

**DIVISION 02000 - SITE WORK****02100 SITE PREPARATION****02101 GENERAL**

Under this section the Contractor shall carry out all work and anything therewith connected and/or necessary to prepare the site area shown on the drawings ready for the construction works of the DHQ Hospital Tando Muhammad Khan. Generally the preliminary works shall include:

- Site Clearing
- Setting Out
- Demolition Works

**02110 SITE CLEARING****02111 GENERAL**

The clearing and grubbing shall consist of clearing the designated area of all trees, down timber snags, bush, other vegetation, rubbish and all other objectionable material, and shall include grubbing stumps, roots, and matted roots, and disposal of all spoils material resulting from the clearing and grubbing. It shall also include the removal and disposal of structure that protrude/encroach upon, or otherwise obstructs the work, except when otherwise provided for on the plans or directed by the Engineer to be saved. The scope of this section of specifications is covered with detailed specifications laid down herein.

**02112 LOCATION OF WORKS**

The Engineer will define the limits of areas where clearing and grubbing is to be done. Normally it will include all land within the right of way and all other construction area including ditches, detours, minor road crossings and other areas shown on the plans or as specified or as directed by the Engineer. The Engineer will designate the fences, structures and debris and trees and bushes to be cleared where grubbing is not required. It shall not include clearing and grubbing of borrow or other pit areas from which material is secured. It shall not include the leveling or removal of blown sand dune or mounds within the site of works unless otherwise directed by the Engineer.

**02113 EXECUTION****A- Grubbing and Cutting**

All roots and stumps within the limits of the site shall be grubbed and excavated unless otherwise specified or approved by the Engineer.

**B- Disposal**

All wood and bush shall be disposed off within ten (10) days after cutting or felling unless otherwise approved. No tree trunks, stumps or other debris shall be fallen, side cast or placed outside the limits of the Site. No debris shall be left within site unless approved in writing by the Engineer. The location of disposal areas shall be outside the limits of the site and shall be acquired by the Contractor at his own expense, acceptable to Tehsil Municipal Administration. Any useable material shall remain the property of the Employer.

**C- Burning**

There shall be no burning on or around the site area whatever. The Contractor shall ensure that neither his employees nor anyone whatsoever burns anything on or within specified limits around the site area.

**D- Protection and Restoration**

The Contractor shall prevent all damage to pipes, conduits, wires, cables or structures above or below ground. No land monuments, property markers, or official datum points shall be damaged or removed until the Engineer has witnessed or otherwise referred their location and approved their removal. The Contractor shall so control his operations as to prevent damage to trees and shrubs, which are to be preserved. Protection may include fences and boards lashed to trees to prevent damage from machine operations. The existing covered or open benchmarks should be relocated as directed by the Engineer. In the event that anything specified herein to be saved and protected is damaged by the Contractor such damages shall immediately be repaired or replaced by the Contractor at his own cost to the satisfaction of the Engineer. All areas cleared and grubbed must be approved by the Engineer or Engineer's Representative before the start of clearing operations.

**02114 MEASUREMENT AND PAYMENT**

No payment shall be made for the Works involved within the scope of this Section of Specifications unless otherwise specifically stated in the Bills of Quantities or herein. The cost thereof shall be deemed to have been included in the quoted unit rate of other items of the Bills of Quantities.

**02120 SETTING OUT****02121 GENERAL**

The Contractor shall make the stakeout survey for construction purposes with competently qualified men, consistent with the current practices. The work shall proceed immediately upon the award of the contract and shall be expeditiously progressed to completion in a manner and at a rate of progress satisfactory to the Engineer. The Contractor shall keep the Engineer fully informed as to the progress of the stakeout survey. The scope of this section of specifications is covered by detailed specifications as laid down herein.

**A- Instruments**

All instruments, equipment, stakes and other material necessary to perform all work shall be provided by the Contractor. These instruments and equipment shall be available to Engineer at all times for the purpose of checking the work of the Contract.

All stakes used shall be of a type approved by the Engineer, clearly and permanently marked so as to be legible at all times. It shall be the Contractor's responsibility to maintain these stakes in their proper position and location at all times. Any existing stakes or markers defining property lines and survey monuments which may be disturbed during construction shall be properly tied into fixed reference points before being disturbed and accurately reset in their proper position upon completion of the work.

**B- Submittals**

Survey Record

Submit all survey data, computation field notes, drawings and all other survey records necessary to accomplish the work.

**02122 EXECUTION****A Setting Out**

The Contractor shall trim trees, bushes and other interfering objects, not consistent with the plans, from survey lines in advance of all survey work to permit accurate and unimpeded work by his stakeout survey crews and the Engineer's survey crews. The exact position of all work shall be established from control points, which are shown on the plans or modified by the Engineer. Any error, apparent discrepancy or absence in or of data shown or required for accurately accomplishing the stakeout survey shall be referred to the Engineer for interpretation or furnishing when such is observed or required.

The Contractor shall be responsible for the accuracy of his work and shall maintain all reference points, stakes, etc. throughout the period of the Contract. Damaged, destroyed or inaccessible reference points, bench marks or stakes shall be replaced by the Contractor. Existing or new control points that will be or are destroyed during construction shall be re-established and all reference ties recorded therefor shall be furnished to the Engineer. All stakeout survey work shall be referenced to the centre lines shown on the plans. All computations necessary to establish the exact position of the work from control points shall be made and preserved by the Contractor. All computations, survey notes and other records necessary to accomplish the work shall be kept neatly and made available to the Engineer and furnished to the Employer upon Contract completion.

The Engineer may check all or any portion of the stakeout survey work or notes made by the Contractor and any necessary correction to the work shall be immediately made. Such checking by the Engineer shall not relieve the Contractor of his responsibilities for the accuracy or completeness of his work.

Reference points, base lines, stakes and benchmarks for borrow pits shall be established by the Contractor.

All required right-of-way and easement limits shall be established, staked and referenced by the Contractor concurrent with the construction stakeout survey.

The Contractor shall place at least two offset stakes or reference at each centre line station and at such intermediate station as the Engineer may direct. From computations and measurements made by the Contractor, these stakes shall be clearly marked with the correct centre line, station number, offset and cut or fill so as to permit the establishment of the true centre line location during construction. He shall locate and place all cut, fill, slope, line grade or other stakes and points as the Engineer may direct to be necessary for the proper progress of the work.

**02123 MEASUREMENT AND PAYMENT**

No payment shall be made for the Works involved within the scope of this Section of Specifications unless otherwise specifically stated in the Bills of Quantities or herein.

The cost thereof shall be deemed to have been included in the quoted unit rate of other items of the Bills of Quantities.

**02140 DEMOLITION WORKS****02141 GENERAL**

The work under this section of specifications consists of furnishing all plant, labour, equipment, appliances and performing all operations in connection with the demolition and removal of existing structure, if any, lying on the site at any elevation and position including disposal of demolished material to designated places. The demolition work shall be done in accordance with these specifications and as directed by the Engineer.

**02142 EXECUTION****A- Demolition**

Before taking the work of demolition in hand, an inventory of all serviceable materials for which special care is to be exercised in demolition, handling or lowering down shall be made and the list shall be checked and duly approved by the Engineer or his authorized representative.

The Contractor shall be responsible for carrying out dismantling operations strictly in accordance with the specifications or direction of the Engineer, with appropriate tools and in such a manner as to avoid unnecessary damage or injury to other adjoining work, and those parts of work which are to be retained, and to render unserviceable as little of the material as possible.

The Contractor shall, if specified or directed by the Engineer, make good any damage to work caused during demolition and shall protect as far as possible all trees, shrubs, etc., near the work.

The Contractor shall at once remove all foul matter, if sewers or drains are to be removed or disturbed.

Unless otherwise stipulated or specified, no payment shall be made for shoring or under-pinning.

**B- Sorting, Stacking and Disposal**

Unless otherwise specified, all demolished materials shall be considered the property of the Employer and shall be disposed of as directed by the Engineer. The rate of an item shall always include the sorting out of any demolished materials, its stacking anywhere within 500 feet of the place of demolition and its safe custody till it is handed over to the Employer in accordance with the directions of the Engineer.

When so specified or directed by the Engineer, the contractor shall completely remove the whole or part of the dismantled material from the site of work and realize such profits as he can by disposing it off or pay for removing from the site and disposing it off.

**02143 MEASUREMENT AND PAYMENT**

No payment shall be made for the Works involved within the scope of this Section of Specifications unless otherwise specifically stated in the Bills of Quantities or herein.

The cost thereof shall be deemed to have been included in the quoted unit rate of other items of the Bills of Quantities.

\*\*\* End of Section 02100 \*\*\*

**02210 EARTH WORKS****02211 SCOPE OF WORK**

The works covered by this section of the specifications consist of furnishing all plant, labour, equipment appliances and materials and in performing all operations in connection with earthworks of all foundations, basements, underground supplies and services and for all structural units, stock piling of suitable excavated material, in accordance with this section of specifications and applicable drawings and subject to terms and conditions of the Contract.

**02212 (1) GENERAL**

- i. The Contractor shall acquaint himself with the nature of the ground, existing structures, foundations and subsoil, which might be encountered during excavation of earthworks.
- ii. The Subsoil stratification is indicated on the drawing for reference. However the Employer or the Engineer does not guarantee or warrant in any way that the material to be found in the excavation will be similar in nature to that of any samples which may have been exhibited or indicated in the Logs, Drawings or in any other Contract Documents or to material obtained from boring or trial holes. The Contractor shall be deemed to have made local and independent inquiries and shall take the whole risk of the nature of the ground subsoil or material to be excavated or penetrated and the Contractor shall not be entitled to receive an extra or additional payment nor to be relieved from any of his obligations by reasons of the nature of such ground subsoil or material.
- iii. All excavations, cuttings, and fills shall be constructed to the lines, levels and gradients specified with any necessary allowance for consolidation, settlement and drainage so that at the end of the Defects Liability Period the ground shall be at the required lines, levels and gradients. During the course of the Contract and during the Defects Liability period, any damage or defects in cuttings and fills, structures and other works, caused by slips, falls or washings or any other Ground movement due to the Contractor's negligence shall be made good by the Contractor at his own cost.
- iv. Arrange for inspection by Local Authority to verify and approve the discharge of surface water and to verify the location of the sewer connection.

**(2) DUST CONTROL**

- i Control dust on and near the work and near off-site borrow areas if such dust is caused by the Contractor's operations during performance of the work or if resulting from the condition in which the Contractor leaves the Site.
- ii Thoroughly moisten surfaces as required to prevent dust being a nuisance to the public, neighbors, and concurrent performance of other work on the Site.

**(3) ANTIQUITIES**

Any ancient carvings, relics of antiquity, coins, or other curiosities, which are discovered or excavated during the progress of the work will remain the property of the Employer and are to be handed over to the Engineer.

**02213 SUBMITTAL**

The Contractor shall perform survey of the area where earthwork is required, plot the ground levels on the drawings and obtain approval from the Engineer before starting the earthwork.

**02214 CODES AND STANDARDS**

Material, construction and testing shall comply with the following codes and standards:

ASTM C	136	Sieve or screen analysis of fine and coarse aggregate
ASTM D	1556	Density of soil in place by the sand cone method
ASTM D	1557	Moisture-Density relation of soils using 4.5 kg Rammer and 457 mm drop
ASTM D	2167	Density of soil in place by the Rubber-Balloon method
ASTM D	2216	Moisture content of soil

**02215 EXECUTION****A- Site Preparation**

- i. The Contractor shall set out the works and shall be responsible for true and perfect setting out of the same and for correctness of the positions, levels, dimensions and alignments of all parts thereof. If at any time any error in this respect shall appear during the progress of the works, the Contractor shall at his own expense rectify such error, to the satisfaction of the Engineer.
- ii. The Contractor shall construct and maintain accurate bench-marks so that the lines and levels can be easily checked by the Engineer.
- iii. The Contractor shall construct and maintain such ditches, in addition to those shown on the plans, as will adequately drain areas under construction at no extra cost to the Employer.
- iv. Clearing shall consist of filling and cutting up, or the trimming of trees and the satisfactory disposal of the trees and other vegetation designated for removal, together with downed timber, snags, bushes and rubbish occurring within the areas to be cleared. Trees, other vegetation, stumps, roots, and bushes in areas to be cleared shall be cut off flush with or below the original ground surface except such Individual trees, group of trees, and vegetation as may be indicated on the drawings or designated by the Engineer to be left standing. Individual trees, group of trees, and other vegetation, to be left standing shall be thoroughly protected from damage incident to construction operations, by the erection of the barriers or by such other means, as the circumstances require, as approved by the Engineer. Clearing operations shall be conducted, so as to prevent damage by falling trees to trees left standing, to existing structures and installations, and to those under construction, and to provide for the safety of workers, so as to provide for the safety of employees and others.
- v. Grubbing shall consist of the removal and disposal of all stumps, roots, larger than 1½" (38 mm) in diameter, matted roots in the designated grubbing areas. Stumps, roots, logs or other timber larger than 1½" (38 mm) in

diameter, matted roots & other debris shall be excavated and moved to a depth not less than 18" (450mm) below any sub grade, shoulder or slope. In areas, where the cut is over 3ft (1.0m), grubbing shall not be necessary. In areas to be paved, or in areas indicated on the drawings as future paved areas, where, excess excavation from grading operations is placed, or in areas designated by the Engineer as future paved areas, where excess excavation from grading operations is placed, grubbing will be necessary.

- vi Timber and other refuse to be disposed off by burning, shall be burned at locations specified by the Engineer in a manner that will avoid all hazards such as damage to the existing structures, construction in progress, trees and vegetation. The Contractor shall be responsible for compliances with all pertinent laws and regulations. Disposal by burning shall be kept under constant attention until the fires have been burned out or have been extinguished. No materials will be permitted to be pushed or placed on adjacent private property without prior written approval of the Engineer.

#### Existing Utilities

Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protecting during excavation operations.

Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the utility Employer immediately for directions. Cooperate with Employer and public and private utility companies in keeping their respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility Employer.

Do not interrupt existing utilities servicing facilities occupied and used by the Employer or others, except when permitted in writing by the Engineer and then only after acceptable temporary utility services have been provided.

Demolish and completely remove from the site existing underground utilities indicated to be removed. Coordinate with local utility companies for shut-off of services if lines are active.

#### Use of Explosives:

The use of explosive is not permitted without specific and written approval from the Engineer.

#### Protection of Person and Property:

Barricade open excavations occurring as part of this work, protect structures, utilities, side walks, pavements and other facilities from damage caused by settlement, lateral movement, under mining, washout and other hazards created by excavation operations.

### **B- Excavations**

- i. Excavation shall include the removal of all material of every name and nature.
- ii. The Contractor shall give reasonable notice that he intends to commence any excavation and he shall submit to the Engineer full details of his proposals. The Engineer may require modifications to be made if he considers the Contractors proposals to be unsatisfactory and the Contractor shall give

effect to such modifications but shall not be relieved of his responsibility with respect to such work.

- iii. For bulk excavations, the Contractor shall submit for the prior approval of the Engineer full details and drawings showing the proposed method of supporting and strutting etc. The design, provisional constructions, maintenance and removal of such works shall be the responsibility of the Contractor and all cost in these respects shall be included in the unit rates for the permanent work.
- iv. The Contractor's attention is drawn particularly to his obligations under the General Conditions in respect of those works, which are in close proximity to existing buildings.
- v. Excavations shall be carried out in accordance with excavation plans and sections shown on the drawings and as directed by the Engineer.

The major portion of excavations shall be carried out by mechanical excavators and excavated materials disposed off to stock on spoil as per drawings or as directed by the Engineer. The excavation, which cannot be done by mechanical means including leveling, trimming and finishing to the required levels and dimensions shall be done manually. The materials suitable for and if required for fill and back-fill shall be stockpiled in or around the boundary of the Works with the approval of the Engineer.

- vi. The Contractor shall preserve the completed excavation from damage from slips and earth movements, ingress of water from any source whatsoever and deterioration by exposure to the sun and the effects of the weather.
- vii. All excavation of every description, in whatever material encountered shall be performed to the elevations and dimensions shown on the drawings in such a manner as to avoid interruption to work in other parts of the site. The Contractor shall be responsible for injury to the permanent works caused by excavation on other parts of the works.
- viii. Excavation shall extend to sufficient distance from walls and footing to allow for placing and removal of forms, installations of services and for inspection, except where the concrete for walls and footings is authorized to be deposited directly against excavated surfaces. Undercutting will not be permitted. The additional excavation for placing and removal of forms, installation of services, for inspection and generally for working area on slopes for stability shall not be measured for payment and shall be deemed to be included in the rates for excavation as measured net.
- ix. All excavations in foundations shall be taken to 6"/150 mm above the final excavation elevations shown on the drawings and the last 6"/150 mm shall be trimmed carefully to a smooth and level surface, immediately after trimming to the final elevation a layer of blinding concrete shall be placed to the thickness shown on the drawings. All excavations for foundations which have been trimmed and disturbed shall be compacted and covered by over site concrete by the end of the day. It is specifically brought to the notice of the Contractor that any excavation taken down to the trimmed elevation which is left overnight or for any length of time thereafter, uncovered by the blinding concrete, shall be required to be trimmed to such lower elevation as directed by the Engineer and any extra work or any consequent increase in the quantities caused thereby shall not be paid to the Contractor.



- x. No excavation shall be refilled nor any permanent work commenced until the foundation has been inspected by the Engineer and his permission to proceed given.
- xi. If excavations for substructures are carried below the required level, as shown in the drawings or as directed by the Engineer, the surplus depth shall be filled in with concrete of same grade as of blinding concrete at the sole cost of the Contractor.
- xii. All excavation shall be performed in the dry. The placing of blinding concrete, placing of reinforcement and casting of the permanent works in the excavation shall be carried out in the dry and the Contractor shall have sufficient equipment for this purpose. Adequate precautions shall be taken to prevent any corrosion due to undercutting from underneath the previously constructed adjoining foundations.
- xiii. Shoring, where required during excavation, shall be installed to protect workmen and the bank, adjacent paving, structures and utilities. The term shoring shall also be deemed to cover whatever methods the Contractor elects to adopt, with prior approval of the Engineer, for upholding the sides of excavation and also for planking and strutting to excavation against the side of roadways and adjoining properties in existing hard-core of any other material. The Contractor will be held responsible for upholding the sides of all excavations and no claim for additional excavation, concrete or other material will be considered in this respect.
- xiv. Excavations for deep retaining walls shall be protected from drying out by covering with tarpaulins or other means, if excavation is to stand open more than 24 hours. This is a precaution to prevent excessive surcharge loads acting on the wall, from the drying out and subsequent swelling of the clay soils when saturated either by rain or by capillarity of ground water.
- xv. If rock is encountered, it shall be removed carefully and without excessive noise and vibration. Blasting, if required shall be done by persons skilled in such work and as directed by the Engineer. Necessary permission for blasting should be obtained from respective Government Authorities by the Contractor. All necessary precautions shall be taken to see that the general public and the properties in the vicinity shall not receive any damage by such blasting. Rock, to receive footings shall be stepped and leveled.
- xvi. Existing utility lines, if any, that are shown on the drawings, or the locations of which are made known to the Contractor prior to excavation and that are to be retained, as well as utility lines encountered during excavation and backfilling, and if damaged, shall be repaired by the Contractor at his expense. Any existing utility lines which are not known to the Contractor in sufficient time to avoid damage, if inadvertently damaged during excavation, shall be repaired by the Contractor and adjustment in payment will be made as approved by the Engineer. When utility lines which are to be removed, are encountered within the area of operations the Contractor shall notify the Engineer in ample time for the necessary measures to be taken to prevent interruption of the service.
- xvii. Excavated material suitable for use as filling material shall be stock piled at a suitable place with the approval of the Engineer. This stock piled material shall be transported back to places requiring fill or backfill. Surplus material unsuitable for use as filling shall be disposed off by the Contractor at his own cost, to location as acceptable to Tehsil Municipal Administration.

- xviii. The bulk excavation work shall include excavation in above water table and excavation below water table. The contractor shall submit the proposal for dewatering from the areas of excavation for the approval of Engineer and shall provide all plant, equipment, pumps, sheeting, well points as required to keep the water table below 3.28 feet/1 m from the deepest foundation as shown on the drawings till the completion of, water proofing of foundation works, basement walls and footing.
- xix. The Contractor shall make independent enquiries and perform and make independent observations to ascertain the water table in the areas of excavations during the period when the construction works are in progress. The Contractor shall take whole risk of any nature for fluctuation of the water table from his own findings. The Employer does not bind in any way and shall not be responsible for any information given by him or any information, observations or values obtained from his reports, drawings and documents or anywhere in these documents.
- xx. Excavation for pits, cable trenches and equipment foundation and other structures shall be taken out to the levels and dimension shown on drawings or such other levels and dimensions as the Engineer may direct.
- xxi. Before starting the excavation, the Contractor shall ensure the correct alignment of the pipeline on the ground, the depth and width of excavation of the trench, all in accordance with the drawings and instructions of the Engineer. The Contractor shall make profiles with cement concrete pillars.
- xxii. Excavation shall be carried out true to line, grade and width as shown on the drawings or as directed by the Engineer ensuring proper laying of the pipeline and bedding fill, construction of chambers for appurtenants and any other structures. The trench bottom shall be graded to provide even and substantial bearing over the specified bedding and of the structure.
- xxiii. The Contractor at his cost shall provide to the satisfaction of the Engineer all timbering, approved supports and shores and bracings to the sides of the excavated trench and foundations in such a manner to secure the sides of the trench and excavations from falling or adverse movement. All responsibility connected with such shoring shall rest with the Contractor.
- xxiv. Adequate clearance/working space on both sides of the structure/pipe line shall be provided for which no payment shall be made.
- xxv. The bottom of all excavations shall be carefully levelled. Any pockets of soft or loose material in the bottom of the pits and trenches shall be removed and the cavities so formed filled with lean concrete at the Contractor's expense.
- xxvi. The Engineer may require the Contractor to excavate below the elevations shown on the drawings or he may order him to stop above the elevations shown depending upon the suitable foundation material encountered.
- xxvii. If for any reasons, the levels grades or profiles of the excavations are changed adversely, the Contractor shall at his own cost be liable to bring the excavations to the required levels and profiles as shown on the drawings or as directed by the Engineer.

**C- Excavation Tolerances**

Excavation shall be performed within the tolerances for excavation limits indicated on the drawings. Where no Tolerance limits are indicated, excavation shall be performed to tolerances established by the Engineer as acceptable for the design and type of work involved.

**D- Backfilling**

- i. After completion of foundation and basement walls and water proofing, the excavation shall be cleaned of trash and debris.
- ii. The backfilling shall include filling under the floors, around the foundations and basement walls, trenches, pipes, conduits, ducts and channels and bedding for pipes.
- iii. The backfilling work shall include loading, unloading, transporting, placing, stocking, spreading of earth, watering, rolling, ramming and compacting complete as specified herein.
- iv. Filling shall be approved selected material from excavation or other predominantly granular material and free from slurry, mud, organic or other unsuitable matter and capable of compaction by ordinary means.
- v. The stockpiled excavated material suitable for back filling shall be used for backfilling if approved by the Engineer and shall be transported by the Contractor anywhere required for the purpose of backfilling work in this contract.
- vi. The Contractor shall provide the approved quality fill and backfilling material as required to complete the fill/backfilling work.
- vii. Material for back filling shall be as approved by the Engineer and shall be placed in layers of 6"/150 mm measured as compacted material and saturated with only sufficient water and compacted by mechanical means to produce in-situ density not less than 95% of the maximum density at optimum moisture content, achieved in Test No. 15 of BS 1377.
- viii. All filled areas shall be left neat, smooth and well compacted the top surface consisting of the normal site surface soil unless otherwise directed.
- ix. Depending on the depth of fill the Engineer may instruct increased thickness of successive layers to be placed.
- x. Fill shall not be placed against foundation walls prior to approval by the Engineer. Fill shall be brought up evenly on the side of the walls as far as practicable. Heavy equipment for spreading and compacting the fill shall not be operated closer to the wall than a distance equal to the height of the fill above the top of footing.
- xi. In case the Contractor has to arrange for the fill material the quality of the fill material will be subject to the approval of the Engineer. The Engineer shall require the Contractor to carry out various tests of the fill material. All such tests shall be made at an approved laboratory at the cost of the Contractor. Once a material from a specific source has been approved, the material for the same quality from that source only shall be used. Any fill material from borrow pits which has not been approved or the quality of which differs from the approved material shall be rejected out of hand and the Engineer reserves the right to order removal of any such materials brought to the site of the works at his discretion at Contractor's expense. In order to ensure satisfactory compaction, it will be necessary to carry out, depending upon the type of material, particle size distribution tests, determination of organic contents tests, maximum and minimum density tests and determination of optimum moisture content for the filling material.
- xii. The method of compaction, namely type of compactor, type of roller, weight of roller and number of passes proposed by the Contractor for any particular fill material shall be subject to the approval of the Engineer after the completion of satisfactory field tests, subsequent to the laboratory analyses, using the materials and equipment proposed to be used for the earthwork in conditions similar to those likely to be encountered during construction.

The final selection of the soil moisture content, the thickness of layers, the type of compaction equipment and the number of passes shall be decided after these tests, which shall be conducted at Contractor's expense.

- xiii. Having established the method of compaction to be used, no departure from this approved method shall be permitted without the prior approval of the Engineer. The adequate control of the fill and compacting operations shall be ensured by in-situ density tests and in order to obtain significant results, not less than two measurements shall be carried out per one hundred square meters of area compacted. The frequency of tests shall be determined on site and may be varied at the discretion of the Engineer as the work proceeds. Tests shall be carried out in accordance with British Standard 1377:1975 or to such other standards as approved by the Engineer. The standard of acceptance of the compaction will not be less than 95% in-situ density with respect to the maximum density, at optimum moisture content, achieved in Test No. 15 of BS 1377.
- xiv. The exact thickness of layers and the method of placing and compacting the fill shall be determined by the field tests, as stated above, but notwithstanding the results of these trials, fill shall not be placed in layers exceeding 8"/200 mm in thickness. In order to maintain control of the thickness of layers, timber profiles shall be used wherever feasible. The travelers of such profiles for each layer of fill shall be checked by the supervisory staff of the Engineer. The Contractor shall provide adequate supply of water and sufficient capacity of mechanical water carriers to ensure uniform and uninterrupted operation of compaction. The Engineer may forbid the Contractor to proceed with placing and/or compaction of fill and/or order removal and re-compaction of such fill when he finds that the Contractor has insufficient or defective equipment or that the fill has been improperly laid and/or compacted.
- xv. If it is found necessary to alter the moisture content of the fill material in any way, then very strict control shall be exercised over the wetting and/or the drying process and frequent moisture content tests.
- xvi. The fill material should be well graded non-cohesive and nearly silt-free (silt content between 5 to 10 percent) salt free and free of Organic material (less than 2%). It should also be free of stones larger than 4"/10 Cms maximum dimension.
- xvii. It should be of such nature and characteristics that it can be compacted to the specified densities in reasonable length of time. It shall be free of plastic clays, of all materials subject to decay, decomposition or dissolution and of cinder or other material which corrode piping and other metals.

**E- Back Filling Tolerances**

The stabilization of compacted backfill/fill surfaces shall be smooth and even and shall not vary more than 4" in 9.843 ft. or 100 mm in 3 meters from true profile and shall not be more than ½"/12.5 mm from true elevation.

**F- Disposal of Surplus Material**

The rejected unsuitable material and surplus excavated material shall be removed from site and disposed off by the Contractor through his own arrangement.

The disposal of surplus excavated material shall include loading, unloading, transporting, and disposing off as per Tehsil Municipal Administration acceptable location.

**02216 MEASUREMENT AND PAYMENT****A- General**

Item numbers to be measured for payment have no relationship to the paras of same number in the specifications.

Except otherwise Specified herein or else-where in the Contract Documents, no measurement and payment will be made for the under mentioned specified works related to the relevant items of the Bill of Quantities. The cost thereof shall be deemed to have been included in the quoted unit rate of the respective items of the Bill of Quantities.

- i) Dewatering to keep the basement areas upto the required depth, dry during construction of foundations and basement walls and floors,
- ii) Timber shoring, planking, strutting, sheet piling and providing slope for up-holding the sides of excavations including sheet piling left in place,
- iii) Any fill with approved material necessitated by over excavation due to fault or convenience of the Contractor,
- iv) Stockpiling of the excavated material at approved locations,
- v) Excavation and back filling involved in providing sufficient working space around basement walls and service line trenches,
- vi) All laboratory and field tests stipulated in these specifications,
- vii) Disposal of rejected unsuitable and surplus excavated material.

**B- Excavation**

Measurement:

Quantities of excavation shall be calculated / measured from the pre-work levels of natural ground taken jointly by the Contractor and the Engineer before commencement of the work.

The quantities set out for excavation and its subsequent disposal shall be deemed to be the bulk before excavating and no allowance shall be made for any subsequent variations in bulk or for any extra excavation.

Unless otherwise shown on the drawings quantities of excavation shall be measured on the basis of vertical excavations required for the nominal concrete dimensions of the basements and the foundations including blinding concrete.

Quantities of excavation for service line trenches shall be measured for payment on the basis of vertical excavation faces for the Specified width as shown on the drawings.

Measurement for acceptably completed excavation works shall be made on the basis of number of cubic unit of material excavated for basements, foundations and service trenches as shown on the drawings or as directed by the Engineer.

Payment:

Payment will be made for acceptable measured quantity of excavation on the basis of unit rate per cubic unit quoted in the Bill of Quantities and shall constitute full compensation for all the works related to the item.

**C- Imported Fills**

Measurement

Measurement for acceptably completed imported fill works will be made on the basis of number of cubic ft/m of compacted imported fill in position, lines and grade, and on the basis of pay line, as shown on the drawings or as directed by the Engineer for back-fill the pay line will be the same as per excavation. The quantity shall be excavation quantity minus displacement by permanent construction.

Payment

Payment will be made for acceptable measured quantity of backfill/fill on the basis of unit rate per cu.ft / cu.meter quoted in the Bill of Quantities and shall constitute full compensation for all the works related to the item.

\*\*\* End of Section 02210 \*\*\*

**02310 TERMITE PROOFING****02311 GENERAL****A- SCOPE**

The work for anti-termite treatment includes spraying/injection of approved insecticide in sides and bottom of foundation trenches, floor sub-grade of the building or elsewhere as directed by the Engineer. The Scope also covers treatment of all wood works with insecticides before installation in position.

**B- SUBMITTALS**

- a. Samples of all the materials to be used for insecticides control for approval of the Engineer and testing in accordance with the specified standards.
- b. Method Statement for application of anti-termite chemical.

**C- CODES AND STANDARDS**

All methods of termite protection used herein shall be in accordance with the standard practice of National Pest Control Association, USA, and the British Wood Preserving Association, PCSIR.

**D- QUALITY ASSURANCE****a. MANUFACTURER'S INSTRUCTIONS**

In addition to the requirements of these specifications, the manufacturer's instructions and recommendations for the work, including preparation of substrata and application shall be complied with.

**b. APPLICATION**

A professional operator shall be engaged who shall have license in accordance with regulations of governing authorities for application of soil treatment chemicals.

**c. GURANTEE**

The Contractor is to guarantee that the building shall be free from termite (white ants), wood bores and other pests, which cause damage to wood or other organic material for 13 years from the date of acceptance of the building.

In the event of any damage caused within the guaranteed period, the contractor shall replaced at his own cost such damaged material, finishes affected and suitably preserve and treat the entire premises with the best method known to the trade to prevent the spreading of termites.

**02312 PRODUCTS****A- INSECTICIDES**

An emulsible concentrate termiticide specially formulated to prevent infestation by termites shall be used. Fuel oil will not be permitted as a diluent. A working solution of one of the following chemical elements and concentrations shall be provided.

Termidor, Dusban Tenekil Plus or an approved equivalent Chemical toxicant, emulsifiable i.e. 1 gallon in 80 gallons clear water.

Termiticide shall be obtained from the manufacturer or their authorized dealers or other approved source in sealed drums in quantity necessary for the requirement of works.

**02313**

**EXECUTION**

**A- METHOD OF APPLICATION**

- a. All mixing will be done at site and mixing proportion of termiticide with water shall be verified by the Engineer.
- b. Termiticide solution shall be applied with approved pressure spraying equipment maintaining a pressure of at least 30 to 40 psi to all applications, on or in earth.
- c. Soil treatment shall begin after all work of preparation of earth prior to installation of concrete has been done. After application, no additional earth moving or work upon sub grade should be done. No covering of earth or concrete should be applied over soil treatment until at least 2 hours after treatment.
- d. Termiticide solution should not be applied during wet weather, or when the earth surface is wet. Application should be made to all areas beneath raft, concrete slabs-on-grade, including sides of retaining walls extending at least 5 ft. beyond building line. Solution shall be applied in amounts of not less than of 4 liters of prepared emulsion/solution per 10.76 sft. of area (4 liters of emulsion on 1 sq. meter). Termiticide shall penetrate to a depth of 3" penetration in the soil.
- e. Similar treatment as provided above shall be made at all locations where expansion joints, control joints, column bases, retaining wall faces and similar work occur at or below grade slabs.
- f. In the areas of application signs shall be fixed to show that soil treatment has been applied. Such signs shall be removed when areas are covered by other construction.
- g. Care shall be exercised to insure that no marks or damage occurs to the finished structure as a result of the work under this Section.
- h. All wood work for the entire project is to be termiticide treated (before application of solignum) in the case of material to receive both treatments. Termiticide shall be sprayed on all surfaces of all the wooden work viz. door frames, blocking, furring, planks, boards etc. before installation. Spraying is to be done at the site, after delivery and before installation. No spraying shall be necessary after fields sawing, jointing or installation of such material.



**02314      MEASUREMENT AND PAYMENT**

**A-      GENERAL**

No measurement and payment will be made for the under mentioned specified work related to the relevant items of the Bill of Quantities. The cost thereof shall be deemed to have been included in the quoted unit rate of the B.O.Q.

- a. Termite Control Treatment on wood works.
- b. Water required for mixing insecticide solution.
- c. Transportation of material and storage at site.

**B-      MEASUREMENT**

Measurement of acceptably completed works of termite control treatment will be made on the basis of number of square feet of area treated by measuring the two dimensions (length and breadth or height) of the treated surface.

**C-      PAYMENT**

Payment will be made for the number of square feet measured as above at the Contract unit rate per square feet and shall constitute full compensation for all the works related to the item.

\*\*\* End of section 02310 \*\*\*

**02400 DEWATERING****02401 SCOPE**

The work covered by this section of Specifications shall consist of supplying all labor, materials and plant and the performance of all work necessary for lowering and continuously controlling the piezometric levels of the ground water in the subsurface material as well as the control and handling of surface water, in such a manner as to maintain the bottom and slopes of the excavations for the structures in a stable condition, and to perform in the dry, as required/shown on the applicable drawings and conditions of Contract. Dewatering drawings to be prepared by the Contractor as specified herein and as required by the Engineer.

**02402 QUALITY ASSURANCE**

The Contractor shall build, maintain and operate all channels, flumes, sumps and other temporary diversion and protective works needed to divert the surface water through or around the required excavations.

All excavations shall be dewatered and kept free of standing water, water seeping from the sides and bottom of the excavations above the free level or excessively muddy conditions as needed for proper execution of the excavation operations. The Contractor shall furnish, install, operate and maintain all drains, sumps, pumps and other equipment needed to dewater the excavation areas. Dewatering methods that cause a loss of fines from the bottom and slopes of the excavations shall not be permitted.

The work shall include designing, installing, operating, and maintaining a system complete with pumps and associated equipment, standby power arrangements, piezometers and all other equipment necessary to achieve the required control of the ground water and surface water in the areas as shown on the drawings, as specified herein and as required by the Engineer. The work shall also include the construction and maintenance of ditches and sumps as required to achieve the specified results.

**02403 SUBMITTALS**

Prior to commencement of the work, the Contractor shall supply to the Engineer for review and comments, complete plans and sketches for diverting surface water and dewatering of the required excavations. The Contractor shall submit detailed design calculations where required. To provide safe and stable excavations is the sole responsibility of the Contractor. Submission for review and comments of the required plans and sketches and any approval from Engineer shall not relieve the Contractor of any of his duties under the Contract.

The Dewatering System shall consist of the Basic Dewatering System, the Standby Power System, monitoring devices, ditches, wells, sumps, pumps and all associated equipment as specified herein or as may be required.

The basic Dewatering System shall be the minimum Dewatering system required to achieve the specified results.

The Standby Dewatering System shall be that system which may be required to achieve the specified results should part or all of the Basic Dewatering System becomes ineffective for maintenance or any reason other than a failure of the power supply.

The Standby Power System shall be the independent generating system, which may be required to keep the Dewatering system fully operational in the event of a power failure.

#### **02404 DESIGN OF DEWATERING SYSTEM**

The Contractor shall arrange to have the entire Dewatering System designed in detail, installed, maintained and operated by qualified and experienced personnel through out the course of the work.

Should the Contractor wish consideration to be given to some properly qualified Dewatering sub-contractor his name, qualifications, record of previous jobs of a similar nature, personnel to be employed on the work and other pertinent information shall be submitted to the Employer for approval with the Tender.

Two weeks prior to commencement of installation of the Dewatering System, the Contractor shall submit to the Engineer for his technical approval, complete final plans, details and descriptions of the Dewatering System.

The Contractor shall be responsible for the arrangements and location of the various Dewatering System components necessary to accomplish the specified work.

The Engineer's approval of the installed Dewatering system will be based on the demonstrated performance of the System and the effectiveness with which it satisfies the requirements for Dewatering the foundation areas during the entire period at least up to the elevation as marked on drawings and/or as directed by the Engineer.

Approval of the Dewatering System by the Engineer shall in no way relieve the Contractor from the responsibility for satisfying the Dewatering requirements as specified herein and to the satisfaction of the Engineer.

#### **02405 DEWATERING OF THE EXCAVATION**

The Contractor shall install maintain and operate the system which may include wells, trenches and pumps as required for the purpose of carrying out the excavations for the areas and subsequent construction of the structures and placement of back-fill in the dry.

The Dewatering of the excavations shall be accomplished in a manner that will prevent seepage, boils, loss of fines, corrosion, softening of the strata, and that will maintain the stability of the bottom and slopes of excavation. Should any damage to work, in the opinion of the Engineer, be due to the inadequacy or failure of the Dewatering System, in part or in whole then the supply of all labor, materials and plant & the performance of all work necessary to carry out additional or remedial work resulting from such damage shall be undertaken by the Contractor at no additional compensation.

The cost of any damage caused to the structures or the permanent works machinery and other equipment due to the failure of the Dewatering system shall be borne by the Contractor and shall be covered by proper insurance to be provided by the Contractor in accordance with the insurance clauses of the Conditions of Contract.

The Dewatering System shall be designed to operate on a continuous basis in such a manner that during excavation, water level as observed in all piezometers installed near the periphery of the excavation with their tips located below the prevailing excavation level, is at least 3-feet (one meter) below the prevailing excavation level, if the water level observed in any or all of the piezometers is higher than that specified, the excavation shall be stopped until remedial measures to the Dewatering System have been taken and the specified water levels in the Piezometers attained or until the Contractor demonstrates to the satisfaction of the Engineer that it is safe to proceed with the excavation. Piezometers tips shall be installed near the bottom of the hole drilled for that purpose.

During construction of structures and subsequent back-filling and associated work operations, the Dewatering System shall operate on a continuous basis in such a manner that the water level, as observed in the piezometers located below the level of the construction and back-filling and the water level in the piezometers is maintained at such a level till the concrete if any, has sufficiently hardened and until in the opinion of the Engineer, it is safe to allow the water level to rise up to a predetermined level.

The Dewatering System shall be maintained in operating condition so as to achieve the specified results until the construction of the structures, back-filling, and installation of machinery etc. reach a stage when, in the opinion of the Engineer Dewatering is no longer required. Thereafter the Dewatering system shall be shut off in stages as directed by the Engineer.

The Contractor shall not permit the accumulation of surface water within the confines of the excavation areas. The Contractor shall control, remove and divert surface water runoff, and water discharging from the Dewatering System away from the excavations, to a point outside the working area as required by the Engineer.

The Contractor shall perform all work including, but not limited to, the construction and maintenance of ditches and sumps and provide, install maintain and operate pumps and pipelines of adequate capacity as are necessary for the effective control of surface runoff and ground water not required to be intercepted by the Dewatering Systems.

The Contractor shall supply, install, maintain and operate as required the generators for power supply, which shall be of sufficient capacity to maintain all pumps and equipment for both the basic and standby systems, operating on a continuous basis.

The Contractor shall supply, install and maintain an alarm system, which will alert responsible personnel at the time of power failure and automatically activate the standby power units simultaneously.

The Standby Dewatering System shall be operated for a period of at least 3 hours duration each week to demonstrate its complete effectiveness. For such demonstration, no payment or compensation shall be made to the Contractor.

The Dewatering System shall be designed in such a manner that all or parts of the standby system may be directly connected to the Basic System. If during construction, it becomes necessary to make this connection, the Contractor shall expeditiously perform all work necessary to resolve the Standby Dewatering system to the requirements as hereto specified.

**02406            OBSERVATIONS**

The Contractor's Dewatering System shall include the supply, installation, data recording and maintenance of piezometers as may be required to demonstrate the satisfactory performance of the Dewatering System.

In order to ascertain the continuous effectiveness of the Dewatering System, the Contractor shall supply all equipment and perform all work necessary to obtain and correlate records of the water elevations in each of the piezometric observation well as records of the discharges from the Dewatering System. These data shall be obtained on a continuous basis and shall be properly compiled and copies of the complied data shall be submitted to the Engineer daily, or as required. The Contractor shall also keep the Engineer advised on a regular basis on the equipment being utilized to effect the required results during the period when the Dewatering System is in operation.

**02407            PAYMENTS**

No payment shall be made for any works and operations falling within the scope of this section of specifications unless otherwise specifically stated in the Bill of Quantities.

The cost of dewatering is deemed to be included in the prices of other items of the Bill of Quantities.

\*\*\* End of Section 02400 \*\*\*

**02510 PAVING AND SURFACING****02511 GENERAL****A. Description****(01) Principal Work**

Including:

- Laying Pre-cast concrete pavers (various sizes) in parking areas around the buildings and in Basement.

**(02) Related Work Specified Elsewhere**

-Concrete: Division 03000

**B- Applicable Codes and Standards**

The applicable standards of ASTM and British Standards shall include, but are not limited to following:

- ASTM C 150 Portland Cement
- ASTM C 33 Fine Aggregates
- ASTM C 172 Sampling
- ASTM C 143 Slump
- ASTM C 231 Air Content

Provisions of the American Concrete Institute (ACI) governing concrete.

**C- Submittals**

The Following submittals are required:

- Detail Drawings and/or Shop Drawings
- Manufacturer's Data
- Manufacturer's Standard Colour Charts
- Certificate of Compliances

**02512 PRODUCTS****A. Materials****(01) Cement**

Portland cement type I or III, manufactured by an approved manufacturer and conforming to ASTM C 150. Use only one brand.

**(02) Water**

Clean, free of organic matter, salts, acid and alkaline substances. Water source shall be approved by the Engineer.

**(03) Aggregates**

Light-coloured and hard rock material suited for use as aggregates. The minimum compressive strength of aggregates shall be 1,500 kg/cm<sup>2</sup> when tested in accordance with testing procedures. Aggregates shall be clean and subject to the approval of the Engineer. They shall not contain harmful materials such as iron pyrites, mica, shale or similar laminated materials in sufficient quantity to adversely affect the strength or durability of the concrete.

- a) Coarse aggregate shall not have a percentage of absorption exceeding 5% when tested to standard method T -85-60 ASSHTO designation.
- b) Fine aggregate shall have a sand equivalent of not less than 75% when tested by standard method T-176-65 AASHTO designation.

**(04) Pavers**

Concrete pavers with the approved shapes and sizes and as indicated on the drawings shall be supplied. They shall have a cylinder strength of 2000 psi.

**B- Setting Materials****(01) Sand for Setting Beds**

Fine aggregate complying with ASTM C 33.

**(02) Sand for Joints**

ASTM C 144, with gradation for unusually thin joints.

**(03) Un-grouted Mortar less Setting Materials for Concrete Pavers**

- a) Sand for Leveling Course: Fine aggregate complying with ASTM C 33.
- b) Sand for Joints: ASTM C 144, gradation for unusually thin joints.

**02513 EXECUTION****A- Installation -General**

- 1) Do not use pavers with chips, cracks, voids, discolorations or other defects, which might be visible or cause staining in finished work.
- 2) Cut pavers with motor-driven saw equipment to provide clean, sharp, unchipped edges. Cut units to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting.
- 3) Set pavers in pattern shown and with uniform joints of width indicated.
- 4) Match existing paver patterns and jointing where indicated.

## 5) Tolerances

Do not exceed 1 mm unit-to-unit offset from flush, and a tolerance of 1 in 200, 1 in 500 from level of slope as indicated, for finished surface of paving.

**B- Types of Paving**

- 1) Hard Pavers layed and jointed in cement mortar (1:3) over 1 1/2" PCC (3000 PSI cylinder strength) over RCC slab including PCC kerb stone.
- 2) Hard Pavers jointed in and over 2" sand cushion over 4" thick compacted dry stone ballast sand grouted over compacted earth including PCC kerbstone.

**C- Placing Concrete Pavers (Type 1)**

Place Cement Sand mortar (1:3) for leveling course to a thickness of 40 mm.

Set concrete pavers hand tight in cement sand mortar (1:3), being careful not to disturb leveling base. Use string lines to keep straight lines. Use block splitter to cut edges when full-size units cannot be used. Select units from 4 or more blocks to blend colour and texture variations.

Finish concrete pavers as shown on the drawings.

**D- Placing Concrete Pavers (Type 2)**

Ascertain that the sub-grade is fully compacted and free of rust or humps, and is graded in such a manner as to fulfill the intent of the drawings which is to provide paving which is full free draining to the drainage devices or to the street.

The sand layer shall be leveled according to the lines and grades of the drawings. Deviations from the required transverse gradient of the pavement shall not exceed + 0.3%. The sand shall be kept damp until placing of the concrete block.

Place sand for leveling course and screed loose to a thickness of 40 mm taking care to ensure it remains loose until paving units are set and compacted.

Set concrete pavers hand tight being careful not to disturb leveling base. Use string lines to kept straight lines. Use block splitter to cut edges when full-size units cannot be used. Select units from 4 or more blocks to blend colour and texture variations.

Compact the pavement very carefully in order not to demolish the paving blocks and to guarantee sufficient compaction. Weight, frequency and kind of the vibrators rollers or plastic slabs shall be chosen accordingly.

Vibrate concrete pavers into leveling base with a plastic vibrator capable of a 3,500 to 5,000 lb compaction force. Perform this operation on installed areas of paving at end of each day of before any rain.

Materials and methods not specifically described but required for proper fabrication and installation of items in this section, shall be provided by Contractor subject to prior approval of Engineer, at no additional cost to Employer.



**E- Repair**

- 1) Remove and replace pavers which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment to eliminate evidence of replacement.

**02514 MEASUREMENT AND PAYMENT**

**A. Measurement**

Measurement of concrete/tuff tiles Paving shall be made in Sq.Ft. of the actual surfaces completed and approved by the Engineer.

**B- Rate and Payment**

The acceptable quantities of Concrete/tuff tiles Paving for drive ways/side walks including excavation, preparation of sub-grade, spreading and compaction of sub-base will be paid for at the rate quoted. Such payment shall include full compensation for all materials, labour, equipment, plant and incidentals.

\*\*\* End of section 02510 \*\*\*

**02910 FLAGPOLES****02911 GENERAL****A- Related Documents**

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1, Specification sections, apply to work of this section.

**B- Description of Work**

Extent and location of flagpoles are shown on drawings.

Refer to Division-03000 sections for 'Concrete Work' requirements.

Refer to Division-02000 sections for 'Earthworks' requirements.

**C- Quality Assurance**

Manufacturing Standards: Provide each flagpole as a complete unit produced by a single manufacturer including fitting accessories, bases and anchorage devices.

Design Criteria: Provide flagpoles and installations constructed to withstand a 90 mph wind velocity when flying flag of appropriate size. Use heavy pipe sizes if required for flagpole type and height shown.

Pole Construction: Construct pole and transport the same to site in one piece if possible. If more than one piece is necessary, provide snug-fitting, precision joints with self-aligning, internal splicing sleeve arrangement for weather-tight, hairline field joints.

**D- Submittals**

Product Data: Submit manufacturer's technical data and installation instructions for each type of flagpole required.

Shop Drawings: Submit shop drawings of flagpoles and bases, showing general layout, jointing and complete anchoring and supporting systems.

Samples: Submit samples of each finished metal for flagpoles, and accessories as may be requested.

**E- Delivery. Storage and handling**

Deliver flagpoles and accessories completely identified for installation procedure. Handle and store flagpoles to prevent damage or soiling.

**02912 MATERIALS****A- Acceptable Manufacturers**

Subject to compliance with requirements, manufacturers offering products, which may be incorporated in the work, shall be acceptable.

**B- Flagpole Type**

Flagpoles: G. I. Pipes flagpoles made of type 304 alloy and having a taper of 1" every 7.14 feet. G. I. Pipes shall be in AISI # 4.

**C- Flagpole Mounting**

Provide manufacturers standards base system for the type of flagpole installation required.

Base Plate: For anchor-bolt mounting, furnish manufacturer's standards cast metal shoe base of same material as flagpole. Furnish and install anchor bolts and lightning ground spike as required.

Foundation Tube: For ground-set flagpoles, provide 12-gauge (2.78mm) rolled steel tube, sized to suit flagpole and installation. Furnish complete with welded steel bottom base and support plate lightning ground spike, and steel centering wedges, all welded construction. Provide loose hardwood wedges at top for plumbing pole after erection. Galvanize steel parts after assembly, including foundation tube.

Provide manufacturer's standard flash collar, finished to match flagpole.

**D- Fittings**

FP Top Ball Manufacturer's standard flush seam ball, size as indicated, or if not indicated, to match pole butt diameter.

14 ga. (1.98mm) spun aluminium, finished to match pole shaft.

Truck: Ball bearing non-fouling, revolving, double-track assembly of cast metal, finished to match pole shaft.

Cleats: Two 225mm cast metal cleats with fasteners, finished to match Pole shaft.

Halyards: Provide 2 continuous halyards for each flagpole, as follow:

Polypropylene, white, braided.

Size 10mm (No.12)

Halyard Flag Snaps: Provide 2 swivel snaps per halyard, as follows:

Stainless steel finish.

**02913 EXECUTION****A- Installation**

Refer to Division-03000 sections for 'Concrete Work' requirements.

Refer to Division-02000 sections for 'Earthworks' requirements.

Flagpole installation: Install flagpoles as shown and in compliance with final shop drawings and manufacturer's instruction.

Provide positive lightning ground for each flagpole installation.

Paint portions of ground-set flagpole below grade with a heavy coat of bituminous paint.

**02914 MEASUREMENT AND PAYMENT**

**A- Measurement**

All the items under this section of specifications shall be measured according to the standard method of measurement and shall be paid for at their respective unit rates as entered in the Bill of Quantities and as shown on drawings in accordance with the terms and conditions of the contract.

**A- Rate and Payment**

The unit rate shall be full compensation for all work described under this section- welding cutting and shaping to size, all paint material and painting. No separate payment shall be made for false work, any unspecified work done in fabricating workshops or yard or other erection expenses.

\*\*\* End of Division 02000 \*\*\*