

ERECTION OF ARCH SPAN

This work shall consist of erection of the arch structure in accordance with the contract documents, Section 1403 *Erection of Structural Steel* of the Steel Construction Manual (SCM), and as directed by the DCES. For the purposes of this note, "erection" is meant to include the pre-assembly of the arch span off-site, the transportation of the pre-assembled arch to the bridge, the lifting and installation of the arch span in its permanent location, the placement of the precast deck and sidewalk panels and associated railings, and all structural adjustments necessary to achieve final geometric configuration.

A suggested schematic erection sequence is shown in the Contract Documents and specified herein. The Contractor shall prepare a complete erection method based on the erection sequence chosen. The Contractor shall define and analyze all temporary and permanent loads to be supported during erection and shall submit complete detailed working and erection drawings of the Contractor's elected erection sequence, including all design calculations, to the DCES for review.

No work on arch span erection shall be performed until the Contractor's erection sequence is reviewed and approved by the DCES in its entirety. Approval of the Contractor's erection sequence and Plans shall not relieve the Contractor from his sole responsibility for performing all work required by the Contract Documents.

If the Contractor elects to use the construction sequence shown in the Plans, he shall ascertain for himself the practicality thereof and shall assume all responsibility for the safety and stability of the bridge in all phases of construction as well as any erection equipment.

Modifications of the structure for erection purposes will be permitted, subject to the approval of the DCES, provided that the proposed modifications will have no adverse effect on the completed structure. The design, detailing, supply and installation of any proposed modification shall be provided by the contractor at no additional cost. Any design computations submitted by the Contractor shall be prepared by a Professional Engineer registered in the State of New York, experienced in cable supported bridge design and construction. Contractor's Professional Engineer shall have at a minimum worked on three (3) cable supported or truss bridge projects in the previous ten (10) years.

The safe erection of the bridge is the sole responsibility of the Contractor. Neither the Contractor's use of an erection procedure similar to that shown on the plans, nor the DCES's review and approval of the Contractor's erection plan and procedures shall relieve the Contractor of this responsibility.

Governing Codes

- AASHTO LRFD Bridge Construction Specifications, latest edition.
- AASHTO Guide Design Specifications for Bridge Temporary Works, latest edition.
- AASHTO Construction Handbook for Bridge Temporary Works, latest edition.
- AISC Steel Construction Manual, latest edition.

- NYS Steel Construction Manual (SCM), Third Edition.

Assumptions

Several assumptions, described hereinafter, have been made concerning the erection process in order to design the structure. Deviations from these assumptions may require reanalysis or redesign. The Department will be the sole judge in determining the amount and extent of reanalysis or redesign to be performed by the Contractor when any deviation from the design shown on the plans is proposed by the Contractor.

- The piers are constructed prior to beginning the erection of the deck or arch.
- The arch has been designed with the assumption that the arch will be erected off-site and transported via barges and erected using the heavy-lift method. To erect the bridge off-site, temporary falsework will be required to support the partially constructed arch span. It is the Contractor's responsibility to ensure the safety and stability of the partially erected structure at all times, including the safety and stability of any necessary falsework bents and/or temporary stay cables during off-site arch erection. The falsework and the arch in its partially constructed condition shall be designed for wind loads consistent with a 20 year return period as presented in the climatology study prepared by RWDI for this project. The Contractor's attention is directed to the general notes for additional information.
- For float-in and heavy lift operations, it has been assumed that the precast concrete deck panels for both sidewalks and deck have *not* been installed, and will be placed only after completion of heavy lift activities and transfer of the arch dead load to the permanent bearings. This is consistent with the suggested erection sequence presented in the Contract Documents.
- At the time of hanger installation, hangers are to be installed to a predetermined force, as specified by the designer, consistent with achieving final geometry as specified in the contract documents after completion of construction activities. The placement of deck panels and closure pours will be cause for redistribution of hanger forces and it is anticipated that interim and final restressing of some cable hangers will be necessary during construction activities to ensure proper force distribution through the arch including hangers. At no time during construction activities will hangers be allowed to go slack. During erection, cable stressing shall be conducted on each pair of hangers simultaneously (for example, H5 and H5'). Any interim imbalance in hanger forces during stressing or re-stressing operations shall not exceed 5%.
- All designs and detailing work (shop and working drawings), and erection sequence stress calculations shall be prepared, approved and signed by a Professional Engineer registered in the State of New York.
- The Contractor is referred to the Design Specifications and Loads on the plans. When preparing erection design stress calculations for shop and erection drawings, erection stresses shall be computed in accordance with the Design Criteria on the Plans.

- The following shall be performed by the Contractor and will be subject to the DCES's approval:
 - a) Conceptual Erection Sequence for the arch and approach spans shall be prepared in accordance with Section 204 *Erection Drawings* of the SCM. The Contractor shall submit this conceptual erection sequence within 60 days of contract award for review and approval by the DCES.
 - b) Based upon the approved conceptual erection sequence, the Contractor shall prepare a Detailed Erection Engineering Submittal including Erection Drawings in Accordance with Section 204 *Erection Drawings* of the SCM. Erection stresses in permanent and temporary members and pier and falsework reactions shall be determined for each stage of the arch erection (including the steel erection prior to lifting into final position, during all phases of the lifting sequence, and during placement of concrete panels and closure pours after lifting and securing on permanent bearings) and the steel approach spans (including the span by span girder erection and erection of the delta frames). Moments, shears, axial loads and other forces shall be computed and tabulated for the superstructure at a sufficient number of points to demonstrate that the load demand will not exceed the capacity and allowable stresses during erection. The Contractor shall include as part of the step-by-step erection procedure complete details of hanger fabrication, erection, and stressing. Details of contemplated elevations, cable lengths, adjustments and shims required shall be shown for each erection stage. Final hanger adjustments and verification of both geometry and hanger forces shall be performed after all other dead loads are in place.
 - c) The Contractor shall prepare and submit detailed shop and erection drawings to the DCES in accordance with the requirements outlined in these Special Specifications. All submittals by the Contractor shall be made within 60 days of Approval of the Conceptual Erection Sequence Submittal to allow the Department adequate time for review as stipulated elsewhere in the Contract Documents. The review period for submittals and any re-submittals shall be per Section 202.13 *Detention of Shop Drawings* in the SCM, except as modified by the Special Note titled "Shop Drawing Review Times."
 - d) Within thirty (30) days of award, the Contractor shall meet with representatives of the Department to discuss the proposed erection procedure, erection design criteria, and structure capabilities to support the proposed erection scheme. The DCES will review the preliminary erection procedure proposal for general compliance with the contract requirements.
 - e) The Contractor shall develop and submit to the DCES a complete description and stress calculations of the proposed process and sequence of erection including positions and weights of equipment at each position and weights of equipment at each stage in sufficient detail to allow review of the effects of the erection procedure on the structure.
 - f) The Contractor shall submit to the DCES the detailed design of all erection equipment, falsework, temporary bracing and other items as required for

erection. The Contractor shall also submit all proposed modifications to the permanent steel structure required to accommodate the temporary erection equipment, falsework and/or bracing.

- g) The Contractor's sequence of construction shall ensure the intermediate static and dynamic stability of the structure for the various stages of the construction.
- h) Based on the Contractor's construction equipment and procedures, the Contractor shall compute and prepare tables of anticipated hanger tensions in each hanger at corresponding stages of erection including, but not limited to, the stages of deck construction and after full dead load. The tables of anticipated hanger tensions and computations shall be submitted to the DCES for review. All computations submitted by the Contractor shall be prepared and sealed by a Professional Engineer registered in the State of New York, experienced in cable supported bridge design and construction. The Contractor's Professional Engineer shall have at a minimum worked on three (3) cable supported or truss bridge projects within the previous ten (10) years. Such computations shall be submitted in a neat, organized manner that is easy to follow.

Approvals

The proposed erection sequence shall be subject to the following approval procedure:

- a) The DCES will review the preliminary erection procedure proposal for general compliance with the erection requirements outlined elsewhere in these Special Specifications and as stipulated in Section 202.6 *Preliminary Review & Approval* of the SCM.
- b) The Contractor shall develop and submit to the DCES a complete description of the proposed procedure and sequence of erection, including positions and masses of equipment and stored materials at each stage. This submittal shall be of sufficient detail to permit review of the erection procedure on the structure as required above.
- c) After the DCES reviews the process and sequence of erection, the Contractor shall submit to the DCES for review, detailed design of all falsework, temporary stays, jacking systems and associated details, temporary lifting attachments, and other items as required for safe erection of the structure.

Geometric Control Plan

The following shall be performed by the Contractor and will be subject to the DCES's approval.

- a) The Contractor shall be responsible for geometric control of construction so that the completed structure will conform to the lines, grades, and dimensions and hanger stresses shown on the Plans. A geometric control plan shall provide the regular monitoring of the superstructure deflections during arch span erection. The plan shall include procedures for adjusting bridge geometry during erection to achieve interim and final geometry targets.

- b) The Contractor shall furnish competent engineering and surveying personnel and equipment to establish and verify elevations and alignment of the structure and hangers at critical stages of construction. Personnel involved in hanger prefabrication, installation and stressing activities shall have a minimum experience of at least three (3) similar projects within the previous ten (10) years. Hangers shall be installed with sufficient shims or other adjustment devices to permit at least 2 inches of detensioning without releasing hanger anchorage component devices. Reseating of wedges for detensioning operations will not be permitted. The reference target for detensioning capability shall be the as-engineered state at the end of construction. The Contractor shall be responsible to determine the need for the amount of shims or adjustments which may be required during erection. The DCES shall review each such use of shims.
- c) The Contractor shall check the elevations and alignment of the structure at every stage of the construction. All surveying shall be performed at a time that will minimize the influence of temperature gradients on the structure. Surveying shall be provided to an accuracy of 1/8 inch. The Contractor shall maintain a record of all surveys, check readings, adjustments, and corrections and shall file such data with the DCES.
- d) The structure shall have a geometric configuration at 55°F normal temperature in general conformance with the dimensions shown on the Plan for the dead load condition. Final adjustments shall be made to obtain the dead load cable stress and deck elevations within the following tolerances:
- 1) Absolute tolerance in deck elevation at centerline of bridge shall be +3 inches to -2 inches provided that deck elevations at panel points (hanger/floorbeam locations) follow a smooth curve consistent with the grade profile, within a tolerance of ½ inch.
 - 2) In general, hangers shall be adjusted for the dead load condition such that each individual hanger shall not exceed values at ±5% of the hanger dead load computed from approved working drawings. No individual hanger dead load force shall fall outside a range of ±10% of the hanger dead load computed from approved working drawings.
 - 3) The hanger cross sections and geometric lengths shown on the plans are for the convenience of the Contractor only. Final fabrication lengths shall be calculated by the Contractor after erection loads and methods are known and detailed erection stress calculations have been completed. The tolerance in the fabricated length of the cable, in the unstressed condition, shall be as plus 1 inch, minus 0 inches.

Intermediate values may be interpolated. Differences between the actual and planned fabricated length shall be compensated for by shims or other adjustment devices at the bottom anchorage.
 - 4) The elevations shown are final elevations to be achieved and do not include the effects of elastic shortening during the construction period. The Contractor shall consider these effects in his analysis and in his construction plan.

Permits

The Contractor shall obtain required permits for float-in and heavy lift operations, and comply with the requirements of said permits, from the U.S. Coast Guard, U.S. Corps of Engineers, and other agencies having relevant jurisdiction in connection with the vessel traffic (including obstructions and vertical clearances).

Deflection

The Contractor shall monitor the deflections in the permanent structure caused by the erection process, and report values to the DCES for evaluation. The procedures are to be listed in the geometric control plan above. The DCES will be the sole judge of the degree of compliance with the erection process and the requirements specified herein.

At intermediate and final stages of arch erection, which the DCES will designate depending on the approved sequence and method of erection, the tension in selected hangers will be verified at 20 locations chosen by the DCES using lift-off methods to ensure that the measured hanger force is generally consistent with the computed hanger forces provided in the approved working drawings and erection sequence. If testing of the first 10 hangers shows hanger stresses that are within 5% of the theoretical design stresses, the remaining 10 hanger locations will not be tested.

Arch Closure

At the time of closing the steel arch ribs, the Contractor shall bring the ribs into alignment by jacking, counterweighting or adjusting selected hangers. This shall be included in the Contractor's erection scheme submittal to the DCES.

Once the closure of the ribs is completed, the hangers shall be adjusted as required to produce the required stresses and profile grade adjustment necessary at that time.

Restressing Hanger Cables

Upon completion of placing the deck, sidewalks, bridge rail, and pedestrian railing, the hanger cables shall be restressed as required to maintain geometry tolerance and/or target cable tensions as specified herein.

Clean Up of Tie Girder

After completion of hanger installation and adjustments, all debris shall be removed from inside of the tie girders and end floorbeams to the satisfaction of the Engineer.

Basis of Payment

No separate payment will be made for the erection of the arch span. The cost of furnishing all equipment, materials, and labor and performing all work required for erecting the Arch Span, as prescribed above and as shown on the plans, shall be included in the appropriate 564 series items.

DESCRIPTION

This work shall consist of furnishing and installing precast concrete deck panels and post-tensioning the precast concrete deck panels in accordance with the Contract Documents and as directed by the Engineer.

MATERIALS

Materials used in this work shall conform to the NYSDOT Prestressed Concrete Construction Manual (PCCM)-Current Edition and the following:

PRECAST CONCRETE

28 Day Compressive Strength	5000 psi (Minimum)	718-06
Class HP		

GROUT

Material Specification	PCCM, Para 4.5.3 and 4.6.3
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REINFORCING STEEL

Galvanized Bar Reinforcing	709-11
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PRESTRESSING STEEL

Strands	709-06
0.6 in diameter 7-wire low-relaxation weldless strands conforming to AASHTO M203, Supplement S1, Grade 270, (ASTM A416) with tensile strength of 270,000 psi	

MATERIALS FOR FINISHING

Penetrating Sealers	PCCM, Para 4.4.2
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Additional material, listed below, shall meet the requirements of the following subsections or specifications:

- | | |
|---|----------------------------------|
| 1) Post-tensioning System | PCCM, Para 4.6 |
| 2) Mechanical Connectors for reinforcing bars splices | 709-10 |
| 3) Adhesive backed foam | ASTM D1056, Type 2 |
| 4) Grout pipe ports and fittings –
Polyethylene or
ferrous metal hot-dip galvanized (inside & outside), | PCCM, Para 4.6.2.4
ASTM D3350 |

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minimum coating of 0.11 PSF ASTM A53, Type F, E, or S,
Grade A or B Sch 40

5) Steel Plates, shims and shapes (ASTM A36 hot-dip galvanized in accordance with ASTM A153, unless the plans show otherwise) 715-01

6) Leveling Bolts ASTM A307, Grade A

7) Fasteners (Galvanized) 719-01

GALVANIZED THREADED FASTENERS

All tapped holes in plates and nuts, for galvanized bolts, shall have a standard oversized tap to allow for the galvanizing on the bolts, nuts and tapped plates.

CONSTRUCTION DETAILS

DRAWINGS

Shop drawings shall be based on the Contract Documents and prepared and submitted as per the requirements of the Prestressed Concrete Construction Manual (PCCM).

The submitted shop drawings shall include details of lifting and handling of panels in the production facility and their storage, transportation, handling and storage at the construction site. Calculations showing actual concrete stresses based upon the proposed support locations and expected dynamic loading of the panels during handling, storage and transportation of the panels shall be prepared by a NYS Licensed Professional Engineer and shall be submitted along with the shop drawings. These drawings and calculations shall be stamped and signed by a Professional Engineer.

FABRICATION

Fabrication shall meet the requirements of the PCCM and the following:

Fabrication Tolerances

- 1. Width (transverse direction of the bridge): +1/8, -1/8 in.
- 2. Length (longitudinal direction of the bridge): +1/8, -1/8 in.
- 3. Depth (overall): +1/8, -0 in.
- 4. Tendon duct location at transverse closure joint +/- 1/8 in.
- 5. Bulkhead alignment (deviation from square or designated skew)
 - Vertical 3/16 in.

Horizontal

3/16 in.

6. Horizontal alignment (deviation from straight line parallel to centerline of unit):

3/16 in. for 40 ft. length

1/4 in. for 40 ft. to 60 ft. length

5/16 in. for greater than 60 ft. length

Placing Concrete, Curing and Finishing

All requirements stipulated in PCCM, Para 5.9, 5.10 and 5.11 shall apply except for the following:

After curing, all form release material and all other forming material adhering to the shear keyway and block out concrete shall be removed.

Shear key faces shall be roughened and blast cleaned as per the PCCM.

Shipping and Handling of Precast Panels

Custom steel installation frames shall be utilized during panel handling in the shop and during transport loading, unloading and the field placement operations. The steel installation frames shall be specially designed by the Contractor to provide panel support at a minimum of four (4) frame bearing points. The Contractor shall verify that the method of lifting does not overstress the precast concrete panels in any way. The use of lifting holes will not be permitted. The panels shall have markings on the edges of the panel to assure that the panels are placed correctly and accurately onto their supports and assuring the required alignments of the tendon ducts are achieved.

Steel Embedment

Steel embedment for the panel leveling devices, hold down devices, grout port pipes, anchor studs, anchor plates, scuppers and tendon anchorages shall be installed in the shop based upon the locations shown on the shop drawings.

Coating of Concrete Panels

All concrete panels shall be coated at the precast plant on all surfaces with a penetrating sealer per Section 6.2.3 of the PCCM.

INSTALLATION REQUIREMENTS

Installation shall meet the requirements of the PCCM and the following:

1. Prior to installing panels, the supporting surfaces in contact with the panels or field placed concrete shall be cleaned.

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2. Install transverse cast-in-place concrete closure pours as shown in the Contract Plans and allow to reach a minimum compressive strength of 3000 psi, prior to beginning the longitudinal post-tensioning operations.
3. After completion of longitudinal post-tensioning operations, the longitudinal cast-in-place closure pours over the tie girders and the closure pours at the ends of the span shall be installed as indicated in the Contract Plans.
4. The roadway surface, including transverse closure pours between curbs, shall be diamond ground as indicated in the Contract Plans with costs paid for under Item 502.83010018, Diamond Grinding of PCC Pavement. After grinding, the roadway surface shall be longitudinally grooved, with costs paid for under Item 558.02, Longitudinal Sawcut Grooving of Structural Slab Surface. Upon completion of longitudinal grooving, the roadway surface shall be coated with a penetrating sealer, with costs paid for under Item 559.18960118, Protective Sealing of Structural Concrete on New Bridge Decks and Bridge Deck Overlays.

METHOD OF MEASUREMENT

This work will be measured as the number of square feet of precast, post tensioned concrete deck panels satisfactorily furnished and installed per the Contract Documents.

BASIS OF PAYMENT

The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work, including fabrication, storage, protection, transporting, unloading and installation of all precast, post-tensioned panels. The cost of bridge railing anchor studs and plates, and scuppers embedded in the precast panels, placement of field placed concrete closure pours, installation of field placed reinforcing steel, and diamond grinding and longitudinal grooving of the roadway surface shall be paid for under their appropriate items.

DESCRIPTION

This work shall consist of furnishing and installing precast concrete sidewalk panels, including steel cantilever bracket assemblies that are cast composite with the precast concrete sidewalk panels and post-tensioning the precast concrete sidewalk panels in accordance with the Contract Documents and as directed by the Engineer.

MATERIALS

Materials used in this work shall conform to the NYSDOT Prestressed Concrete Construction Manual (PCCM)-Current Edition, the New York State Steel Construction Manual (SCM)-Current Edition, and the following:

PRECAST CONCRETE

28 Day Compressive Strength	5000 psi (Minimum)	718-06
Class HP		

GROUT

Material Specification	PCCM, Para 4.5.3 and 4.6.3
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REINFORCING STEEL

Galvanized Bar Reinforcing	709-11
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PRESTRESSING STEEL

Strands	709-06
0.6 in. diameter 7-wire low-relaxation weldless strands conforming to AASHTO M203, Supplement S1, Grade 270, (ASTM A416) with tensile strength of 270,000 psi	

MATERIALS FOR FINISHING

Penetrating Sealers	PCCM, Para 4.4.2
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STEEL CANTILEVER BRACKETS

T-beams cut from rolled wide flange sections, connection angles and stiffeners	715-01 ASTM A709, Grade 50
Stud Shear Connectors	709-05

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Additional material, listed below, shall meet the requirements of the following subsections or specifications:

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|--|---|
| 1) Post-tensioning System | PCCM, Para 4.6 |
| 2) Mechanical Connectors for reinforcing bars splices | 709-10 |
| 3) Adhesive backed foam | ASTM D1056, Type 2 |
| 4) Grout pipe ports and fittings –
Polyethylene or
ferrous metal hot-dip galvanized (inside & outside),
minimum coating of 0.11 PSF | PCCM, Para 4.6.2.4
ASTM D3350

ASTM A53, Type F, E, or S,
Grade A or B Sch 40 |
| 5) Steel Plates, shims and shapes (ASTM A36
hot-dip galvanized in accordance with ASTM A153,
unless the plans show otherwise) | 715-01 |
| 6) Leveling Bolts | ASTM A307, Grade A |
| 7) Fasteners (Galvanized) | 719-01 |

GALVANIZED THREADED FASTENERS

All tapped holes in plates and nuts, for galvanized bolts, shall have a standard oversized tap to allow for the galvanizing on the bolts, nuts and tapped plates.

CONSTRUCTION DETAILS**DRAWINGS**

Shop drawings shall be based on the Contract Documents and prepared and submitted as per the requirements of the NYS Prestressed Concrete Construction Manual (PCCM) and the NYS Steel Construction Manual (SCM).

The submitted shop drawings shall include details of lifting and handling of panels in the production facility and their storage, transportation, handling and storage at the construction site. Calculations showing actual steel and concrete stresses based upon the proposed support locations and expected dynamic loading of the panels during handling, storage and transportation of the panels shall be prepared by a NYS Licensed Professional Engineer and shall be submitted along with the shop drawings. These drawings and calculations shall be stamped and signed by a Professional Engineer.

FABRICATION

Fabrication shall meet the requirements of the PCCM, the SCM and the following:

Fabrication Tolerances

- | | |
|--|----------------|
| 1. Width (transverse direction of the bridge): | +1/8, -1/8 in. |
| 2. Length (longitudinal direction of the bridge): | +1/8, -1/8 in. |
| 3. Depth (overall): | +1/8, -0 in. |
| 4. Tendon duct location at transverse closure joint | +/- 1/8 in. |
| 5. Bulkhead alignment (deviation from square or designated skew) | |
| Vertical | 3/16 in. |
| Horizontal | 3/16 in. |
| 6. Horizontal alignment (deviation from straight line parallel to centerline of unit): | |
| 3/16 in. for 40 ft. length | |
| 1/4 in. for 40 ft. to 60 ft. length | |
| 5/16 in. for greater than 60 ft. length | |

Steel Cantilever Bracket Assembly Fabrication

Steel components of the metalized cantilever bracket assemblies that are cast composite with the precast sidewalk panels shall be fabricated in accordance with the applicable requirements of the New York State Steel Construction Manual (SCM).

Stud shear connectors shall be shop welded to the top flange of the steel cantilever bracket in accordance with the provisions of the SCM.

Placing Concrete, Curing and Finishing

All requirements stipulated in PCCM, Para 5.9, 5.10 and 5.11 shall apply except for the following:

The top surface shall be finished by roughening, in the long direction of the panel, with a stiff broom to an amplitude of 3/16 in. After curing, all form release material and all other forming material adhering to the shear keyway and block out concrete shall be removed.

Shear key faces shall be roughened and blast cleaned as per the PCCM.

Shipping and Handling of Precast Panels

Custom steel installation frames shall be utilized during panel handling in the shop and during transport loading, unloading and the field placement operations. The steel installation frames shall be specially designed by the Contractor to provide panel support at a minimum of four (4) frame bearing points. The Contractor shall verify that the method of lifting does not overstress the precast concrete panels or steel cantilever brackets in any way. The use of lifting holes will not be permitted. The panels shall have

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markings on the edges of the panel to assure that the panels are placed correctly and accurately onto their supports and assuring the required alignments of the tendon ducts are achieved.

Steel Embedment

Steel embedment for the panel leveling devices, hold down devices, grout port pipes, anchor rods, steel cantilever bracket assemblies and tendon anchorages shall be installed in the shop based upon the locations shown on the shop drawings.

Coating of Concrete Panels

All concrete panels shall be coated on all surfaces with a penetrating sealer per Section 6.2.3 of the PCCM.

INSTALLATION REQUIREMENTS

Installation shall meet the requirements of the PCCM and the following:

1. Prior to installing panels, the supporting surfaces in contact with the panels, steel cantilever bracket assemblies or field placed concrete shall be cleaned.
2. Cantilever bracket assemblies composite with the precast sidewalk panels shall be completely connected to the arch tie girder with fully-tightened high strength bolts in accordance with the SCM and the Contract Documents prior to releasing support provided by the steel installation frames.
3. Install transverse cast-in-place concrete closure pours as shown in the Contract Plans and allow to reach a minimum compressive strength of 3000 psi, prior to beginning the longitudinal post-tensioning operations. Closure pours shall have the same surface texture as the sidewalk precast panels.
4. After completion of longitudinal post-tensioning operations, the longitudinal cast-in-place closure pours over the tie girders and the closure pours at the ends of the span shall be installed as indicated in the Contract Plans. Closure pours shall have the same surface texture as the sidewalk precast panels.

METHOD OF MEASUREMENT

This work will be measured as the number of square feet of precast, post tensioned concrete sidewalk panels satisfactorily furnished and installed per the Contract Documents.

BASIS OF PAYMENT

The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work, including fabrication, storage, protection, transporting, unloading and installation of all precast, post-tensioned sidewalk panels, including steel cantilever bracket assemblies that are cast composite with the precast concrete sidewalk panels. The cost of pedestrian railing anchor rods embedded in the precast panels, metalizing of the steel cantilever bracket assemblies, placement of field placed concrete closure pours and installation of field placed reinforcing steel shall be paid for under their appropriate items.

ITEM 564.4000NN16 - HIGH PERFORMANCE STEEL, HPS GRADE 70W**DESCRIPTION:**

Under this work, the Contractor shall furnish and erect structural steel in accordance with this specification and the contract documents.

All provisions of Subsection 564 of the Standard Specifications and the New York State Steel Construction Manual shall apply, except as modified on the plans or in this specification.

MATERIALS:

All High Performance Steel furnished under this item shall meet the requirements of the latest edition of ASTM A709M Grade HPS70W material and the supplementary requirement S83 Zone 3 for Non-Fracture Critical material or S84 Zone 3 for Fracture Critical Material. The requirements of A709 Section 5 *Heat Treatment* is hereby modified to permit the use of non-heat treated material (TMCP).

The Contractor is advised that quenched and tempered HPS 70W steel plates may be limited to a 50 foot maximum delivery length from the mill.

All non-HPS elements shall meet the requirements of ASTM A709M Grade 50W material and Section 564 of the Standard Specifications.

CONSTRUCTION DETAILS:

All structural steel work, including but not limited to shop drawings, fabrication, inspection and transportation shall be done in accordance with the provisions of the NYS Steel Construction Manual, as modified by the Contract documents.

Fabricators shall be certified in accordance with the AISC Quality Certification Program in the "Major Steel Bridges (Cbr)" category with the "Fracture Critical Members (F)" endorsement or an approved equal prior to the start of fabrication.

Welding:

Welding shall be in accordance with the ANSI/AASHTO/AWS D1.5-2002 *Bridge Welding Code* including the AASHTO *Guide Specifications for Highway Bridge Fabrication with HPS 70W Steel* published in September of 2000, modified as follows:

Welding procedure specifications shall be submitted to the Metals Engineering Unit for determination of welding procedure qualification (WPQR) tests to be performed.

WPQR tests must be witnessed by a representative of the Department and be

ITEM 564.4000NN16 - HIGH PERFORMANCE STEEL, HPS GRADE 70W

performed within three years of the start of fabrication. Results of the welding procedure qualification tests and final welding procedure specifications shall be submitted to the Metals Engineering Unit for review and approval. Qualification tests shall measure tensile strength, yield strength, ductility and toughness of the course grained area of the Heat Affected Zone (HAZ). The notch in the specimens shall be carefully located in the course grained area of the HAZ as determined by macroetching the specimens prior to machining and testing. The toughness requirement (Table 4.1, Zone I & II) for the HAZ shall be the same as the weld metal.

Welders and welding operators shall be qualified in accordance with AWS D1.5 Section 5, Part B using radiographic examination only. Qualification testing shall be performed within three years of the start of fabrication.

Filler metal shall meet the requirements of AWS D1.5, Table 4.1 *Matching Filler Metal Requirements* for Welding Procedure Specifications (WPS) qualified in accordance with Article 5.12 as follows:

Filler metals used for complete penetration groove welds connecting HPS70 material shall conform to AWS D1.5, Table 4.1 for Grade 70W material.

Filler metals used for complete penetration groove welds connecting HPS70 material to Grade 50W material shall conform to AWS D1.5, Table 4.1 using either Grade 50W or 70W material

Filler metals used to attach stiffeners and connection plates to HPS70 webs and flanges shall conform to AWS D1.5, Table 4.1 using either Grade 50W or 70W material.

Filler metals for fillet welds connecting HPS webs to HPS flanges shall conform to AWS D1.5, Table 4.1 for 70W material unless undermatching filler metals are allowed in the contract plans. If undermatching is allowed, filler metals shall meet the requirements for 50W material.

Only Submerged Arc Welding (SAW) and Shielded Metal Arc Welding (SMAW) are permitted when welding HPS70 material. Consumable handling requirements shall be in accordance with AWS D1.5 Articles 12.6.5 and 12.6.6 except that all consumables shall meet the hydrogen control level of either H4 or H8. The electrode and flux combinations shall conform to the following:

(A) Submerged Arc Welding process:

Electrode: LA-85 by the Lincoln Electric Company

Flux: MIL 800-HPNi by the Lincoln Electric Company

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(B) Shielded Metal Arc Welding process:

Matching: E9018MR*
Undermatching: E8018MR*

Note: MR designation required for all SMAW electrodes.

Preheat and interpass temperatures shall meet the requirements of Table 3 in the AASHTO *Guide Specifications for Highway Bridge Fabrication with HPS 70W Steel (September 2000)*, with the higher temperatures required when using H8 consumables.

The fillet welds shall be magnetic particle (MP) tested in accordance with Section 6.7.2 of AWS D1.5. MP tests shall be done as described in Section 18 of the NYS Steel Construction Manual using the yoke technique, modified to test in the AC output mode only.

100% of all complete penetration groove welds in tension and stress reversal areas of the plate girders shall be evaluated by and conform to both radiographic and ultrasonic tests as described in Sections 16 and 17 of the NYS Steel Construction Manual. Testing must be completed before repairs are made to the weld.

Complete penetration groove welds in compression shall be evaluated in accordance with AWS D1.5 Article 6.7.1.2.

Restrictions

Application of heat for any reason must be done by procedures approved by the Deputy Chief Engineer Structures. In addition, heating is limited to 1094°F maximum for quench and tempered materials and 896°F maximum for TMCP material unless otherwise approved by the DCES.

METHOD OF MEASUREMENT

Measurement will be made by lump sum.

BASIS OF PAYMENT

The provisions of Subsection 564-5 shall apply.