

TERMS OF REFERENCE

PREPARATION OF DETAILED PROJECT REPORT FOR PROVIDING ROADS , DRAINS AND WATER SUPPLY IMPROVEMENT UNDER Hon'ble CM ASSURANCES 2017-18 IN KHAMMAM MUNICIPLA CORPORATION, TELANGANA STATE.

NAME OF PROJECT:- Preparation of Detailed Project Report for Providing Roads , Drains and Water Supply Improvement Under Hon'ble CM Assurances 2017-18 in Khammam Municipal Corporation, Telangana State.

1) BACK GROUND:

Roads , Drains and Water Supply Improvement. works are identified as one of the basic urban infrastructure facilities to be provided for the Municipality. Hence, in this connection it is proposed to appoint a consultant and to prepare a Detailed Project Report (DPR) for the above said components.

2) BRIEF DESCRIPTION OF TASK:

The Khammam Municipal Corporation intended to take up Roads , Drains and Water Supply Improvement. The scale of the work means that the municipalities require assistance in the preparation of detailed designs, estimates, plans and contract documentation.

3) OBJECTIVE OF TASK:

The prime purpose of this assignment is to prepare detailed project report (DPR) including bid documents for providing Roads , Drains and Water Supply Improvement. This will require surveys, preparation of detailed designs, estimates, plans for according technical sanction as per competent authority and all contract documents required for the tender process to enable a renderer to submit a bid and effectively construct the project.

4) SCOPE OF SERVICES:

The scope shall broadly cover the following phases:

- A. Review the existing situation and undertaking necessary assessments.
- B. Feasibility analysis and detailed planning.

The scope involves the following aspects:

- The Preparation of DPRs shall be done in a consultative manner by consulting municipal authorities .
- The proposals shall be confirm to the guide lines issued by the GOI and GOTS including CPHEEO manuals.
- The designs shall be in compliance with the relevant Indian Standards (as amended up to date) and CPHEEO manual. Wherever such standards are not available, appropriate standards shall be followed after discussions with the Municipal/P.H Dept authorities.
- For any studies and assessments, the required equipment /tools/logistics shall be arranged by the consultants themselves.
- The consultants shall be wholly responsible for all the details of the proposals, the physical and site conditions. All data utilized in the preparation of the proposals shall be presented indicating the source of the data and also the basis of assumption, if any. The consultants shall be responsible for all the data or designs and drawings given by them.
- The scope will include complete planning exercise and preparation of reports and necessary procurement documentation.
- To study the Master Plan with detailed land use pattern, identification of existing and future roads/streets, water bodies such as lakes and ponds, natural drains and river for the urban agglomeration.

4.A. REVIEW OF THE EXISTING SITUATION AND UNDER TAKING ASSESSMENTS :

The consultants shall review the existing infrastructure to analyze the current strengths and weaknesses for providing efficient infrastructure facilities duly collecting necessary information from authentic sources.

Reviewing existing maps and Master Plan studies and other related documentation to obtain a better understanding of the Infrastructural facilities prior to the start of field work. The consultant will search for and obtain maps and previous related studies.

4.A.1. STORM WATER DRAINS :

- i) Identify all the storm water drainage issues including severity and location of inundation, location of drains and outfalls; study of disposal at outfall points; critical outfalls including natural drains, irrigation tanks, canals, water supply sources etc., pollution and other environmental issues; and identify any gaps in the existing drainage system. Additionally, identify physical constrains to drainage i.e., encroachments into drainage channels; solid waste dumping natural and human made obstructions, including pipe culverts and low level cause ways, road and rail over bridges, flyovers, canals, permanent ways etc.
- ii) Examine the existing drainage regime and assess its capacity to accommodate storm flows. This will also involves assessing the capacity and usefulness of the various drains in the city constructed by the Municipality and the other agencies. The impacts of growth and interventions on the drainage system should be assessed along with possible future land use to assess the drainage regimes design parameters, particularly infiltration factors and drain sizes.

- iii) Estimate both existing and future dry weather and storm water drainage flows in the various catchments. Care should be taken in using the rational method that drain sizes are not too large. Return periods also need to be seriously considered to ensure economic drain sizes.
- iv) Produce city plans of the existing drainage situation and drainage flow estimates in and around the municipality, denoting catchments basins drainage structures and features (including katcha), and other items described above.

Present practice of operation and maintenance including type of tools and equipment available should be analyzed and suitable design for alternative tools suggested if necessary.

INFORMATION COLLECTION AND ASSESSMENT:

The assessment should cover, inter-alia, the following key issues:

- Municipal service area with no of households (as per 2001 & 2011 census), economic growth, urban growth, physical and hydro geological parameters, population growth and factors influencing. (Population projection should be as per CPHEEO Manual coinciding with the information to be projected in the check list enclosed)
- Status of existing assets and their rehabilitation needs.
- Study of Rainfall data and Hydrology for Municipality region duly getting the authenticated data of autographic rainfall data for the project area for the last 25 to 30 years.
- Identification of drainage basins & sub-basins for municipality area from NRSA topo-sheets or any other source.

- Conducting field survey of drainage and roads network, identification & classification of major, medium and minor/primary storm water drains and their present condition indicating the list as per ID, lengthwise & widthwise.
- Preparation of storm water drainage map for municipal area and zonal maps showing the existing major, medium and minor/primary storm water drains and their disposal system
- Prioritization of drains for Remodeling/Improvements & rehabilitation
- Pollution prevention measures and sillage diversion arrangements to all major and primary storm water Drains.
- Identification of flood prone area, reasons for flooding and mitigation measures.
- Sea backwater control measures.
- Preparation of micro level storm water network plan for water stagnation areas only integrating with the major storm.
- Preparation of master plan dividing in to basins, sub-basins, catchment & sub-catchment for improvement of Storm Water Drainage of Municipality area including cost estimation.
- List out all natural drains in the city/ Project / Mater Plan area along with the names (IDs) and lengthwise & widthwise.
- Preparation of DPR's for Improvements & Re habitation of priority/selected storm water drains.

- **The DPR's shall include the following:**

- Detailed survey of drain and its flood plain areas
- Review of existing conditions
- Deficiency analysis from hydraulic and structural point of view
- Enlisting of obstructions, bottlenecks and encroachments
- Rehabilitation plan (including lengths of territory drain, secondary drain, primary drain & pumping/rising main; no of SWD pumping stations, & capacity of pumps.
- Estimation of flood discharge and Hydraulic design
- Preparation of Longitudinal Sections(LS) and Cross Sections (CS)
- Soil Investigation
- Structural design of all sizes of drain cross sections
- Detailed estimates with rate analysis based on current SSR
- Preparation of detailed drawings
- Prepare O&M plan for future maintenance
- Preparation of Tender Documents
- Construction Program

All the information raised by the department of Urban Development during the scrutiny of DPRs, shall be attended by the Consultants forthwith. If needed, the Consultant must attend office of the department of Urban Development, and fulfill all shortfalls then and there itself to avoid delay.

ESTABLISH DESIGN PRINCIPLES, CONDUCT NECESSARY SURVEYS AND STUDIES AND PREPARE OPTIONS:

Using key design principles (below) develop options for storm water drainage with outline cost at the most feasible options selected.

KEY DESIGN, PRINCIPLES FOR COLLECTION AND CONVEYING AND STORM WATER ARE:

- Reducing capital and recurrent costs such as using existing drains to the greatest extent possible and using roads as short time retention areas etc. or no retention at all.
- Preventing encroachments on drains.
- Priority in flood prevention should be first – homes and businesses; second –roads and third – open areas (conversely, drains fill flood first, open areas, second roads, third and flooding of homes and businesses should be totally avoided);
- Integrating drains with roads and other development plans
- Development of time-rainfall intensity frequency curves with the limited historical data available.
- Routing of major drains shall be compatible with the land available and cost of acquiring land shall be considered; (major drains routing may be proposed away from densely populated commercial areas as far as possible.
- Minimize and pumping requirements and operational costs while addressing the main drainage concerns.

- Necessary detailed surveys shall be done by the consultants for the municipal area. Longitudinal sections at 25m interval, cross section levels at every three meters. At 25m interval of L.S., junction levels, double check bench marks.
- Where needed, establishment of Bench Marks with concrete pedestals and super imposing them on the contour map for the extended areas also to be prepared by the consultants with an interval of one meter contour lines. The TBMs shall be approximately one per one Sq.Km to be located at important junctions and on structures and such other land marks and well documented in a register. All the documentation will become the property of the Municipality.
- Prepare plans showing the existing regime and all the above features to a suitable scale.
- Prepare micro level storm water network plan integrated with the major storm.
- Prepare selective pipe material for rising mains and required bedding conditions as per site conditions duly following the CPHEEO Manual guide lines.

MINIMUM REQUIREMENTS AND CONCEPTS:

The study shall include but not the limited to the following:

- Catchment boundaries and sub-boundaries shall be identified. The study shall encompass the whole catchment or water shed identified and the drainage system including any area beyond the municipal boundary.

- If any, survey of existing drainage network and data related to water logging, soil conditions, ground water levels, tanks spillways, storm water retentions structures, pumping (no of pumping stations, capacity of pumps and length of pumping mains), etc., survey shall include levels at maximum 25mts intervals and at high and low points along the proposed drains top and invert levels and sections of existing secondary or territory drains joining the proposed drains.
- For the entire length of all the drains, determine the invert elevation, top of drain and proposed cross sectional flow area for each section of drain duly considering existing culverts.
- In flat terrain, check not only hydraulic capacity but also retention capacity of drains.
- Identify opportunities for storm water retention and infiltration within the drainage system.
- Consider alternative routing for drains to avoid channeling large quantity of water through density populated areas.

ANALYTICAL FRAME WORK & METHODOLOGY FOR COLLECTION OF DATA AND ASSESSMENTS:

The consultants shall develop the frame work and methodology for completing the tasks listed above. The methodology shall be agreed with the client before undertaking the assessment. Some of the specific assessments listed below shall follow the frame work indicated.

FIELD SURVEY AND PREPARATION OF BASE MAPS:

Undertake total station survey and prepare /update the base maps indicating all the infrastructure elements along with their key features.

FINAL OUT PUT:

By the completion of this task the Municipality will have:

- An accurate assessment and understanding of the Municipal storm water drainage system.
- A complete and comprehensive storm water drainage Master plan with the study report for the entire Municipal area up to design period showing complete details like drain size, material, slope, depth, invert level and all hydraulic details.
- Contour map indicating one meter interval contour with junction levels. Bench marks covering the entire municipality @ one per Sq.Km at suitable locations.
- Intensity duration curves and run off coefficients
- Flow charts, preliminary designs, drawings and detailed cost estimates for drainage works until final disposal for the entire drainage.
- Implementation plan with phasing of works BAR Chart and PERT/CPM Network and standard type design and plans.
- Increased awareness of staff towards drainage issues.

FEASIBILITY ANALYSIS AND DETAILED PLANNING:

Divide the project area into various drainage zones showing all streets to scale (preferably based on Municipal Zonal boundaries) considering the natural topography and contributory areas with a view to adopt decentralized approach as far as possible and economize the cost of overall system and also to avoid pumping stations. Zonings should be done after detailed field survey and investigation. Consultants shall also study the impact of the project on the adjoining areas.

Identify appropriate planning and design parameters based on the project area situation mainly, the appropriate design frequencies of the storms (based on degree of protection needed vs. permitted flooding, based on type of area – residential, commercial, business districts etc), the run-off coefficients, proposed method of computation, proposed channel shapes etc., and design shall be based on CPHEEO guidelines, with appropriate justified modifications if needed.

Utilizing proven and readily available computer dynamic modeling software (that allows for visually depicting the design changes and their impact), carry out analysis of existing situation of storm water drains to identify deficiencies and develop alternative strategies and options for expansion / augmentation of the existing system to address system deficiencies. While planning the system, give considerations to the principles and functional requirements listed below:

PRINCIPLES:

The proposed solutions should

1. Collect and safely convey storm water to receiving waters
2. To flood proof important buildings/areas (major drainage design)
3. To cater for frequent or nuisance storm water flows (minor drainage design)
4. To retain within each catchment as much incident rain as possible by maximizing use of existing natural water courses and providing flood way reservations / minor detention measures within the catchment area.
5. Follow the general alignment of the existing water way.
6. Provide minimum interference with manmade / natural obstructions (particularly on the drain alignments);
7. Reduce land acquisition requirements; Possible alternatives to reduce land acquisition and social impacts.
8. Meet the existing and proposed developmental needs and ongoing / proposed projects in and around the project area.
9. Study the project alternatives and minimize the impact on the surrounding areas such as trees and other Sensitive Environmental Components (SEC) and suggest mitigation measures for design, construction and O&M phases. Meet the functional requirements:
10. Sustainability (maximizing use of natural drainage, storage's);
11. Functionality (ease of maintenance, reliability of suggested measures)
12. Levels of service (alleviation from flooding, community expectations through consultations with various stakeholders, obtaining and incorporating the feed backs received as appropriate, damage consequences); and

13. Cost effectiveness (maintenance, environmental benefits, balance between allowed damages vs. safety).

Using preliminary longitudinal sections of the existing drains and water courses, and their tentative slopes fixed early on, undertake trial designs, to compare alternative drain reaches, based on which select the most suitable alternative for the final design, which are technically and economically justifiable.

Drains should be planned taking into consideration the ground levels, slope of the ground, valley and ridges and also approved land use plan for development of Municipality

For each length of Storm drain, the drainage area should be indicated clearly on the map and measured. The boundaries of each tributary are dependent on topography, land use, nature of development and shape of the drainage basins. The incremental area may be indicated separately on compilation sheet and the total area computed.

Temporary flooding of selected areas may be allowed, on economic considerations.

The analysis of the level of intensity / frequency of rain beyond which such flooding is likely to happen, and the areas where it is likely shall be done, based on various scenarios and costs which shall be agreed by the client.

While formulating designs, the existing side drains, canals, and other major storm water Canals / rivers maintained by the PWD Department., Highways Department & Railways should be analyzed based on the maximum rainfall and storm water runoff for the project area on a scientific basis.

In case the capacity of existing major drains/rivers connecting the river / canals are not sufficient to take care of the maximum run off, then remodeling of the existing major drains and new additional drains may be proposed so as to avoid any inundation of rain water in the project area. The adequacy of the outlet of the existing major rivers / canals may also be checked for the total maximum run off in the project area and propose suitable measures to address the issues.

Where there is interface between sewerage system and storm water drainage, propose appropriate plans to remove / reduce the interface; and/or reduce the impact. The existing SWD system in the original municipality area and the proposed system in the extended areas shall seamlessly merge so as to function without bottlenecks.

The designs shall be prepared taking into consideration all potential risks from the works and site constraints to ensure safety during implementation, operation and maintenance. The access difficulties in frequented places like schools, religious places, offices, etc, public utilities that cross the drain needs to be specifically considered for design of drains in such points.

Based on this analysis, identify the most appropriate alternatives that may include drain improvements, augmentation/extension, flood detention measures, improvements in flood handling equipment/structures, strengthening of existing structures etc. The proposed alternative (which consists various sub-alternatives on major drains / decisions on flood water retention / pumping etc) shall be the economic one amongst the selected alternatives, looking from capital / O&M costs angle; in addition to meeting the planning and design requirements mentioned above.

SURVEY, INVESTIGATIONS AND TESTS REQUIRED:

DATA:

The details given in the technical conditions and specifications taken in conjunction with the study, in only a reasonable preliminary basis. The nature of the overall contract is such that after the proposal, the consultant shall be wholly responsible for all the details of the proposals, physical and site conditions etc. All data utilized in preparation of the proposals shall be presented indicating the source of the data and also the basis of assumptions if any. The consultants shall be responsible for all data designs and drawings given by them.

- Survey and Analysis. The consultants shall conduct his own studies and prepare estimates based on schedule of rates specified by Govt but updated to reflect actual market conditions wherever necessary. The municipality shall not be responsible for the validity of the project details, designs and estimates.
- The Municipality shall indicate the project sites and their measurements. The consultants shall be responsible for its verification. The consultants shall be responsible for carrying out survey to determine the losses of water in the system and the condition of the pipes.
- Soil investigation and tests: Soil tests as per relevant IS/IRC standards have to be done by the consultants to arrive at design parameters for the formation and safe bearing capacity.
- At locations proposed for important installations like pump house, OHT/sumps etc at least one bore hole at a grid of 1km x 1 km for every such installation should be made to determine the SPT N values at depths specified in the relevant IS codes. Recommendations of a Geo-technical expert should be furnished in

the soils report and should cover aspects e.g. appropriate soil stabilization measures if required , bearing capacity of the founding strata.

- Other survey: Site survey, Engineering surveys, other relevant surveys required to support the assignment.

PROJECT DESIGNS:

For the given purpose and functional use of the respective projects, proper design has to be developed. Unlined drains may be considered in extended areas having small settlements. In built-up areas and junctions, a network of sub-surface drains with interception chambers may be considered to intercept the surface flow. The consultants can have freedom to choose the type of sub structure and superstructure, provided code specification / CPHEEO stipulations are met. The drawings and designs shall include a general arrangement drawing and a detailed longitudinal section drawing of all components in size A1 or A2. The level of detailing shall be such so as to enable check of conformance with code provisions, including detailed construction drawings and bar bending schedules.

4.A.2. GRAVE YARDS/MARKETS/COMMUNITY HALL/BUILDING ETC.

TOPOGRAPHICAL SURVEY :

The survey should also produce a map showing other important features and facilities in the surrounding areas including roads, buildings, sewer lines, electric lines, trees, temple/ cultural sites, historic buildings, flooding areas, etc.

The consultant shall discuss the following with the appropriate municipal authorities for final decision of the building size, type and Layout of site :

- (i) Anticipated soil condition for foundation.
- (ii) The most appropriate proposed building type and Layout of site.
- (iii) Type of proposed foundation, substructure and superstructure.

MISCELLANEOUS

If not covered by aforesaid, the Consultants shall perform other studies, explorations, tests surveys, calculations, etc. required to produce full and complete set of working drawings, specifications, bills of quantities, requirement of materials and complete cost estimates for the works based upon which construction activities can be started to complete without further study and/or reference to them.

4.A.3 ESTIMATION OF QUANTITIES:

Based on the surveys and designs evolved by the Consultants, within the frame work and the requirements of the project, the consultants have to prepare detailed item and quantity schedules and work out the BOQ & Cost estimates as per current SOR duly showing necessary provisions.

4.A.4 TENDER:

Preparation of Bid documents as per the rules and regulations and in the prescribed format.

5. FORMAT:

- Any survey data and analysis formatted and digitized shall be compatible with Govt. of Telangana standards.
- Present practices of operation and maintenance including type of tools and equipment available should be analyzed and improvements suggested.
- Use only A4, A3 and A2 paper sizes for all reports and plans.

- Plans shall be produced on Auto CAD (or) equal application on appropriate size sheets at appropriate scales to show the city and its components as defined in each section of the TOR and necessary for understanding of the situation(existing and proposed). Reports submitted without satisfactory plans will be considered incomplete.

6. PAYMENT SCHEDULE:

The Commissioner of Municipality or authorized representative will pay the consultancy charges as detailed below as per their lowest rate quoted at the time of tendering.

The professional charges payable to the consultants will be quoted rate in Indian Rupees.

The professional charges so calculated will be released in the stages mentioned below:

(a)	On conducting detailed survey, submission of detailed designs , drawings and estimates	50 % on total Estimate
(b)	On approval of final detailed designs, Drawings and Estimates cost	50 % on total Estimate
	Total	: 100 %

SERVICE TAX:

On all bills raised a GST @ 18.00 % (or any other rate fixed by Govt. of India from time to time) will be added and this will be remitted to Govt. by the consultants.

The municipality has the option of having the consultants prepare the bid documents. Then payment can be made separately. For any reasons if the Client dropped or cancelled the work on administrative grounds total payment (i.e. Quoted percentage on estimate cost) shall be made to the Consultants.

Payment shall be made within 15 days of receipt of the relevant documents specified above and within 30 days in the case of final payment.

Consultant

Commissioner
Khammam Municipal Corporation