

ITEM 08557.4011 M - EXODERMIC BRIDGE DECK WITH CLASS DP CONCRETE (PRECAST)

DESCRIPTION:

This work shall consist of fabricating, furnishing, delivery to the job site and installing steel grid panels, epoxy coated reinforcing steel, metal forms, precast concrete and cast-in-place concrete as shown in the contract plans and in accordance with Manufacturer's recommendations.

MATERIAL REQUIREMENTS:

Obtain the steel grid panels for the patented exodermic deck from:

L. B. Foster Company	or	IKG Greulich
1016 Greentree Road		P.O. Box 295, Route 910
Pittsburgh, PA 15220		Cheswick, PA 15024
TEL: (412) 928-7820		TEL: (412) 828-2223
FAX: (412) 928-3514		FAX: (412) 828-4103

or other licensed exodermic deck steel grid panel manufacturers. Licensing status and other information can be obtained from:

Exodermic Bridge Deck , Inc.
60 Long Pond Road
Lakeville, CT 06039
TEL: 860-435-0300 or toll free: 888-EXODERM (396-3376)
FAX: 860-435-4868
E-MAIL: info@exodermic.com

Notify the Engineer of the name, address, telephone number, and contact person of the steel grid panel manufacturer.

Exodermic Panels:

Structural Steel - (ASTM A36M with a minimum 0.20% copper content, unless the plans show otherwise.)	§715-01
Galvanized Coatings and Repair Methods	§719-01
Leveling Bolts	ASTM F568M, Class 4.6
Nuts	ASTM A563M

Use galvanized steel, sheet metal conforming to ASTM A653M for the forms.

Use ASTM A366M for sheet metal that is installed prior to galvanizing the panels.

Cast-In-Place and Precast DP Concrete:

All materials for superstructure slabs and structural approach slabs	§557-2
Stud Shear Connectors	§709-05

Shear keys and other field-placed concrete shall meet the requirements of Subsection 701-09 of the Standard Specifications.

For the Class DP portland cement concrete, follow §555-2 and proportion according to the mix criteria below. Use a Water-Reducing and Retarding Admixture (§711-08) to delay setting until after final

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concrete placement and finishing, and produce the desired slump without exceeding the maximum water-cementitious material ratio.

Cement (kg/m ³)	318
Fly ash (kg/m ³)	86
Microsilica (kg/m ³)	26
Sand - % of total aggregate (solid volume)	45.8
Maximum water/cementitious material ratio (430 kg total)	0.40
Desired air (%)	7.5
Allowable air (%)	6.0 - 9.0
Desired slump (mm)	100
Allowable slump (mm)	75 - 125
Aggregate gradation	CA 1
NOTE: Criteria given for design information is based on a fine aggregate fineness modulus of 2.80. Determine the mixture proportions by using actual fineness modulus and bulk specific gravities (saturated surface dry for aggregate). Compute proportions according to Department written instructions.	

Section 711-12 - Ground Granulated Blast Furnace Slag (GGBFS) may be substituted, in total, for fly ash and shall appear on the Department's Approved List.

Supply either a densified powder or slurry form of microsilica admixture whose brand name appears on the Department's Approved List. Use only one brand for any structural element. Provide written certification from the Supplier that the microsilica meets the requirements of the Materials Bureau. Include the following data: fineness, silica content, total chloride ion content, solids content for slurries, and moisture content for densified powders.

Agitate the slurry as necessary to prevent separation. Remove and replace slurry that reaches a temperature less than 0°C., at no cost to the Department.

The Regional Materials Engineer will take a ½ - 1 liter microsilica sample directly from the storage container, for each days placement, for testing by the Department.

If densified powder is used, and added independently - weigh cumulatively in the following order: cement, fly ash and microsilica. Base the batching tolerance of ±½% on the total mass of cementitious material, for each material draw mass.

If densified powder is used as part of a blended cement - weigh cumulatively in the following order: blended cement and fly ash. Base the batching tolerance of ±1% on the total mass of cementitious material, for each material draw mass.

If microsilica slurry is used - use proportioning equipment approved by the Regional Materials Engineer. Add through an existing automation system or a two stop, off-line automated, batching system meeting the following requirements:

- Delivery accuracy - ±1% (by volume)
- Program quantity - liters (nearest half liter)
- Batching tolerance - ±2.0% (by volume)
- System interlocks
- Print requirements:
 - a. Date and time
 - b. Truck number (or alternate method relating microsilica to batch ticket)
 - c. Delivered quantity (liters, nearest half liter)

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Locate the control box/printer for a two stop, off-line batching system at the batch plant operator's work station unless otherwise approved by the Regional Materials Engineer.

Calibrate in accordance with procedures approved by the Regional Materials Engineer. Recalibrate the entire system if part or all of the off-line system is moved.

CONSTRUCTION DETAILS:

Grid Manufacturing Details:

Prior to steel grid panel manufacture, check the proposed panel layout and verify all shop drawing dimensions and cross-slopes in the field for accuracy.

Manufacture the steel grid panels with the properties and to the dimensions shown on the plans, shop drawings, and in accordance with Section 564 - Structural Steel, and the New York State Steel Construction Manual.

Gas Metal Arc Welding (MIG) may be used for steel grid panel manufacture. Prior to welding, an approved Procedure Qualification Record (PQR) and Welding Procedure Specification (WPS) are required in accordance with the New York State Steel Construction Manual.

Use the Bridge Grid Flooring Manufacturers Association current standards for dimension tolerances.

After the attachment of all edge bars, leveling devices (with clearance for on-top field adjustment), and other components, galvanize the grid according to §719-01 Type I. Repair defects in galvanizing as specified in §719-01.

Identify each steel grid panel for correct placement on the structure. Support the steel grid panels with wood or similar blocks to avoid distortion or other damage during transportation and storage.

DP Concrete Placement

Apply the provisions of §557-3.01 with the following modifications:

1. Install epoxy coated reinforcing steel in accordance with Section 556 - Reinforcing Steel for Concrete Structures. Position the top rebars, which run in the same direction as the main bars, a minimum 25 mm away from the web of the main bars.
2. If concrete construction joints exist, coat the surface with portland cement bonding grout as per §584-3.07.
3. Handle and place concrete according to §555-3.06, Handling and Placing. Insert concrete vibrators deeper at the shear key areas. Finish the concrete wearing surface according to §557-3.09, finishing integral wearing surfaces on superstructure slabs.
4. Cure concrete according to §557-3.12, curing.
5. Precast panels may be lifted from the forms after the average compressive strength of any three (3) cylinders exceeds 24 MPa.
6. Identify and repair damaged or defective concrete according to §584-3.15.

7. Mark completed panels with their proper identification number, and proper orientation for placement on the structure.
8. Support panels properly during storage and transportation. Use wood lagging to prevent damage to concrete or galvanized coatings.

Exodermic Panel with Precast Concrete Installation:

1. When rehabilitating a structure, and prior to exodermic panel installation, blast clean the top surface of beam flanges, and the surfaces of concrete or reinforcing that will be in contact with new concrete, according to §584-3.04A. and B.
2. Check the exodermic panels for defects and identification. Repair or replace exodermic panels or metal forms damaged during shipment and site storage to the satisfaction of the Engineer.
3. Position exodermic panels on the steel beams and align with adjacent panels. Measure from fixed points to avoid cumulative error. Adjust elevations with the attached leveling devices and square-up as necessary.
4. After sheet metal form and miscellaneous form installation, attach the shear studs through openings in the exodermic panels as per §556-3.03. With precise layout, and the Engineer's permission, shear studs may be welded in place prior to placing the exodermic panels.
5. Break the ceramic ferrules around the welded studs, and remove all debris.
6. Place rapid-setting concrete in the shear keys and where indicated on the Contract Plans. The placement of the rapid setting concrete shall conform to the following requirements:
 - a. Place rapid setting concrete material only when the ambient air temperature is within the range recommended by the manufacturer.
 - b. Sandblast clean all precast surfaces prior to placement of the rapid setting concrete. Take care to protect the galvanized grid and epoxy rebar from damage during the cleaning operation.
 - c. The rapid setting material shall be firmly worked into the area and shall be consolidated by internal vibration in accordance with §555-3.04B "Vibrating" to minimize voids in the concrete.
 - d. Finishing. The rapid setting material shall be hand screeded and finished to meet the adjacent elevation, cross slopes and texture, unless otherwise directed by the Engineer.
 - e. The rapid setting concrete shall be wet burlap cured or as recommended by the approved manufacturer.
 - f. No vehicles will be allowed on the deck panels before the rapid setting concrete has reached a minimum compressive strength of 17.2 MPa.

METHOD OF MEASUREMENT:

This work will be measured as the number of square meters of exodermic deck shown on the contract plans.

BASIS OF PAYMENT:

The unit price shall include the cost of all labor, materials and equipment necessary to complete the work.

Make progress payments on a per span basis as follows:

1. 40 percent of the estimate area after delivery of the steel grid panels with properly cured precast concrete.
2. 40 percent of the estimate area after installation of the panels.
3. Pay the remainder after curing of cast-in-place shear keys is complete.

This Specification has been Disapproved by EI 04-021