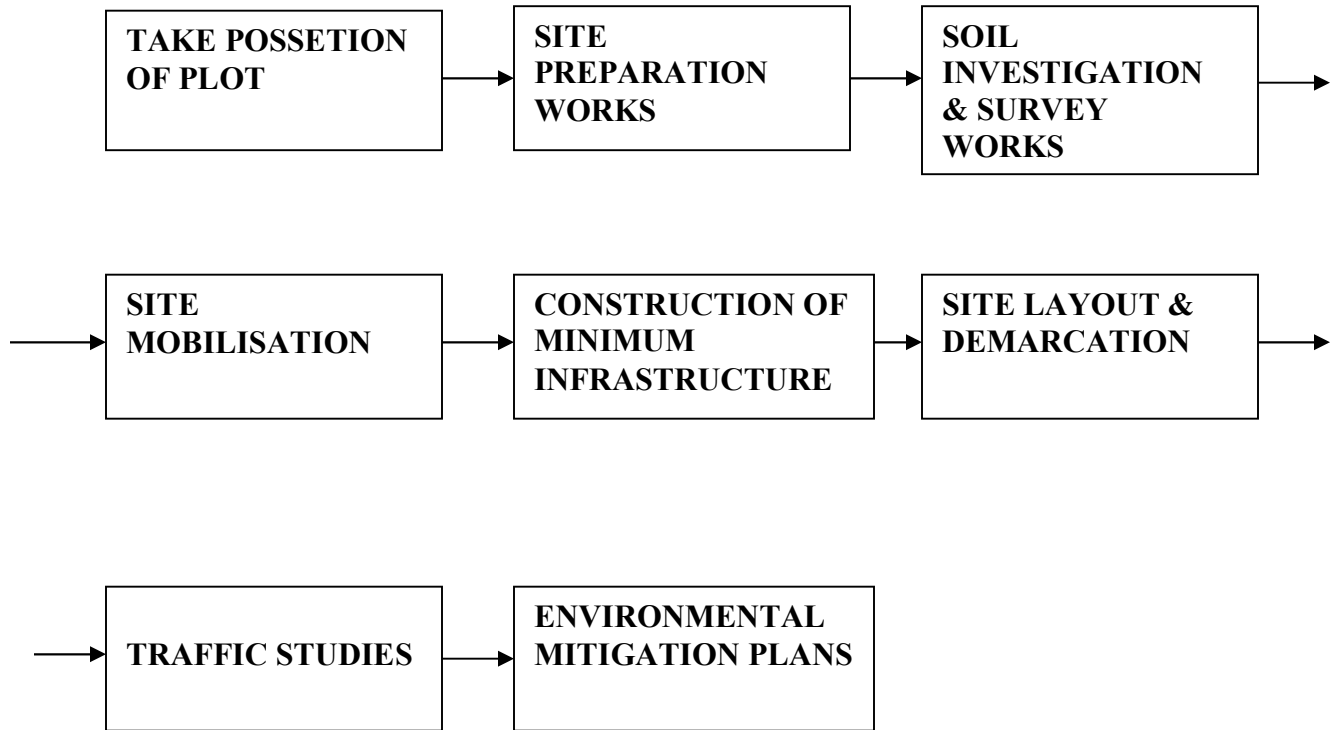


ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES



**A MANUAL FOR YOUNG ENGINEERS BY
SUBRAHMANAYA S MURTHY TATA**

FLOW CHART FOR PRE-CONSTRUCTURE ACTIVITIES



SECTION A)...TAKES POSSESSION OF PLOT

Contents

1) DEPLOYMENT OF SECURITY

2) CHECK THE PLOT BOUNDARY

3) VERIFY SITE ENCROACHMENTS

4) VERIFY NO DISCHARGE INTO PLOT

5) NO FIRE TO THE PROPERTY

6) PROPER AND UNOBSTRUCTED ACCESS TO THE PLOT

7) NO CONTAMINATION INSIDE THE PLOT

8) SOIL EROSION FROM THE PLOT

9) DEVELOPMENTS AROUND THE PLOT

10) LOCAL MATERIAL AVAILABILITY FOR CONSTRUCTION

11) NOISE POLLUTION

12) TRIAL PIT FOR SITE PREPARATION WORKS

13) MISCELLANEOUS INFORMATION

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

1) DEPLOYMENT OF SECURITY

- 1) To decide whether security is deployed from the in house arrangements or through outsourcing. In case of in house arrangements, find out the concerned representative. In case of out sourcing find out the out sourcing agency. The following information is to be obtained for the security deployment at site.
 - a) Whether security is required for day and night?
 - b) Number of security persons to be deployed
 - c) Is special security required depends on the location, area, place of site.
 - d) Is gunman required depends on the location, area and place of site.
 - e) Is dog squad required depends on the location, area and place of site.
 - f) Lighting for the night arrangements.
 - g) Site arrangements required for deployment of security.

The above information is very much required to decide the type and number of security staff to be deployed at site. This information will further help us in deciding the number of security check posts based on the size of site to be developed.

2) CHECK THE PLOT BOUNDARY

The following information is required to carry out the checks on the existing plot boundary.

- 1) Obtain site plan from Architecture Department clearly showing the boundaries of site to be developed.
- 2) Check whether the fencing, boundary wall, boundary pegs etc existing including the existing condition of fencing or boundary wall such as whether the existing boundary wall or fencing can be reused without repairs or with repair and what type of repair is required.
- 3) Measure the actual dimensions of existing boundary walls, fencing, and existing facilities.
- 4) Demarcate the reference points and reference lines and take relevant dimensions.
- 5) Mark the actual on the site plan and send a copy to architect with a copy to be kept at site for information under the above named file.
- 6) To carry out the surveillance of existing structure and to find out whether they can be used for any future infrastructure developments such as for example for storage facilities, godowns etc and a detail report to be made with plan showing all dimensions, condition of existing facilities and any repair to be done for reusage. One copies each of the report to be sent to Engineering, Architecture with a copy in file at site for site records.
- 7) Take photographs where ever necessary and incorporate it into site record

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

3) VERIFY SITE ENCROACHMENTS.

Detailed site surveillance to be carried out by through visiting of site at all corners of site based on the site boundary plan and find out the following.

- 1) To check any roads, walk ways, drains, services are existing from the neighborhood areas around the site to be developed.
- 2) To measure the dimensions and reference points at site and transfer it to the site boundary plan.
- 3) Find ways to block the encroachments, divert the encroachments from the existing site.
- 4) A detail report to be made with plan showing the existing encroachments with either diversion of services out of site or method to block the existing roads drains etc.
- 5) Take photographs where ever necessary and incorporate it into site record

4) VERIFY NO DISCHARGE INTO PLOT

Detailed site surveillance to be carried out by through visiting of site at all corners of site and also the neighborhood roads, sites etc based on the site boundary plan and find out the following.

- 1) To find out any drains which are discharging water to the plot from the surrounding areas.
- 2) To find out any seepage of water from the surrounding area to the plot
- 3) To find out any over flow of water during monsoons due to the ground levels from the surrounding areas.
- 4) To find out any depressions or pits in the plot to be developed.
- 5) Measure all the above drains, pits dimensions with reference points and transfer it to the site boundary plan.
- 6) Is there any Water reservoir in the vicinity.
- 7) Collect information on the peak rainfall at that place.
- 8) Take photographs where ever necessary and incorporate it into site record

The above information is to be recorded with the boundary plan showing all the details as it will be helpful to decide the measures to be implemented for development.

5) NOFIRE TO THE PROPERTY

Detailed site surveillance to be carried out by through visiting of existing properties around the site boundary plan and find out the following.

- 1) To find out any wild land is surrounded by site.
- 2) To find out any factories which are prone to fire around the site.
- 3) To find out any oil storage facilities around the site such as petrol filling stations etc around the site.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

- 4) To find out any area where wood and wood related products are stored around the site.
- 5) To find out any debris which may catch fire is storing around the site.
- 6) To find out any inflammables or explosives storage around the site.
- 7) Take photographs where ever necessary and incorporate it into site record

Collect all the information and mark these areas with reference points on the site Boundary plan with all details and send one copy each to Engineering, Architect with a copy on site for records.

6) PROPER AND UNOBSTRUCTED ACCESS TO THE PLOT

Detailed site surveillance to be carried out by through visiting of existing properties around the site boundary plan and find out the following.

- 1) To find out the existing Main road from the plot
- 2) To find out existing branch roads from the plot.
- 3) To find out the existing walkways from the plot.
- 4) Measure the distance of the existing road from the plot.
- 5) Measure the dimensions of the existing road and also find out the type of road.
- 6) Observe the traffic conditions of the existing roads and find out the peak traffic timings of main road.
- 7) To verify any obstruction from the plot to the road such as Electrical poles, open drains, canals, etc.
- 8) To also verify the inaccessible areas and borders of site.
- 9) Take photographs where ever necessary and incorporate it into site records.
- 10) Collect all the above information and transfer to the site boundary plan with all dimensions and send copies to Engineering Department, Architecture Department with a copy to be kept at site with all relevant information. It is always advisable to take as many photographs of the existing plot as well as surroundings

7) NO CONTAMINATION INSIDE THE PLOT

Detailed site surveillance to be carried out by through visiting of site at all corners of site and also the neighborhood areas based on the site boundary plan and find out the following.

- 1) Is there any contaminated soil located inside the plot.
- 2) Is there any seepage of contaminated chemicals from the neighborhood areas
- 3) Is there any leakage of chemical gases through air to the plot to be developed.
- 4) Is there any chemical powders spreading to the plot from neighborhood factories.
- 5) Is there any marshy soil present inside the plot.
- 6) Are there any tanks left underground which previously used for storage of chemicals and petrochemicals etc.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

- 7) Is there any chemical debris inside the plot
- 8) Is there any sea near by the plot.
- 9) Measure the dimensions of contaminated areas with reference points and transfer it to site boundary plan with all available details.
- 10) Take photographs where ever necessary and incorporate it into site records.

Record down all the information along with site boundary plan showing contaminated areas. In case of chemical contamination, Gas analyzers are to be used to find out the percentage of oxygen, carbon dioxide, sulphur dioxide, carbon monoxide etc at designated points such as point 1,2,3 etc and mark these points on the site boundary plan. The frequency of points to be at least 100meters intervals in order to keep the information more accurate.

8) SOIL EROSION FROM THE PLOT

Detailed site surveillance to be carried out by through visiting of site at all corners of site and also the neighborhood areas based on the site boundary plan and find out the following.

- 1) Is there any soil erosion from the plot to outside areas.
- 2) Is there any soil flowing out of the site.
- 3) Find out what are the places with reference data.
- 4) Locate the areas of soil erosion, measure the areas.
- 5) Find out the ways to control erosion such as land scaping, planting trees, breast wall at those areas.
- 6) Transfer the details to site boundary plan with all details and send copies to Engineering Department, Architecture Department with a copy at site with all records.
- 7) Take photographs where ever necessary and incorporate it into site records.

9) DEVELOPMENTS AROUND THE PLOT

Detailed site surveillance to be carried out by through visiting of 500 meter radius around the plot to be developed based on the site boundary plan and find out the following.

- 1) Note down the existing developments like existing residences with population details.
- 2) Sites to be developed viz open sites
- 3) Note down commercial developments around the area.
- 4) Nearest amenities like existing markets, bus stops, MRT, Railway station, Taxi stand, air port.
- 5) Any other interesting places like places of entertainment, parks, institutions etc.
- 6) Any building or property certified as green building in the vicinity.
- 7) Take photographs where ever necessary and incorporate it into site records

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

Transfer all these details in to the site boundary plan with all details. This information is very much required and useful for green building certification.

10) LOCAL MATERIAL AVAILABILITY FOR CONSTRUCTION

Detailed site surveillance to be carried out by through visiting of the surrounding construction areas around the plot to be developed based on the site boundary plan and find out the following.

- 1) Availability of RMC in the vicinity
- 2) Cement Factories within a range of 500Km.
- 3) Steel supply details within 500km range.
- 4) List of locally available material like bricks, stones, tiles, sand, coarse aggregates, and fly ash.
- 5) Shuttering Materials, Wood Products.
- 6) List of recycling material that can be used in construction.
- 7) Availability of Centering material
- 8) Others if any.
- 9) Take photographs where ever necessary and incorporate it into site records

Collect all the information and analyze the data and send the information to purchase department. This information will be useful in the finalization of local suppliers, which in deed useful for green building certification process.

11) NOISE POLLUTION

Detailed site surveillance to be carried out by through visiting of 500 meter radius around the plot to be developed based on the site boundary plan and find out the following

- 1) Is there any noise inside the plot from neighborhood for example noise from side by factories.
- 2) Measure the noise using noise meter and record the noise at different reference points. The noise readings are to be taken at 100 meters intervals for well developed areas and 250meters for open areas with one side development.
- 3) Note down the readings at peak hours of traffic and record it with locations on the site boundary plan.
- 4) Send copies to Engineering and Architecture and keep a copy at site for records.

12) TRIAL PIT FOR SITE PREPARATION WORKS

Excavate a trail pit 3meter length 3m width and 3m depth and collect the following information.

- 1) Soil type at every half meter intervals visually and use pocket penetrometer to find out the bearing capacity of soil. The soil to be identified like greyish, brown clay sand.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

- 2) Record the information in the prescribed format and locate the trial pit location on the boundary plan. It is always advisable to locate the trial trench at the site office location. This information is useful for designing the site office foundations.
- 3) If the soil conditions are bad structurally, extend the trench depth further and provide shoring for excavation exceeds 2.5m depth of soil. The shoring can be soldier piling with piles driven in to the ground supported by timber planks.

13) MISCELANEOUS INFORMATION

- 1) To check and verify and collect the soil information of Existing buildings.
- 2) Problems faced during their development.
- 3) Experience and feed back on their development.
- 4) Any other technical information.

FORMATS FOR “TAKE POSITION OF PLOT”

Contents

FORMAT-A)... DEPLOYMENT OF SECURITY

FORMAT-B).... CHECK THE PLOT BOUNDARY

FORMAT-C).... VERIFY SITE ENCROACHMENTS

FORMAT-D).... VERIFY NO DISCHARGE INTO PLOT

FORMAT-E)..... NOFIRE TO THE PROPERTY

FORMAT-F)..... PROPER AND UNOBSTRUCTED ACCESS TO THE PLOT

FORMAT-G)..... NO CONTAMINATION INSIDE THE PLOT

FORMAT-H)..... SOIL EROSION FROM THE PLOT

FORMAT-I)..... DEVELOPMENTS AROUND THE PLOT

FORMAT-J)..... LOCAL MATERIAL AVAILABILITY FOR CONSTRUCTION

FORMAT-K)..... NOISE POLLUTION

FORMAT-L)..... TRIAL PIT FOR SITE PREPARATION WORKS

FORMAT-M)..... MISCELANEOUS INFORMATION

FORMAT-N).....SAMPLE PLAN OF PLOT BOUNDARY LAYOUT.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-A)... DEPLOYMENT OF SECURITY

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

REFERENCE DRAWING NUMBER:-

LOCATION OF PROJECT:-

S.NO	ITEM	YES	NO	NUMBER	REMARKS
1)	Is Security required for day and night				
2)	Is Special security required for day and night				
3)	Is Gunman required for day and night				
4)	Is dog squad required				
5)	No. of security posts for the plot				
6)	Lighting arrangement required at security posts				

OTHER INFORMATION:-

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Verified by: -
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Approved by:-
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ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-B).... CHECK THE PLOT BOUNDARY

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

REFERENCE DRAWING NUMBER:-

LOCATION OF PROJECT:-

S.NO	ITEM	Length	Width	Height	REMARKS
1)	Existing Fencing				
2)	Existing Boundary Wall				
3)	Conditions of Boundary wall				
4)	Condition of fencing				
5)	New Boundary wall/Fencing required.				
6)	Others existing things on the boundaries				
7)	Trees at boundary areas				
8)	Obstructions at Boundaries areas				
9)	Others				

OTHER INFORMATION:-

**Checked by: -
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**Approved by:-
Name:-**

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ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-C).... VERIFY SITE ENCROACHMENTS

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

REFERENCE DRAWING NUMBER:-

LOCATION OF PROJECT:-

S.NO	ITEM	Length	Width	Height	REMARKS
1)	Road-1				
2)	Road-2				
3)	Road-3				
4)	Walk way-1				
5)	Walk way-2				
6)	Drain -1				
7)	Drain-2				
8)	Services-1				
9)	Services-2				

OTHER INFORMATION:-

**Checked by: -
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ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-D).... VERIFY NO DISCHARGE INTO PLOT

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

REFERENCE DRAWING NUMBER:-

LOCATION OF PROJECT:-

S.NO	ITEM DESCRIPTION	AREA COVERED	APP. QTY.	REMARKS
1)				
2)				
3)				
4)				
5)				
6)				
7)				
8)				
9)				

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Verified by: -
Name: -

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Approved by:-
Name:-

Signature:-

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-E)..... NOFIRE TO THE PROPERTY

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

REFERENCE DRAWING NUMBER:-

LOCATION OF PROJECT:-

S.NO	ITEM DESCRIPTION	APPROX.AREA	REMARKS
1)			
2)			
3)			
4)			
5)			
6)			
7)			
8)			
9)			

OTHER INFORMATION:-

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Name:-**

Signature:-

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-F)..... PROPER AND UNOBSTRUCTED ACCESS TO THE PLOT

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

REFERENCE DRAWING NUMBER:-

LOCATION OF PROJECT:-

S.NO	ITEM DESCRIPTION	DISTANCE	REMARKS
1)	Distance between the plot and the main road		
2)	Distance between the plot from the branch road		
3)	Distance from the plot to the nearest Walk Way		
4)			
5)			
6)			
7)			
8)			
9)			

OTHER INFORMATION:-

Checked by: -

Name: -

Signature: -

Verified by: -

Name: -

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Approved by:-

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Signature:-

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-G)..... NO CONTANIMATION INSIDE THE PLOT

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

REFERENCE DRAWING NUMBER:-

LOCATION OF PROJECT:-

S.NO	ITEM DESCRIPTION	AREA COVERED	APP. QTY.	REMARKS
1)				
2)				
3)				
4)				
5)				
6)				
7)				
8)				
9)				

OTHER INFORMATION:-

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Name:-**

Signature:-

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-H)..... SOIL EROSION FROM THE PLOT

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

REFERENCE DRAWING NUMBER:-

LOCATION OF PROJECT:-

S.NO	ITEM DESCRIPTION	AREA OF SOIL EROSION	APP. QTY. OF SOIL	REMARKS
1)				
2)				
3)				
4)				
5)				
6)				
7)				
8)				
9)				

OTHER INFORMATION:-

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**Approved by:-
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ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-I)..... DEVELOPMENTS AROUND THE PLOT

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

REFERENCE DRAWING NUMBER:-

LOCATION OF PROJECT:-

S.NO	ITEM DESCRIPTION	BUILT UP AREA	POPULATION	REMARKS
1)				
2)				
3)				
4)				
5)				
6)				
7)				
8)				
9)				

OTHER INFORMATION:-

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Name: -

Signature: -

Verified by: -
Name: -

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Approved by:-
Name:-

Signature:-

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-J)..... LOCAL MATERIAL AVAILABILITY FOR CONSTRUCTION

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

REFERENCE DRAWING NUMBER:-

LOCATION OF PROJECT:-

S.NO	ITEM DESCRIPTION	SUPPLIERS/M ANUF. NAME	DISTANCE FROM PLOT IN KM	REMARKS
1)				
2)				
3)				
4)				
5)				
6)				
7)				
8)				
9)				

OTHER INFORMATION:-

**Checked by: -
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**Verified by: -
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**Approved by:-
Name:-**

Signature: -

Signature: -

Signature:-

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-K)..... NOISE POLLUTION

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

REFERENCE DRAWING NUMBER:-

LOCATION OF PROJECT:-

S.NO	REFERENCE POINT	NOISE READING IN DB	REMARKS
1)			
2)			
3)			
4)			
5)			
6)			
7)			
8)			
9)			

OTHER INFORMATION:-

**Checked by: -
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Signature: -

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**Approved by:-
Name:-**

Signature:-

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-L)..... TRIAL PIT FOR SITE PREPARATION WORKS

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

REFERENCE DRAWING NUMBER:-

LOCATION OF PROJECT:-

S.NO	SOIL DEPTH	SOIL TYPE	BEARING CAPACITY	REMARKS
1)	0.5m			
2)	1.0m			
3)	1.5m			
4)	2.0m			
5)	2.5m			
6)	3.0m			
7)				
8)				
9)				

OTHER INFORMATION:-

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Name: -

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Verified by: -
Name: -

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Approved by:-
Name:-

Signature:-

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-M)..... MISCELANEOUS INFORMATION

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

REFERENCE DRAWING NUMBER:-

LOCATION OF PROJECT:-

S.NO	ITEM DESCRIPTION	BUILTUP AREA	APPROX.O CCUPANCY	REMARKS
1)				
2)				
3)				
4)				
5)				
6)				
7)				
8)				
9)				

OTHER INFORMATION:-

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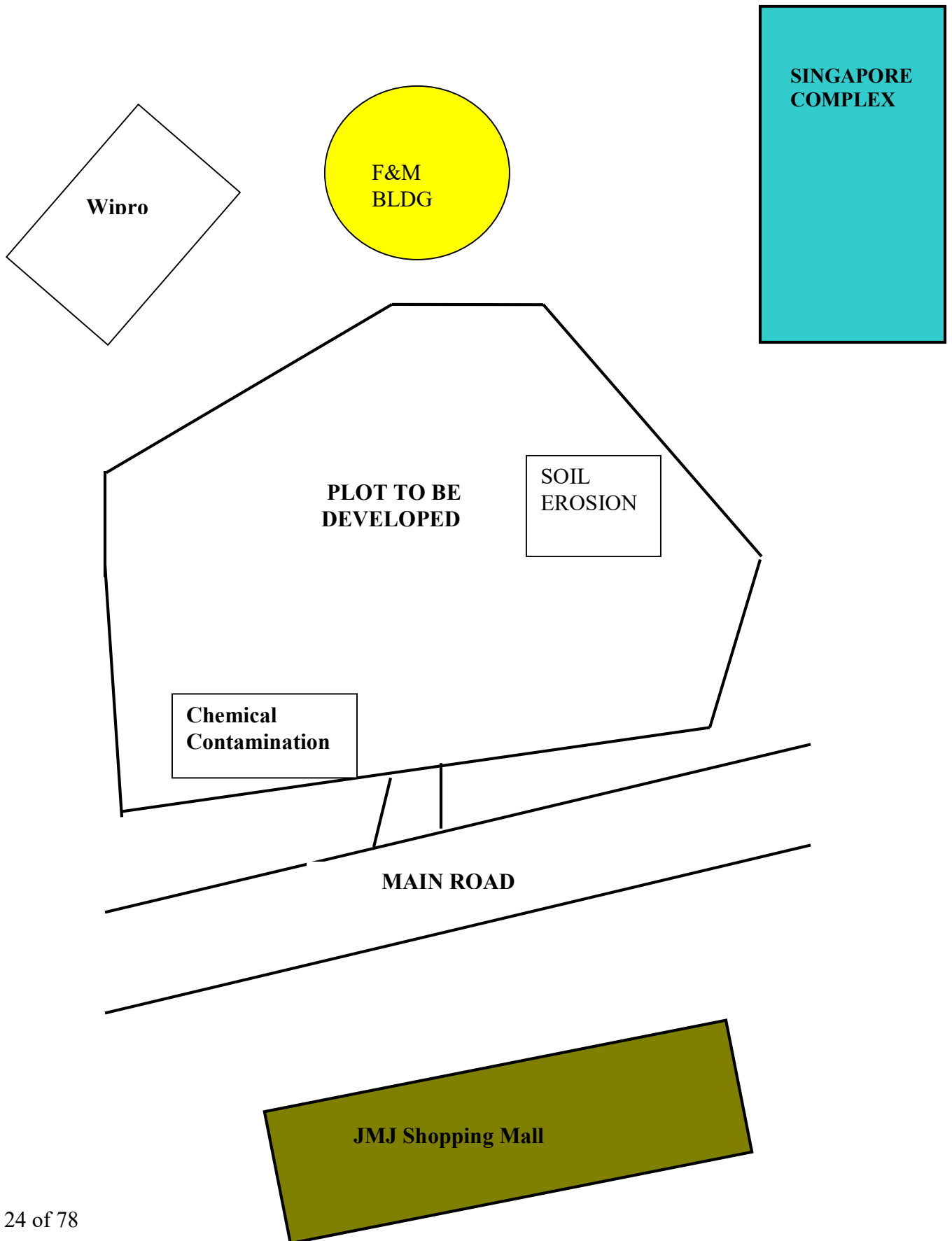
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ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-N.....SAMPLE PLAN OF PLOT BOUNDARY LAYOUT.



SECTION-B).....SITE PREPARATION WORKS

Contents

1) CONSTRUCTION SECURITY POSTS

2) CONSTRUCTION OF SITE OFFICE

3) CONSTRUCTION OF BOUNDARY WALL/FENCING/HOARDING

4) PREPARATION OF PROPER ACCESS TO PLOT

**5)APPLICATION FOR WATER, ELECTRICITY AND
TELECOMMUNICATION SERVICES**

6) LOCATE SOIL DISPOSAL AREAS

7) INSTALLATION OF PROJECT SIGN BOARDS.

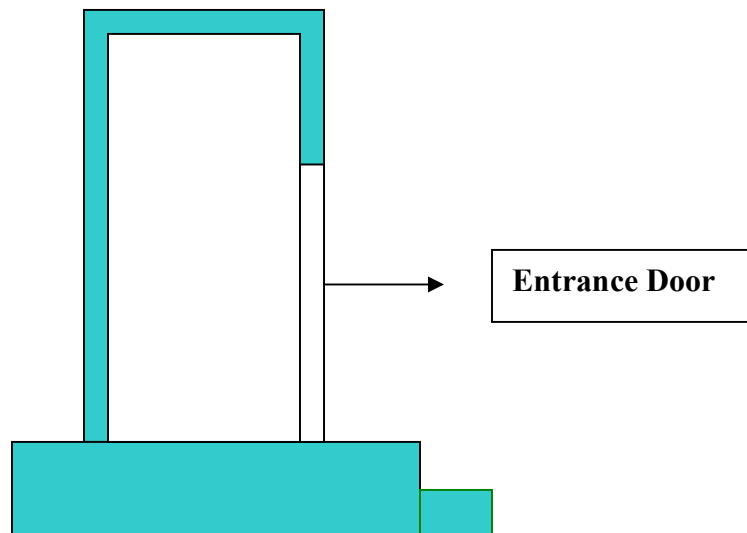
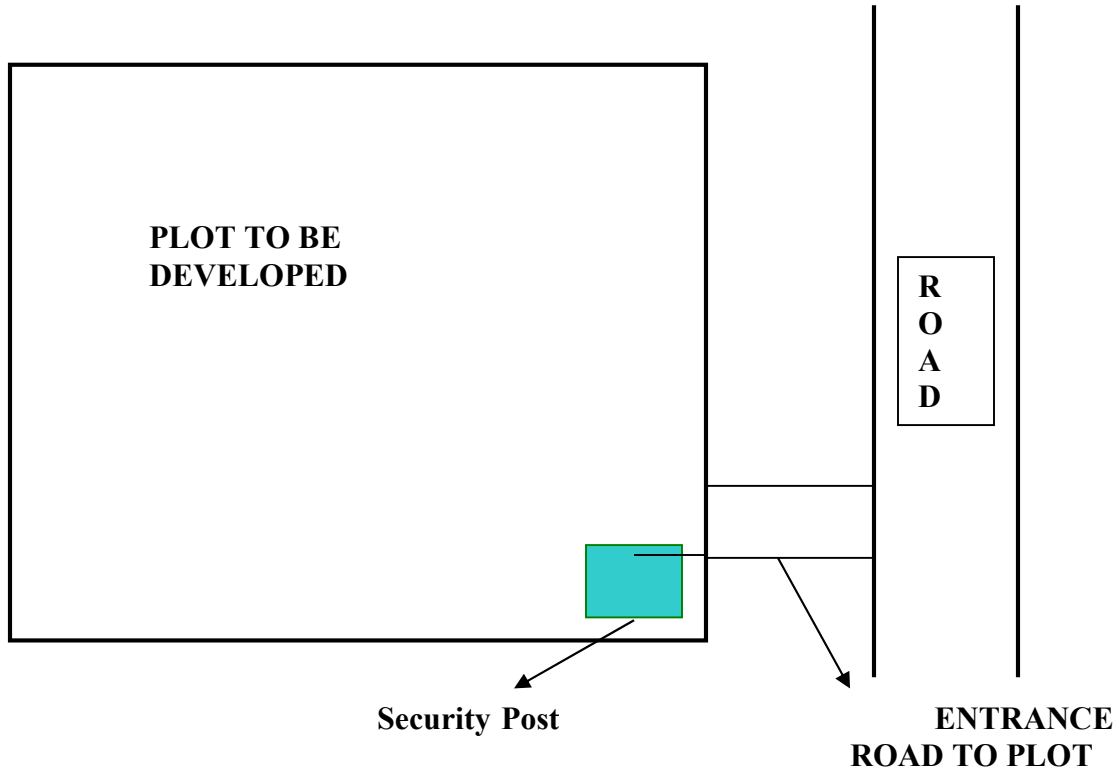
8) TEMPORARY LIGHTING FACILITIES AT SECURITY AND SITE

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

1) CONSTRUCTION OF SECURITY POSTS

- 1) Find out how many security guards/ staff have to be deployed at site depends on the size of development and location of site.
- 2) Find out other security requirements if any? (Steps 1& 2 are already covered in Section-A of Manual)
- 3) The above requirements have to be finalized in consultation with security Department.
- 4) Find out how many security check posts/ security cabins are required for the entire site
- 5) Find out similar security posts (Pre-fab containers) are available at any site where construction is completed and that site do not need any security check.
- 6) If available make arrangements to shift to the site and prepare for installation.
- 7) If not available, Raise indent to order the new security cabins.
- 8) Identify the area where the security posts are to be located, preferably at the Main entrance Gate and any other areas as decided.
- 9) Level the surface where security posts to be located including removal of shrubs, bushes etc if any?
- 10) Cast that area with 50mm thick M10 concrete. The extra area around the area of post can be taken as 1000mm.
- 11) Install the Security Pre-fab cabins.
- 12) Ensure that the level of slab should be at least 300mm above the existing road level.
- 13) If required construct 300mm walls using blocks or bricks or stones and fill inside with good soil (250mm) and compact it. The top 50mm with M10 Concrete.
- 14) Construct 2no steps from the ground level to the cabin slab.
- 15) In case if pre fab cabin is not available, obtain drawing and construct using Brick or block masonry. The minimum clear height should be 2500mm. One door at the front side to be located. Provide two windows one at the front side viz towards site and another towards the entrance to site. The walls to be plastered using minimum 12mm/15mm thick 1:5 cement sand plaster both inside and outside. The walls need to be painted using approved emulsion painting. The top slab using RCC, M15 grade concrete and provide appropriate water proofing and rain water pipe.
- 16) Find out the furniture required for security arrangement at site.
- 17) Arrange the required furniture from an existing site or get new ones if not available.
- 18) Arrange for required stationary like staff registers, visitors registers, vehicle movement registers, tags etc.
- 19) Arrange for Water, lighting at security posts.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES



TYPICAL SKETCH OF SECURITY CONTAINER/CABIN

2) CONSTRUCTION OF SITE OFFICE

- 1) Create the site organization chart and find out how many staff is required to be equipped at the site office.
- 2) Find out the total area of site office based on 100sq.ft area per person.
- 3) Decide the number of floors required and area floor wise.
- 4) Find out the type of office required whether movable type (pre fabricated type) or a fixed type of construction or a modular container office.
- 5) In case of pre fab office find out the suppliers.
- 6) Supply them the minimum information like area required and number of persons occupying the office and site bearing capacity.
- 7) Find out whether foundation is in their scope or not.
- 8) Collect quotations from approved suppliers with rates and specifications and catalogues.
- 9) Prepare a comparative statement for all the vendors.
- 10) Call the suppliers for a meeting and negotiations.
- 11) Ask them to resubmit the revised price.
- 12) Prepare the revised price and technical comparison statement.
- 13) Evaluate the best technical and price bid.
- 14) Finalize the supply contractor.
- 15) Prepare base line program to complete the site office including HVAC, Plumbing etc.
- 16) Obtain structural loading calculations and details.
- 17) Check whether foundation design is in house or out sourcing.
- 18) Obtain foundation drawings for the site office from in house or out sourcing agency.
- 19) Check whether foundation is to be done by in-house or throughout side contractor.
- 20) Construct the foundation as per the approved drawings of foundation.
- 21) Ensure the supply of pre fab office is as per schedule and monitor, update the base line program.
- 22) Check the water and electricity requirements for site office installation.
- 23) Arrange for water and electricity for site office construction.
- 24) Supervise the installation of site office as per the approved drawings of vendor.
- 25) Mean while finalize the HVAC and Lighting, Plumbing contractors.
- 26) Make arrangements for E&M contractor's mobilization.
- 27) Ensure that the works are as per the approved drawings.
- 28) Ensure the all the finishing items like flooring, ceiling, lighting fixture, sanitary fittings are completed and commissioned properly.
- 29) Ensure that Green mark concept is used in the construction of site office building so that energy and water efficiency can be achieved.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

2.1) CONSTRUCTION OF SITE OFFICE USING LOCAL AVAILABLE MATERIAL (FIXED TYPE)

- 1) Obtain the drawings of site office. The complete set of drawings includes site plan layout, foundation drawings, wall & column details, Roofing details, E&M drawings, Architectural finishing drawings, plumbing drawings, HVAC drawings, Landscaping drawings etc.
- 2) Prepare a master schedule and budget of the site office.
- 3) Check whether the office is to be constructed in-house or out through sourcing.
- 4) Complete the foundation of site office building as per the spec and drawings.
- 5) Complete the super structure of office building.
- 6) Co-ordinate and supervise the Architectural finishes, Plumbing, HVAC works.
- 7) The above works includes car parking facilities also.

2.2) CONSTRUCTION OF SITE OFFICE USING MODULAR CONTAINERS.

- 1) Check whether modular container is on lease or to buy new one.
- 2) Obtain the drawing for modular container office.
- 3) Obtain drawing for the foundation drawing for the container like how the container will sit.
- 4) Construct the foundation as per the drawing.
- 5) Find out the site delivery date of mobile office.
- 6) Obtain the loading details of container and the erection procedure of mobile office.
- 7) Make arrangements for Crane, erection crew for erection.
- 8) Erect the container as per the erection procedure stipulated in the manual or drawings.
- 9) Please note that the entire area of erection to be isolated during erection by proper barricading and sign boards like erection is in progress in order to avoid any incidents or accidents.
- 10) Please note that the crane safe loading capacity at that boom length is at least 1.5 times the weight of container.
- 11) Complete the Sanitary, plumbing connections etc.

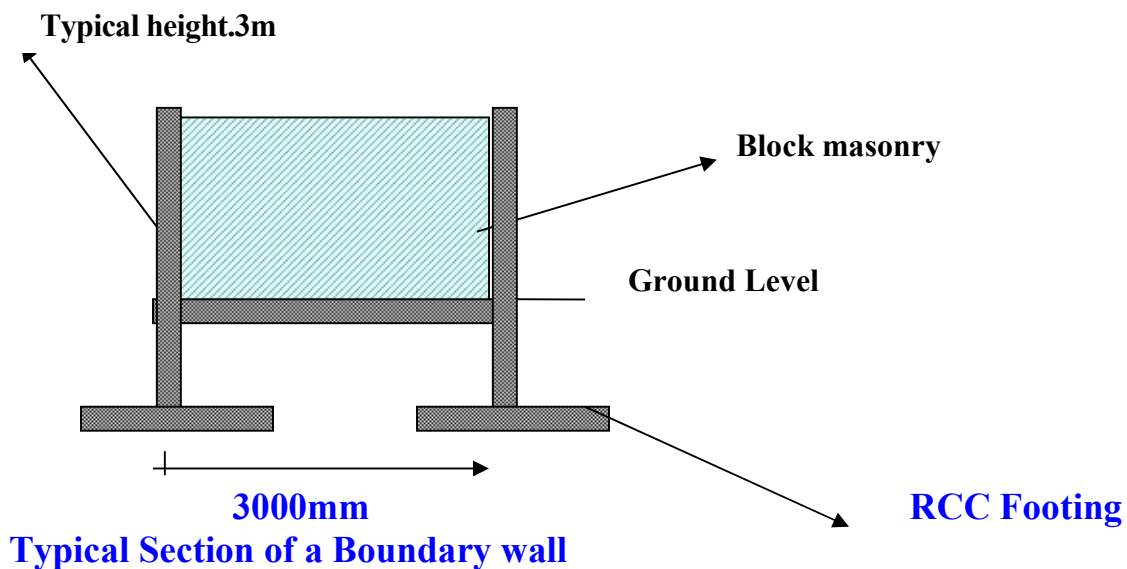
2.3) TIPS FOR SELECTING A SITE OFFICE

- 1) The selection of site office depends upon the following factors.
 - a) Number of staff occupying the office viz area required for site office.
 - b) Number of years the site office is required.
 - c) Quality of site office
 - d) Cost of site office
 - e) Type of development to be done.

3) CONSTRUCTION OF BOUNDARY WALL/FENCING/HOARDING

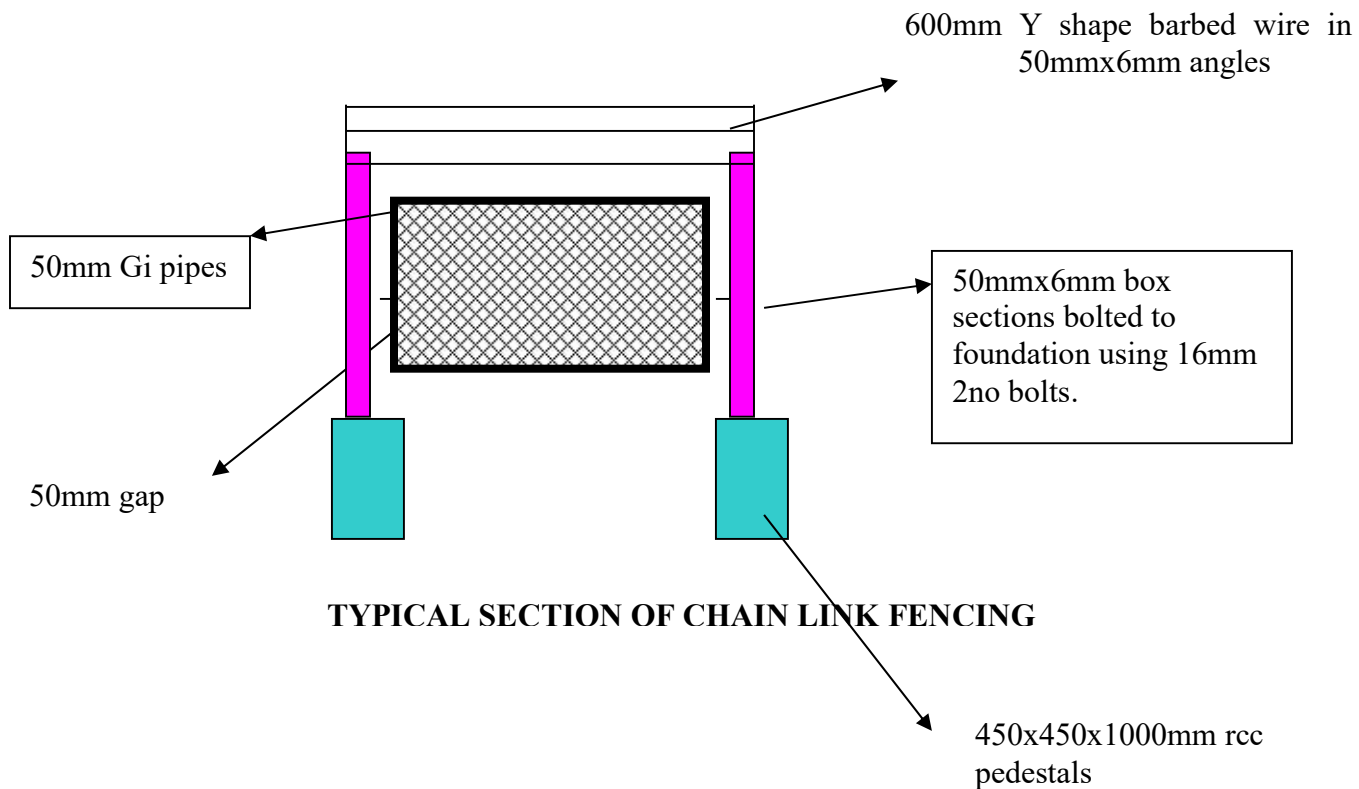
3.1) CONSTRUCTION OF BOUNDARY WALL

- 1) Obtain final site boundary layout plan with boundary co-ordinates.
- 2) Obtain drawings for Boundary wall like foundation drawings, super structure drawings etc.
- 3) Mark boundary pegs around the periphery
- 4) Establish temporary bench marks at regular intervals.(After survey is completed)
- 5) Check whether boundary wall is to be constructed using PRW contractors or throughout sourcing
- 6) Prepare separate budgets for the above mentioned items.
- 7) Decide which ever is cheaper, faster and better.
- 8) Complete the foundation of boundary wall.
- 9) Since the boundary wall front is available from all sides it can be started simultaneously at two or more locations.
- 10) Obtain drawings for entrance gate with all details.
- 11) Check whether the gate to be fabricated at site or at factory.
- 12) Prepare cost estimate for the above and finalize the better one.
- 13) Start super structure construction once certain part of foundation is completed and follow further.
- 14) Please note that the hold posts for main gate to be installed at the entrance while super structure is in progress.
- 15) Complete the foundation and super structure as stipulated in the drawings.



3.2) CONSTRUCTION OF CHAIN LINK FENCING

- 1) Obtain the Boundary layout plan for chain link fencing
- 2) Obtain the Foundation details, detailed sections, structural details of chain link fencing.
- 3) Check whether the work to be done through PRW or out sourcing.
- 4) Collect quotations for the above.
- 5) Negotiate with the contractors and finalize.
- 6) Prepare a cost comparison for the above.
- 7) Decide and finalize the better offer based on the quality, safety and price.
- 8) Make arrangements for the mobilization.
- 9) Prepare a master planning program me for the chain link fencing.
- 10) Complete the Foundations as stipulated in the drawings and specs.
- 11) Start chain link fencing work once certain part of foundation is completed.
Ensure that enough font is available for chain link contractor.
- 12) Monitor the work based on the base line and feed back to MIS.



3.3) CONSTRUCTION OF HOARDING

- 1) Obtain drawings for site hoardings.
- 2) Check whether it is to be done with PRW by supplying material or out sourcing or leasing.
- 3) Prepare detailed cost estimate for all the above.
- 4) Call parties for Negotiations and prepare revised price bid
- 5) Prepare comparative statement and decide the better technical and price bid.
- 6) Establish reference lines and pegs at site boundary for hoarding foundation construction.
- 7) Prepare a master schedule for completion.
- 8) Mobilize the civil contractor at site.
- 9) Construct RCC footings for hoarding and install the bolts in foundation using template for foundation bolts...
- 10) Protect the bolt threads by wrapping it with plastic or polyethylene while concreting.
- 11) Start erecting hoardings once certain portion of foundation is completed and progress further and as stipulated in the drawings.
- 12) Make sure enough font is available for hoarding contractor at all times.
- 13) Monitor the progress of work and update the progress.
- 14) Regular maintenance is required to keep the hoardings in good condition

4) PREPARATION OF PROPER ACCESS TO PLOT

- 1) Check is there any unobstructed access from the main road to the plot.
- 2) If there are obstructions, find out and list out what type of obstructions?
- 3) Find out ways to remove them, for example a ditch, fill it with soil and compact it. In case of services like an electric pole, liaise with the authority and plan for diversion.
- 4) Level and compact the portion from main road to plot.
- 5) Since it is the main approach road, Road with Class A loading to be constructed.
- 6) Obtain drawing with all details.
- 7) Check whether it is in-house or through PRW by supplying material
- 8) Prepare detail cost estimate for the above.
- 9) Decide and finalize the best offer.
- 10) Arrange for the mobilization of the contractor.
- 11) Prepare a base line program me for the approach road construction.
- 12) Supervise the road and complete the road as per specifications.

5) APPLICATION FOR WATER, ELECTRICITY AND TELECOMMUNICATION SERVICES

- 1) Check is there any existing water, Electricity and telecom points at the plot and whether it can be used for site office or security posts.
- 2) Calculate the water requirements, Electricity requirement and no of telephone points, Fax points required for the development to be done.
- 3) Find out the where the application for the above to be obtained.
- 4) Find out the documents to be submitted for submission.
- 5) Prepare all the documentation and fill the application along with the required fee for submission.
- 6) Identify the locations of water point, Electricity point and communication and mark in the drawing and send it to Architecture dept. for information.
- 7) Submit the application form with all relevant documents to the local authorities either directly or through an agent.
- 8) Find out the time required to obtain the permissions.
- 9) Prepare the site to receive the above points.
- 10) Please note one set of above copies of submission is to be kept at site.

6) LOCATE SOIL DISPOSAL AREAS

- 1) Identify the areas where the soil from the Excavation is to be stored and can be used for backfilling inside the plot.
- 2) In case there is no place inside the plot available, find out the areas nearby for storage.
- 3) Find out the nearest dumping areas where soil which cannot be used for backfilling has to be dumped.
- 4) Find out the distance of dumping from the plot, rate per cum for dumping.
- 5) Prepare procedure for the soil to be sent to dumping ground.
- 6) Calculate the approximate volume of excavation, soil required for backfilling and extra soil volume which to be sent to dumping ground.
- 7) Separate file to be kept at site for information and records.

7) INSTALLATION OF PROJECT SIGN BOARDS.

- 1) Identify the location for the project sign board is to be placed. It is always preferred to keep the sign board near by the entrance gate and facing the main road.
- 2) The sign board should include the following information. Name of Developer, Type of Development, Name of Architect, Name of Structural consultant, Name of E&M consultant, Landscaping consultant, Name of Contractor.
- 3) Obtain the drawing for the sign board, which shall include sign board layout, size, and color of font, structural support details and foundation details.
- 4) Identify the contractor for the foundation and structural supports.
- 5) Construct the foundation with bolts inside.
- 6) Erect the structure for the sign board.
- 7) Get the sign board from the approved vendor.
- 8) Install the sign board.

Identify the places and locations for keeping the sign boards for Advertisement purpose at the main roads etc. The above procedure shall be repeated for installing the Add Sign boards.

8) TEMPORARY LIGHTING FACILITIES AT SECURITY AND SITE

- 1) Find out how many light points are required at security and at site boundaries, inside the plot etc. The site boundary lighting is required to check any trespassers at night time.
- 2) Calculate the total power requirements for the above.
- 3) Identify the location of the fixtures and mark it in the boundary layout plan and send it to architect.
- 4) Check whether the lights to be procured locally or from a vendor from HO.
- 5) Calculate the power supply required and find out the source of supply like DG Set or from the electricity point.
- 6) Arrange the source of supply, May be on hire or to shift a DG set from the existing sites or to buy a new one.
- 7) Get the Source of supply and Install it at the identified point on the drawing and as per the manufacturer's catalogue. Please note that the place where DG sits should be free from any future constructions in that place.
- 8) Get the fixtures along with the pipes, cables etc and install it at the demarcated points as per the drawing. Identify the electrical team and mobilize them to site.
- 9) Complete the connection and commission.

SECTION-C) SOIL INVESTIGATION AND SURVEY WORKS

Contents

- 1) **BOUNDARY DEMARCATION & CONSTRUCTION OF PERMANENT BOUNDARY PEGS**
- 2) **CONTOUR SURVEYING**
- 3) **PROVISION OF WATER POINTS**
- 4) **SOIL INVESTIGATION**
- 5) **ENVIRONMENTAL SURVEY**
- 6) **HYDRO GRAPHICAL SURVEY**

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

1) BOUNDARY DEMARCATION & CONSTRUCTION OF PERMANENT BOUNDARY PEGS

- 1) Obtain the boundary layout plan from the Architect.
- 2) Measure the actual boundary length with reference points.
- 3) Incorporate the above data in the boundary layout plan and send one copy to Architect.
- 4) Find out at what intervals boundary pegs are required.
- 5) Identify the locations for the construction of boundary pegs.
- 6) Find out the Dimensions of boundary pegs for example 450mmX450mmX 750mm with 300mm below ground level.
- 7) Please note that the top surface of the Boundary pegs to be plain and in level in order to mark the survey information like co-ordinates and levels.
- 8) Transfer the locations to boundary layout plan.
- 9) Construct the boundary pegs using concrete or any approved material.
- 10) The boundary pegs should be free from any sort of damages in nearby future either due to any vehicle movements etc. The locations have to be carefully finalized.
- 11) Protect the boundary pegs by putting sign boards nearby area. The sign boards can be 1000mm high and 300mmX300mm size showing “Boundary PEG-1”. The boundary peg boards can be made from waste timber and supported by steel rebar inserted into the ground.
- 12) It is always better to locate the boundary pegs at all corners.
- 13) The boundary pegs should be located away from the boundary wall excavation area in order to prevent any soil stacking over the pegs there by damaging the boundary pegs.
- 14) The boundary pegs should be made ready before the survey works.

2 CONTOUR SURVEYING

- 1) Check whether the surveying is to be done in house or throughout side agency.
- 2) In case of in-house verify for the team to be deployed, find out for the survey instruments and accessories availability.
- 3) Make necessary arrangements for the survey team viz survey umbrellas, temporary tents, vehicle, food and water arrangements etc.
- 4) Mobilize the survey team at site and provide them with all sort of information including site boundary layout plan. Brief them about the site and surroundings.
- 5) Take the site survey team to a site visit and show them the permanent boundary pegs.
- 6) Lead the team till the completion of survey works.
- 7) Obtain survey drawings viz actual boundary layout, Contour maps etc.
- 8) Please note that if any existing structure are there, has to be incorporated in the drawings.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

- 9) Survey of the surrounding areas also to be completed with average radius of half kilometer. This information will be useful for the architect as well as site team for Green building certification.
- 10) Incorporate the above details in the site boundary layout plan.
- 11) After obtaining the survey drawings, inspect the site and surrounding areas and ensure that all the details are incorporated in the drawing.
- 12) Send final copies of reports and drawings to architect and engineering department.

3) PROVISION OF WATER POINTS

- 1) Obtain the proposed site layout plans and sections from the Architect.
- 2) Study the drawings and calculate the quantity of water required for the construction purpose which includes site office requirements, landscaping requirements etc.
- 3) Identify the location of source via the location of main water tank, pumps location etc.
- 4) In case if the site is too big, it may require multiple points.
- 5) Find out the sizes of main water tank, pumps etc.
- 6) Identify the distribution net work of water from the main source.
- 7) Measure the actual dimensions of the net work.
- 8) Incorporate the above details in the site boundary layout plan and mark the drawing name as “Construction water supply scheme”.
- 9) The water supply points for different buildings have to be clearly identified.
- 10) Please note that the height of the building is to be taken while deciding the pumps capacity.
- 11) Please take the help of pump suppliers or vendors for deciding the pump capacities.
- 12) Avoid locating the pipes below the roads in order to avoid the pipe bursts due to construction heavy vehicle movement. Try to locate on the sides of roads. Proper measures have to be taken in case the pipe has to pass through roads like hunching of pipe and sand filling above the pipe etc.
- 13) Identify the pipe material and prepare a list of material for the net work including all accessories like bends, tees etc. based on the drawing.
- 14) All the above drawings and records have to be kept at site as a separate file for future reference and information.
- 15) Send one set of above records to Architect and Engineering department.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

4) SOIL INVESTIGATION

- 1) Find out the number of points with locations where soil investigation is to be done. Co-ordinates for the bore hole are to be taken.
- 2) Transfer the above points to the site boundary layout plan and send the copy to Geo-technical or Civil Structural consultant for approval.
- 3) Finalize the size of bore hole and depth of bore hole.
- 4) Obtain information about the soil investigation agencies.
- 5) Collect technical and price bids from at least 3 agencies.
- 6) Evaluate the bids.
- 7) Obtain information about the agencies from their previous clients about their performance, work quality etc.
- 8) Call the bidders for a meeting and decide the agency to be deployed. Please select the bidder based on the best technical as well as commercial capacities.
- 9) Make arrangements for the mobilization of agency like water for drilling, etc.
- 10) Obtain method statement from the agency for soil investigation, review it and finalize it.
- 11) Supervise all the works. All the soil sampling at different levels, soil penetration tests etc to be witnessed by site staff and records to be documented clearly indicating the name of person witnessed along with signature etc.
- 12) Ensure all the bore holes have to be drilled up to the required depth.
- 13) The depth of bore holes shall be measured using a calibrated tape with 25mm diameter and 300mm long steel rod attached to the tape as a counter weight.
- 14) Casing has to be provided up to the bottom of trench in order to avoid collapse of trench.
- 15) All the mud water arising from the drilling has to be stored in a pit near by and should not be pumped in to any public drain or any water source, which may cause contamination.
- 16) Ensure that all the soil sampling has to be properly collected and properly marked with depth of sample etc.
- 17) Soil sampling at different levels has to be kept at site for future reference.
- 18) Ensure that all the soil samples shall be sent to an approved laboratory.
- 19) Ensure that all the required soil tests to carried in laboratory such as N value, Unconfined compression strength, Permeability, Liquid limit, Plastic limit, etc
- 20) Once if the drilling is completed, Grout the bore hole with cement betonite grout or cement grout.
- 21) Bore whole area has to be fully cleaned once the investigation is completed.
- 22) Obtain all the testing reports and bore whole records along with necessary drawings and send copies to Geotechnical/Structural engineer and engineering department for information and action.
- 23) File one copy of all drawings and reports at site for future reference and information.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

5) ENVIRONMENTAL SURVEY

- 1) Environmental survey of the site plays a vital role in order to establish a “Green Mark” during the Pre-construction, Construction and post construction phases. The following items have to be surveyed 1) Site soil Contamination 2) Soil erosion 3) Chemical pollution 4) Noise pollution 5) Dust pollution 6) Smoke pollution 7) Vehicle pollution 8) Air pollution from the vicinity.
- 2) Detailed survey about the above mentioned items have to be carried out inside the plot and the surrounding areas.
- 3) All the details have to be properly documented and filed in a proper format for future reference and information and send copies to engineering department, Architect.
- 4) The Environmental survey should include the Existing drains, Sewage manholes nearby site etc.
- 5) Items 1 to 4 are covered under SECTION-A of the Manual.
- 6) All the Existing Drains, sewerage connections to be measured at site and transfer the information on to the Boundary layout plan and send copies to Plumbing and Sanitary consultant for the future plot development purpose.
- 7) Ensure that all the above information has to be captured with all possible details.

6) HYDROGRAPHICAL SURVEY

- 1) Find out the list of agencies for hydrographic surveys.
- 2) Collect technical and commercial information from the agencies.
- 3) Evaluate the technical and commercial information.
- 4) Call the agencies for a meeting and seek for clarifications if any?
- 5) Ask them to submit the revised bids if required.
- 6) Prepare a comparative statement and finalize the best technical and commercial bid.
- 7) Identify the locations for Hydrographic survey and transfer the points with reference details to Site layout plan.
- 8) Make arrangements for the mobilization of agency.
- 9) Brief them about the site and make a site visit along with surrounding areas to well aware about that area.
- 10) The aim of Hydrographic survey is to find out the depth of water table, quality of underground water, surface runoff calculations during wet and dry weathers
- 11) The hydrographic survey has to be witnessed and properly documented.
- 12) Send the underground water samples for testing and find out whether is potable, can be used for construction or not.
- 13) Find out any sort of treatment required?
- 14) Collect all the information like water table depths, surface runoff calculations and quality of water and send copies to Architect, M&E Consultant, and engineering department with a copy at site for future reference.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-A).... Soil Investigation Summary Reports

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

REFERENCE DRAWING NUMBER:-

LOCATION OF PROJECT:-

BORE HOLE NUMBER:-

S.NO	Depth	Soil type	Bulk Density	Temp./ PH	Permeability	N-value	Comp Strength	Bearing capacity	Particle Distribution
1)	0.0m								
2)	1.0m								
3)	2.0m								
4)	3.0m								
5)	4.0m								
6)	5.0m								
7)	6.0m								
8)	7.0m								
9)	8.0m								
10)	9.0m								
11)	10.0m								
12)	12.0m								
13)	14.0m								
14)	16.0m								

OTHER INFORMATION:-

**Checked by: -
Name: -**

Signature: -

**Verified by: -
Name: -**

Signature: -

**Approved by:-
Name:-**

Signature:-

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-B).... Permanent Boundary pegs Reports

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

REFERENCE DRAWING NUMBER:-

LOCATION OF PROJECT:-

S.NO	PEG Details	PEG TAG NO.	Distance from ref.pt.	North co-ordinate	South co-ordinate	Reduced Level	Color Coding	Remarks
1)	BP1	MH/Sur/ bp1						
2)	BP2							
3)	BP3							
4)								
5)								
6)								
7)								
8)								
9)								
10)								
11)								
12)								
13)								
14)								

OTHER INFORMATION:-

**Checked by: -
Name: -**

Signature: -

**Verified by: -
Name: -**

Signature: -

**Approved by:-
Name:-**

Signature:-

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-C. Hydrographic data

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

REFERENCE DRAWING NUMBER:-

LOCATION OF PROJECT:-

S.NO	Ground water table depth	Pore water Pressure	Water pH	Surface runoff flow	Chemical compositi on of water	Others	Remarks
1)							
2)							
3)							
4)							
5)							
6)							
7)							
8)							
9)							
10)							
11)							
12)							
13)							
14)							

OTHER INFORMATION:-

**Checked by: -
Name: -**

Signature: -

**Verified by: -
Name: -**

Signature: -

**Approved by:-
Name:-**

Signature:-

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-D. Environmental data

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

REFERENCE DRAWING NUMBER:-

LOCATION OF PROJECT:-

S.NO	Distance from ground	% age oxygen	% CO ₂	% CO	% H ₂ S	% SO ₂	% Nitrogen	Remarks
1)								
2)								
3)								
4)								
5)								
6)								
7)								
8)								
9)								
10)								
11)								
12)								
13)								
14)								

OTHER INFORMATION:-

**Checked by: -
Name: -**

**Verified by: -
Name: -**

**Approved by:-
Name:-**

Signature: -

Signature: -

Signature:-

SECTION-D... SITE MOBILIZATION

Contents

1) MOBILIZATION OF SECURITY AT SITE

2) MOBILIZATION OF STAFF AT SITE

3) MOBILIZATION OF FURNITURE, STATIONARY, OTHERS

4) MOBILIZATION OF PLANT AND EQUIPMENT

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

1) MOBILIZATION OF SECURITY AT SITE

- 1) Freeze the security personals required at site (Please refer to Section-A and B).
- 2) Plan for the working hours of security such as two shifts or three shifts.
- 3) Identify the job scope for security personal for various grades such as the job scope of security officer, security assistant, and security guards.
- 4) Establish the security working system such as how many times security will surveillance the site ranging from officer to guard etc.
- 5) Arrange for security stationary such as Log books for visitors, staff, vehicles and security tags for visitors and material in and out registers, gate passes for machinery.
- 6) Verify any security equipment is required such as bomb detectors etc.depends on the location of site.
- 7) Please note that security has to present at all times at the security post at the entrance to control the material, machinery and manpower inflow as well as out flow.

A) Duties of Security Guard

The primary responsibility of security guard is to check the site frequently and keep an eye on all the material, machinery at site, to note and control the materials, machinery, and manpower coming to site and to go out of site.

B) Duties of Security Assistant

The primary responsibility of security assistant is to ensure that all the above records have to be properly maintained from day to day including maintaining the guard's attendance registers. Security assistant will visit the site regularly and inform to security guards in case of any system non-compliance.

C) Duties of Security Officer

Security officer will lead the team of guards and assistants and will provide the information to Project manager as well as his administrative authority on a regular basis such as weekly material, manpower, machinery reports. Security officer will have the first hand knowledge of security at site at all times. He will also liaise with local police, local government agencies regarding all the security matters.

- 8) The security department shall maintain the following minimum documentation at site.
 - 1) Visitors Register
 - 2) Staff Register
 - 3) Staff movement register
 - 4) Incoming material register
 - 5) Outgoing material register
 - 6) Incoming machinery register
 - 7) Outgoing machinery register.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

8) Vehicle register.

Outgoing material and machinery gate passes should be signed by the project manager before leaving the site. No material or machinery should leave the site without the knowledge of Project manager.

The primary responsibilities of security shall be 1) to maintain all the documentation 2) to protect all the materials and machinery or parts from any theft 3) to control the inflow of workers at site such as how many workers entered the site, how many left the site and how many working on the site. Please note that no person under the age of 18 will be allowed to work on site. 4) No trespassers will be allowed from any part of site without prior intimation. 5) To safeguard the property of company especially all the assets as well as the land from any illegal occupancy 6) to protect all the site staff from any threats of any reason.

SECURITY EMERGENCY MANAGEMENT SYSTEM

The purpose of the above system is to safeguard all the assets, materials, machinery and manpower, staff in case of any riots, communal violence, strikes etc. Method statement has to be prepared to isolate the site under such circumstances which includes how to vacate the manpower quickly and food, water arrangements for the people present at site, what precautions to be taken etc.

The most important point to be noticed is how fast to activate the system when such incident occurs. It is always advisable to set up a Co-ordination team consists of Site Project Manager who will chair the committee, site security officer, site safety officer, site co-coordinator etc in the beginning of project.

Mark on the drawing safe escaping routes for the people to go out without any difficulty.

All the documents pertaining to 'SEMS' has to be kept in conference room along with all drawings.

All the site staff, contractor staff and sub contractor staff to well informed about such incidents in advance.

Please note that Contractors shall have to prepare their own 'SEMS' to protect their assets and manpower and submit a copy to Security Department.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

2) MOBILIZATION OF SITE STAFF

- 1) Prepare the site organization chart with responsibilities of all personal.
- 2) Prepare the deployment schedule viz which person has to be deployed at what time for example Project Manager and two engineers in March 2008 followed by Construction Manager in May 2008 and so on.
- 3) Sent the above copy to Engineering head. Engineering Head will revise and finalize the requirements based on the Budget.
- 4) Sent the finalized copy to HR department to arrange for the staff as per the deployment schedule and file a copy at site.
- 5) Please note that Site organization chart has to be finalized first with priority as other items like site office layout design etc depends on the occupancy.

3) MOBILIZATION OF FURNITURE, STATIONARY, OTHERS

- 1) Find out the furniture requirements such as tables, chairs and cupboards based on the approved organization for staff.
- 2) Find out the furniture requirements for meeting rooms, visitor's waiting room, conference room, kitchen etc based on the site office layout plan.
- 3) Freeze the size of tables, chairs along with numbers required for all the personal.
- 4) Prepare a furniture requirement data sheet with deployment schedule.
- 5) Send the copy to Administration department for necessary arrangements.
- 6) File a copy at site for future reference and records.

4) MOBILIZATION OF PLANT AND EQUIPMENT

- 1) Find out what plants and equipments required for site office, security and for site works. This refers to Oven in kitchen of site office, Refrigerator, Water treatment units, DG sets for site office, site and security, vehicles required at site etc.
- 2) Prepare a list of plant and equipment with all details including deployment schedule.
- 3) Send the requirements to Administration and engineering departments with a copy at site for future reference.
- 4) Co-ordinate with the above departments for delivery and installation at site.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMATS FOR SITE MOBILIZATION

Contents

FORMAT-A ... VEHICLE MOVEMENT

FORMAT-B..... INCOMING MATERIAL

FORMAT-C.....OUTGOING MATERIAL

FORMAT-D.....INCOMING MACHINERY

FORMAT-E.....OUTGOING MACHINERY

FORMAT-F.....VISITORS REGISTERS

FORMAT-G.....WORKER REGISTER

FORMAT-H.....STAFF MOVEMENT REGISTER

FORMAT-I.....SAMPLE ORGANIZATION CHART

FORMAT-J..... STAFF DEPLOYMENT SCHEDULE

FORMAT-K.....FURNITURE DEPLOYMENT SCHEDULE

FORMAT-L.....PLANT AND MACHINERY DEPLOYMENT SCHEDULE.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-A ... VEHICLE MOVEMENT

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

LOCATION OF PROJECT:-

DATE:-

S.NO	VEHICLE NUMBER	OWNER NAME	COMING FROM	TIME IN	TIME OUT	PURPOSE	SECURITY SIGN
1)							
2)							
3)							
4)							
5)							
6)							
7)							
8)							
9)							
10)							
11)							
12)							
13)							
14)							
15)							
16)							
17)							

Checked by: -
Name: -

Signature: -

Security assistant

Verified by: -
Name: -

Signature: -

Security officer

Approved by:-
Name:-

Signature:-

Project Manager

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-B..... INCOMING MATERIAL

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

LOCATION OF PROJECT:-

DATE:-

S.NO	TYPE OF MATERIAL	QUANTITY	SUPPLIER NAME	COMING FROM	TIME IN	PURPOSE	SECURITY SIGN
1)							
2)							
3)							
4)							
5)							
6)							
7)							
8)							
9)							
10)							
11)							
12)							
13)							
14)							
15)							
16)							
17)							

Checked by: -
Name: -

Signature: -

Security assistant

Verified by: -
Name: -

Signature: -

Security officer

Approved by:-
Name:-

Signature:-

Project Manager

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-C.....OUTGOING MATERIAL

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

LOCATION OF PROJECT:-

DATE:-

S.NO	TYPE OF MATERIAL	QUANTITY	SUPPLIER NAME	GOING TO	TIME OUT	REASON	SECURITY SIGN
1)							
2)							
3)							
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11)							
12)							
13)							
14)							
15)							
16)							
17)							

Checked by: -
Name: -

Signature: -

Security assistant

Verified by: -
Name: -

Signature: -

Security officer

Approved by:-
Name:-

Signature:-

Project Manager

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-D.....INCOMING MACHINERY

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

LOCATION OF PROJECT:-

DATE:-

S.NO	MACHINERY DETAILS	QUANTITY	SUPPLIER NAME	COMING FROM	TIME IN	PURPOSE	SECURITY SIGN
1)							
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16)							
17)							

Checked by: -
Name: -

Signature: -

Security assistant

Verified by: -
Name: -

Signature: -

Security officer

Approved by:-
Name:-

Signature:-

Project Manager

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-E.....OUTGOING MACHINERY

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

LOCATION OF PROJECT:-

DATE:-

S.NO	MACHINERY DETAILS	QUANTITY	SUPPLIER NAME	GOING TO	TIME OUT	REASON	SECURITY SIGN
1)							
2)							
3)							
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12)							
13)							
14)							
15)							
16)							
17)							

Checked by: -
Name: -

Signature: -

Security assistant

Verified by: -
Name: -

Signature: -

Security officer

Approved by:-
Name:-

Signature:-

Project Manager

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-F.....VISITORS REGISTERS

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

LOCATION OF PROJECT:-

DATE:-

S.NO	NAME OF VISITOR	COMING FROM	CONTACT NO.	TO MEET	PURPOSE	TIME IN	TIME OUT	SECURITY SIGN
1)								
2)								
3)								
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11)								
12)								
13)								
14)								
15)								
16)								
17)								

Checked by: -
Name: -

Signature: -

Security assistant

Verified by: -
Name: -

Signature: -

Security officer

Approved by:-
Name:-

Signature:-

Project Manager

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-G.....WORKER REGISTER

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

LOCATION OF PROJECT:-

DATE:-

S.NO	NAME OF WORKER	COMPANY NAME	IDENTITY NO.	TRADE	TIME IN	TIME OUT	SECURITY SIGN
1)							
2)							
3)							
4)							
5)							
6)							
7)							
8)							
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11)							
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14)							
15)							
16)							
17)							

Checked by: -
Name: -

Signature: -

Security assistant

Verified by: -
Name: -

Signature: -

Security officer

Approved by:-
Name:-

Signature:-

Project Manager

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-H.....STAFF MOVEMENT REGISTER

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

LOCATION OF PROJECT:-

DATE:-

S.NO	NAME STAFF	OF	COMPANY NAME	IDENTITY NO.	TIME OUT	TIME IN	PURPOSE	SECURITY SIGN
1)								
2)								
3)								
4)								
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6)								
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10)								
11)								
12)								
13)								
14)								
15)								
16)								
17)								

Checked by: -
Name: -

Signature: -

Security assistant

Verified by: -
Name: -

Signature: -

Security officer

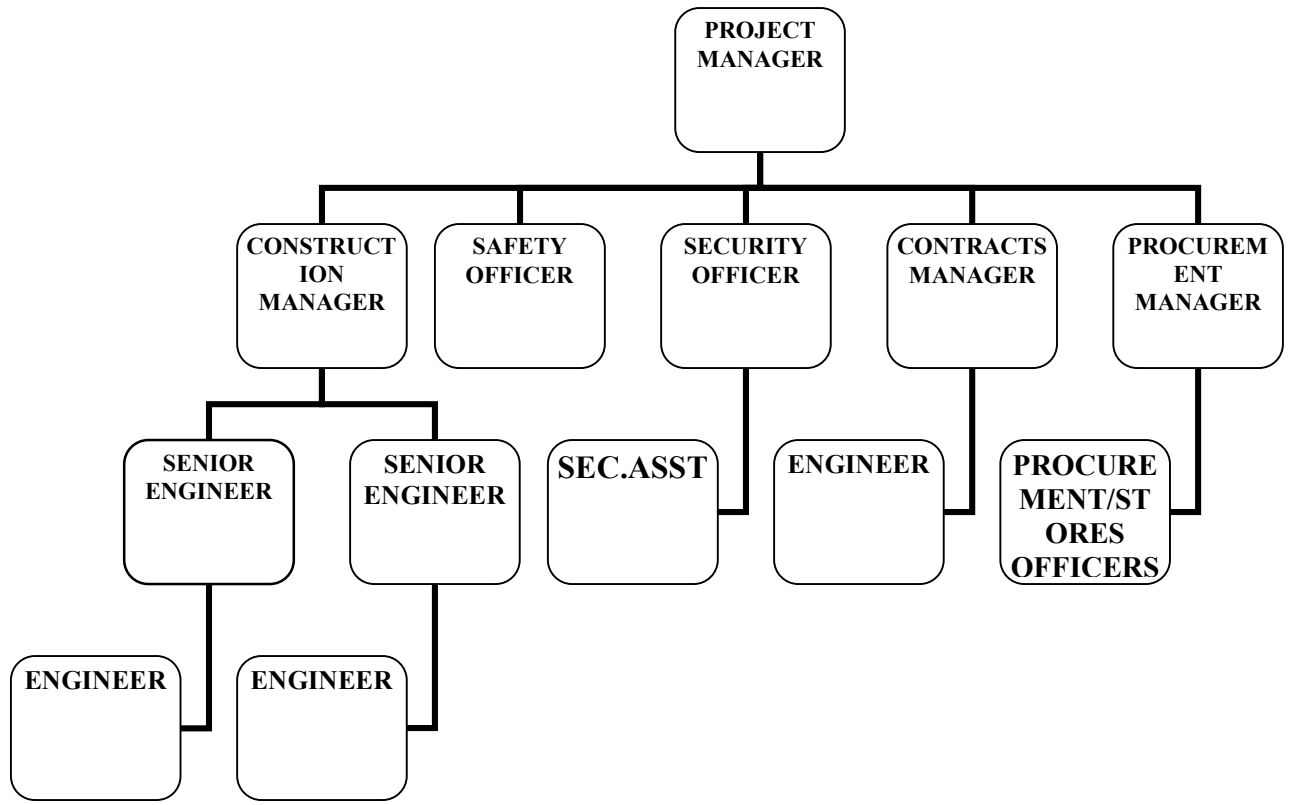
Approved by:-
Name:-

Signature:-

Project Manager

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-I.....SAMPLE ORGANIZATION CHART



ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-J..... STAFF DEPLOYMENT SCHEDULE

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

LOCATION OF PROJECT:

S.NO	TITLE	NUMBERS	DEPLOYMENT DATE	REMARKS
1)	Project Manager	01	March2008	
2)	Construction Manager			
3)	Procurement Manager			
4)	Contracts Manager			
5)	Senior Engineers			
6)	Engineers			
7)	Contracts Engineer			
8)	Procurement Officer			
9)	Procurement assistants			
10)	Stores Officer			
11)	Stores Assistants			
12)	Security Officer			
13)	Security assistants			
14)	Security Guards			
15)	Drivers			
16)	Office Boys			
17)	Cleaners			

Checked by: -
Name: -

Verified by: -
Name: -

Approved by:-
Name:-

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

Signature: -

Signature: -

Signature:-

FORMAT-K.....FURNITURE DEPLOYMENT SCHEDULE

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

LOCATION OF PROJECT:

S.NO	ITEM	QUANTITY	DEPLOYMENT DATE	REMARKS
1)	TABLE...1			
2)	TABLE-2			
3)	TABLE-3			
4)	TABLE-4			
5)	TABLE-5			
6)	TABLE-6			
7)	CHAIR-1			
8)	CHAIR-2			
9)	CHAIR-3			
10)	SOFA-1			
11)	SOFA-2			
12)	CUPBOARD-1			
13)	CUPBOARD-2			
14)	LOCKER-1			
15)				
16)				
17)				

Checked by: -
Name: -

Verified by: -
Name: -

Approved by:-
Name:-

Signature: -

Signature: -

Signature:-

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

FORMAT-L.....PLANT AND MACHINERY DEPLOYMENT SCHEDULE

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

LOCATION OF PROJECT:

S.NO	ITEM	QUANTITY	DEPLOYMENT DATE	REMARKS
1)				
2)				
3)				
4)				
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Checked by: -
Name: -

Signature: -

Verified by: -
Name: -

Signature: -

Approved by:-
Name:-

Signature:-

**SECTION-E... CONSTRUCTION OF MINIMUM
INFRASTRUCTURE DEVELOPMENT**

- 1) **CONSTRUCTION OF SECURITY POSTS**
- 2) **CONSTRUCTION OF SITE OFFICE**
- 3) **CONSTRUCTION OF BOUNDARY WALL/FENCING/HOARDING**
- 4) **SITE CLEARING, GRADING AND MICROGRADING**
- 5) **CONSTRUCTION OF CEMENT GODOWN**
- 6) **CONSTRUCTION OF STORES**
- 7) **CONSTRUCTION OF INTERNAL ROADS AND DRAINS**
- 8) **CONSTRUCTION OF STEEL FABRICATION YARDS**
- 9) **CONSTRUCTION OF PLANT AND MAHINERY YARD**
- 10) **CONSTRUCTION OF LABOUR CAMP**

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

1) CONSTRUCTION OF SECURITY POST

Please refer to Section-B.

2) CONSTRUCTION OF SITE OFFICE

Please refer to Section-B

3) CONSTRUCTION OF BOUNDARY WALL/FENCING/HOARDING

Please refer to Section-B

4) SITE CLEARING, GRADING AND MICRO GRADING

- 1) Obtain site layout plan, site contour plan, and site grading plan.
- 2) Study and check the drawings whether it covers all the areas and all the details are included.
- 3) Check whether the work is to be done in house or outsourcing.
- 4) Prepare a base line program for the completion of works.
- 5) Prepare a detailed BOQ for all items such as removal of grass, shrubs & Bushes, excavation, filling and soil disposal etc.
- 6) Collect quotations from different approved contractors. Please note that there must be minimum 3 bidders.
- 7) Evaluate the technical and commercial bids.
- 8) Call the parties for a meeting for clarifications and negotiations and decide the date for revised bid submission.
- 9) Prepare a comparative statement for all the bidders via both technical and commercial bids.
- 10) Finalize the best commercial and technical bidder to carry out the works.
- 11) Make necessary arrangements for site mobilization.
- 12) First remove all the grass, shrubs and bushes up to 200mm from the ground level.
- 13) Start the site grading works; follow the drawing for levels as mentioned in the drawings.
- 14) Actual measurement for the grading to be done at site on daily basis and to be documented.
- 15) Send the soil to the filling area or designated stacking area or dumping ground based on the site condition.
- 16) Areas where filling is required to be done ensure the filling should be done in layers of 300mm and soil to be properly compacted to a density index of 95%.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

- 17) In case of soil disposal to a stacking area or dumping ground, measure the actual dimensions of the distance.
- 18) Monitor the progress of works as per the base line program.
- 19) The actual progress of work is to be reported weekly, meeting should be conducted to review the progress. In case of any delay, action plan for recovery to be submitted.
- 20) Complete the site clearing and grading as per the drawing.

5) CONSTRUCTION OF CEMENT GODOWN

- 1) Find out the approximate volume of concreting to be done per month.
- 2) Calculate the number of cement bags required.
- 3) Presume a 3month storage capacity of go down, calculate the storage capacity of go down, which is equal to 3Xcement bags required per month.
- 4) Based on the storage capacity decide the dimensions of godown with a clear height of 4m.
- 5) Identify the type of construction to be used for godown such as using RCC framed structure with brick masonry, GI sheet roof with steel trusses.
- 6) Send the above dimensions to Structural consultant.
- 7) Obtain foundation drawings, structural drawings for Construction.
- 8) Check whether the work is to be done in house or outsourcing.
- 9) Prepare a base line program for the completion of works.
- 10) Prepare a detailed BOQ for all items such as excavation, filling, PCC, RCC, structural steel, GI sheeting, plastering, concrete flooring etc
- 11) Collect quotations from different approved contractors. Please note that there must be minimum 3 bidders.
- 12) Evaluate the technical and commercial bids.
- 13) Call the parties for a meeting for clarifications and negotiations and decide the date for revised bid submission.
- 14) Prepare a comparative statement for all the bidders' viz both technical and commercial bids.
- 15) Finalize the best commercial and technical bidder to carry out the works.
- 16) Make necessary arrangements for site mobilization such as water and electricity.
- 17) Setting out for the footings to be completed with temporary bench marks with levels and co-ordinates.
- 18) Excavate the footings up to the required level as mentioned in the drawings.
- 19) Cast the PCC.
- 20) Fabrication and binding of rebar for footings and part of columns to be completed as per the drawings.
- 21) Complete the form work to plumb around the footings.
- 22) Cast the footing and pedestal up to the plinth beam bottom.
- 23) Fabrication and binding of rebar for plinth beam to be completed.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

- 24) Shuttering for the plinth beam to plumb and line to be completed.
- 25) Install the foundation bolts using template in to the columns.
- 26) Cast the plinth beam as per the drawing.
- 27) Complete the back filling of trenches and up to plinth level including the construction of masonry up to plinth level from ground level.
- 28) Ensure the protection of threads of bolts by covering it with plastic sheet while concreting.
- 29) Ensure the delivery of structural columns and trusses, Purlins, GI sheets on time.
- 30) Complete the erection of columns to plumb. Ensure the foundation bolts and properly bolted to the required torque.
- 31) Complete the erection of trusses, purlins as per the drawing and ensure all the bolts are tight enough to the required torque.
- 32) Complete the installation of GI sheets with enough bracings.
- 33) Complete the brick masonry as per the drawings including the installation of doors/windows/ ventilators frames.
- 34) Complete the inside and outside plastering as per specification.
- 35) Complete the flooring as per the drawing.
- 36) Install all the door shutters, window shutters, ventilators.
- 37) Complete all the painting works as per the specifications.
- 38) Monitor the progress of work as per the base line program and to be documented.
- 39) Conduct weekly meetings to review the progress and prepare an action plan in case of any delay.
- 40) Send the progress reports on weekly basis.
- 41) A copy of the above reports to be kept at site.
- 42) Samples of concrete to be taken as per IS 456 and to be tested and documented.
- 43) Structural and reinforcement steel to be tested as per the relevant IS/BS standards and copy of the reports including manufacturer's certificates to be kept at site.
- 44) All other materials to be tested as per the relevant IS/BS standards and copies have to be kept at site.

6) CONSTRUCTION OF STORES BUILDING

- 1) Find out the size of stores building based on the material to be stored inside.
- 2) Identify the type of construction to be used for stores such as using RCC framed structure with brick masonry, GI sheet roof with steel trusses.
- 3) Send the above dimensions to Structural consultant.
- 4) Obtain foundation drawings, structural drawings for Construction.
- 5) Check whether the work is to be done in house or outsourcing.
- 6) Prepare a base line program for the completion of works.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

- 7) Prepare a detailed BOQ for all items such as excavation, filling, PCC, RCC, structural steel, GI sheeting, plastering, concrete flooring etc
- 8) Collect quotations from different approved contractors. Please note that there must be minimum 3 bidders.
- 9) Evaluate the technical and commercial bids.
- 10) Call the parties for a meeting for clarifications and negotiations and decide the date for revised bid submission.
- 11) Prepare a comparative statement for all the bidders' viz both technical and commercial bids.
- 12) Finalize the best commercial and technical bidder to carry out the works.
- 13) Make necessary arrangements for site mobilization such as water and electricity.
- 14) Setting out for the footings to be completed with temporary bench marks with levels and co-ordinates.
- 15) Excavate the footings up to the required level as mentioned in the drawings.
- 16) Cast the PCC.
- 17) Fabrication and binding of rebar for footings and part of columns to be completed as per the drawings.
- 18) Complete the form work to plumb around the footings.
- 19) Cast the footing and pedestal up to the plinth beam bottom.
- 20) Fabrication and binding of rebar for plinth beam to be completed.
- 21) Shuttering for the plinth beam to plumb and line to be completed.
- 22) Install the foundation bolts using template in to the columns.
- 23) Cast the plinth beam as per the drawing.
- 24) Complete the back filling of trenches and up to plinth level including the construction of masonry up to plinth level from ground level.
- 25) Ensure the protection of threads of bolts by covering it with plastic sheet while concreting.
- 26) Ensure the delivery of structural columns and trusses, Purlins, GI sheets on time.
- 27) Complete the erection of columns to plumb. Ensure the foundation bolts and properly bolted to the required torque.
- 28) Complete the erection of trusses, purlins as per the drawing and ensure all the bolts are tight enough to the required torque.
- 29) Complete the installation of GI sheets with enough bracings.
- 30) Complete the brick masonry as per the drawings including the installation of doors/windows/ ventilators frames.
- 31) Complete the inside and outside plastering as per specification.
- 32) Complete the flooring as per the drawing.
- 33) Install all the door shutters, window shutters, ventilators.
- 34) Complete all the painting works as per the specifications
- 35) Monitor the progress of work as per the base line program and to be documented.
- 36) Conduct weekly meetings to review the progress and prepare an action plan in case of any delay.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

- 37) Send the progress reports on weekly basis.
- 38) A copy of the above reports to be kept at site.
- 39) Samples of concrete to be taken as per IS 456 and to be tested and documented.
- 40) Structural and reinforcement steel to be tested as per the relevant IS/BS standards and copy of the reports including manufacturer's certificates to be kept at site.
- 41) All other materials to be tested as per the relevant IS/BS standards and copies have to be kept at site.

7) CONSTRUCTION OF INTERNAL ROADS AND DRAINS

- 1) Obtain the latest Site layout plan from the architect.
- 2) Mark the internal access roads and drains on the drawing with dimensions, reference points and levels based on the actual measurements. Also attach Hydrographic survey report
- 3) Send the drawing to Architect, Civil & Structural consultant for information and for the preparation of construction drawings.
- 4) Obtain the construction drawings for roads and drains along with specifications.
- 5) check whether the work is to be done in house or outsourcing.
- 6) Prepare a base line program for the completion of works.
- 7) Prepare a detailed BOQ for all items such as excavation, filling, PCC, RCC, structural steel, GI sheeting, plastering, concrete flooring etc
- 8) Collect quotations from different approved contractors. Please note that there must be minimum 3 bidders.
- 9) Evaluate the technical and commercial bids.
- 10) Call the parties for a meeting for clarifications and negotiations and decide the date for revised bid submission.
- 11) Prepare a comparative statement for all the bidders' viz both technical and commercial bids.
- 12) Finalize the best commercial and technical bidder to carry out the works.
- 13) Make necessary arrangements for site mobilization such as water and electricity.
- 14) Prepare a base line program for the completion of works.
- 16) Setting out for the roads and drains along with alignment and levels to be completed first.
- 17) Complete the excavation for the roads up to the sub grade.
- 18) Compact the sub grade to the required density index and file the copy.
- 19) Lay down the sub base course as per the drawings and specifications and compact it using a roller to the required density index.
- 20) Lay down the base course as per the drawings and specifications and compact it using a roller to the required density index.
- 21) Lay down the asphalt course as per the drawings and specifications and compact it to the required density index.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

- 22) All the materials have to be tested as per the relevant IS/BS standards and copies have to be kept at site.
- 23) All the culverts and pipe sleeves below the road have to be completed before the road construction.

DRAIN CONSTRUCTION.

- 1) Obtain the site lay out plans, sections, details and specification of drains from the consultant.
- 2) Complete the setting out of the drains with reference points.
- 3) Excavate up to the bottom of drain as per the drawing to the correct level.
- 4) Cast the PCC as per drawings and specs.
- 5) Fabricate the rebar for the base slab and walls.
- 6) Place the rebar and bind the rebar for slab and walls.
- 7) Cast the base slab.
- 8) Complete the form work for walls to plumb
- 9) Cast the walls as per the drawing and specifications.
- 10) Install the pre cast cover on the top.
- 11) Concrete sampling and testing has to be done as per the relevant IS/BS codes.
- 12) If the drains are to be constructed using pre cast elements, get the elements from the factory. Erect it on the PCC and join them using Cement sand mortar or as per specification.

8) CONSTRUCTION OF STEEL FABRICATION YARDS.

- 1) Mark on the site layout drawing the size and position of fabrication yard.
- 2) Please note that it should be free from any future constructions if possible.
- 3) Level the ground and compact the ground.
- 4) Cast 50mm thick PCC and level it.
- 5) Install sign boards.
- 6) Arrange for timber sleepers 200mm high.
- 7) All the rebar bundles to be stored on timber sleepers to be placed at regular intervals.
- 8) Arrange for canvas sheets to protect the rebar from any corrosion.

9) CONSTRUCTION OF PLANT AND MACHINERY YARD

- 1) Mark on the Site layout drawing the size and position of Plant and Machinery yard.
- 2) Please note that it should be free from any future constructions if possible.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

- 3) Level the ground and compact the ground.
- 4) Cast 50mm thick PCC slab.
- 5) Construct fencing with access door around to isolate the area.
- 6) Install enough sign boards.

10) CONSTRUCTION OF LABOUR CAMP

- 1) Calculate the peak manpower required during the peak construction stage.
- 2) Based on the above manpower calculation find out how many married accommodation and bachelor accommodation required.
- 3) Find out the location for labor quarters inside the plot or outside. Please note that while selecting the place the following factors are taking in to consideration. 1) Away from the construction area 2) free from future construction 3) Should retain till the completion of construction. 4) should be easily accessible. 5) Optimum cost of construction.
- 4) Mark it on the site layout plan and send it to architect and Structural Engineer.
- 5) Identify the type of construction for labor camp viz pre-fab construction or construction using GI sheets.
- 6) Obtain drawings from the consultant for construction.
- 7) Complete the foundation as per the drawings with bolts for the super structure.
- 8) Erect the super structure as per the drawings and specifications.
- 9) Complete the Flooring, Electrical connections, plumbing & sanitary connections.

SECTION-F)...SITE LAYOUT AND DEMARCATION

Obtain the site layout plan with all the infrastructure details shown in the drawing such as

- 1) Location and position of site office.
- 2) Location of security cabins
- 3) Site grading details.
- 4) Location and position of cement go down.
- 5) Location of stores building
- 6) Location and position of Roads and drains
- 7) Location of labor camp
- 8) Location of soil stacking area
- 9) Location of steel fabrication yard
- 10) Location of plant and machinery yard.
- 11) Actual location of boundary wall.
- 12) Location of existing buildings.

The architect and structural consultant has to visit the site after taking position of plot and conduct a meeting at site and to finalize the location and position of above on the drawings primarily. Based on the above Basic site layout plan has to be prepared and to be made available at site before the start of survey works at site.

The actual location co-ordinates and levels have to be obtained after the completion of survey and obtaining the survey drawings.

The Architect and Structural consultant along with site staff and co-coordinator has to review and finalize the locations of above items on the basic site layout plan. Based on the actual, Architect has to prepare the final site layout plan, which also includes the locations and positions of proposed Buildings and facilities via master layout plan has to be prepared and finalized. Please note that once the master layout plan is prepared and finalized, the drawing has to undergo minimum changes, which may not affect the site construction activities adversely.

DEMARKATION

- 1) Obtain the master layout plan from the architect.
- 2) Establish temporary bench marks with co-ordinates and levels near the above mentioned items from 1 to 12.
- 3) Establish reference bench marks around the above items (From 1 to 12).
- 4) Establish survey reference pegs at regularly intervals for the above items.
- 5) Site surveyor is totally responsible for the accuracy of all the records of the above at site.
- 6) All the above references have to be documented and to be kept at site for future reference.
- 7) All the bench marks, survey pegs, survey reference lines have to be protected from any

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

damage caused due to construction vehicles etc.

- 8) All the above survey references have to be made available before the start of the construction of respective elements.

GENERAL NOTES ON SITE LAYOUT

The master site layout plan is the most important drawing for any project as all the construction of temporary facilities and permanent facilities development depends on the layout plan. The site layout plan has to be prepared in such a way that 1) the cost, quality and safety of the construction should be optimum.

The access roads which have to be used for construction can be used as permanent roads for the proposed development with laying an asphalt ware course on the roads after the completion of construction.

The storm water drains or underground drains can be permanent ones for the proposed development with minimum temporary drains located at temporary facilities such as site office, labor camps, storage facilities etc. It is always better to use pre cast drain construction for all temporary drains so that the same drains can be reused at other sites once the construction is completed. All the temporary drain connections to the permanent drains can be blocked after the completion of construction and removal of drains. The drains have to be designed and constructed so that minimum maintenance is required. An example is that provide enough silt traps at the junction of temporary drains and permanent storm water drains. The permanent drains have to be located at the sides of roads and sufficient distance from the roads in order to allow any road widening in the coming future.

It is always better to preserve the trees and greenery which is not coming in the proposed development in order to have minimum impact on the environment. These can be utilized properly for a beautiful and natural landscaping in the design.

All the temporary facilities like site office, labor camp, storage sheds have to be constructed using pre-cast or pre-fabricated elements. This not only increases the usage but also yields optimum cost and better comforts and minimum impact on environment. For example in case of cast in-situ, the breaking of concrete involves in dust pollution, Noise pollution and cost of demolition, dumping of debris etc. and have considerable impact on the environment.

All the sewage and sewerage system should be designed for the entire development with a sewage treatment plant and the water from the plant can be reused for landscaping, toilets flushing etc.

In order to reduce the surface runoff and the sizes of drains rain harvesting pits to constructed at proper places so that this water can be reused for landscaping etc. It is always advisable to send minimum water to public drains. An efficient Site layout plan yields zero water to go out of plot. These criteria is very important in deciding the site grading levels, so that maximum water from the water shed will go to the rain harvesting pits. In case of heavy monsoons, a separate water tank collecting rain water with treatment plant from the rain water harvesting pits shall be constructed to store and reuse the water. These criteria will be very much useful for a green mark building certification.

The best way to prepare the best layout plan is to involve all the relevant parties through meetings and brain storming sections such as Architect, Landscaping architect, structural consultant, Hydrographic consultant, E&M consultant and site team. All the previous experiences have to be taken into account with latest trends in the construction industry. It is always better to use recycled material in the construction so that cost can be optimum with environmental friendly construction.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

ACTION CHECK LIST FOR SITE LAYOUT PLAN

PROJECT DESCRIPTION:-

PROJECT CODE NO:-

LOCATION OF PROJECT:

S.NO	ITEM	YES	NO	REMARKS
1)	Location of site boundary with co-ordinates and levels available			
2)	Location of site office with co-ordinates and levels available			
3)	Location of security posts with co-ordinates and levels available			
4)	Location of cement godown with co-ordinates and levels available			
5)	Location of stores shed with co-ordinates and levels is available			
6)	Location of labor camp with all co-ordinates and levels available			
7)	Location of steel fabrication yard with all co-ordinates and levels available			
8)	Location of batching plant with all co-ordinates with levels available			
9)	Location of plant and machinery yard with all co-ordinates and levels available.			
10)	Roads with alignment details and levels available			
11)	Drains with alignment and levels available			
12)	Harvesting pits with co-ordinates and levels available.			
13)	Site grading levels available			
14)	Existing Demolition structures identified and finalized.			
15)				
16)				
17)				

SECTION-G...TRAFFIC STUDIES

Contents

- 1) **DEVELOPING THE SCOPE OF TRAFFIC MANAGEMENT STUDY**
- 2) **COLLECTION OF TRAFFIC DATA**
- 3) **PREDICTION OF TRAFFIC VOLUME**

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

1) DEVELOPING THE SCOPE OF TRAFFIC MANAGEMENT STUDY

- 1) No study will be required on a road with a Level of Service A.
- 2) A study will be required for the following:
 - a) any proposed project that would generate traffic on a road providing access to the site with a Level of Service B where such project, if new, will generate 3000 or more net new vehicle trips per day or, if an expansion or change in use of an existing project, shall add 3000 or more net new vehicle trips per day; or
 - b) any proposed project that would generate traffic on a road providing access to the site with a Level of Service C where such project, if new, will generate 2000 or more net new vehicle trips per day or, if an expansion or change in use of an existing project, shall add 2000 or more net new vehicle trips per day; and
 - c) any proposed project that would generate traffic on a road providing access to the site with a Level of Service D where such project, if new, will generate 1000 or more net new vehicle trips per day or, if any expansion or change in use of an existing project, shall add 1000 or more net new vehicle trips per day.

2) PREDICTION OF TRAFFIC VOLUME

Calculate the total built up area of the plot to be developed. This can be calculated by multiplying FSI of that city with plot area. Find out the area occupied per person depending upon the type of development. For example 10sq.ft per person for commercial development. Calculate the total occupancy of the development. In case of residential development a minimum of 2 car trips per flat can be assumed. Based on the above we can calculate how much total additional traffic volume can be generated.

3) TRIPS GENERATION ESTIMATION

The total traffic volume prediction is already obtained from the above. Now conduct a survey how many are using 1) Rail 2) Bus 3) Two wheeler 4) Bicycles 5) Walking 6) Cars. This can be surveyed based on the existing developments in that area or collect data from the relevant authority. Find out how many equal car spaces are required for parking purpose based on the car usage. (Generally 15 to 20% in major cities). Find out the number of bus trips during the peak hours. Make special provisions for bus lanes and cars, two wheelers. This information is required for the design of internal roads.

SECTION-H...ENVIRONMENTAL MITIGATION MEASURES

Contents.

- 1) **WATER POLLUTION**
- 2) **DUST POLLUTION**
- 3) **NOISE POLLUTION**
- 4) **AIR POLLUTION**
- 5) **CHEMICAL CONTAMINATION**
- 6) **DISPOSAL AND STORAGE OF HAZARDOUS CHEMICALS**
- 7) **MINIUM DISTURBANCE TO HISTORICAL PLACES**
- 8) **MOSQUITO CONTROL**

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

1) WATER POLLUTION

- 1) Send the construction water samples as well as all the water reaching to public drains for testing and obtain the test report. The test report identifies whether the water is contaminated or not.
- 2) Find out what are the contaminants inside the water and the source of contamination.
- 3) Identify the location and place of contamination.
- 4) Find out the methods to avoid the contamination.
- 5) If required treat the contaminated water before entering the drains, canals etc.

The sources of water contamination may be soil erosion or ground water contamination due to chemicals from the ground, mixing of construction chemicals with water and directly reaching the drains etc. for example betonies slurry leakage to the drains from the plant or piles. This can be avoided by storing the slurry in underground pits and send it to proper disposal area. All the water sources have to be tested and to be treated before using for construction.

2) DUST POLLUTION

The causes of dust pollution are 1) fine dust flying from the site to atmosphere due to construction vehicle movement or through strong winds 2) Unloading of cement, betonies, other power chemicals in to mixer machines etc. The fine dust flying in to the atmosphere can be avoided by sprinkler water on to these areas or plant shrubs, bushes, grass in case of open areas or cover these areas with membranes. For example all the soil stacks has to be covered with canvas sheets in order to avoid flying fine dust in to atmosphere during the dry weather conditions. The power chemicals unloading can be controlled by enclosing the areas with tents etc. The workers working in these areas shall wear face mask to avoid these enter in to the human body protecting the nose and eyes from direct contact?

3) NOISE POLLUTION

Please refer to SECTION-A...Take position of PLOT.

4) AIR POLLUTION

The air pollution is primarily caused due to the release of gases like carbon dioxide, carbon monoxide, Sulfur dioxide, Nitrogen dioxide, lead etc directly in to the atmosphere without any treatment. These chemical gases will cause several problems to the human body. The carbon dioxide is resulting from vehicle pollution from traffic and construction machinery at site. The high content of carbon dioxide is due to not enough plantation at site and surroundings. The other gases may be due to the presence of industries in the vicinity.

All the construction machinery present at site have to be properly maintained viz regular cleaning and change of filters at the exhaust of machinery. If machinery is continuously exhausting dark smoke then such machinery shall be removed from site. It is always advisable not use machinery with life span more than 15 years especially lifting machinery due to safety reasons unless and other wise certified by a competent person as safe to use.

5) SOIL EROSION CONTROL

- 1) Find out the places of soil erosion viz open areas, excavation slopes, excavation areas. Most of the times the soil through surface runoff due to monsoons will enter the drains.
- 2) All the construction drain entry and exit points should be provided with sediment traps or filtration units.
- 3) All the drains should be regularly cleaned and maintained.
- 4) All the slopes of excavation should be protected using shotcreting or by planting trees, shrubs, bushes or grass etc. The slopes can also be covered with geotextile membranes.
- 5) In case of deep excavations, the water to be collected to a pit and allow sufficient time for soil sedimentation before pumping the water to surface drains.
- 6) Provide enough rain water harvesting pits at site.
- 7) Provide check dams at regular intervals in case of natural drains.
- 8) All the water from construction as well as during wet weather is to be sent to a treatment plant before discharging to public drains.
- 9) It is better to store the water and recycle it for irrigation and toilet flushing etc.
- 10) The slopes of the ground while site grading should be proper in order to avoid any stagnant water.
- 11) All the soil stacking areas have to be covered with canvas with counter weights.
- 12) Regular site inspections should be conducted and necessary precautionary measures should be implemented to prevent soil erosion.
- 13) The contractor should prepare a method statement indicating all the precautionary measures for soil erosion before the start of work.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

5) CHEMICAL CONTAMINATION

- 1) List out all the construction chemicals that require special storage and usage such as additives, bentonite, paints, epoxy material, construction chemicals required for ground improvement works, etc.
- 2) Obtain the MSDS for all the materials along with manufacturer's instructions and implement the procedures stipulated.
- 3) The Contractor shall have to submit Method statements for all the activities such as JET Grouting, TAM Grouting, etc with all the safety precautions for storage, handling and usage of such materials at site.
- 4) The site safety officer has to check the above before the start of work along with the site-in charge.
- 5) Place enough sign boards at the place of storage.
- 6) Train all the construction workers on how to store, use the materials for construction.
- 7) Make sure there is no leakage or wastage of this material to site soils or drains etc.
- 8) The waste material to be stored and disposed to the approved or designated areas properly.
- 9) All the lubricants to be stored separately with fencing around and in trays to be placed below the drums with sand filled in the trays. Sign boards like "no smoking" and Highly Inflammable to be placed nearby.
- 10) Fire extinguishers have to keep nearby with sign boards along with instructions on how to use the fire extinguishers.
- 11) Care has to be taken to avoid these mixing with site soil.
- 12) All the empty drums to be send back properly.
- 13) The same procedure shall be adopted for the oxygen and acetylene gas cylinders storage that can be used for steel cutting purpose.

6) DISPOSAL AND STORAGE OF HAZARDOUS CHEMICALS

- 1) Find out the list of the above construction chemicals such as Sulphuric acid, Nitric acid, etc which are highly dangerous for the workers.
- 2) Obtain the MSDS and instructions on how to use, store, and dispose these materials. The safety officer/ Site engineer shall obtain a method statement for the site works for the items to be used for construction and review, approve the method statement.
- 3) All the construction personal involved in these works should be trained and educated before the start of works.
- 4) Enough safety sign boards have to be placed at storage and usage areas with instruction manuals.
- 5) All the safety PPE has to be made available at the above areas.
- 6) Follow the instructions on how to dispose these waste materials.

ENGINEERING MANUAL-PRECONSTRUCTION ACTIVITIES

7) MINIMUM DISTURBANCE TO HISTORICAL PLACES.

- 1) Find out any places of interest around the plot to be developed such as museums, forts, wild life parks, etc
- 2) Find out how much distance from the plot.
- 3) Ensure the access to the plot to be away from such areas in order to less disturb these areas such as noise, dust pollution etc.
- 4) If required, place enough height of boundary wall or hoarding at these sides.
- 5) Provide canvass or any other membrane above the walls to isolate the area.
- 6) Make this boundary impermeable by providing water proofing on this side to avoid any leakage to these areas.
- 7) Conduct regular inspections at these areas within the plot.
- 8) Maintain all the necessary documentation for future reference.

8) MOSQUITO CONTROL

- 1) Find out the ditches, depressions inside the site where water may stagnant for several days.
- 2) Fill all these depressions and ditches with soil and level them.
- 3) Please note that any stagnant water may lead to mosquito breeding.
- 4) The mosquito breeding may result in Malaria, dengue of human beings working in these areas. Mosquito's are serious killers of persons, if enough precautions are not taken.
- 5) The site shall be graded to enough gradient so that no stagnant water will be present at site.
- 6) All the roof gutters have to be cleaned regularly.
- 7) Thermal Foaming has to be done weekly once to kill the lava of mosquitoes.
- 8) Chemical oil has to be spread at all places where stagnant water is present.
- 9) All the sumps, manholes have to be closed properly and ensure no mosquito breeding around.
- 10) Regular site inspections have to be conducted and precautionary measures have to be taken.
- 11) The contractor has to submit a method statement for controlling the mosquitoes breeding at site together with safety precautionary measures.
- 12) Review the method statement and approve the Method statement for site implementation at site.