ITEM 16603.5909 M - LONG-SPAN CORRUGATED STRUCTURAL PLATE STRUCTURE-STEEL

DESCRIPTION

Under this item, the Contractor shall furnish, fabricate and install a corrugated steel structural plate long-span structure, including stiffening members where required, as shown on the plans.

The terms of this item require certain submissions to be sent to, and approvals to be received from, the D.C.E.S. Such submittals and approvals apply to the D.C.E.S. only if the structure meets the definition of a bridge as stated in §101-05. If the structures does not meet the definition given in §101-05, then all required submittals shall be sent to, and approvals received from the Regional Director.

MATERIALS

Structural plates, bolts and nuts supplied under this item shall conform to the requirements of §707-09, Corrugated Structural Steel Plate for Pipe, Pipe Arches and Underpasses**.** The gauge of plates for the top, sides and bottom shall be as specified on the plans.

Bar reinforcement, if required, shall conform to the requirements of §709-01 and shall be grade 400. Class A Concrete, if required, shall meet the requirements of §501.

Bedding sand shall meet the gradation requirements of §703-06, Cushion Sand.

The requirements of §603-3.04A, Damaged Pipe and Repair-General shall apply.

All plates or assembled sections with dimensions at variance from those specified shall be replaced or repaired by the Contractor at his expense as ordered by the Engineer. The Engineer shall determine whether a damaged plate or section may be repaired or must be replaced.

Circumferential reinforcing ribs where specified shall conform to the requirements of ASTM Designation A36M and shall be galvanized in conformance with §719-01.

CONSTRUCTION DETAILS

A. General. It shall be the Contractor's responsibility to have a qualified and experienced manufacturer's representative at the structure site continuously during all phases of bedding, assembly and backfill of the structure up to the time that the following conditions are met:

1. Fill is in place either to 1.5 meters over the top of the structure or to subgrade, whichever occurs first.
2. All temporary supports are removed.

The manufacturer's representative shall be subject to the approval of the D.C.E.S. based on a written submission of qualifications and work experience with this type of structure, including the project location and owner of each installation shown in the experience record submitted.

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This qualification and experience summary shall be submitted to the D.C.E.S. for review within 14 days after the award of the contract. The manufacturer's representative is to supervise the installation of the structure for the Contractor, subject to the direction of the Engineer. No work shall be started by the Contractor until the manufacturer's representative is approved and at the work site.

All damage to the structure, attributable to the Contractor's operations or omissions, shall be rectified in a manner satisfactory to the Engineer, at no cost to the State.

B. Excavation and Bedding. §603-3.01, Excavation and §603-3.03, Bedding and Backfill Pipe shall apply except as modified herein, on the plans or by the Engineer, in writing.

If a firm foundation is not encountered at 300 mm below the planned bottom of the structure, the treatment of the foundation shall be based on an evaluation by the Regional Soils Engineer. Unsuitable material shall be removed as ordered by the Engineer and replaced with Select Structure Fill, meeting the requirements of §203-2.02C, Select Granular Fill and Select Structure Fill. It shall be compacted in accordance with the requirements of §203-3.15, except as modified herein, to the satisfaction of the Engineer.

The foundation material directly under the structure shall be carefully shaped to fit the pipe structure. The shape shall be gauged with a template conforming to the outside radius of the invert plates. A uniform 75 mm thick blanket of cushion sand (703-06) shall be spread over the shaped bed to fill the corrugations and provide uniform bearing.

C. Assembly. All elements of the structure shall be handled and assembled in accordance with the manufacturer's instructions, except as modified herein, on the plans, or by the Engineer in writing. The manufacturer's instructions, including erection drawings, shall be submitted to the D.C.E.S. for review. The D.C.E.S. shall be allowed a minimum of seven (7) working days to review the Contractor's submittal. All drawings shall be submitted in accordance with §202.2, §202.3, §202.5 and §202.10 of the New York State Steel Construction Manual. The Contractor shall distribute prints of approved drawings, and manufacturer's instructions, in accordance with §202.7 of the New York State Steel Construction Manual. Should the D.C.E.S. not approve the Contractor's submission, the Contractor shall be required to resubmit the drawings with appropriate changes or corrections.

The Contractor shall maintain the shape of the structure during all stages of assembly and backfill. In order to prevent distortion and maintain structure shape within specified limits, the following methods or combination of methods may be used:

1. Field strutting and temporary shoring.
2. Utilization of cables.
3. Utilization of backfill material.

No temporary support shall be removed until the fill is brought to a height over the crown equal to one-quarter the span, or to the subgrade elevation, whichever is less, unless otherwise approved by the Engineer.

Care shall be exercised to align plates and to avoid permanent distortion from specified dimensions.

The bolts nearest the visible edge of the lapped joints at the top of the corner plate of steel pipe arch structures shall be in the valleys of the corrugations. The joint with the top of the corner plate on the outside of the structure shall be covered with a geotextile conforming to Geotextile Underdrain from the Department's Materials Bureau Approved List. The geotextile shall extend a minimum of 300 mm each side of the joint for its entire length. Any laps in the geotextile shall be 300 mm minimum.

Seam bolts shall be tightened during the installation to a final torque of 200 to 270 N•m. Final tightening to the required torque will not be permitted until all bolts are placed in the seam within 3 meters of those being tightened. Any bolts loosened by plates being drawn together shall be retightened to required torque.

The rise dimension before backfill of arches with a ratio of top-to-side radii of three or more shall not deviate by more than one percent of the span; the span deviation shall not exceed two percent of the specified span.

For all other structures the variation from specified dimensions before backfill shall not exceed 2% of the span or rise, whichever is greater, but in no case shall it exceed 125 mm.

D. Filling and Backfill. Filling and backfilling shall be done in accordance with the details shown on the plans and this specification, unless otherwise modified by the Engineer. The difference in backfill elevation from one side of the structure to the other shall not exceed 300 mm at any time. If thrust beams are used, the backfilling operation shall be brought up to the base of the thrust beams and suspended until the thrust beams have been constructed and concrete allowed to cure a minimum of 7 days. Backfilling may then proceed as previously described with strict attention given to monitoring the structure for any movement. Care shall be taken that the compaction process and compaction equipment shall not cause distortion or damage to the structure due to unequal or excessive horizontal or vertical earth pressure. Heavy compaction equipment operated adjacent to thrust beams shall be avoided since this can cause rotation of these units. Movement of construction equipment and all other vehicles or loads over and adjacent to the structure shall be done at the Contractor's risk. Any section of structure which, in the judgement of the Engineer, is damaged or disturbed through any cause, shall be replaced by the Contractor as directed by the Engineer, at no cost to the State.

The first lift of fill over the top of the structure shall be 300 mm thick and shall not be compacted. The equipment used by the Contractor to place this lift and equipment for placing

and compacting subsequent lifts shall be selected and operated so as to prevent any deflection in excess of that allowed, or other damage to the structure.

E. Monitoring Program. The size and shape of this type of structure is such that rigid control of soil placement and compaction must be maintained. Structures of this type are designed to fully mobilize soil-structure interaction, and therefore a major percentage of full strength is achieved only when sidefill and overfill are in place. Equipment and construction procedures used shall be such that excessive structure distortion will not occur.

Care shall be taken during assembly to avoid bending the plates from specified shape. The final tightened, assembled structure shall be checked before backfilling for rise, span and alignment to insure conformance with the above specified tolerance criteria. The variation in span and rise during and after backfilling shall not exceed 2 percent of their design dimensions. In addition, the variation in horizontal alignment of the structure centerline from that indicated on the plans shall not exceed 75 mm per 30 meters. The final accepted structure shall be within these specified tolerances.

During, backfilling, the Contractor shall monitor the shape of the structure to verify acceptability of the construction methods used. All measurements shall be taken and recorded by the Contractor and made available to the Engineer. Measurements shall be taken at each cross section indicated on the plans. The rise and span shall be measured and the alignment checked before backfilling begins. During backfilling, one complete set of measurements shall be taken for every 600 mm of backfill height until a depth of 1.5 meters of backfill is placed on top of the structure. One set of readings shall be taken for every 1.5 meters of backfill height above the top of the structure unless otherwise waived by the Engineer. If the above tolerances are exceeded, the Engineer will order a halt to backfilling until remedial measures have been established and accomplished by the Contractor as approved by the Engineer. At the completion of backfilling a copy of all measurements shall be given to the Engineer.

METHOD OF MEASUREMENT

Measurement shall be in meters along the bottom centerline of structure.

BASIS OF PAYMENT

The price bid shall include the cost of all labor, materials and equipment necessary for furnishing and erecting the long-span corrugated plate structure, including anchor bolts, nuts, reinforcing ribs or thrust beams where called for on the plans, geotextile material and all temporary support systems for maintaining shape during backfilling, along with all incidental work associated with the above, including furnishing and placing the cushion sand and monitoring the shape of the structure. The price bid shall also include cost of the manufacturer's representative required during construction and all royalties that may be required because of the use of a proprietary item. Excavation, backfilling and the concrete and bar reinforcement required for the concrete collar, headwalls, cut-off walls, wingwalls and footings will be paid for under their appropriate items.

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Progress payments will be made in accordance with the following schedule:

Thirty percent of the length estimated for this structure, as shown in the Estimate of Quantities, will be paid for when the structural plates are on the work site. Payment will be authorized after the plates have been approved by the Engineer, and stored in a place and manner satisfactory to him.

Thirty percent of the length of this structure actually installed, will be paid for after the structure is actually assembled on the work site in a manner satisfactory to the Engineer.

Thirty percent of the length of this structure actually installed, will be paid for when the placement of Select Structure Fill is completed in a manner approved by the Engineer.

The remainder will be paid when the embankment is placed to the bottom of subgrade in the vicinity of the structure with the final dimensions within the specified tolerances.