Georgia Department of Transportation

Construction Engineering Inspection Training

Bridges Inspection—Group 3
Table of Contents

- 500 Concrete Structures
- 501 Steel Structures
- 502 Timber Structures
- 504 24-Hour Accelerated Strength Concrete
- 505 Corrugated Steel Bridge Plank
- 506 Expanded Mortar
- 507 Prestressed Concrete Bridge Members
- 508 Asphalt Plank Bridge Floor
- 509 Prestressing Concrete by Post Tensioning
- 510 Protective Platforms
- 511 Reinforcement Steel
- 512 Shear Connections
- 513 Precast Reinforced Concrete Box Culverts Barrel Sections And End Sections
- 514 Epoxy-Coated Steel Reinforcement
- 515 Handrail-Ferrous Metal and Pipe
- 516 Aluminum Handrail
- 520 Piling
- 522 Shoring
- 525 Cofferdams
- 528 Epoxy Pressure Injection of Concrete Cracks
- 529 Navigation Lighting
- 530 Waterproofing Fabrics
- 531 Dampproofing
- 533 Bridge Deck Waterproofing Membrane
- 535 Painting Structures
- 540 Removal of Existing Bridge
- 541 Detour Bridges
- 542 Contractor Proposed Alternative to Reinforced Concrete Deck Girder
- 543 Bridge Complete
Contractor is responsible for all concrete mix designs

Specifications Note: Use the applicable method in Section 500 of the Sampling, Testing, and Inspection Manual

General Construction Notes

- The Contractor must submit all concrete mix designs to the Office of Materials
- The Department will approve mixes that contain materials from approved sources and that produce concrete by the Department that meets the GDOT Standard Specifications
- The concrete plant must transmit delivery tickets with each load of concrete delivered to the site
- Required information on each delivery ticket: (1) project designation, (2) date, (3) time, (4) class, (5) quantity of concrete, (6) batch proportions, (7) free moisture content of aggregates, (8) quantity of water withheld, and (9) concrete mixing revolutions
- Discuss the following before beginning a bridge deck placement:
  o Reinforcing steel support method
  o Final screed setting check
  o Anticipated placement rate
  o Equipment type
Curing methods
- Adverse weather placement procedures
- Emergency procedures
- Other work-related details

**Cold and Hot Weather Concrete**
- Secure the Engineer’s approval of a “Cold Weather Concrete Curing and Protection Plan” for bridges and structures
- Ensure protection for the underside of bridge decks for metal forms
- Provide protection procedures to keep concrete above 50°F for 72 hours after placement and above freezing for 6 days after placement
- Keep concrete at no more than 90°F
- Cool aggregates by fogging or other means that do not affect moisture content
- Do not “splash on” water to aid screeding or finishing operations

**Materials**
- Use either Class A or B coarse aggregate (except for limestone or dolomite in bridges)
- Use Type I or II portland cement or Type IP portland–pozzolan cement
- Do not use air entraining cement
- Construct bridge sections with duct enclosures with a maximum stone size of No. 7
- Stockpile aggregates separately by type and source
- Keep stockpile areas firm, reasonably level, well-drained, and clean

**Concrete Handling and Preparation**
- Ensure concrete reaches its final position within 1 hour after adding cement to aggregates
- Use the following to transport the concrete from the truck to the forms: (1) buckets, (2) buggies, (3) pumps, or (4) other approved means
- Place the concrete without delays

The Engineer may reject improperly formed stockpiles
• Manipulate the delivery unit to avoid vibration damage to partially set concrete
• Thoroughly clean and wet forms before placement

Use pipes or tubes to place concrete requiring dropping of the concrete more than 5 ft vertically

• Do not use equipment that leaks grout, water, oil, or gas
• Operate pumping equipment (if used) so that the concrete is produced in a continuous stream without air pockets
• Have enough production and placement capacity to continuously mix, place, and finish the concrete in each pour
• Form an approved construction joint if the pour cannot be completed in 1 day
• Construct and maintain in mortar-tight condition
• Must be easily removed without damaging concrete
•

• Repair defects using approved methods
• Reuse forms in good condition as determined by the Engineer
• Use acceptable formwork materials:
  o Lumber
  o Plywood
  o Metal
  o Plastic
  o A combination of these
Concrete Placement

- Work concrete around reinforcement bars without displacing them
- Compact the concrete using tools and vibration
- Do not disturb the forms or projecting reinforcing bars after placement
- Do not drive, pile, blast, or perform other operations before concrete is 3 days old

Curing Concrete

- Continue curing for 5 days after applying surface finish
- Cure formed surfaces after removing forms
- Cure surfaces exposed to air using methods that prevent premature curing or moisture loss
- Use cotton mats, burlap, sand, hay, or straw coverings
- Keep coverings moist continuously

Open a structure to traffic other than haul traffic after all concrete in the decks, parapets, or curbs (sidewalks) reaches its 28-day cylinder strength and is at least 14 days old

Payment

- Concrete structures are paid at the Contract Price per cubic yd (m), per Lump Sum, or per linear ft (m), each complete in place and accepted
**Related Specifications**

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>104</td>
<td>Scope of Work</td>
</tr>
<tr>
<td>211</td>
<td>Bridge Excavation and Backfill</td>
</tr>
<tr>
<td>431</td>
<td>Grind Concrete Pavement</td>
</tr>
<tr>
<td>621</td>
<td>Concrete Barrier</td>
</tr>
<tr>
<td>800</td>
<td>Course Aggregate</td>
</tr>
<tr>
<td>801</td>
<td>Waterproofing Fabrics</td>
</tr>
<tr>
<td>824</td>
<td>Cationic Asphalt Emulsion</td>
</tr>
<tr>
<td>836</td>
<td>Special Surface Coating for Concrete</td>
</tr>
<tr>
<td>838</td>
<td>Graffiti-Proof Coating for Concrete</td>
</tr>
<tr>
<td>853</td>
<td>Reinforcement and Tensioning Steel</td>
</tr>
<tr>
<td>865</td>
<td>Manufacture of Prestressed Concrete Bridge Members</td>
</tr>
</tbody>
</table>
Preparation

- The Engineer must verify the Contractor’s installation method
- Use straightening methods that do not injure the metal
- Reject metal that has sharp kinks and bends
- Apply heat no hotter than 1150°F to adjust deviations
- Ensure each steel piece is marked with:
  - Mill test report number
  - Heat number
  - Color code (if applicable)

Bolts

- Before reaming, drilling, or bolting, ensure forming members are: (1) straight; (2) close-fitting; (3) clean; (4) true to the required dimensions; (5) free from twists, bends, and burrs; (6) well-pinned; and (7) firmly drawn together
- Fit up connections securely before placing bolts
- Ream or drill unfair holes (holes that prevent the bolt from entering)

Welded Construction

- Ensure welded construction conforms to specification requirements
- Do not allow electroslag welding; it is prohibited
- Repair, remove, or replace welds that do not meet specifications

If welds are unacceptable, Engineer will reject the entire piece
**Straightening Material (Heat Straightening)**

- Ensure all parts are free of stress and external forces
- Heat metal to the temperature given by the specifications
- Cool metal slowly after heating

**Payment**

- Steel structures are paid at the Contract Price per pound (kilogram) of structural steel or per Lump Sum, each complete in place

**Related Specifications**

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>109</td>
<td>Measurement and Payment</td>
</tr>
<tr>
<td>851</td>
<td>Structural Steel</td>
</tr>
<tr>
<td>852</td>
<td>Miscellaneous Steel Materials</td>
</tr>
<tr>
<td>854</td>
<td>Castings and Forgings</td>
</tr>
<tr>
<td>857</td>
<td>Bronze Bushings, Bearings, and Expansion Plates</td>
</tr>
<tr>
<td>870</td>
<td>Paint</td>
</tr>
<tr>
<td>881</td>
<td>Fabrics</td>
</tr>
<tr>
<td>885</td>
<td>Elastomeric Bearing Pads</td>
</tr>
</tbody>
</table>
Material Handling and Storage

- Handle timber carefully without dropping, breaking outer fibers, bruising, or piercing with tools
- Place all stored material in well-drained locations and keep it free from weeds and rubbish

The following hardware must be galvanized: bolts, nuts, washers, special couplings, dowels, nails, and spikes

Construction

- Repair and apply treatments to treated timber
- Treat bolt holes with creosote oil and an approved pressure bolt hole treater
- Treat countersunk holes with hot creosote oil before placing bolts
- Cut and frame the lumber and timber to a close fit so the joints will have an even bearing over the entire contact surface
- Countersink holes wherever smooth faces are required
Timber Superstructure Construction

- Install stringers
- Lay single plank floors
- Lay laminated or strip floors
- Frame and erect hub guards and railings

Payment

- Structural metal is paid at the Contract Price according to quantity of structural metal
- Lumber and timber are paid at the Contract Unit Price bid per thousand feet board measure, complete in place and accepted

Related Specifications

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>645</td>
<td>Repair of Galvanized Coatings</td>
</tr>
<tr>
<td>852</td>
<td>Miscellaneous Steel Materials</td>
</tr>
</tbody>
</table>
Section 504: Twenty-Four Hour Accelerated Strength Concrete

Batch and Mix Materials

- The Engineer must approve the method of adding the acceleration admixture
- The Contractor shall measure admixture into the concrete with an accuracy of ±3%
- The Contractor shall not add accelerating admixture to concrete that has attained an age of 45 minutes as measured from the beginning of the initial mixing at the plant
- Mix the concrete for 40 additional revolutions at mixing speed

Payment

- Accelerator admixtures are paid at the Contract Unit Price bid either by cubic yard (meter) or square yard (meter)
Plank Installation

- Place plank as shown on the plans
- Ensure the bottom corrugations have full bearings on the supporting members
- Hold the bottom corrugations in full contact with the supporting members until they are securely connected

In-Shop Fabrication Requirements

- Shop-pump holes for the welded attachment to the beams and space the holes as shown on the plans
- Ensure shop painting is of the paint type and number of coats shown on the plans

Payment

- Corrugated steel bridge planks are paid at the Contract Price per square ft (m) for corrugated steel bridge plank, complete in place

Related Specifications

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>852</td>
<td>Miscellaneous Steel Materials</td>
</tr>
<tr>
<td>870</td>
<td>Paint</td>
</tr>
</tbody>
</table>
Georgia Department of Transportation Construction Engineering Inspection Training

Bridges Inspection

Section 506: Expanded Mortar

Mortar Placement

- Use expanded mortar for the shear keys
- Completely fill the shear key with mortar
- Rod the mortar into a dense, homogeneous mass
- Float the mortar off flush with the surface of the precast decks
- Moist cure the mortar continuously for a minimum of 3 days

Do not allow traffic on bridge decks until 5 days after expanded mortar is placed

Payment

- Expanded mortar is paid at the Contract Price for concrete of the same Class as the concrete the mortar accompanies

Related Specifications

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>800</td>
<td>Coarse Aggregate</td>
</tr>
<tr>
<td>801</td>
<td>Fine Aggregate</td>
</tr>
<tr>
<td>830</td>
<td>Portland Cement</td>
</tr>
<tr>
<td>835</td>
<td>Aluminum Powder</td>
</tr>
<tr>
<td>880</td>
<td>Water</td>
</tr>
</tbody>
</table>
Prestressed Concrete (PSC) Bridge Members Erection

- Erect the beams in conformity with true longitudinal alignment and transverse placement as shown on the plans or as directed by the Engineer
- Align and grade the caps according to the plans
- Drift the caps to the timber pile heads according to the plans
- Erect PSC deck units that bear directly on the caps so sections have a smooth and uniform bearing on the caps

Pouring Expanding Mortar into Shear Keys Between Deck Units

- Erect the entire bridge
- Ensure all units are in final alignment
- Pour mortar in the shear keys
- Continuously moist cure the keys for at least 3 days
- Keep traffic off the structure for at least 5 days
**Tightening Diaphragm Bars**

- Bring diaphragm bar nuts to a snug fit against the beams
- Pour the diaphragm
- Allow the diaphragm concrete to age at least 5 days and reach at least 1500 psi
- Tighten the nuts fully
- Cut off the excess bar length
- Place an approved grout in the recessed area provided for the bar’s nuts and washer

> Use Type III coating on prestressed members as required by the chart in Specifications 500AB.3.

**Payment**

- Beams are paid at the Contract Price per linear ft (m)
- PSC box beams are paid at the Contract Price per linear ft (m)
- Deck units are paid at the Contract Price per span of each different nominal span length
- Caps are paid at the Contract Price per each

**Related Specifications**

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>109</td>
<td>Measurement and Payment</td>
</tr>
<tr>
<td>865</td>
<td>Manufacture of Prestressed Concrete Bridge Members</td>
</tr>
</tbody>
</table>
Concrete Base Construction

- Ensure the concrete is dry and free from dust and rubbish
- Remove surplus talc and other powder from the base
- Apply approximately 1 gal (1 L) of cold cutback asphalt to each 100 ft² (9 m²) of surface
- Brush the cutback asphalt coat out well and allow it to dry
- Mop the surface with hot-applied asphalt cement
- Lay the plank straight and smooth with staggered joints
- Ensure the plank is free of irregularities

Timber Base Construction

- Securely spike the wooden floor upon which the plank will be laid
- Remove nails, dirt, and rubbish before laying the asphalt plank

Payment

- Asphalt plank bridge floor is paid at the Contract Price per square yard (meter)
Geo

rgia Department of Transportation Construction Inspection Training

Bridges Inspection

Section 509: Prestressing Concrete by Post Tensioning

Contractor Options

- *Alternative Prestressing Systems:* The Contractor may use post-tensioning systems other than those shown on the plans
- *Alternative Stressing or Anchorage Blocks:* Stressing or anchorage blocks for the structure may deviate from those shown on the plans

Duct Installation

- Support the ducts at intervals of no more than 2 ft
- Join rigid duct sections using positive metallic connections
- Use waterproof tape at the connections
- Make duct splices so the nose of the tendon being pushed into the duct goes from a male end into a female end
- Stagger splices in ducts to prevent splices in the same location in a row of ducts
- Carefully cut and deburr the ends of the ducts
- Place continuous-draped longitudinal ducts in the web in one vertical row at the center of the web
- Tie the ducts securely to the saddles
- Ensure a clear distance between the ducts
- Do not bundle the ducts
- Ensure the vents are mortar tight, taped as necessary, sealable, and capable of allowing grout to be injected into them
Steel Installation Reinforcement

- Fabricate reinforcing steel and place it according to the plans and shop drawings
- Do not cut and remove reinforcing steel to align stressing ducts properly
- Replace bars that cannot be fabricated to clear ducts with bars with an adequate lap length

Post-Tension Install Anchorages

- Secure post-tensioned prestressing steel at ends using permanent anchoring devices

Post-Tension the Tendons

- Ensure the deck slab thickness and deck reinforcement cover comply with the plan requirements
- Wait to prestress cast-in-place concrete until the compressive strength of all the concrete placed reaches the required 28-day strength and the concrete is at least 14 days old
- Conduct the tensioning process so that the applied tension and elongation can be measured
- Tension the prestressing steel using hydraulic jacks
**Grout the Duct**

- Open the grout and vent openings
- Ensure that the pumping pressure at the tendon inlet does not exceed 250 psi
- Allow grout to flow from the first vent after the inlet pipe to remove residual flushing water or entrapped air
- Once water or air is removed, cap or otherwise close the vent

---

Do not use sand in grout used for prestressing concrete bridge members
Section 510: Protective Platforms

**Construction**

- Construct and maintain a protective platform so that no object or liquid will fall from the bridge superstructure or platform to the roadway below
- Place protective platforms under spans that pass over pedestrian or vehicular traffic lanes

*Place platforms immediately after setting beams and before working on the span*

**Platform Specifications**

Use platforms that:

- Extend at least 3 ft (1 m) beyond each side of the outside limits
- Completely cover the length of the spans over the traveled ways
- Maintain the minimum vertical clearance over the traffic lanes

**Protective Platforms Construction and Removal**

- Post signs stating (MUTCD:W 12-2) for approaching traffic
- Remove the protective platforms when the superstructure worker is complete
- Stop operations and take remedial actions if the platforms fail to provide required protection
- Remove the protective platforms and signs when complete
Handling

- Load, transport, unload, and handle reinforcement steel in a way that prevents damage
- Block unloaded reinforcement steel off the ground and store it in piles separated by size and type
- Protect reinforcement steel from weather if prolonged exposure is expected
- Clean off loose mill scale, rust scale, and coatings that will destroy the bond

Construction

- Tie the mat steel at each intersection on the outer edges and at alternate intersections within the mat
- Support the mat steel using precast blocks fastened with cast-in wires
- Position dowel bars so that the column bars or vertical wall bars can be spliced and tied in the location the plan specifies
- Support the mat steel using precast blocks fastened with cast-in wires
- Construct a rigid template across the top of the footing to support the dowel bars
- Attach the dowel bars to the template so they cannot move during concrete placement
- Do not push the dowel bars into the wet concrete after placing
- Space steel off the side forms using precast blocks
- Tie hoop ties at intersections with dowel bars and corner vertical bars
- Ensure bundled bars have at least 3 ties per bundle for beam and cap steel ties

Do not use rocks or random pieces of broken concrete to support steel
Payment

- Reinforcement steel is paid at the Contract Price per Lump Sum or per pound (kilogram) of bar reinforcement steel

Related Specifications

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>853</td>
<td>Reinforcement and Tensioning Steel</td>
</tr>
</tbody>
</table>
Georgia Department of Transportation Construction Engineering Inspection Training

Bridges Inspection

Section 512: Shear Connectors

Materials

- Use stud-type shear connectors of the size or diameter and length specified in the plans
- Do not paint or galvanize studs

Construction

- Fabricate channel-type shear connectors as denoted in the specifications and plans
- Fabricate stud-type shear connectors of the correct length after welding
- Allow shear connectors to be welded in the girder flanges’ beam either in the shop or onsite
- Before welding, clean the shear connectors and base of rust, scale, oil, and paint
- Wire-brush, peen, prick-punch, or grind base metal where shear connectors will be welded

Channel-Type Shear Connectors Defective Welds Repair

- Repair undersized but otherwise sound welds by bringing the weld up to size with additional welding
- Repair undercut caused by the welding process by filling with additional weld metal

Payment

- Shear connectors of the specified type are paid at the Contract Price per pound (kilogram), complete in place

Repair unsound welds by chipping
Material Requirements

- Ensure precast wingwalls and aprons are built so that corrugations of pipe sleeve inserts lock into concrete and have reinforcement steel maintained around the pipe sleeve inserts
- Use modified connector boxes of the type required for connections to precast ends or cast-in-place ends
- Use pipe sleeves rigid enough to withstand concrete placement, anchoring, and construction loads without damage or excessive deformation

Excavation, Bedding, and Backfill

- Place bedding between graded forms set at least 18 in. (450 mm) outside each wall of the boxes or from the edge of the precast apron sections
- Shape bedding material to fit the bottom of the precast sections
- Screed off graded forms
• Ensure bedding is level in the plane perpendicular to the culvert centerline
• Check the grade of the bedding surface on both sides before installing precast sections
• After placing precast sections on the graded bedding, remove the forms
• Install barrels according to the manufacturer’s recommendations

Make all joint sections between aprons and barrels water tight

• Ensure all concrete is set up before installing the wingwalls
• Use cast-in-place ends at the ends of precast box culvert barrels
• Use cast-in-place ends of the same design as cast-in-place box culverts
• Repair spalled areas around the holes
• Fill lift holes with mortar or concrete

Related Specifications

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>207</td>
<td>Excavation and Backfill for Minor Structures</td>
</tr>
<tr>
<td>834</td>
<td>Masonry Materials</td>
</tr>
<tr>
<td>843</td>
<td>Concrete Pipe</td>
</tr>
<tr>
<td>848</td>
<td>Pipe Appurtenances</td>
</tr>
<tr>
<td>852</td>
<td>Miscellaneous Steel Materials</td>
</tr>
</tbody>
</table>
Handling

- Use a system for handling coated bars that have padded contact areas for bars whenever possible
- Use padded bundling bands
- Lift bundles with multiple supports or a platform bridge
- Do not drop or drag bars

Repair damaged areas within 12 hours and before visible rusting appears between aprons and barrels are not permeable

Construction

- During and after installing bars into their deck locations, repair any cuts, nicks, and abrasions in the bar coating with epoxy repair material
- Repair damaged reinforcing steel and metallic accessories with epoxy repair material supplied by the powdered epoxy resin manufacturer
- Thoroughly remove rust by sandblasting or other approved methods before repairing
- To prevent subsequent rusting, provide a rust-free and completely coated steel reinforcement system before placing concrete in the deck
• Keep coated bars free from dirt, paint, oil, grease, or other foreign substance
• Place the deck concrete using methods and equipment that will not damage the coated materials
• Do not expose coated bars to fire or flame

**Related Specifications**

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>853</td>
<td>Reinforcement and Tensioning Steel</td>
</tr>
</tbody>
</table>
Handrails Construction

- Set anchor bolts according to the plan details and ensure that bolts have the correct spacing and projection
- If the projection is too short, lengthen or replace the bolt as directed by the Engineer
- Remove all concrete protrusions and fill all depressions before placing posts
- Finish concrete with Type IV—Floated Surface Finish

Handrails Erection

- Make all rails parallel to grade
- Set the handrail posts normal to grade when the bridge rails are supported on a concrete parapet
• Tighten the set screws as detailed on the plans
• Tighten the anchor bolt nuts to a snug fit with full bearing on the base of the post

Ensure posts and rails are true to line and grade

Payment
• Metal or pipe handrail is paid at the Contract Price per linear ft (m), complete in place

Related Specifications

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>645</td>
<td>Repair of Galvanized Coatings</td>
</tr>
</tbody>
</table>
Bridges Inspection

Section 516: Aluminum Handrail

All cast posts for any one structure shall be produced by the same manufacturer

**Construction**

- Set anchor bolts according to the plan details and ensure that the bolts have the correct spacing and projection
- Remove all concrete protrusions and fill all depressions for bearing areas
- Ensure that bearing areas for posts are true to grade
- Separate contact surfaces with neoprene pads
- Do not place aluminum alloys in direct contact with copper, copper base alloys, lead, nickel, iron, steel, or wood

**Handrail Erection**

- Make all rails parallel to grade
- Set handrail posts normal to grade where the bridge rails are supported on a concrete parapet
- Tighten the anchor bolt nuts to a snug fit with full bearing on the post base
- When posts and rails are completely bolted into place, ensure they are true to grade
Payment

- Aluminum handrail is paid at the Contract Price per linear ft (m), complete in place

Related Specifications

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>645</td>
<td>Repair of Galvanized Coatings</td>
</tr>
</tbody>
</table>
Definitions

Plan Driving Objective (PDO): A statement on the plans specifying the minimum requirements during pile driving

Minimum Tip Elevation: The elevation the pile tip cannot stop above

Long Pile: A pile more than 50 ft (15 m) in length

Handling

<table>
<thead>
<tr>
<th>Pile Type</th>
<th>Handling Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber</td>
<td>• Handle carefully using only non-metallic slings</td>
</tr>
<tr>
<td></td>
<td>• Do not drop or damage piling</td>
</tr>
<tr>
<td></td>
<td>• Store on skids above the supporting surface</td>
</tr>
<tr>
<td>Prestressed Concrete</td>
<td>• Handle carefully to prevent fracture by impact or by excessive bending stress</td>
</tr>
<tr>
<td></td>
<td>• Do not place other materials on piling during storage or transport</td>
</tr>
<tr>
<td></td>
<td>• Load and unload piles using embedded pick-up points placed during manufacturing</td>
</tr>
<tr>
<td>Metal Shell</td>
<td>• Do not deform or dent during handling and storage</td>
</tr>
<tr>
<td></td>
<td>• Keep shells fully drained</td>
</tr>
<tr>
<td>Sheet H-Piling</td>
<td>• Do not deform or bend flanges during handling and storage</td>
</tr>
<tr>
<td></td>
<td>• Keep the piling fully drained</td>
</tr>
</tbody>
</table>
**Preparation**

- Remove or cut out portions of obstacles that interfere with attaining the PDO
- Make the embankment at the bridge ends full depth to the subgrade template except for the stage of construction providing a bench of the end bent
- Thoroughly compact the embankment as provided in the specifications

**Construction**

- Determine pile length (always use full-length timber piling)
- Drill pilot holes when required
- Test the piling
- Evaluate the bearing capacity (determine the driving resistance and perform a loading test)
- Drive the piling
- Excavate and re-drive
- Jet and spud unless otherwise noted in the Contract
- Cut off, splice, and extend the piling
- Weld the steel piling splices and sway-bracing attachments
- Repair and treat the timber piling
- Bolt the timber bracing
- Coat and paint the piling
Payment

- Piling is paid at the Contract Prices, complete in place

Related Specifications

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>104</td>
<td>Scope of Work</td>
</tr>
<tr>
<td>109</td>
<td>Measurement and Payment</td>
</tr>
<tr>
<td>636</td>
<td>Highway Signs</td>
</tr>
<tr>
<td>855</td>
<td>Steel Pile</td>
</tr>
<tr>
<td>865</td>
<td>Manufacture of Prestressed Concrete Bridge Members</td>
</tr>
</tbody>
</table>
Shoring Design

- Ensure the shoring is structurally adequate to withstand forces from pressures resulting from excavation and pressures of surcharge loads from adjacent structures, roadbeds, tracks, slopes, and equipment
- Ensure the work conforms to the sequence of construction outlines on the plans and in the special provisions

Payment

- Shoring is paid at the Contract Price, complete in place, maintained, and removed
Cofferdam Design
In the design of cofferdam, consider the following:

- Use forces and pressures from an excavated depth of not less than 6 ft (1.8 m) below the elevation of the bottom of the footing
- Use forces and pressures from surcharge loads from adjacent structures, roadbeds, tracks, slopes, and equipment

Cofferdam Construction
- Correct to the Engineer’s satisfaction cofferdams that tilt or move laterally during construction
- Use all reasonable methods to provide a dewaterable enclosure
- Unless otherwise specified, completely remove all cofferdam material

Cofferdam material shall remain the property of the Contractor
Payment

- Cofferdams measured for separate payment are paid at the Contract Price per each, complete in place, maintained, dewatered, removed, and disposed of
- Cost of cofferdams not measured for separate payment will be included in the Contract Price for bridge excavation
Conduit, Boxes, Fittings, Wiring, and Supports

- Ensure conduit connections are waterproof
- Use flexible conduit when going from bridge superstructure to substructure, from bridge fender system, and in transition areas between rigid members
- Use nonmetallic conduit for the underground conduit between the service riser and the bridge

- Use flexible conduit to connect the rigid galvanized steel conduit located on the faces of the pier or bent columns to the conduit located on the finder system walkway
- Install conduit perpendicular to or parallel with the principal structural members
- Fit conduit terminals at the junction boxes with bushings
- Allow use of powder-actuated galvanized studs and clamps to fasten items to the concrete

Ensure the Qualified Electrician possesses evidence of classification
**Power Supply and Wiring**

- Require a service pole at least 30 ft (9 m), Class 5, or as shown on the plans
- Use a metallic service riser with a weatherhead
- Use a weatherproof enclosure containing a fusible disconnect switch of the appropriate voltage and ampere rating or as shown on the plans
- Mount the photoelectric control near the top of the service pole
- Direct the photoelectric control toward the north sky
- Enclose the wiring to and from the photoelectric control in rigid galvanized conduit
- Mount the disconnect switch, magnetic contactor, and transformer to the service pole
- Install the weatherproof enclosure so that it is accessible from the ground

**Payment**

- Each navigation lighting system completed and accepted at the location specified is paid at the Lump Sum Price bid for each system

**Related Specifications**

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>645</td>
<td>Repair of Galvanized Coatings</td>
</tr>
<tr>
<td>852</td>
<td>Miscellaneous Steel Materials</td>
</tr>
<tr>
<td>863</td>
<td>Preservative Treatment of Timber Products</td>
</tr>
<tr>
<td>921</td>
<td>Luminaires</td>
</tr>
<tr>
<td>922</td>
<td>Electric Wire and Cable</td>
</tr>
<tr>
<td>923</td>
<td>Electrical Conduit</td>
</tr>
<tr>
<td>924</td>
<td>Miscellaneous Electrical Materials</td>
</tr>
</tbody>
</table>
**Preparation**
- Prepare concrete surfaces next to the cracks by exposing the clean and sound concrete
- Ensure procedures must comply with any traffic handling and construction sequencing requirements for the Project

**Seal Injection**
Seal concrete cracks as follows:
- Prepare the concrete surfaces
- Seal cracks at the surface with epoxy
- Thoroughly penetrate voids on the surface
- Clean the sealed cracks to the original concrete surface
- Remove devices and surface sealers over the injection holes

**Payment**
- Epoxy pressure injection of concrete cracks is paid at the Lump Sum Price bid

**Related Specifications**

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>886</td>
<td>Epoxy Resin Adhesives</td>
</tr>
</tbody>
</table>
**Concrete Preparation**

- Fill all hole cracks and depressions in the concrete surface flush with the mortar
- Chip or grind smooth all high spots, sharp points, and edges
- Thoroughly clean and dry the concrete surface

**Construction**

- Seal openings and structure edges; construct a seal to prevent water from passing between the waterproofing and surface
- Require a double thickness of waterproofing membrane over properly sealed expansion, construction, or control joints
- Ensure edge and end seams overlap at least 4 in. (100 mm) on all applications
- Rub membrane firmly as soon as possible to minimize bubbles caused by air outgassing or water vapor from the concrete

**Payment**

- Waterproofing is paid at the Contract Price per square yard (meter), complete in place
Surface Preparation

- Thoroughly clean and dry the surface to be dampproofed
- Spray at least two applications of primer, allowing primer to be thoroughly absorbed before the next application

Concrete surfaces shall cure at least 5 days before dampproofing

Construction

- Evenly apply a seal coat having a temperature of 300°F to 350°F and 200°F for pitch
- Allow the seal coat to dry at least 2 days or longer
- The seal coat shall be hard before any water or earth contacts it
- Protect the seal coat from the weather during the drying period

Payment

- Dampproofing is paid at the Contract Price per square yard (meter), complete in place
Georgia Department of Transportation Construction Engineering Inspection Training

Bridges Inspection

Section 533: Bridge Deck Waterproofing Membrane

Methods

Method A: A waterproofing membrane system placed directly on a portland cement concrete bridge deck surface

Method B: A waterproofing membrane system placed directly on a specified grade and thickness of freshly placed asphaltic concrete on the bridge deck

Surface Preparation

Method A

- Chip or grind smooth the high spots, sharp points, and edges on the deck surface
- Fill holes and depressions in the concrete surface flush with the mortar
- Allow the mortar to cure
- Clean and remove all traffic paint and other harmful materials from the deck by sandblasting the entire deck surface
- Remove all sandblasting residue with compressed air

Do not use water to clean the deck

Method B

- Place a strip of preformed sheet membrane transversely across deck joints
- Apply a mastic at the face of the curb and at the joints to ensure the membrane uniformly adheres to the concrete
- Apply the asphaltic concrete
**Waterproofing**

**Method A**
- Observe weather conditions
- Prime the surface
- Place the waterproofing membrane
- Place the pavement

**Method B**
- Place the waterproofing membrane directly on asphaltic concrete using guidelines specified in Method A
- Do not require tack coat or primer on the asphaltic concrete beneath the membrane

---

**Bituminous Overlay Application**

**Methods A and B**
Apply bituminous overlay in either Method A or Method B as follows:
- Apply a bond coat of adhesive (bituminous tack coat) to the surface of the waterproofing membrane
- Overlay the waterproofing membrane with the thickness or quantity and the type of asphaltic concrete specified on the plans
- Dump the asphalt concrete directly into the receiving hopper of the paving machine
- Have trucks pull forward and avoid contacting the paving machine while it is moving
- Do not permit the mixture to be dumped onto the deck ahead of the paving machine
- Spread and roll the asphalt concrete such that the membrane will not be damaged
- Compact the asphaltic concrete to the satisfaction of the Engineer
- Place a final surface course of Open Graded Surface Mixture
**Payment**

- Preparing the surfaces and furnishing and applying the waterproofing system are paid at the Contract Unit Price per square yard (meter)

**Related Specifications**

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>Hot Mix Asphalitic Concrete Construction</td>
</tr>
<tr>
<td>413</td>
<td>Bituminous Tack Coat</td>
</tr>
</tbody>
</table>
Health and Safety Responsibilities

- Comply with all relevant Environmental Protection Agency (EPA) regulations and all other regulatory agencies
- Personnel involved with lead paint removal operations must have received the required training
- Provide test results from an OSHA Certified Laboratory showing blood lead levels of employees that may be exposed to lead during the Project
- Do not allow the containment system of equipment to violate the minimum bridge clearances shown on the plans
- Submit to the Engineer for review and approval an emergency contingency plan for cleaning up spills from failure of the containment system
- Submit Material Safety Data Sheets (MSDS) on abrasive and paint materials used

Preparation

- Clean new and existing steel structures before painting
- Clean structures under or over the railroads
- Prepare steel piling, sway bracing, and concrete piling surfaces for special protective coatings

Construction

- Provide protection to the structure, adjoining property, and public from the dangers of cleaning and painting
- The Contractor must meet the general painting requirements (including weather conditions, oxidation requirements, paint thinning, application methods, properly drying, and cracks/cavities)
**Painting New Steel Structures**

- Use the correct paint system
- Use one shop prime coat, one field touch-up coat, and two field weather coats
- Apply the type and color of paint coats as required by the system number shown on the plans
- Do not paint advertising on structural steel

**Painting Existing Steel Structures**

- Prevent paint overspray by using containments
- Adhere to the same weather conditions as when painting new steel structures
- Give steel one full prime coat and two weather coats, all of the color and type required by the special provisions or plans

**Painting Steel H-Piling, Metal Shell Piling, and Steel Sway Bracing**

- Paint in open yards or on erected structures
- Do not paint metal when freezing weather is forecast
- Apply a thick application of paint to be plastered or troweled onto steel surfaces
- Brush out paint only as required to obtain uniform thickness
- Ensure that each coat is thoroughly dry before the next coat is applied

**Related Specifications**

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>107</td>
<td>Legal Regulations and Responsibility to the Public</td>
</tr>
<tr>
<td>647</td>
<td>Traffic Signal Installation</td>
</tr>
<tr>
<td>870</td>
<td>Paint</td>
</tr>
</tbody>
</table>
Georgia Department of Transportation Construction Engineering Inspection Training

Bridges Inspection

Section 540: Removal of Existing Bridge

**Sequence of Operations**

- Do **not** remove or close to traffic any existing structure until traffic has been satisfactorily provided for as required by the plans or the Engineer

**Extent of Removal**

- Remove portions of the existing bridge (including piling) within the area of a proposed culvert to a minimum depth of 5 ft (1.5 m) below the flow line
- Remove the entire substructure down to the streambed or natural ground line unless plans require that old substructures or parts are used as parts of the new structure
- Leave abutments or end bents in place that do not interfere with stream flow or new work if the plans indicate

**Care of Removal**

- For reuse of existing structures, if possible, remove parts from each unit without blasting
- Clean, straighten, or bend reinforcement to the required dimensions and cut it as an incidental part of this work
- Arrange for the salvaging method according to the parts designated on the plans
Disposal

- Salvage only the material designated on the plans for salvage
- Disassemble the material and neatly stockpile it near the bridge site and above high water
- Do not use any materials stockpiled for the Department without written permission from the Engineer

Payment

- Removal of existing bridge is paid at the Contract Price per Lump Sum

Related Specifications

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>201</td>
<td>Clearing and Grubbing Right-of-Way</td>
</tr>
</tbody>
</table>
Bridges Inspection

Section 541: Detour Bridges

Safety Features

- **Guardrail**: Construct according to the Construction Detail shown in the plans
- **Precast Median Barrier**: Use on both sides and both ends of the detour bridge unless otherwise directed by the Engineer
- Ensure the barrier extends at least 40 ft (12 m) from the bridge ends unless plans show otherwise

Detour Bridge Removal

- Remove the bridge after permanent construction is open to traffic
- Material salvaged from the detour bridge remains the property of the Contractor

Payment

- Detour bridges are paid at the Contract Price per each, complete in place, maintained, and removed

Related Specifications

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>104</td>
<td>Scope of Work</td>
</tr>
<tr>
<td>105</td>
<td>Control of Work</td>
</tr>
</tbody>
</table>
Design and Construct Team

- **Contractor**: Responsible for engineering design, drawing, detailing, plan preparation, printing, and other work necessary
- **Design Engineer**: Remains a part of the team and is available to discuss the Project with the Department at any time during the Project

Proposed Alternate Requirements

Contractor-proposed alternates are subject to the following:

- Comply with traffic handling and sequence of operation schemes
- Do not change the following: horizontal/vertical alignments, beginning and ending bridge stations, minimum horizontal clearance, and span lengths
- Reduce vertical clearances from those indicated on the plans

Related Specifications

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>105</td>
<td>Control of Work</td>
</tr>
</tbody>
</table>
Plans Note: The prestressed concrete pile order lengths shown on the plans are the estimated pile lengths

Estimated Pile Lengths

- Estimated pile lengths shown on plans with more than 4 bents apply to the first 4 bents constructed
- The Engineer will adjust pile order lengths for the remaining bents based on pile driving for the first 4 bents constructed
- The Contractor may order lengths by furnishing and driving a test pile in a permanent pile location

Related Specifications

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>211</td>
<td>Bridge Excavation and Backfill</td>
</tr>
</tbody>
</table>