

October 13, 2017

AMENDMENT TO ADVERTISED CONTRACT

CONTRACT I.D. NUMBER: B1CBA1701737-1
GEORGIA PROJECT NUMBER: CSBRG-0007-00 (128)
PCN: 0007128
COUNTY: CHATHAM
AMENDMENT NUMBER: 4
LETTING DATE: OCTOBER 20, 2017
LETTING NUMBER: 011

THE FOLLOWING CHANGES ARE HEREBY MADE TO THIS CONTRACT. THE BIDDER IS RESPONSIBLE FOR MAKING ANY NECESSARY CHANGES IN THE PROPOSAL. BIDDER SHALL ACKNOWLEDGE THIS AMENDMENT BY CHECKING THE APPROPRIATE SPACE ON THE PROPOSAL SIGNATURE PAGE.

CSBRG-0007-00 (128) , PLANS

1. Drawing No. 35-0004, Under GENERAL NOTES, **Add:** "EXISTING BRIDGE MAINTENANCE - EXCEPT FOR INSTALLING AND MAINTAINING THE PROTECTIVE NETTING, CHATHAM COUNTY WILL MAINTAIN AND OPERATE THE EXISTING BRIDGES UNTIL STAGE I CONSTRUCTION IS COMPLETED AND TRAFFIC IS SHIFTED FROM THE EXISTING BRIDGES TO NEW CONSTRUCTION. ONCE TRAFFIC IS SHIFTED, THE CONTRACTOR SHALL MAINTAIN AND OPERATE THE EXISTING BRIDGES, INCLUDING RAISING AND LOWERING OF THE BASCULES TO MAINTAIN MARITIME TRAFFIC, UNTIL THE COMPLETION OF BRIDGE REMOVAL."

CSBRG-0007-00 (128) , SPECIAL PROVISIONS

1. **Add** Special Provision 502 - PLASTIC BRIDGE TIMBER dated October 12, 2017.
2. **Add** Special Provision 502 - COMPOSITE MARINE BRIDGE TIMBER dated October 12, 2017.
3. **Add** Special Provision 520 - COMPOSITE MARINE BRIDGE PILING dated October 12, 2017.

RICH WILLIAMS
STATE TRANSPORTATION OFFICE ADMINISTRATOR

**DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA**

SPECIAL PROVISION

**PROJECT NO.: CSBRG-0007-00(128), CHATHAM COUNTY
P.I. NO.: 0007128**

Section 502—Timber Structures

Add the following:

Section 502 — Plastic Bridge Timber

502.1 General Description

This work consists of supplying and installing plastic bridge timber for fender systems in association with highway bridges. Furnish and install plastic bridge timber in accordance with this Special Provision and the plans and Standard Specifications

502.1.01 Related References

A. Standard Specifications

Section 502 – Timber Structures

B. Referenced Documents

ASTM D 256
ASTM D 543
ASTM D 611
ASTM D 638
ASTM D 695
ASTM D 4060
ASTM D 4329
ASTM D 6117
ASTM D 6341

502.2 Materials

A. Physical Properties

Manufacture plastic bridge timber in one continuous process consisting of a polyethylene or polypropylene thermoplastic mixture of recycled plastics. Ensure that materials conform to the physical properties listed in Table 1. Add suitable additives and pigments to the matrix to obtain the required colors and physical processing properties. Provide a surface suitably roughened to provide for a non-skid surface for all plastic timber used for walkways.

TABLE 1 – PLASTIC BRIDGE TIMBERS TYPICAL PROPERTIES

Property	Value (Minimum)
Density	50 lbs/cu.ft
Compressive Strength	2,800 psi parallel
Tensile Strength	3,800 psi
Hardness	65 Shore D
Notched Impact Resistance, Method A	> 2.0 ft-lb/in (0.015 kg-m/mm)
Thermal expansion	<0.000033 in/in/ °F
Screw withdrawal	450 lbs
Nail Withdrawal	140 lbs
Seawater absorption	<0.240% weight increase
UV Resistance	<10% Change after 500 hours in Type D Durometer
Abrasion	<0.03 grams Weight Loss
Flammability (flash point)	644°F (340 °C)

502.3 Construction

A. Handling and Storage

Handle plastic timber carefully without sudden dropping, bruising, or penetrating the surface with tools. Handle plastic timber with non-metallic slings. Place all stored material in a well drained location, fully supported on the ground to prevent warping or bowing. Keep all hardware and miscellaneous metal in covered storage and protect from damage.

B. Framing

1. General

Accurately cut and frame all composite marine bridge timber to a close fit in such a way that the joints will have an even bearing over the entire contact surface. No shimming or open joints will be permitted.

2. Workmanship

Ensure that workmanship is in accordance with the plans and first class throughout. Evidence of poor workmanship will be cause for rejection of the work.

3. Holes for Bolts, Dowels, Rods, Cables and Lag Screws

Drill holes with the following diameters to receive these hardware items:

- Round drift bolts and dowels – 1/16 inch (1.6 mm) smaller
- Square drift bolts and dowels – same as least the dimensions
- Machine bolts – same as the diameter
- Rods – 1/16 inch (1.6 mm) larger
- Lag Screws – no larger than the body of the screw at the base of the thread

Countersink holes wherever smooth faces are required. Place holes in composite marine bridge timber in the middle of the member wherever practical. Maintain at least one inch clear distance to the edge of the member on all holes.

4. Bolts, Nuts, and Washers

Use washers of the specified size and type under all bolt heads and nuts to prevent their direct contact with the timber. Ensure that all bolts, nuts, and washers are unburnished stainless steel, A304 or A316. After nuts are adjusted do the following:

- Cut the excess length off of bolts projecting more than one inch (25 mm) beyond the nuts.
- Burr the bolt threads.

502.4 Measurement

Plastic bridge timber will be measured per thousand feet board measure (MBM) (cubic meter). Quantities in the structure will be computed based upon nominal sizes and the actual length in place.

No additional measurement will be made for splices.

Section 502 — Plastic Bridge Timber

No separate measurement for payment will be made for items such as the following:

- U-bolts
- V-bolts
- oval head bolts
- special couplings
- bolts
- nuts
- washers
- dowels
- nails
- spikes
- other hardware

502.5 Payment

This work will be paid for at the Contract Unit Price bid per thousand feet board measure (MBM) (cubic meter), complete in place and accepted. The payment will be full compensation for material, labor, and equipment necessary to complete the Work as shown on the Plans and as described in this Specification. Payment includes incidentals and all costs, direct and indirect.

Payment will be made under:

Item No. 502	Plastic Bridge Timber	Per MBM (cubic meter)
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**DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA**

SPECIAL PROVISION

**PROJECT NO.: CSBRG-0007-00(128), CHATHAM COUNTY
P.I. NO.: 0007128**

Section 520 — Piling

Add the following:

Section 520 — Composite Marine Piling

520.1 General Description

This work consists of supplying and installing composite marine piling for fender systems in association with highway bridges. Furnish and install composite marine piling in accordance with the Special Provision and the plans and Standard Specifications.

520.1.01 Related References

A. Standard Specifications

Section 520 – Piling

B. Referenced Documents

ASTM D 543
ASTM D 570
ASTM D 638
ASTM D 695
ASTM D 746
ASTM D 746 Modified
ASTM D 790
ASTM D 792
ASTM D 1761 Section 102
ASTM D 2240
ASTM D 4060
ASTM D 4329 UVA-340
ASTM E 12
ASTM F 489

Section 520 — Composite Marine Piling

520.2 Materials

A. Physical Properties

Manufacture composite marine piles in one continuous process consisting of a polyethylene or polypropylene thermoplastic matrix that surrounds sixteen 1 ¼ inch (32 mm) diameter fiberglass reinforcing rods arranged in a concentric pattern around the inside circumference of the pile. Ensure that the thermoplastic portion of the pile conforms to the characteristics listed in Table 1. Ensure that the fiberglass reinforcing elements conform to the characteristics listed in Table 2. Ensure that the outer skin of the pile consists of a protective layer that protects the pile from abrasion, ultraviolet deterioration and weathering effects. Manufacture piles as one continuous piece. Ensure that the outer skin is black in color and meets the tolerances as listed in Table 3. Ensure that structural properties are in accordance with Table 4.

TABLE 1 – PLASTIC PILE PROPERTIES

Density	Skin	55-63 lbs/cu.ft (881-1009 kg/m ³)
Density	Core	34-52 lbs/cu.ft (545-833 kg/m ³)
Water Absorption	Skin Core	2 hrs: <1.0% wt. increase 24 hrs: <3.0 wt. increase
Brittleness	Skin	No break at -40° F (-40°C)
Impact Resistance	Skin	Greater than 4.0 ft-lbs/in. (0.022 kg-m/mm)
Hardness	Skin	45-75 (Shore D)
Ultraviolet	Skin/Core	No more than 10% change in Shore D durometer hardness after 500 hours exposure
Abrasion	Skin	Weight Loss: < 0.001 lb (0.5 g) Wear Index: 2.5 to 3.0 Cycles = 10,000 Wheel = CS17 Load = 2.2 lbs (1 kg)
Chemical Resistance	Skin/Core Sea Water Gasoline No. 2 Diesel	< 1.5% weight increase < 7.5% weight increase < 6.0% weight increase
Tensile Properties	Skin/Core	Minimum 500 psi (3.45 MPa) at break
Compressive Modulus	Skin/Core	Minimum 40,000 psi (275.79 MPa)
Coefficient of Friction	Skin	Maximum 0.25, wet or dry
Nail Pull Out	Skin/Core	Minimum 60 lbs. (27.2 kg)

TABLE 2 – FIBERGLASS REINFORCING

Flexural Strength	Flexural Strength	70,000 psi (482.63 MPa)
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TABLE 3 – COMPOSITE MARINE PILING DIMENSIONS AND TOLERANCES

Fender Pile	Dimension	Tolerance
Length	Per order 85 feet (25.9 meters) maximum per piece	+1.0/-0.0 feet (+0.3/-0.0 meters)
Overall Diameter	16 inches (406 mm)	+0.5/-0.5 inches (+12.7/-12.7 mm)
Outer Skin Thickness	3/16 inches (4.8 mm)	+0.0/-0.125 inches (+0.0/-3.2 mm)

Section 520 — Composite Marine Piling

Reinforcing Element Circle Diameter (as defined by the outer edges of the reinforcing elements)	14 inches (356 mm)	+0.5/-1.0 inches (+12.7/-25.4 mm)
Straightness (gap, bend or bulge inside while lying on a flat surface)		<1.5 inches (38 mm) per 10 feet (3.05 meter) of length

TABLE 4 – STRUCTURAL PROPERTIES

Modulus of Elasticity	> 548,000 psi (3780 MPa)
Yield Stress	> 9,860 psi (68 MPa)
Stiffness, E.I.	>1.76 x 10 ⁹ lb-in ²
Bending Moment at Yield	>330 kip-ft (447 KN-m)
Weight	74-82 lbs/ft (110-122 kg/m)

Piles must exhibit recoverable deflection. Piles must not exhibit more than a 5% reduction in bending stiffness (EI) when cyclically load tested. As part of the submittal package, the manufacturer of the piles must provide cyclical, flexural load test results from an independent test laboratory. Cyclical load testing must be conducted on either a 13" (330 mm) O.D. or 16" (406 mm) O.D. pile. The test must be for a minimum of 200 load cycles. The test must be a four point load condition with a minimum 30.5' (9.3 meters) clear span and a minimum 15 feet (4.6 meters) shear span. The applied load must produce a minimum of 40% of the specified pile’s bending moment at yield.

520.2.01 Delivery, Storage, and Handling

E. Composite Marine Piling

Handle composite marine piling in a manner to prevent damage to the piles. Load or unload piles as per the manufacturers recommendations. Store piles in single layers directly upon the ground with a uniform level bearing for the full length of the pile.

520.3.05 Construction

E. Driving Piling

Drive piles utilizing vibratory or impact hammers in accordance with the manufacturer’s recommendations. Perform jetting and spudding if necessary in accordance with Section 520.3.05.G of the Standard Specification. Ensure that pile tolerance for driving is in accordance with Section 520.3.06.B of the Standard Specifications. Determine bearing capacity for driven piles in accordance with Section 520.3.05.D of the Standard Specifications

520.4 Measurement

Piles will be measured for payment in linear feet (meter) of piling in place accepted and measure for payment. No payment will be made for the cost of cutting off the pile nor for the pile cut off lengths.

520.5 Payment

This work will be measured as provided above and paid for at the respective contract price complete in place. These payments will be full compensation for all costs of complying with these specifications, including incidentals and additional work in conjunction therewith.

Payment will be made under:

Item No. 520	Composite Marine Piling, (Size)	Per linear foot (meter)
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**DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA**

SPECIAL PROVISION

**PROJECT NO.: CSBRG-0007-00(128), CHATHAM COUNTY
P.I. NO.: 0007128**

Section 502—Timber Structures

Add the following:

Section 502—Composite Marine Bridge Timber

502.1 General Description

This work consists of supplying and installing composite marine bridge timber for fender systems in association with highway bridges. Furnish and install composite marine bridge timber in accordance with this Special Provision and the plans and Standard Specifications.

502.1.01 Related References

A. Standard Specifications

[Section 502 – Timber Structures](#)

B. Referenced Documents

ASTM A 304
ASTM A 316
ASTM D 543
ASTM D 570
ASTM D 638
ASTM D 695
ASTM D 746
ASTM D 746 Modified
ASTM 790
ASTM D 792
ASTM D 953 Method A
ASTM D 2240
ASTM D 4060
ASTM E 12
ASTM F 489

Section 502—Composite Marine Bridge Timber

502.2 Materials

A. Physical Properties

Manufacture composite marine bridge timber in one continuous process and consisting of a polyethylene thermoplastic matrix that surrounds four 1-1/2 inch (38 mm) diameter fiberglass reinforcing rods spaced inside the four corners of the timber. Ensure that the thermoplastic portion of the member conforms to characteristics as listed in Table 1. Ensure that the fiberglass reinforcing elements conform to the characteristics as listed in Table 2. Steel reinforcing elements will not be permitted. Ensure that the outer skin of the member consists of a protective layer that protects the timber from abrasion, ultraviolet deterioration and weathering effects. Manufacture timber as one continuous piece. Ensure that the outer skin is black in color and meets the tolerances as listed in Table 3. Ensure that structural properties are in accordance with Table 4.

TABLE 1 – THERMOPLASTIC MATERIAL TYPICAL PROPERTIES

Density	Skin	55-63 lbs./cu.ft (881-1009 kg/m ³)
Density	Core	34-52 lbs./cu.ft (545-833 kg/m ³)
Water Absorption	Skin	2 hrs: <1.0% wt. increase
	Core	24 hrs: <3.0% wt. increase
Brittleness	Skin	No break at -40°F (-40°C)
Impact Resistance	Skin	Greater than 4.0 ft-lbs/in. (0.022 kg-m/mm)
Hardness	Skin	45-75 (Shore D)
Abrasion	Skin	Weight Loss: < 0.001 lb (0.5 g)
		Wear Index: 2.5 to 3.0
		Cycles = 10,000
		Wheel = CS17 Load = 2.2 lbs (1 kg)
Chemical Resistance	Skin/Core	<1/5% weight increase <7.5% weight increase <6.0% weight increase
	Sea Water	
	Gasoline	
	No. 2 Diesel	
Tensile Properties	Skin/Core	Minimum 500 psi (3.45 MPa) at break
Compressive Modulus	Skin/Core	Minimum 40,000 psi (275.79 MPa)
Coefficient of Friction	Skin	Maximum 0.25, wet or dry
Nail Pull Out	Skin/Core	Minimum 60 lbs. (27.2 kg)
Bearing Strength	Skin/Core	Minimum 1,500 psi (10.34 MPa)

TABLE 2 – FIBERGLASS REINFORCING

Flexural Strength	Flexural Strength	70,000 psi (482.63 MPa)
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Section 502—Composite Marine Bridge Timber

TABLE 3 - COMPOSITE MARINE TIMBER DIMENSIONS AND TOLERANCES

Plastic Timber	Dimension	Tolerance
Length	Per order 85 feet (25.9 meters) maximum per piece	+1.0/-0.0 feet (+0.3/-0.0 meters)
Width	10 inches (254 mm) or 12 inches (305 mm)	+0.5/-0.5 inches (+12.7/-12.7 mm)
Height	10 inches (254 mm) or 12 inches (305 mm)	+0.5/-0.5 inches (+12.7/-12.7 mm)
Outer Skin Thickness	3/16 inches (4.8 mm)	+0.125/-0.125 inches (+3.2/-3.2 mm)
Reinforcing: One rebar in each corner	The centers of each 1.5-inch (38 mm) rebar to be 1.88 inches (47.8 mm) from the side of the timber	+0.5/-0.5 inches (+12.7/-12.7 mm)
Straightness (gap, bend or bulge inside while lying on a flat surface)		<1.5 inches (38 mm) per 10 feet (3.05meter) of length

TABLE 4 – STRUCTURAL PROPERTIES

	10 in x 10 in (254 mm x 254mm)	12 in x 12 in (305 mm x 305 mm)
Modulus of Elasticity	> 460,000 psi (3170 MPa)	> 375,000 psi (2585 MPa)
Yield Stress	> 8,280 psi (36 MPa)	> 6,740 psi (46 MPa)
Stiffness, E.I.	> 3.56 x 10 ⁸ lb-in ²	> 6.08 x 10 ⁸ lb-in ²
Bending Moment at Yield	>107 kip-ft (145 kN-m)	>151 kip-ft (205 kN-m)
Weight	35-43 lbs/ft (52-64 kg/m)	46-53 lbs/ft (62-79 kg/m)

1. Modulus of Elasticity

Determine the Modulus of Elasticity of a full size specimen by conducting a three point bend test with a load applied in the center of a simply supported 14 feet (4.3 meter) span at a deflection rate of 0.25 inches (6 mm) per minute. The Modulus is to be taken at a strain of 0.01 inches per inch, where strain equals (6) x (depth of cross section) x (deflection) / (span length squared) and where Modulus of Elasticity equals (load) x (span length cubed) / [(48) x (deflection) x (moment of inertia)].

502.3 Construction

A. Handling and Storage

Handle composite marine timber carefully without sudden dropping, bruising, or penetrating the surface with tools. Handle timber with non-metallic slings. Place all stored material in a well drained location, fully supported on the ground to prevent warping or bowing. Keep all hardware and miscellaneous metal in covered storage and protect from damage.

B. Framing

1. General

Accurately cut and frame all composite marine bridge timber to a close fit in such a way that the joints will have an even bearing over the entire contact surface. No shimming or open joints will be permitted.

Section 502—Composite Marine Bridge Timber

2. Workmanship

Ensure that workmanship is in accordance with the plans and first class throughout. Evidence of poor workmanship will be cause for rejection of the work.

3. Holes for Bolts, Dowels, Rods, Cables and Lag Screws

Drill holes with the following diameters to receive these hardware items:

Round drift bolts and dowels – 1/16 inch (1.6 mm) smaller

Square drift bolts and dowels – same as least the dimensions

Machine bolts – same as the diameter

Rods – 1/16 inch (1.6mm) larger

Lag Screws – no larger than the body of the screw at the base of the thread

Countersink holes wherever smooth faces are required. Place holes in composite marine bridge timber in the middle of the member wherever practical. Maintain at least one inch clear distance to the edge of the member on all holes.

4. Bolts, Nuts, and Washers

Use washers of the specified size and type under all bolt heads and nuts to prevent their direct contact with the timber. Ensure that all bolts, nuts, and washers are unburnished stainless steel, A304 or A316. After nuts are adjusted do the following:

- Cut the excess length off of bolts projecting more than one inch (25 mm) beyond the nuts.
- Burr the bolt threads.

502.4 Measurement

Composite marine bridge timber will be measured for payment in linear feet (meter) of timber in place accepted and measured for payment.

502.5 Payment

This work will be measured as provided above and paid for at the respective contract price complete in place. These payments will be full compensation for all costs of complying with these specifications, including incidentals and additional work in conjunction therewith.

Payment will be made under:

Item No. 502	Bridge Timber, Composite Marine, Size ___ in (mm)	Per linear foot (meter)
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