MIGRATORY BIRD PROTECTION

Description

This work shall consist of protecting migratory bird species as required by the Migratory Bird Treaty Act, MBTA, in accordance with 105.03.

Materials

Materials shall be as required and as described herein.

Construction Requirements

The structures may, or may not, have shown evidence of use, such as nests, by a bird species protected under the MBTA during previous inspections. Every effort shall be made by the Contractor not to disturb any nests with eggs or young.

Intentional taking of migratory birds or nests with eggs or young without a federal permit is prohibited by the Migratory Bird Treaty Act, 16 U.S.C. 703-712.

During the period between May 1 and September 7, bridge work on structures with migratory birds will be allowed provided the procedure below is implemented:

No special action is necessary by the Contractor for bridge work performed entirely on the deck as long as the Contractor shall not require access to areas where birds are nesting and contract work will not result in the disturbance of nesting adults, or to their eggs or young. Disturbance is any activity that would result in reproductive failures or the killing of eggs or young.

For bridge structures that have previous or current evidence of use and where the work will be done entirely on the deck that may result in perforation of the deck or create strong vibrations that could potentially dislodge nests beneath the deck or that requires activity above and below the deck to include removal shall require that the Contractor use exclusionary devices to deter birds from nesting beneath the deck prior to start of work. If birds are present, the Contractor shall determine the status of the birds, their nests, and young and shall take any and all actions necessary to meet the requirements of the Migratory Bird Treaty Act.

For bridge work performed from September 8 to April 30, birds are normally not nesting; therefore, no special actions by the Contractor are necessary after an inspection is conducted to determine that no birds are present.

Avoidance and Minimization Measures

Measures designed to avoid and minimize impacts to migratory birds nesting on structures shall be implemented prior to April 30 and be maintained throughout the nesting season. The Contractor shall be responsible for developing a project specific avoidance and minimization plan that shall be as approved by the Engineer. Avoidance and minimization measures shall include, but shall not be limited to:

After inspection and confirmation that no active nests with eggs or young are present, the Contractor shall remove existing nests and other nesting debris from the bridge girders or other surfaces that will be impacted by the project.

After nest removal, exclusion devices shall be installed on the structure, especially if the start of construction will be delayed after April 30. Exclusion devices may include plastic sheeting, canvas, burlap or other material to block access to the underside of bridges and exterior girders. Ledge protectors, such as coil, pin and wire, can be placed on structures to prevent nest building where appropriate. The use of weather resistant polypropylene netting with 1/4 in. or smaller openings is also an option but is not recommended since it can trap adult birds.

After nest removal, hazing or harassment devices using sight or sound to scare the birds away may be installed on the structure. Materials may include mylar flagging and auditory speakers. Other sensory deterrents such as active construction, predator models, scare balloons and sonic devices may also be used.

The Contractor shall inspect the underside of the existing structure on a routine basis to ensure that nests are removed prior to egg laying and that exclusion devices that have been damaged are repaired. If eggs or young are present, construction activity that may impact those nests shall not occur and the Department’s Office of Environmental Services shall be contacted. No additional contract time will be granted if eggs or young are found.

If approved by the Engineer, the Contractor shall consider not removing nests that are near, but not in, the immediate work area. The nests may also be screened from construction to prevent impacts. Work may continue if the active nests will not be destroyed and if parent birds will not be precluded from tending their nests to the extent that eggs or young are negatively impacted.

Status of Birds and Nests

If birds penetrate the barrier or nest building has commenced, the Contractor shall determine how birds are entering the underside of the bridge and adjust or repair the barrier to prevent further access. If nest building or repair of existing nests has begun, but no eggs or young are present in the nests based upon visual inspection of the nest and activity of the adults, the Contractor shall remove the nests.

Every effort shall be made by the Contractor not to disturb any nests with eggs or young. If active nests with eggs or young are found that would be affected by construction activities, work shall be delayed until an evaluation of nesting status and avoidance and minimization measures implemented or the birds fledge from the nest.

Method of Measurement

Monitoring the structures, removal of nests and the furnishing, installation, and removal of bird deterrents, and all other activities associated with the migratory bird protection as described herein will not be measured for payment.

Basis of Payment

All costs for determining the need for, the placing of deterrents and all costs associated with conducting work in compliance with the Migratory Bird Treaty Act as stated herein will not be paid for separately but shall be included in the cost of other items.

COST REDUCTION INCENTIVE

The Standard Specifications are revised as follows:

SECTION 109, LINE 325, INSERT AS FOLLOWS:

The Contractor shall submit only CRI which utilize precast reinforced concrete elements which are assembled on-site.

COFFERDAM

The cofferdam details as shown on the plans are part of documentation included for permit approval. Contractor may elect to use a different method at the risk of resubmitting permit for approval from the resource and reviewing agency. The Contractor shall be responsible for the costs and schedule delays resulting from any such changes. Only one cofferdam shall be in place at any given time to allow for adequate stream flow, and it shall be constructed of non-erosive material.

PILE DRIVING TEMPLATE

The Standard Specifications are revised as follows:

SECTION 701, LINE 210, INSERT AS FOLLOWS:

Pile driving templates shall be used as specified below.

SECTION 701, LINE 320, INSERT AS FOLLOWS:

9. Pile Driving Templates

Pile driving templates shall be used for the installation of all piles. Templates shall be capable to maintain the pile in proper position during driving and installation. Templates shall be capable of keeping the pile within tolerances specified in 701.09(b). Where practical, the template shall be placed so that the pile can be driven to cut-off elevation before removing the template. Templates shall not restrict the vertical movement of the pile. Templates shall be approved by the Engineer prior to pile installation.

SECTION 701, LINE 695, DELETE AND INSERT AS FOLLOWS:

(b) Location and Alignment Tolerance

A maximum deviation of 1 1/2 in. in any direction from the plan position will be allowed in pile trestle bents and exposed pile bents. A maximum deviation of 3 in. in any direction will be allowed for a foundation pile in footings for piers or abutments. The tendency of concrete or steel piles to twist or rotate shall be prevented and corrected. Piles to be swaybraced shall be aligned as necessary so that the swaybracing may be properly welded to the piles by a welder qualified in accordance with 711.32. No pile shall be closer than 4 in. from an edge of the pile cap. Pulling or pushing laterally on installed piles to correct misalignment, or splicing a properly aligned section on a misaligned section will not be allowed. The pile head at cutoff elevation shall be within 2 in. of plan elevation for bent caps supported by piles.

SECTION 701, LINE 838, INSERT AS FOLLOWS:

Concrete encasement, class A concrete, reinforcing bars, epoxy coating, reaction piles if not used as production piles, splices, end plates, predrilling, cleaning of drilled holes, drilling fluids, sealing materials, casing, jetting, followers, spudding, *pile driving templates,* or other methods used to facilitating pile driving will not be measured for payment.

SECTION 701, LINE 948, DELETE AND INSERT AS FOLLOWS:

(t) pile driving templates;
~~(t)~~ *(u)* all straps on treated and untreated timber piling; and
~~(u)~~ *(v)* all labor, equipment, and necessary incidentals.

SELF-CONSOLIDATING CONCRETE

Description

This Work shall consist of furnishing, forming and placing Self-Consolidating Concrete (SCC) and incidental construction in accordance with 105.03 and 702.

Materials

All materials shall conform to the requirements of 702 and the following performance-based provisions:

A. The minimum concrete strength shall be 4,000 pounds per square inch at 28 days. The strength level of the concrete shall not be considered satisfactory if any individual test falls below the specified strength by more than 500 pounds per square inch.

B. Minimum slump flow of the mix shall be 20 in., with a target slump flow of 30 in. The maximum stone size should be #8.

C. The target water-to-cement ratio shall be a maximum of 0.40±0.05.

D. Cements shall conform to ASTM C150. Admixtures or pozzolans meeting ASTM C618, C989, or C1240 may be added to mix for workability, strength, and permeability considerations.

E. The self-consolidating concrete mix design, including source of material, shall be submitted to INDOT for acceptance before it may be used.

F. Visual Stability Index (VSI) shall be 2 or less, and exhibit little or no bleeding, segregation, halo, or aggregate pile. See ASTM C1611.

Construction Requirements

Preconstruction Testing

A. Sampling shall be in accordance with ASTM C31. Testing of plant samples shall be in accordance with ASTM C39.

B. A trial mix shall be required and verified by INDOT.

Field Testing

Each day SCC is being placed, three 6 in. diameter standard concrete cylinders will be sampled in accordance with ASTM C31.

These cylinders shall be inspected for uniformity and shall be tested for compressive strength in accordance with ASTM C39. If a test cylinder indicates unsatisfactory mixture or performance of the SCC, cores shall be taken from the applicable structure unit(s) cast from the same mix for additional evaluation and testing as directed by INDOT. All core holes in the repaired structure units shall be patched to the satisfaction of the Engineer. All testing of materials, samples, and cores will be performed by the Engineer.

Curing
Curing of the SCC shall be in accordance with Article 702.22.

Placing Concrete
Vibrating of the concrete is not permitted. The rate of pour shall be great enough as to not cause cold joints, but not more than strength of the forms will allow.

Method of Measurement
SCC will be measured by the cubic yard, complete in place.

Basis of Payment
The accepted quantities of SCC will be paid for at the contract unit price per cubic yard of concrete installed.

Payment will be made under:

Pay Item	**Pay Unit Symbol**
Self-Consolidating Concrete	CYS

The cost of forms, falsework, furnishing materials, labor, tools, equipment, waterproofing, curing, finishing, and incidentals necessary to accomplish the work specified shall be included in the cost of the pay item.

ULTRA HIGH PERFORMANCE CONCRETE

Description

This Work shall consist of furnishing and placing Ultra High Performance Concrete (UHPC) in accordance with 105.03, the Design Documents, and as described herein.

Materials

Materials shall be in accordance with the following:

Admixtures for Concrete*.....912.03
Portland Cement .....901.01(b)
Water 913.01
*Admixtures shall be in accordance with Manufacturer's requirements.

UHPC material shall meet the following requirements at 28 days, unless noted otherwise:

1. Minimum compressive strength (ASTM C39)
   - Heat-treated* ≥ 25 ksi
   - Not heat-treated** ≥ 21 ksi
   - Not heat-treated 4 day** ≥ 12 ksi
   - Heat-treated 2 day* ≥ 10 ksi
2. Minimum flexural strength (ASTM C78)
   - Heat-treated 2 day* ≥ 5 ksi
3. Prism flexural tensile toughness (ASTM C1018; 10 inch span) $I_{30} \geq 48$
4. Long-term shrinkage (ASTM C157; initial reading after set) ≤ 766 microstrain
5. Chloride ion penetrability (ASTM C1202) ≤ 250 coulombs
6. Chloride ion penetrability (AASHTO T259; 1/5 inch depth) ≤ 0.07 oz/ft^3
7. Scaling resistance (ASTM C672) y < 3
8. Abrasion resistance (ASTM C944 2x weight; ground surf.) < 0.025 oz. lost
9. Freeze-thaw resistance (ASTM C666A; 600 cycles) RDM > 96%
10. Alkali-silica reaction (ASTM C1260; tested for 28 days)
    - Innocuous

*Heat treated according to Manufacturer's recommendation; temperature not to exceed 250°F.
**Not heat-treated-cured at a temperature of 60°F ± 3°F.

Fine aggregates shall be crushed quartz with 100% passing the No. 30 sieve and a maximum of 3% passing the No. 200 sieve.

Steel fibers shall be ASTM A 820, Type 1, cold drawn high-carbon steel with a minimum tensile strength of 360 ksi, length of 12mm to 13mm, and diameter of 0.220 to 0.225mm. Minimum steel fiber content will be 3.25% of the mix's dry volume.

Construction Requirements

Submittals

The Contractor shall submit for written approval by the Engineer as follows:

1. **UHPC Placement Plan**
   a. The UHPC Placement Plan shall be submitted for approval 30 days before casting concrete that includes a joint

surface abutting UHPC for the superstructure to substructure connection (e.g. abutment footing concrete).

b. The UHPC Placement Plan shall include, but not necessarily be limited to, the following:
   - Proposed method(s) of joint surface preparation to achieve the required concrete surface profile texture, exposed aggregate to 1/4 in. amplitude of the precast elements.
   - Proposed forming method(s).
   - Proposed batching sequence. The batching sequence shall include the order and time of introduction of the materials and the mixing time.
   - Proposed sequence and schedule for UHPC placement operations.
   - Details of all equipment to be used to batch and place UHPC materials, including mixers, pumps, concrete buggies, etc.
   - Method to maintain constant pressure head on the precast elements.
   - Curing procedures, including minimum cure time and minimum strength requirements prior to loading.
   - Testing procedures.
   - Quality control / quality assurance procedures for verification of mix uniformity.

2. **UHPC Mix Design**
   Submit UHPC mix design and results of the material testing conducted by an AASHTO accredited testing lab to INDOT 60 days prior to first placement of UHPC. INDOT may waive the tests of the UHPC mix if these tests have been previously performed for material supplied by the Manufacturer.

3. **List of Similar Bridge Projects**
   The Contractor shall provide a list of bridge projects in which the proposed UHPC material has been used as joint fill between cast-in-place and/or precast concrete elements (within or outside the USA)60 days prior to first placement of UHPC. INDOT reserves the right to reject proposed UHPC material which lacks a proven track record for precast concrete joint filling in bridge applications.

Pre-Pour Meeting

Prior to the initial placement of UHPC, arrange for an onsite meeting with the UHPC representative and INDOT. The Contractor's staff shall attend the site meeting. The objective of the meeting will be to clearly outline the procedures for mixing, transporting, finishing and curing of the UHPC material. Arrange for a representative of UHPC supplier to be on site during the placement of all UHPC connections.

The UHPC representative shall be knowledgeable in the supply, mixing, delivery, placement, and curing of the UHPC material.

Storage

Assure the proper storage of UHPC premix fibers and additives as required by the UHPC supplier’s specifications in order to protect materials against loss of physical and mechanical properties.

Forming, Batching, Placement, and Curing.

The Contractor shall work with the UHPC Manufacturer to ensure

appropriate initial strength gains to meet the desired project schedule. The bridge can be opened to traffic when strength of 15 ksi has been achieved, unless otherwise recommended by the UHPC Manufacturer.

Forming, batching, placing, and curing shall be in accordance with the procedures as submitted to and accepted by INDOT. The design and fabrication of forms shall follow 702.14 and the recommendations of the UHPC Manufacturer.

The Contractor shall follow the batching sequence as specified by the UHPC Manufacturer and as approved by INDOT.

The condition of the joint at the time of placement shall be saturated surface dry.

The UHPC joint shall be cast using one continuous placement. No cold joints shall be permitted.

A minimum of 1/8 in. overpour is required above the surface of the precast elements adjacent to the joint.

Consolidation of the UHPC is not permitted.

The concrete in the form shall be cured according to the UHPC Manufacturer's recommendations at minimum temperature of 60°F to attain the design strength.

Material Testing

The Contractor shall cast four sets of compressive test cylinders for each day of UHPC placement. Each set shall consist of three 3 inch by 6 inch cylinders. An additional three 12 in. diameter by 7 ½ in. deep cylinders with one 32 in. long No. 4 epoxy-coated reinforcing bar embedded 3 in. deep in the center of the circular face shall be cast for pullout testing. The axis of the bar shall be perpendicular to the formed surface. All sets shall be cured using the same method of curing proposed to be used in the field. The temperature during curing shall be within 18°F of the low end of the proposed temperature range for curing in the field.

Compressive tests shall be performed in accordance with ASTM C39. Three specimens shall be tested to validate achievement of the 10 ksi compressive strength required prior to grinding UHPC overfill. Three specimens shall be tested to validate achievement of 15 ksi compressive strength prior to opening the bridge to traffic. Three specimens shall be tested at 28 days to validate the required 21 ksi final strength. The remaining three specimens shall be treated as reserves.

Pullout testing shall be in accordance with ASTM E488. The cylinders shall be kept wet for four days prior to delivery to the testing lab. The test shall be performed as soon as practical after corresponding compressive test samples reach 12 ksi compressive strength. Pullout test samples pass if the bars yield without the UHPC failing and without the bars pulling out of the UHPC.

Slump will be measured in accordance with 505 and shall be no less than 7 in. and no more than 10 in.

UHPC not meeting the minimal material properties described herein, will be removed and replaced.

Method of Measurement

Ultra High Performance Concrete (UHPC) will be measured by the cubic yard, complete in place.

Basis of Payment

The accepted quantities of UHPC will be paid for at the contract unit price per cubic yard of concrete installed.

Payment will be made under:

Pay Item	**Pay Unit Symbol**
Ultra High Performance Concrete	CYS

The cost of surface preparation, supplying, mixing, transporting, placing, finishing, curing, grinding, grooving, water proofing, necessary incidentals, and furnishing all forms, falsework, equipment, tools, and labor required to complete the work shall be included in the cost of the pay item.

The cost of additional material used for acceptance testing shall be included in the cost of the pay item.

FULL DEPTH PRECAST CONCRETE DECK PANELS

Description

This Work shall consist of furnishing all labor, materials, equipment, and incidentals necessary to fabricate, furnish, erect, and install full-depth, precast concrete deck panels, both exterior with railing attached, and interior with no railing, in accordance with 105.03, 707, the Design Documents, and as described herein.

Materials

Materials shall be in accordance with 702.03 and the following:

A. Concrete
   1. Structural concrete for reinforced precast concrete deck panels shall beClass C with a minimum 28 day f'c = 4,000 psi in accordance with 702.
   2. Prestressed precast concrete panels shall have a minimum 28 day f'c = 5,000 psi in accordance with 707.
   3. Structural concrete for closure pours shall match the applicable precast elements.

B. Reinforcing bars shall be epoxy coated.

C. Vertical Adjusting Hardware
   1. Steel vertical adjusting hardware shall include high strength leveling bolts, steel plates, and heavy hex nuts in accordance with 711.02 and 711.65. Alternate devices may be substituted with approval from INDOT.

E. Lifting Devices
   1. Lifting devices shall be used that can support the required vertical and horizontal forces with the applicable safety factors as specified in the Component Handling and Erection Bracing requirements in the PCI Design Handbook.
   2. Devices used shall have 2.75 inch top cover and 1 inch bottom cover after installation. Partial removal of the device may be required after installation.

F. Structural non-shrink grout shall be used for girder camber strips, shear stud blockouts, keyway blockouts, and other blockouts.
   1. Gray non-shrink grout concrete shall contain no calcium chloride or admixture containing calcium chloride or other ingredient in sufficient quantity to cause corrosion to reinforcing bars.
   2. Quick-setting, rapid strength gain, non-shrink, and high-bond strength grout shall be used in accordance with 702.03.
   3. All the requirements of AASHTO T 160 shall be met, with the exception that the Contractor-supplied cube molds will remain intact with a top firmly attached throughout the curing period.
   4. Further requirements for structural non-shrink grout shall be in accordance with Table 1.

Table 1

Structural Non-Shrink Grout			
***Properties**	**Requirements**	**ASTM**	**AASHTO**
Accelerated Weathering			

Tested Medium Accepted Weight Loss	<3% White Indiana Road Salt <15% @ 300 Cycles		T161
Compressive Strength	>3,000 psi @ 24 hours >5,000 psi @ 7 days		T106
Accepted Bond Strengths	>1,000 psi @ 24 Hours	C882 as modified by C928 8.5	
Length Change	No expansion after 7 days		T160

* Certified test results from an AASHTO accredited testing laboratory will suffice for acceptance.

J. Chemical anchor systems for doweled anchors shall be in accordance with 901.05.

Submittals

Working Drawings shall be produced by the Contractor that supplement the Design Documents to provide information not included in the contract documents and that are required to fabricate, erect, transport, or temporarily support the structure or structural elements in the completion of the Work. If there is a conflict between the Working Drawings and the Design Documents, the Design Documents control.

Detailed shop drawings shall be provided of all fabricated materials.

a. Should Contractor provide an alternate to what is shown in the Contract Documents, the following shall be included:
   1) Locations and details of all lifting inserts, hardware, or devices.
   2) Type and amount of any additional reinforcing required for lifting.
   3) Locations and details of vertical adjusting hardware. Bolts shall be designed for twice the tributary dead load.
   4)
   5) Minimum compressive strength attained before handling the precast elements.

b. Supporting engineering calculations shall be included in accordance with 105.02. Precast panels shall be designed in accordance with the Project Standards. Empirical deck design shall not apply to full depth deck panels.

c. Drawings and calculations shall be sealed by a Registered Professional Engineer in the State of Indiana.

Erection drawings shall be provided for all precast concrete members.

a. The following shall be included:
   1) Crane charts
   2) Crane and pick locations
   3) Cables and lifting equipment
   4) Load distribution
   5) Panel erection and sequence
   6) Sequence used to level panel
   7) Method, equipment, and sequence for installing the structural

non-shrink grout.
8) Method of forming closure pours at joints between precast panels.

b. Supporting engineering calculations shall be included.
c. Drawings and calculations shall be sealed by a Registered Professional Engineer in the State of Indiana. Bridge temporary Works shall be designed in accordance with the Project Standards.

Additional calculations shall be provided that include:
a.
b. Tensile stresses that show both faces do not exceed the modulus of rupture during the handling, fabrication, shipping, and erection of the panel.
c. Engineering calculations shall be certified as having been checked according to the Contractor Quality Management Plan.

Drawing Preparation
a. The Contractor shall submit drawings. The following information shall be placed in the title block of each sheet:
1) INDOT/State Project Designation
2) INDOT/State Project Name
3) INDOT/State Structure Number
4) Contractor, Fabricator, or Erector Name
5) Contractor, Fabricator, or Erector Drawing Number
6) Contractor, Fabricator, or Erector Sheet Number
b. Drawings shall be signed and sealed by a Registered Professional Engineer in the State of Indiana.
c. Drawings shall be certified as having been checked according to the Contractor Quality Management Plan.

Engineering Calculation Preparation
a. The Contractor shall submit calculations. The following information shall be placed in the title block of each sheet:
1) INDOT/State Project Designation
2) INDOT/State Project Name
3) INDOT/State Structure Number
4) Contractor, Fabricator, or Erector Name
5) Contractor, Fabricator, or Erector Drawing Number
6) Contractor, Fabricator, or Erector Sheet Number
b. Calculations shall be signed and sealed by a Registered Professional Engineer in the State of Indiana. The seal shall be placed on the calculation cover sheet.
c. Engineering calculations shall be certified as having been checked according to the Contractor Quality Management Plan.

The Contractor shall assume the responsibility for faulty detailing or fabrication.

Material Submittals
Structural Non-Shrink Grout
a. A Certificate of Compliance shall be submitted to INDOT in accordance with ITM 804.
b. The proposed method, sequence, and equipment for forming grout voids and installing the structural non-shrink grout shall be submitted to INDOT before beginning installation of structural non-shrink grout.

Concrete testing and submittals shall be in accordance with 702, 704, and

707.

A written plan for handling and storage of precast elements shall be submitted to INDOT as described below for Quality Assurance. Written procedures for repair to defects and breakage of precast elements shall be submitted to INDOT as described below for Quality Assurance.

Fabrication

The Contractor shall use a concrete precaster on INDOT's list of Certified Precast Concrete Producers in accordance with ITM 813.

Concrete shall not be placed in the forms until the placement of all materials in the deck panels has been inspected.

Panels shall be constructed to tolerances as shown below.

Table 2

Variable	**Description**	Tolerance (inch)
A	Length Measured From Control Line	± 3/16
B	Width (Overall)	± 1/4
C	Depth (Overall)	± 3/16
D	Variation From Specified Plan End Squareness or Skew	± 1/4
E	Location of Leveling Bolts	± 1
F	Sweep over Member Length	± 3/8
G	Location of Projecting Reinforcing Measured From a Common Reference Point	± 1/2
H	Local Smoothness of Any Surface	± 1/8 in 10 Feet
I	Location of Blockout for Shear Connectors	± 1/2
J	Location of Post-Tensioning Duct Measured From a Common Reference Point	± 1/8
K	Location of Post-Tensioning Duct Measured From Bottom of Panel at Edge of Panel	± 1/8
L	Erection Elevation Tolerance	± 1/8

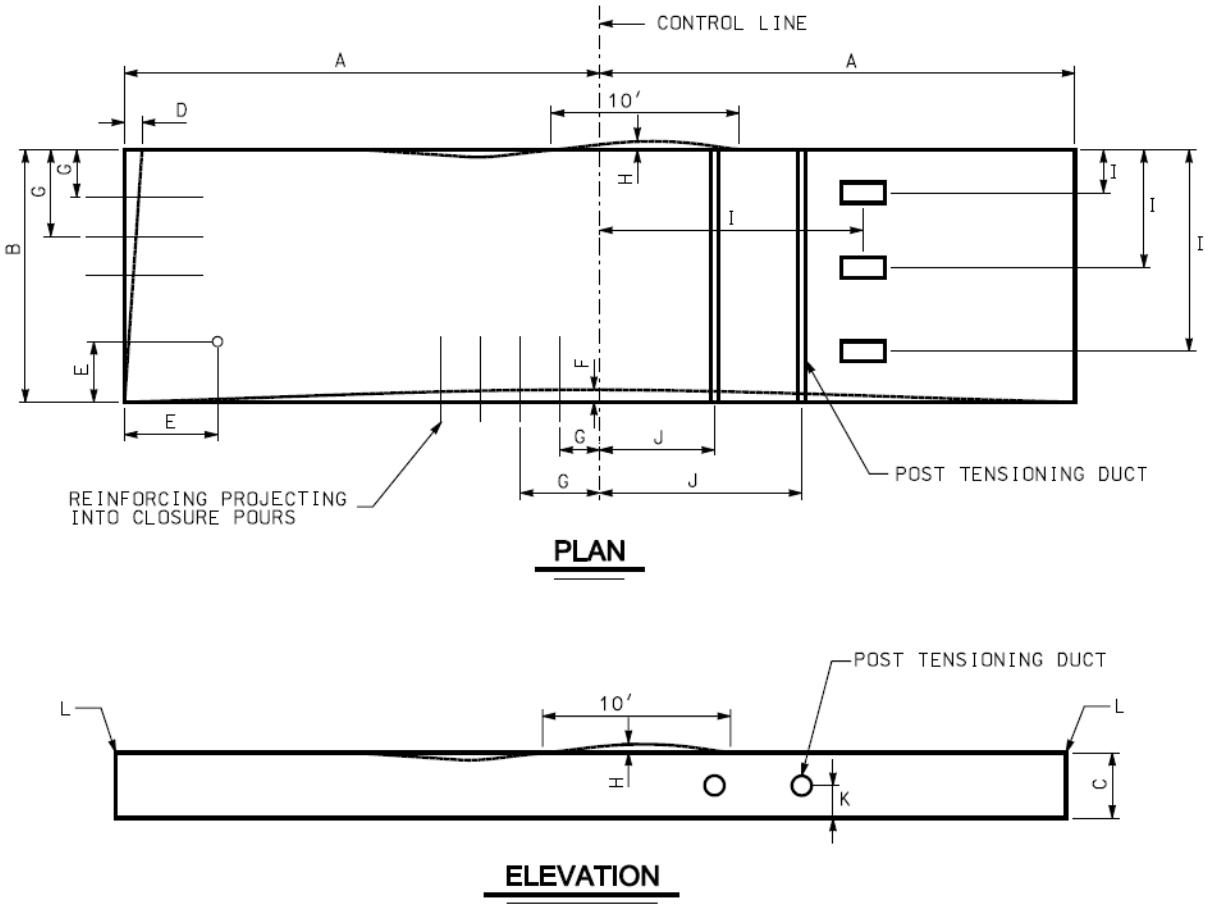

Figure 1

During panel erection any individual strand which conflicts with beam stirrups may be mechanically cut the minimal amount sufficient to provide clearance. Only those strands which interfere with panel placement may be cut.

Reinforcing bars and strands in the panel shall have a minimum of 1 in. concrete cover on the bottom of the panel and a minimum of 2 1/2 in. concrete cover on the top of the panel.

The Contractor has the option to provide an alternate lifting configuration. If Contractor elects to provide an alternate, the Contractor shall be responsible for designing and determining the required number and location of lifting devices. Lifting devices shall be designed and detailed in accordance with the applicable Project Standards.

Finishing and texturing of the precast concrete deck panels shall be in accordance with 702.21, 704.05, and 707.06.

All exposed corners shall be chamfered ¾ in. in accordance with 702.13(a). Precast panels adjacent to closure pours or other panels will not be considered exposed corners.

Each precast unit shall be permanently marked with the date of casting and supplier identification. Markings shall be stamped in fresh concrete.

A minimum compressive strength of 500 psi, or as specified in the shop drawings, shall be maintained before stripping the form.

The deck panels shall be wet cured for 14 consecutive days before placing on the superstructure. Cure shall begin immediately after performing the final finish. The Contractor shall wet cure panels by covering all exposed surfaces with wet burlap, cotton mats, or both and plastic sheets. The Contractor shall keep the burlap and cotton saturated throughout the wet cure. The precast panels shall have a minimum cure of 28 days prior to placement on the superstructure.

Quality Assurance

Precast Deck Panels

1. Cracking or damage shall be prevented during handling and storage of precast units.
2. Storage and handling shall be designed and detailed in accordance with the applicable Project Standards. The Contractor shall be responsible for the handling and storage of panels in such a manner that does not cause undue stress on the panels.
3. Defects and Breakage of Non-stressed Elements
    a. Elements that sustain damage or surface defects during fabrication, handling, storage, hauling, or erection shall be subject to review and rejection.
    b. Proposed repair procedures shall be provided in writing and approval obtained before performing repairs.
    c. Repair work shall reestablish the element’s structural integrity, durability, and aesthetics to the satisfaction of INDOT.
    d. The cause of any damage shall be determined, and corrective action shall be taken.
    e. Failure to take corrective action leading to similar repetitive damage shall be cause for rejection of the damaged elements.
    f. Cracks that extend to the nearest reinforcing plane and fine surface cracks that do not extend to the nearest reinforcing plane but are numerous or extensive shall be subject to review and rejection.
    g. Full depth cracking and breakage greater than 12 in. long shall be cause for rejection.
4. All test results shall be documented. The quality control file shall contain at least the following information:
    a. Element identification
    b. Date and time of cast
    c. Concrete cylinder test results
    d. Quantity of used concrete and the batch printout
    e. Form-stripping date and repairs if applicable
    f. Location/number of blockouts and lifting inserts
    g. Temperature and moisture of curing period
    h. Lifting device details, requirements, and inserts

Construction Requirements

Precast Concrete Deck Panels Placement

The precast concrete deck panels shall be placed as shown on the Design Documents. Panels shall not be considered as lateral bracing of supporting structural members.

The grade of the deck panels shall be checked after all deck panels are placed and adjusted to provide the elevations shown on the Design Documents.

The grade shall be checked before any post-tensioning of the deck panels, if applicable.

Leveling devices shall be adjusted in the sequence defined in the erection plan to bring panels to the elevations shown on the Design Documents. The Contractor shall be responsible for the design of the leveling device based on the weight of the panels and the number of devices.

Shifting of the precast concrete deck panels shall be prevented during the joining of all the deck panels after the proper grade is achieved.

Preparation and Installation of Structural Non-Shrink Grout

All debris from the blockouts shall be cleaned and removed before placing the structural non-shrink grout.

Bonding surfaces shall be kept free from laitence, dirt, dust, paint, grease, oil, rust, or any contaminant other than water.

Grout material installation shall be pre-tested under field conditions in a grout pocket and camber strip mock-up to determine grout flowability and whether subsequent cracking will occur. The mock-up shall include at least two shear connector pockets and a camber strip that is the same configuration as the actual bridge. Once completed INDOT will determine if any corrective action is required. The grouting process shall only proceed at INDOT’s direction.

All surfaces receiving structural non-shrink grout shall be saturate surface dry, SSD.

Grout materials shall be mixed and placed in accordance with the manufacturer’s recommendations for preparation and installation. Structural non-shrink grout shall be mixed just before use in accordance with the manufacturer’s instructions.

Voids shall not be allowed in the grout for the girder camber strips and shear stud blockouts.

Construction loads, superimposed dead loads, or live loads shall not be applied to the precast concrete deck panels until the structural non-shrink grout in the shear stud blockouts and the girder camber strips have reached a strength of 1,000 psi based on the manufacturer’s published data.

All surface voids shall be filled with non-shrink grout including lifting device blockouts and grout ports.

The top surface of all grouted blockouts and voids shall be textured in accordance with 704 for bridge decks with an overlay.

Structural non-shrink grout shall be cured in accordance with the manufacturer’s recommendation. The Contractor shall follow the manufacturer’s written recommendations on limiting the heat of hydration to levels acceptable by the manufacturer.

Grout shall be finished flush or a maximum of 0.125 in. above adjacent panels. Blockout and void profiles shall be corrected in excess of 0.125 in.

higher than the adjacent panel through surface grinding. Blockout and void profiles shall be corrected below the top of the adjacent panels through removing and replacing of the blockout or void at no cost to INDOT.

Deck Grinding

The deck shall be profile ground in accordance with 508.08(c) and 704.05 after all panels are in place, grouting and closure pours are complete, and design strength is achieved. The precast panels shall have a 0.25 in. concrete grinding allowance for correcting uneven roadway surfaces at joints between precast concrete deck panels and end of bridge deck or edge of adjacent phase(s). The deck thickness shown on the Design Documents shall be the nominal or final thickness after grinding. The Contractor shall account for the load of the 0.25 in. grinding allowance.

Overlay

An LMC-VE overlay shall then be placed on the completed bridge deck in accordance with 722 and the Design Documents.

Method of Measurement

Full Depth Precast Concrete Deck Panels shall be quantified per cubic yard of concrete in accordance with 702. Reinforcing bars shall be quantified per pounds in accordance with 703.

Basis of Payment

Full Depth Precast Concrete Deck Panels shall be paid at the contract unit price per cubic yard of concrete in accordance with 702. Reinforcing bars shall be paid at the contract unit price per pounds in accordance with 703.

The following shall be considered incidental to this item:

Vertical adjusting hardware, embedded blind pocket blockouts, lifting devices, structural non-shrink grout, prestressing strands, shear connectors, and other necessary incidentals.

PRECAST BRIDGE ELEMENTS

Description

This Work shall consist of manufacturing, storing, transporting and assembling prefabricated substructure and superstructure elements and modular systems, specifically intended for accelerated bridge construction applications, including end bents and wings, and pier columns and caps herein referred to as elements or modular systems in accordance with 105.03, the Design Documents, and as described herein.

Materials

Materials used for prefabricated elements and modular systems, closure pours, and connections shall conform to the requirements of the Project Standards, the Technical Provisions, and as described herein.

1. Concrete
   Concrete shall be in accordance with 702 and 707.

2. Steel
   Reinforcing bars, prestressing strand, and structural steel shall be in accordance with 703, 707, 711, and the Technical Provisions. Closure Pours
   a. High early strength self-consolidating concrete, SCC: A unique special provision and mix designs for substructure closure pours and pile pockets, as shown on the Design Documents, shall be submitted for review and approval.
   b. High early strength ultra-high performance concrete, UHPC: A mix design for superstructure closure pours, as shown on Design Documents, shall be submitted in accordance with the unique special provision for Ultra-High Performance Concrete.

3. Grout
   A structural non-shrink grout shall be applied at all pier column joints to ensure uniform bearing, as shown on the Design Documents. Grout shall be high-performance structural non-shrink grout that has low-permeability, quick-setting, rapid strength gain, and high-bond strength. Contractor shall mix grout just prior to use according to the manufacturer's instructions. Contractor shall follow the manufacturer's recommendation for dosage of corrosion inhibitor admixture. Contractor shall use structural non-shrink grout that meets a minimum compressive strength of 4,000 psi within 24 h when tested as specified in AASHTO T106. The grout shall be pre-packaged, commercially available, and approved by INDOT prior to use.

4. Lifting Devices
   Design-Build Contractor shall use lifting devices that can support the required vertical and horizontal forces with the applicable safety factors according to the Component Handling and Erection Bracing requirements in the PCI Design Handbook. In the approach slabs, the Contractor shall use a device that has 2¾ in. top cover and 1 in. bottom cover after installation. This may require partial removal of the device after installation.

Design Requirements

Design of the prefabricated bridge elements and modular systems shall consider the final in-service condition and construction loading, including the means of construction. Design consideration shall be given to loading due to

construction conditions for transportation, support on blocking, and unique one-time demands during erection. Accelerated bridge construction details for construction methods such as suggested erection sequence and details to facilitate the anticipated construction methods such as lifting lugs or similar shall be included on the Design Documents and Working Drawings.

Construction Requirements

Contractor shall design and construct temporary structures, falsework, or specialized equipment required to construct the bridge.

Contractor shall construct the bridge in an undamaged condition with correct geometry accounting for built-in dead load stresses and erection stresses consistent with the design.

Contractor shall perform all construction operations in accordance with the Project Standards.

Chemical Epoxy Dowel Anchor Installation

Field drill holes in the top flange of existing concrete and pre-stressed precast concrete beams shall be in accordance with 702.25. The Design-Build Contractor shall locate all internal beam reinforcing before drilling holes and shall avoid drilling through reinforcing bars or prestressing stands.

Anchors shall be installed in accordance with the manufacturer's recommendations.

Inspection

Two phases of inspection will be implemented by INDOT for accelerated bridge construction. Fabrication inspection will monitor the fabrication operations in the shop or at the site casting facility to verify the quality of the physical elements or modular systems to be used in the bridge construction. Materials, quality of workmanship, shop operations and geometry will be addressed for the fabrication inspection process. Field inspection will verify the proposed erection methods are executed in the field and the final in-place bridge elements or modular systems are in accordance with the Design Documents, Project Standards, and Technical Provisions. Specific Contractor means-and-methods will be reviewed to ensure the Contractor’s methodology conforms to the design requirements or addresses deviations from the design.

Fabrication

Fabrication shall be performed in accordance with 707.

The Contractor shall use a concrete precaster on INDOT’s list of Certified Precast Concrete Producers in accordance with ITM-813.
The prefabrication of precast concrete elements and modular systems shall be done at a precast concrete manufacturing plant. All precast products used in the bridge elements and modular systems shall be fabricated by the same precast plant, unless approved by INDOT. The prefabrication of non-prestressed concrete elements and modular systems may be done at a temporary site casting facility.

Contractor shall not place concrete in the forms until INDOT has inspected the form and has approved all materials in the precast elements and the placement of the materials in the form.

Decked girder systems shall be supported at the bearing points during deck casting operations and storage. Shored construction is not allowed. Design Documents shall include a completed table of anticipated deflections. The deflection control shall be checked prior to pouring and monitored throughout

the pouring process.

Prefabricated superstructure spans shall be pre-assembled to ensure proper match between modules to the satisfaction of INDOT before shipping to the Site. The procedure for leveling any differential camber shall be established during the pre-assembly and approved by INDOT. The modules shall be matched as closely as possible for camber and shall be match-marked. Dimensions shall be provided by the Contactor for setting precast substructure elevations.

The modules shall be measured for sweep and the bearing anchor bolt locations reconfigured as needed. Anchor bolts may be cast into the precast pier cap or, at the Contractor's option, the pier cap fabricated with preformed oversized holes and the anchor bolts grouted into the precast pier cap.

Fabrication tolerances shall be in accordance with standard precast practice. PCI MNL-116 Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Production or PCI MNL–135-00 Tolerance Manual for Precast and Prestressed Concrete Construction shall be used for more detailed tolerances for precast elements.

Contractor shall construct modules to the following minimum tolerances unless noted otherwise:

- Deck surfaces shall meet a 1/8 in. in 10-ft straightedge requirement in longitudinal and transverse directions.
- Control of camber during fabrication shall be required to achieve ride quality. Differences in camber between adjacent modules shall not exceed ¼ in. at the time of erection. Design-Build Contractor shall establish the differential camber by pre-assembling the modules as required herein.

Yard Assembly

Contractor shall ensure the prefabricated elements will fit-up and align properly before shipping from the precast facility. Each superstructure and substructure composed of prefabricated elements shall be assembled in the yard prior to shipping the elements to the Site to perform such verification. Contractor shall use blocking to simulate the support of the elements and the spacing between the elements. Contractor shall verify the construction of all element units in compliance with the Design Documents and Working Drawings. All connections shall be dry fit in the fabrication yard prior to installation of the elements at the Site.

Submittals

Working Drawings

Contractor shall prepare and submit Working Drawings and all other necessary shop details for review and approval in accordance with 105.02 and the requirements of the PPA Documents. Working Drawings shall be signed and sealed by a Registered Professional Engineer. Contractor shall submit the Working Drawings at least 60 days before fabrication. Fabrication shall not begin until written approval of the submitted Working Drawings has been received from INDOT. Deviations from the approved Working Drawings will not be allowed without written approval of INDOT.

Working Drawings shall include at least the following:

- Location and details of all lifting inserts, hardware, or devices including supporting calculations, type, and amount of any additional reinforcing bars required for lifting. Lifting devices shall be placed to avoid being visible once the prefabricated

element is placed or should be detailed with recessed pockets that can be patched after installation.

- Description of method of curing, handling, storing, transporting and erecting the sections.
- Supporting calculations regarding transport and erection loads and stresses.
- Any leveling inserts in the deck and include the leveling procedure for modules.
- Details of vertical elevation adjusting hardware.
- Minimum compressive strength attained for all precast concrete prior to handling the modules.
- Quantities for each section, concrete volume, reinforcing bar weight and total section weight.

Contractor shall not order materials or begin Work until receiving final approval of the Working Drawings. INDOT may reject any element or module fabricated before receiving written approval or outside of specified tolerances. Contractor shall be responsible for faulty detailing or fabrication.

Assembly Plan

Contractor shall prepare an assembly plan that is prepared and signed and sealed by a Registered Professional Engineer. Contractor shall submit for review and approval at least 60 days prior to fabrication.

The assembly plan shall include at least the following:

- A work area plan, depicting all utilities overhead and below the work area, drainage inlet structures, and protective measures.
- Details of all equipment that will be employed for the assembly of the superstructure, substructure and approach slabs.
- Details of all equipment to be used to lift modules including cranes, excavators, lifting slings, sling hooks, and jacks. Include crane locations, operation radii, and lifting calculations.
- Computations to indicate the magnitude of stress in the prefabricated components during erection are within allowable limits and to demonstrate that all of the erection equipment has adequate capacity for the Work to be performed.
- Detailed sequence of construction and a CPM schedule for all operations. Account for setting and cure time for any grouts and concrete closure pours, splice couplers and fill of pile pockets.
- Methods of providing temporary support of the elements. Include methods of adjusting, bracing and securing the element after placement.
- Procedures for controlling tolerance limits.
- Methods for leveling any differential camber between adjacent modules prior to placing closure pour.
- Methods of forming closure pours, fill concrete and sealing lifting holes.
- Methods for curing grout, closure pour, and lifting hole concrete.
- Implementation of the Next Generation Concrete Surface special provision to achieve deck profile and longitudinal grooving.

Quality Assurance

When precast members are manufactured in established casting yards, Contractor and manufacturer shall be responsible for the continuous monitoring of the quality of all materials and concrete strengths. Tests shall be performed

in accordance with AASHTO or ASTM methods. INDOT shall be allowed to observe all sampling and testing and the results of all tests shall be made available to INDOT.

INDOT will inspect the fabrication of the members for quality assurance. This inspection will include the examination of materials, work procedures, and the final fabricated product. Contractor shall provide Notice at least 14 days prior to the scheduled start of casting on any member or test section. Contractor and fabricator shall fully cooperate with INDOT in the inspection of the Work in progress. Contractor and fabricator shall allow INDOT unrestricted access to the necessary areas of the shop or site casting yard during work hours.

Contractor shall permanently mark each module with date of fabrication, supplier identification and module identification. Contractor shall stamp markings in fresh concrete.

Contractor shall prevent cracking or damage of precast components during handling and storage.

Contractor shall replace defects and breakage of precast concrete members according to the following:

- Modules that sustain concrete damage or surface defects during fabrication, handling, storage, hauling, or erection are subject to review or rejection.
- Obtain approval before performing concrete repairs.
- Concrete repair work shall reestablish the module’s structural integrity, durability, and aesthetics to the satisfaction of INDOT.
- Determine the cause when damage occurs and take corrective action.
- Failure to take corrective action, leading to similar repetitive damage, can be cause for rejection of the damaged module.
- Cracks that extend to the nearest reinforcing bar plane and fine surface cracks that do not extend to the nearest reinforcing bar plane but are numerous or extensive are subject to review and rejection.
- Full depth cracking and breakage greater than 1 ft are cause for rejection.

Modules will be rejected for any of the following reasons:

- Fabrication not in conformance with the Design Documents and Working Drawings.
- Full depth cracking of concrete and concrete breakage that is not repairable to 100% conformance to the actual product.
- Camber that does not meet the requirements required by the Design Documents and Working Drawings.
- Honeycombed texture.
- Dimensions not within the allowable tolerances specified in the Design Documents, Working Drawings, and Project Standards.
- Defects that indicate concrete proportioning, mixing and molding not conforming to the Project Standards.
- Damaged ends, preventing satisfactory joint.
- Damage during transportation, erection, or construction determined to be significant by INDOT.

Contractor shall document all test results for structural concrete. The quality control file shall contain at least the following information:

- Module identification
- Date and time of fabrication of concrete pour
- Concrete cylinder test results
- Quantity of used concrete and the batch printout
- Form-stripping date and repairs if applicable
- Location/number of blockouts and lifting inserts
- Temperature and moisture of curing period
- Lifting device details, requirements, and inserts

Handling, Storing, and Transportation

Handling, storing and transportation shall be performed in accordance with 707.08.

Contractor shall be responsible for the safety and stability of prefabricated elements during all stages of handling, transportation and construction.

Contractor shall follow Chapter 5 of the PCI Design Handbook for handling and erection bracing requirements.

Modules shall be lifted at the designated points by approved lifting devices properly attached to the module and proper hoisting procedures. Contractor shall be responsible for handling stresses in the modules. Contractor shall include all necessary precast element modifications to resist handling stresses on the Working Drawings. The locations of the lifting points shall be chosen so that the anticipated flexural tensile stress induced in the top of the structural concrete slab for the assumed support locations is no greater than the allowable stress.

Storage areas shall be smooth and well compacted to prevent damage due to differential settlement.

Precast elements shall be stored in such a manner that adequate support is provided to prevent cracking or creep induced deformation, sagging, during storage for long periods of time. Precast elements shall be checked at least once per month to ensure that creep-induced deformation does not occur.

Modules shall be protected from freezing temperatures for five days or until precast concrete attains design compressive strength detailed on the plans, whichever comes first. Contractor shall not remove protection any time before the units attain the specified compressive strength when the surrounding air temperature is below 20°F.

The modules shall not be subject to damaging torsional, dynamic, or impact stresses.

A 48 h notice of the loading and shipping schedule shall be provided to INDOT.

Contractor shall transport modules supported at approximately the same points they will be supported when installed.

Material, quality and condition after shipment will be inspected after delivery to the construction site.

Geometry Control

General

Design-Build Contractor shall ensure proper fit-up of prefabricated elements and modular systems and construction geometry control for differential camber, skew, and cross-slopes.

Design-Build Contractor shall check the elevations and alignment of the structure at every stage of construction to assure proper erection of the structure to the final grade shown on the Design Documents. Contractor shall use vertical adjustment devices to provide grade adjustment to meet the elevation tolerances shown on the substructure elevation Plans. Pier columns and pier cap elevations may be adjusted with shim stacks contained in the grouted joints. Bridgeseat elevations at the erected end bents and piers shall not deviate from the plan elevations by more than ± ¼ in. Corrections and adjustments for grade shall be done only when approved by INDOT.

Camber and Deflection

Contractor shall control camber during fabrication to achieve ride quality. Contractor shall schedule fabrication so that camber differences between adjacent deck sections are minimized. Differences in camber between adjacent modules shall not exceed 1/8 in. at the time of erection. Contractor shall establish the differential camber by pre-assembling the modules as required herein.

Finishing of Bridge Deck

Design-Build Contractor shall finish bridge decks in accordance with the Next Generation Concrete Surface special provision.

Connections

Requirements for UHPC Joints in the Deck

Ultra-High Performance Concrete, UHPC, shall be in accordance with the Ultra High Performance Concrete special provision.

Bolted Connections

Bolted connections shall be in accordance with the Project Standards for bolted connections between prefabricated steel elements and modules.

Erection Methods

Contractor shall employ methods and equipment which will produce satisfactory Work under the Site conditions encountered and Project constraints.

Erection Procedures

General Requirements for Installation of Precast Elements and Systems

1. Contractor shall dry fit adjacent precast elements in the yard prior to shipping to the Site.
2. Contractor shall establish working points, working lines, and benchmark elevations prior to placement of all precast elements.
3. Contractor shall place precast elements in the sequence and according to the methods outlined in the assembly plan. Contractor shall adjust the height of each precast element by means of leveling devices or shims.
4. Contractor shall use personnel familiar with installation and grouting of splice couplers that have completed at least two successful projects in the last two years. Training of new personnel within three months prior to installation by a manufacturer’s technical representative is an acceptable substitution for this experience.
5. Contractor shall keep bonding surfaces free from laitance, dirt, dust, paint, grease oil, or any contaminants other than water.

General Procedure for Superstructure Modules

1. Contractor shall not place modules on precast substructure until the compressive test result of the cylinders for the precast substructure connection concrete has reached the specified minimum values.
2. Contractor shall survey the top elevation of the precast concrete substructures and shall establish working points, working lines, and benchmark elevations prior to placement of all modules.
3. Contractor shall clean bearing surface before modules are erected.
4. Contractor shall lift and erect modules using lifting devices as shown on the Working Drawings in conformance with the assembly plans.
5. Contractor shall set module in the proper location. Contractor shall survey the top elevation of the modules. Contractor shall check for proper alignment and grade within specified tolerances. Approved shims may be used between the bearing and the girder to compensate for minor differences in elevation between modules and approach elevations. Contractor shall follow match-marks.
6. Contractor shall temporarily support, anchor, and brace all erected modules as necessary for stability and to resist wind or other loads until they are permanently secured to the structure. Contractor shall support, anchor, and brace all modules as detailed in the assembly plan.
7. Differences in camber between adjacent modules shipped to the site shall not exceed the prescribed limits. If there is a differential camber the Contractor shall apply dead load to the high beam to bring it within the connection tolerance. A leveling beam can also be used to equalize camber. The leveling procedure shall be demonstrated during the pre-assembly process prior to shipping to the site. The assembly plan shall indicate the leveling process to be applied in the field. If a leveling beam is to be used, have available a leveling beam and suitable jacking assemblies for attachment to the leveling inserts of adjacent modules. Contractor shall equip all modules with leveling inserts for field adjustment or equalizing of differential camber. The inserts with threaded ferrules shall be cast in the deck and centered over the beam's or girder’s web. A minimum tension capacity of 5,500 lbs is required for the inserts.
8. Contractor shall saturate surface dry, SSD, all closure pour surfaces prior to connecting the modules. Design-Build Contractor shall apply an epoxy bonding coat as required by the specifications.
9. Contractor shall form closure pours and seal lifting holes as required by the approved assembly plan. The closure pour forms and the sealed lifting holes shall be free of any material such as oil, grease, or dirt that may prevent bonding of the joint. Apply epoxy bonding coat where required by Design Documents.
10. Contractor shall cast UHPC closure pours and fill lifting holes with UHPC as shown on the Design Documents. Contractor shall cure closure pours and lifting holes.
11. Remaining concrete defects and holes for inserts shall be repaired as required by INDOT.
12. Contractor shall not apply superimposed dead loads or construction live loads to the prefabricated superstructure until the compressive test result of the cylinders for the UHPC closure pour concrete has reached the specified minimum compressive strength of 10 ksi.
13. Contractor shall construct the very early strength LMC overlay in accordance with 722 and the Technical Provisions.

General Procedure for Pier Columns and Caps

1. Contractor shall lift the precast element as shown on the assembly plan using lifting devices as shown on the Working Drawings.

2. Contractor shall survey the elevation of the completed structure directly below the element. Design-Build Contractor shall provide shims to bring the bottom of the element to the required elevation.
3. Contractor shall set the element in the proper horizontal location. Contractor shall check for proper horizontal and vertical alignment within specified tolerances. Contractor shall remove and adjust the shims and reset the element if it is not within tolerance.
4. Contractor shall install temporary bracing if specified in the assembly plan.

General Procedure for End Bent Stem and Wingwalls Supported on Piles

1. Contractor shall lift end bent stem precast element or wingwall precast element as shown in the assembly plan using lifting devices as shown on the Working Drawings.
2. Contractor shall set the precast element in the proper horizontal location. Contractor shall check for proper alignment within specified tolerances.
3. Contractor shall adjust the devices prior to full release from the crane if vertical leveling devices are used. This will reduce the amount of torque required to turn the bolts in the leveling devices. Contractor shall check for proper grade within specified tolerances.
4. Contractor shall place high early strength self-consolidating concrete around pile tops as shown on the Plans. Contractor shall allow concrete to flow partially under the precast element. The entire underside of the precast element need not be filled with concrete.
5. Contractor shall not remove the installation bolts, if used, or proceed with the installation of additional precast elements above until the compressive test result of the cylinders for the pile connection concrete has reached the specified minimum values.

Basis of Payment

Structural concrete for precast bridge elements shall be quantified per cubic yard of concrete, for the class and use specified in accordance with 702.28. Reinforcing bars and epoxy-coated reinforcing bars shall be quantified in accordance with 703.08. Stainless steel reinforcing bars shall be quantified in accordance with the unique special provision for Stainless Steel Reinforcing Bars.

The following shall be considered incidental to these items:

All materials, labor and equipment, including additional reinforcing bars for lifting and transport, lifting hardware, testing, transportation and installation, grinding, corrugated steel pipe, leveling devices, shims, and grout for bedding material or closure pours.

All materials, labor and equipment including additional reinforcing bars for lifting and transport, lifting hardware, testing, transportation, B Borrow for leveling, and installation for the terminal joint and sleeper slab.