field of large-scale water transmission systems.

TROI's scope of services in this business area encompasses all supply systems for drinking and irrigation water, power generation, oil production, mining, and industrial purposes.

### Fields of Expertise:

- ❖ Pressurized and gravity water transmission systems
- ❖ All associated facilities such as water intake, pumping stations, tanks, etc.

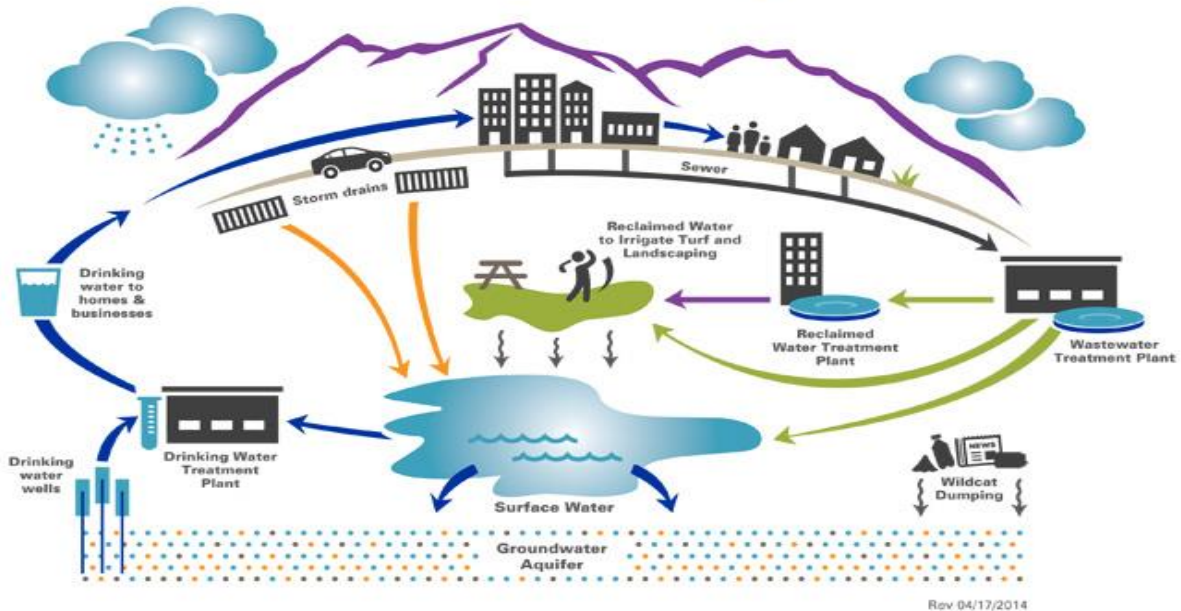
### ➤ *Urban Water*

The vast majority of the world's population today is living in an urbanized environment and the trend of people moving to cities continues to grow. Thus a large proportion of human water consumption and wastewater discharge occurs in urban space.

Raw or treated water, often supplied from remote sources, is frequently stored in urban supply areas to serve as a buffer at times of peak demand or interruption of bulk supply, before being distributed to consumers through (mostly) pumped network systems.

For modern water distribution systems, it is essential to make water of sufficient quality, quantity and pressure available at all times. Today, substantial water losses caused by aging supply networks jeopardize the supply reliability and increase the supply costs. TROI is committed to working with clients around the world to tackle leakage and employ the latest know-how in efficient supply concepts and technologies to make the most out of the world's precious fresh water resources.

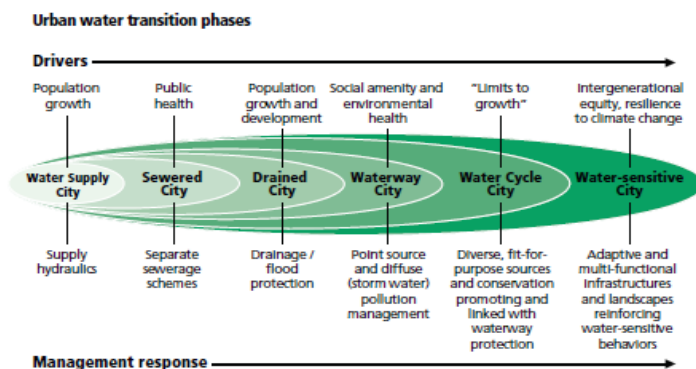
## Urban Water Cycle



When it comes to collecting wastewater, either in dedicated separate systems or together with stormwater in combined systems, TROI can draw on its experience – be it for master plans, feasibility studies or complex system designs. In addition to the design of new systems, increasingly significant public and private investments target the expansion and rehabilitation of existing sewer systems with the goal of maximizing the use of available system components.

But Urban Water is not just about the human demand for potable water and the resulting generation of wastewater, it is increasingly about the management of rain water and specifically

### Water-Sensitive Cities Framework



extreme surface runoff. Conventional combined or separate drainage systems have for long sufficiently addressed the capturing and safe assimilation of this water into the environment. However, the rapid expansion of impervious surfaces in combination with the widely observed change in weather patterns that has resulted in greater rainfall intensities and durations now necessitate alternative approaches. Hence, TROI is promoting integrated surface water

management in urban environments – local ground infiltration, decentralized retention in cities and safe routing through urban agglomerations.

## Fields of Expertise:

### Water Supply:

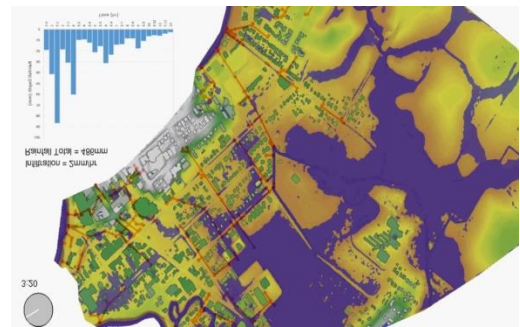
- ❖ Spring catchment structures
- ❖ Wells
- ❖ Reservoirs and tanks
- ❖ Pumping stations
- ❖ Water distribution networks
- ❖ Trenchless construction methods
- ❖ Non-revenue water reduction
- ❖ Infrastructure rehabilitation

### Wastewater Collection:

- ❖ Sewage pumping stations
- ❖ Combined and separate sewer systems
- ❖ Combined sewer overflows (CSOs)
- ❖ Trenchless construction methods
- ❖ Infrastructure rehabilitation

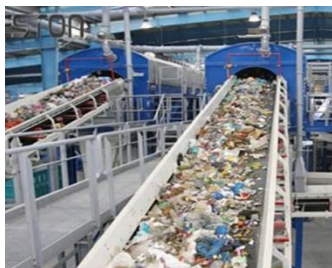
### Integrated Urban Drainage:

- ❖ Data collection and processing – drone surveys, network flow monitoring, GIS, BIM
- ❖ Surface water hydrology (2D modelling)
- ❖ Groundwater hydrology (3D modelling)
- ❖ River hydrology (1D modelling)
- ❖ Sewer network hydraulics (1D modelling)
- ❖ Decentralized surface water management
- ❖ Sustainable urban drainage systems (SUDs)
- ❖ Infiltration systems



### ➤ *Solid Waste Management*

*The campaign to create sustainable societies has thrust waste management to the forefront of the endeavor. This is done by using services such as reducing, reusing and recycling waste. We can help you develop waste management strategies that comply with international and local standards.*



Our waste management team of planners, engineers and environmental scientists has helped our customers develop their business opportunities in the waste sector while protecting communities and the natural environment.

Our range of expertise covers the whole waste collection and disposal cycle, and all types of waste, including domestic, municipal, commercial, clinical, industrial, electrical, and hazardous waste.

## Fields of Expertise:

- ❖ Creative solutions through masterplanning
- ❖ Engineering the disposal of waste
- ❖ Using waste to power our world

# Transport

## ➤ *Multimodal Transport*

The global changes in social, technological, ecological and spatial conditions have a considerable impact on the mobility of people and the transport of goods. Today traffic is subject to greater changes than ever before. The trend "better, faster, further" and the pursuit of economic vitality and ecological sustainability are transportation aspects that are almost consistent all over the world. Especially in passenger transport people increasingly use several different means of transportation for one single route to reach their destination.



This multimodality in transport requires sound knowledge of the traffic processes and the interaction between the different types of transportation as well as modern tools to be able to make accurate forecasts of traffic volumes and to simulate movement scenarios. When developing intelligent transportation concepts, TROI not only takes into account purely technical conditions, but also social, economic and ecological aspects. From a transportation perspective, it is essential to understand the effects on the transportation network in order to illustrate and optimize the benefits of investments in transportation engineering measures in all aspects already in the run-up to decisions.

### Fields of Expertise:

- ❖ Traffic planning and forecasting
- ❖ Traffic simulation
- ❖ Traffic management
- ❖ Traffic flow optimization
- ❖ Mobility design

## ➤ *Railways*

Increasing mobility needs coupled with calls for environmental protections and conservation of natural resources is bringing railway transport back into the spotlight.

While the construction of high-speed railway lines is geared towards passenger transport, the upgrade and rehabilitation of existing standard and narrow gauge lines is aimed at both passenger and freight transport. Modernization of railway infrastructure makes railway transport more attractive.

TROI has contributed significantly to the implementation of numerous rail projects in many



different countries. TROI provides engineering services both for civil works and rail systems. This enables TROI to render comprehensive engineering services for all disciplines involved in railway projects.

### Fields of Expertise:

- ❖ Conventional railway lines for regional, freight or mixed traffic
- ❖ High-speed/high-capacity railway lines for regional, freight or mixed traffic
- ❖ Standard, narrow and broad gauge

#### ➤ *Urban Transport*

The quality of public transport affects the attractiveness of living and working in large cities. In order to meet future needs and avoid problems like traffic jams, lack of parking space, and noise and air pollution, many large cities today promote the use of underground and rapid transit systems. Because of space limitations, such systems frequently require sophisticated engineering structures such as tunnels and bridges. Urban transport systems are demanding projects that entail complex permit applications and interdisciplinary cooperation.



TROI draws on its pool of experienced engineers to provide all of the engineering services needed for civil works, electromechanical equipment, and rail systems.

### Fields of Expertise:

- ❖ Trams
- ❖ Metro systems
- ❖ Light rail transit
- ❖ Commuter rail
- ❖ Cable cars
- ❖ Various types of guided transport

#### ➤ *Roads*

As society grows more dependent on private motorized transport, roads – from access roads to motorways – become the central element of a modern traffic and transport system.



Today, the design and construction of roads requires not only technical expertise but also special environmental awareness, and as such constitutes an essential prerequisite for the feasibility of road and motorway projects.

The design and construction of roads require expertise and environmental awareness, and they are critical to the feasibility of road and motorway projects. TROI has rendered design and consulting services for many successful construction and rehabilitation projects in the past years.

TROI ensures overall project success by integrating qualified experts, available mostly in-house, into the design team. TROI also organizes and conducts public relations activities alongside other experienced professionals after contract award.

### Fields of Expertise:

- ❖ Motorways
- ❖ Trunk roads
- ❖ Urban roads
- ❖ Access points
- ❖ Crossings
- ❖ Toll systems
- ❖ Traffic management systems

### ➤ *Tunnels*

Rapid urban development and the need to protect the environment make it necessary to build more traffic routes and industrial plants underground.

For the success of a project, it is critical to choose a technically safe construction method that is still economically viable. TROI has the technical know-how and long-standing project experience to provide clients with professional advice on appropriate construction methods.



### Fields of Expertise:

- ❖ Railway tunnels
- ❖ Road tunnels
- ❖ Water tunnels
- ❖ Utility tunnels

## Buildings & Structures

The quality of building complexes and building structures is determined by aesthetics and functionality.

TROI has many years of experience as prime consultant in the design and implementation of industrial and office buildings. Based on this experience, TROI has also begun to develop its own projects. TROI's capabilities include the design of complex engineering structures for protection against natural hazards.

### Fields of Expertise:

- ❖ Office buildings
- ❖ Hospitals
- ❖ Shopping centers
- ❖ Industrial plants
- ❖ Operating buildings for infrastructure facilities
- ❖ Various civil engineering structures

