Oregon TECH
Procurement & Contract Services

Klamath Falls:
541.885.1133 (office)
3201 Campus Drive
Klamath Falls, OR 97601

Portland-Metro
503.821.1266 (office)
27500 SW Parkway Avenue
Wilsonville, OR 97070

INVITATION TO BIDDERS #2024-01
INDUSTRIAL PARK DRIVE IMPROVEMENTS
RESPONSE TO CLARIFYING QUESTIONS II
March 7, 2024

Note that these are questions submitted by interested firms to this solicitation. The below answers are for clarification purposes only and in no way alter or amend the BID as published.

1. **QUESTION**: Knife River Concrete Store, in regards to utilizing #3 Gator Bar (fiberglass rebar) in lieu of steel rebar in the flatwork on the Industrial Drive Improvements Project at Oregon Tech. Knife River Concrete Store has attached data sheets with prescriptive tables that explain how to replace steel rebar and welded wire mesh in flatwork, their ICC and ESR certification, a University of Miami study preformed on the bar, a submittal packet, a design and installation manual from the ICC, and a designed and stamped footing using Gator Bar by Oregon PE Patrick Ford.

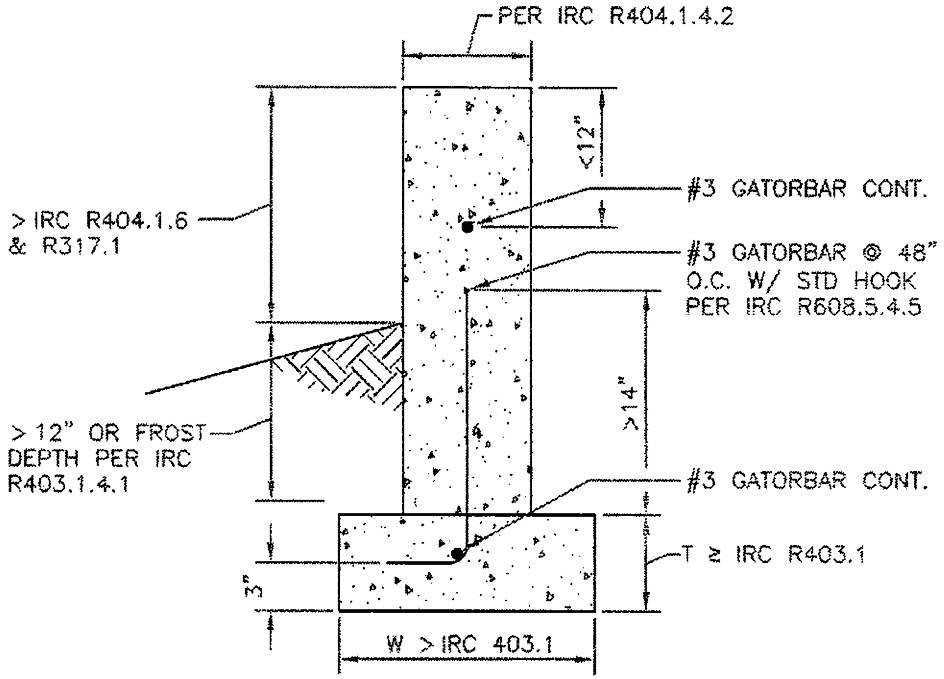
   Knife River Concrete Store is sure Oregon Tech will come to see the many benefits of the material itself another key benefit is it's cost effectiveness in comparison to traditional steel rebar and welded wire mesh. The most advantageous way to utilize fiberglass rebar is by replacing #4 steel with #3 Gator Bar and replacing #5 steel with #4 Gator Bar. Replacing #4 steel with #3 Gator Bar would yield savings between 25-30% per 20' stick, depending on the cost of steel rebar.

   ANSWER: After review of the provided documents, Gator Bar (fiberglass rebar) is an approved alternate to the currently specified steel rebar for the reinforced concrete flatwork only, for the Industrial Park Drive project. Attachments referenced in Knife River Concrete Store question are attached as Exhibits A – H in this Response to Clarifying Questions II.

End of Clarifying Questions

EXHIBIT A – GATORBAR OR DRAWING LETTER

[Please see attached.]



1. CONCRETE PER IRC R402.2
2. SEISMIC DESIGN CATEGORIES A, B, C, D_0, D_1 & D_2
3. APPLIES TO ONE AND TWO FAMILY RESIDENTIAL DWELLINGS OF THREE STORIES OR LESS, SUPPORTING LIGHT FRAMED CONSTRUCTION.

CONCRETE STEM WALL & FOOTING

REGISTERED PROFESSIONAL ENGINEER
18,077
OREGON
SEPT. 19 1995
PATRICK W. FORD
1/24/18

MATSEN FORD DESIGN
Associates, INC.

January 24, 2018

Mr. Ken Keranen, COO
Neuvokas Corp.
3206 Number 6 Rd,
Ahmeek, MI 49901

RE: Use of GatorBar® in Residential Foundations

Dear Mr. Keranen:

Per your request, I have reviewed the use of GatorBar reinforcing in residential footings as shown in the attached details.

In my professional opinion as a registered Professional Engineer in the State of Oregon, the #3 GatorBar® may replace #4 steel bars, and may be used as indicated in footings, thickened edge slab foundations, and stem walls in one- or two-family residential construction. This would be applicable to buildings of three stories or less of light framed construction in Seismic Design Categories A to D_2, since it meets or exceeds the intent of the International Building Code (IBC) and the International Residential Code (IRC).

The reasoning is fairly straightforward: in this particular instance, the footings and foundations in question would be considered plain concrete per ACI 318, which defines plain concrete as follows: "Plain Concrete – Structural concrete with no reinforcement or with less reinforcement than the minimum amount specified for reinforced concrete". The typical specified amount of reinforcement for stem wall and thickened edge slab footings per the IBC or IRC is less than the minimum for reinforced concrete. Therefore, by definition these are plain concrete footings with longitudinal bars included. Stem walls are considered as part of the footing/foundation under the IRC and their requirements are included under the Footings Section. In Seismic Design Categories D_0, D_1, or D_2 a longitudinal #4 bar is required within the top 12 inches of the stem wall and another longitudinal #4 bar at 3 to 4 inches above the bottom of the footing. Additionally, when the stem wall is poured separately from the footing, vertical #4 bars are required at not more than 48 inches on center (much greater than the minimum spacing allowed by ACI 318 for reinforced concrete construction) with hooks extending into the footing and at least 14 inches into the stem wall. This amount of reinforcement is also insufficient to qualify this as a reinforced concrete wall. It is a plain concrete wall, with a minimum prescribed amount of reinforcement. For the longitudinal bars, substitution of #3 GatorBar® for #4 steel would be acceptable, since they provide greater tensile strength. The vertical bars, since they are only required where the stem wall is placed after the footing, provide some tensile reinforcement to prevent overturning of the wall and some small amount of shear at the construction joint. For this purpose #3 GatorBar® with a tensile strength of 14.6 kips is greater than Grade 40, #4 steel with a tensile yield of 7.85 kips and would be acceptable in my opinion. Direct substitution would meet the apparent design intent of the IRC requirement.

N8 W22350 JOHNSON DRIVE, B9
WAUKESHA, WI 53186
(262)-522-9500 matsenford.com

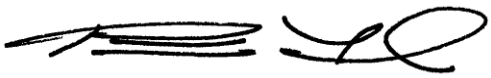
RE: Use of GatorBar® in Residential Foundations (continued)

Regarding spread footings used in seismic design code areas D_0 to D_2; supporting foundation walls with light frame construction above, for up to three story residential buildings, must have dimensions as specified in the IBC and meet ACI 318. ACI 318 states that foundations of structural plain concrete are not allowed in Seismic Design Categories D, E, or F, except for "detached one-and two-family dwellings three stories or less, with stud bearing walls." Plain concrete is allowed by ACI 318 for footings for the excepted category of buildings, which is incorporated by reference into the IBC. The IBC applies to any building type, so it encompasses the limited IRC buildings, which only applies to one- and two-family residential dwellings, three stories and less. However, in many places, it is customary to provide longitudinal bars and at least one #4 bar is placed in the top and bottom of the footing. Therefore, in these instances, the use of #3 GatorBar® would also be acceptable.

We also analyzed the GatorBars for compatibility based on strength and elongation for the purposes of maintaining the concrete integrity under shrinkage and temperature stresses. We find that the #3 GatorBars as shown are more than adequate for this purpose.

The foregoing is my professional opinion based on the given properties of the GatorBar as well as the applicable codes and my interpretation of their intent. Please feel free to contact me should you have any questions about this opinion.

Sincerely,



Patrick W. Ford, P.E.
OR P.E. 18077
Matsen Ford Design Associates, Inc.

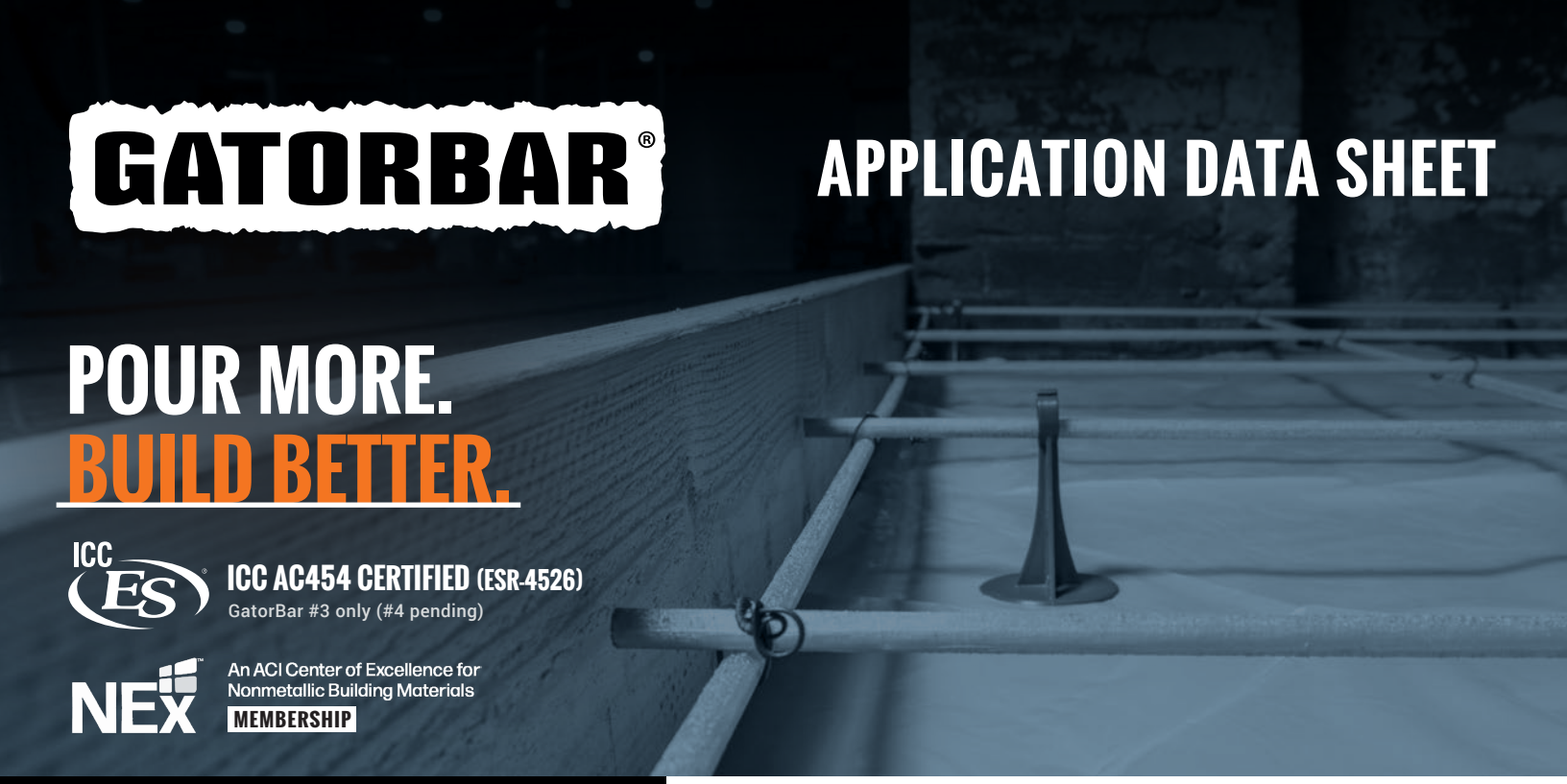
N8 W22350 JOHNSON DRIVE, B9
WAUKESHA, WI 53186
(262)-522-9500 matsenford.com

EXHIBIT B – GATORBAR APPLICATION DATA SHEET WITH NEUVOKAS CORPORATION SUBMITAL FOR GLASS FIBER REINFORCED POLYMER (GFRP) FOR CONCRETE REINFORCEMENT

[Please see attached.]

GATORBAR®

APPLICATION DATA SHEET



POUR MORE. BUILD BETTER.

ICC AC454 CERTIFIED (ESR-4526)
GatorBar #3 only (#4 pending)

An ACI Center of Excellence for Nonmetallic Building Materials
MEMBERSHIP

PHYSICAL PROPERTIES

	#3 BAR	#4 BAR
Nominal Diameter	10 mm 3/8 in	13 mm 1/2 in
Weight	.09 lbs/ft (1.8 lbs/stick) >75% Fiber Content	.166 lbs/ft (3.32 lbs/stick) >75% Fiber Content
Guaranteed Tensile Strength ASTM 7205	1100 MPa 155 ksi 17,100 lbs	1100 MPa 155 ksi 30,400 lbs
Tensile Modulus of Elasticity ASTM7205	47 GPa 6.8 x 10^6 psi	49 GPa 7.1 x 10^6 psi
Guaranteed Transverse Shear Capacity ASTM 7617	185 MPa 26.8 ksi 6,800 lbs	185 MPa 26.8 ksi 10,500 lbs
ICC-ESR	AC454 Certified (ESR-4526) for #3 AC521 (#3 & #4 pending)	
Bond Strength ASTM D7913	1400 psi guaranteed for #3 (#4 pending)	
Moisture Content ASTM D570	< 0.25% (both #3 & #4)	
Performance Standards	Above performance criteria are met or exceeded in accordance with ASTM D7957, ASTM D7913, ACI440.11, and AC454	

100% MADE IN THE USA

PATENT #9688030B2 | ZERO POLYESTER

PRODUCT FEATURES

LOW COST
WINS ON INITIAL & TOTAL COST

LIGHTWEIGHT
LABOR & FREIGHT SAVINGS

HIGH STRENGTH
4X-7X STRONGER IN TENSILE STRENGTH

RUST-FREE
USE IN HIGH CHLORIDE

APPLICATIONS

- ✓ PAVEMENTS
- ✓ PARKING LOTS
- ✓ CURB & GUTTER
- ✓ SIDEWALKS
- ✓ COMMERCIAL FLOORS
- ✓ POURED WALLS
- ✓ FOUNDATIONS & FOOTINGS
- ✓ AND MANY MORE!

GATORBAR VS STEEL

Tensile Strength & Weight Comparisons*

STEEL REBAR	#3 GATORBAR		#4 GATORBAR	
(GRADE 60)	STRONGER	LIGHTER	STRONGER	LIGHTER
#3 STEEL	2.7X	4X	4.4X	2.3X
#4 STEEL	1.5X	7.4X	2.5X	4X
#5 STEEL	~EQUAL	11.6X	1.6X	6.3X

*For crack control consideration. It is not Neuvokas' intent to imply that composite rebar can replace steel in all applications.

225,000,000 FEET IN CONCRETE & COUNTING.

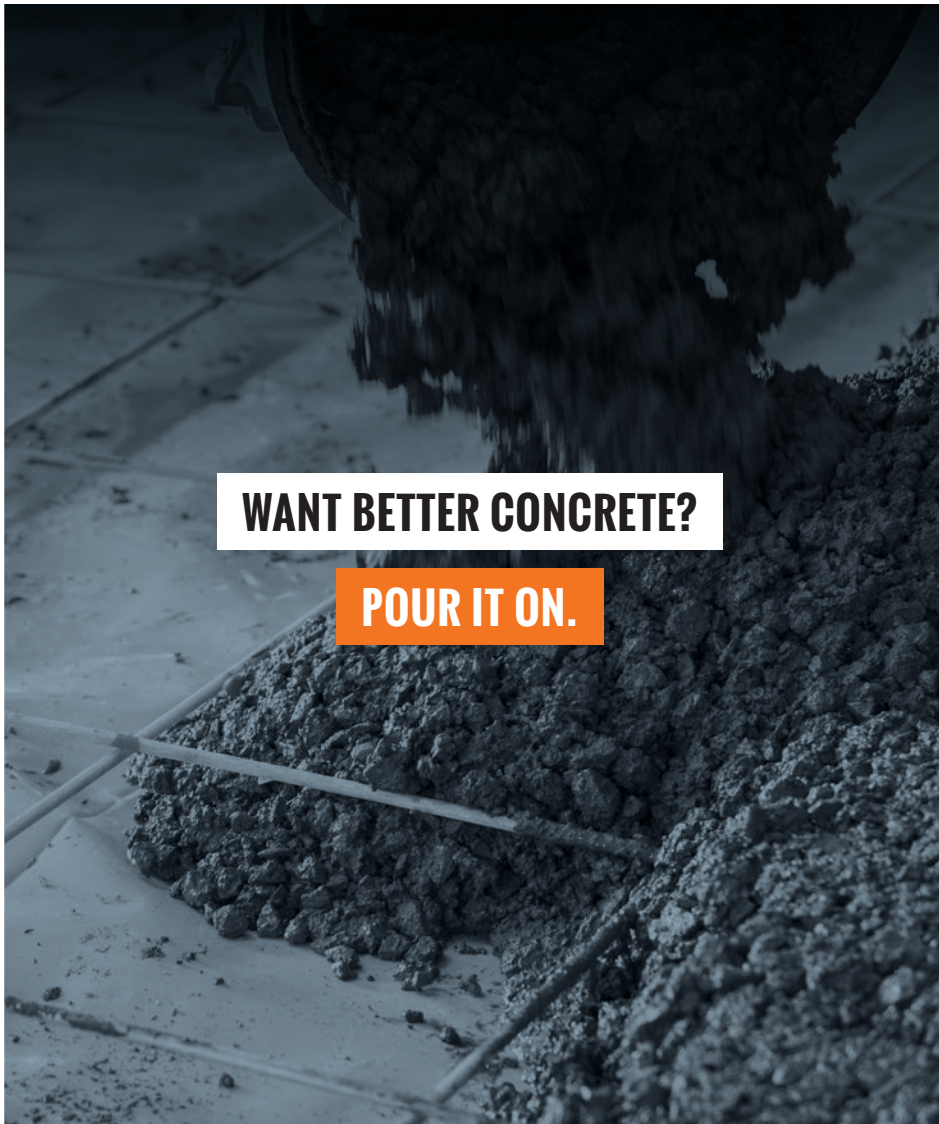
906.934.2661 | GATORBAR.COM

GATORBAR®

RAINY DAY? TIE ANYWAY.

BUST BAR. NOT YOUR BACK.

DRIVE ON. DRIVE OFF.



WANT BETTER CONCRETE?

POUR IT ON.

NEUVOKAS CORPORATION

SUBMITTAL
FOR
GLASS FIBER REINFORCED POLYMER (GFRP) FOR CONCRETE REINFORCEMENT

a. Description. This work consists of furnishing and placing glass fiber reinforced polymer **(**GFRP) reinforcement as detailed on the plans and specified herein.

b. GatorBar material properties are described in ESR-4526 and as applicable this document will match those requirements. This certifies that GatorBar meets the material performance and quality criteria set forth by the International Code Council (ICC) in AC 454 and AC10.

c. Materials. Furnish GFRP reinforcement that meet the following material specifications and requirements and are fabricated in accordance with the details on the plans. The size of GFRP bars shall be consistent with typical standard sizes of steel reinforcing bars.

1. Fibers. Use fibers in the form of unidirectional rovings of given size and weight with fiber sizing and coupling agents that are compatible with the resin system used to impregnate them. The GFRP reinforcement must contain 70 percent minimum, by weight of glass fiber.

2. Resin Matrix. Use commercial grades of resin. Ensure the base polymer in the resin system does not contain any polyester. Polyester based resin will not be permitted in the manufacturing process of the bar. Ensure the glass transition temperature (T_g) of the resin is not less than 212 degrees Fahrenheit (F). The glass transition temperature of the resin does not represent a service level maximum temperature, but a quality assurance tool used by the manufacturer. Test the resin matrix in accordance with the Differential Scanning Calorimetry (DSC) method as described in *ASTM E 1356*.

3. Fillers: Inorganic fillers and secondary fibers may be used, but their quantity shall not exceed 20% by weight of the base polymer resin specified. Commercial grade additives and process aids such as release agents, low profile shrink additives, initiators, promoters, hardeners, catalysts, pigments, fire-retardants, and ultra violet inhibitors are permitted and depend on the process method. If used, limit shrink additives to less than 20% by weight of the polymer resin.

4. Mechanical properties. Furnish GFRP with the following minimum requirements:

    a. Tensile Strength: this property varies with bar size. The minimum tensile strength of GFRP reinforcement is listed in Table 1. Testing shall be in accordance to ASTM D7205.

Table 1. Minimum Tensile Strength Requirements

Bar Size	Minimum Tensile Strength (ksi)
3	155
4	155

b. Tensile Modulus: The nominal tensile modulus of elasticity shall average 6,810 ksi according to ASTM D7205.

c. Transverse Shear: Transverse shear is tested according to ASTM D7617. The minimum transverse shear for all bars shall be 27 ksi.

d. Moisture Absorption: Moisture absorption tests shall be determined in accordance with ASTM D570. The maximum value of this test shall follow ACI recommendations and be less than 1.0%.

e. Bond Strength: The guaranteed bond strength for all bars must follow ACI recommendations of ACI 440.6-08, 1.4 ksi. The manufacturer is to disclose the test method used for testing bond strength. A suggested test method is ACI 440.3R test method B3.

f. Ultimate Tensile Strain: The ultimate tensile strain shall be calculated by dividing the guaranteed tensile strength by the nominal tensile modulus of elasticity. The nominal values obtained by this procedure should at least be 1.4%.

Provide GFRP rebar (GatorBar) as manufactured by:

Neuvokas Corp., 3206 Number 6 Road, PO Box 220, Ahmeek, MI 49901, (906) 934-2661

d. Construction. Before ordering material, submit approved drawings and specifications to manufacturer for quotation. This should include: bar size, length, bent shape and radius of bends, and quantities in linear feet. GFRP reinforcement bars shall be uniform in diameter/ size and free of defects that would be injurious to the mechanical and durability properties. Defects include: cracks, kinks, and surface pitting. Slight discoloration over time is typical and is not cause for concern.

1. Field Fabrication. Provide composite reinforcement in accordance with the details shown on the plans. The minimum bending radius is two feet and must utilize the necessary tying and stabilization methods to ensure reinforcement remains in the proper position before and during concrete placement. Field cut reinforcement may be accomplished using high speed grinding cutter, fine blade saw, diamond blade, or masonry blade.

2. Handling. Bars can be handled similar to their steel counterparts. Minor scratches and chipping that do not impact performance may be permitted with approval of the Engineer.

3. Storage of Reinforcement. Store reinforcement above the surface of the ground on platforms, skids, pallets, or other supports. If stored outside for an extended period of time GatorBar will yellow and it can be covered if desired. Overall strength is not affected by this yellowing and GatorBar does not need to be covered.

4. Placing and Fastening. Place all reinforcement within the tolerances recommended in the CRSI "Manual of Standard Practice" unless otherwise specified in the contract documents. Secure reinforcement firmly with mechanical fasteners during the placing and setting of the concrete. Suspend concrete placement and take corrective action if it is observed that

the reinforcement is not adequately supported or tied to resist settlement, floating upward, or movement in any direction during concrete placement.

5. Ties and Supports. It is recommended that all accessories for use with the bars such as tie wires, bar chairs, supports or clips are either plastic coated steel, stainless steel, galvanized steel or plastic, but that depending on engineering plans or application plain steel may be used. Place all reinforcement in locations as shown on the plans and securely hold in position while placing and consolidating concrete. Fasten bars together with ties at all intersections.
6. Lap Splices. Lap splices are the only approved method to tie bars together to make a continuous bar. Mechanical splices are prohibited. Ensure lap length and spacing is as specified in the contract. Provide the same cover clearances for splices that is shown or specified for the reinforcement.

EXHIBIT C – GATORBAR PRODUCT BROCHURE

[Please see attached.]

GATORBAR®

ICC ES ICC AC454 CERTIFIED
(ESR-4526)

ICC certification for GatorBar #3 only. #4 pending.

- LOWER COST
- 2X STRONGER IN TENSILE
- 4X LIGHTER
- ZERO SLIVERS
- RUST FREE
- BETTER BOND
- AVAILABLE IN #3 & #4 BAR
- 100% USA MADE

WANT HIGHER MARGINS?

HOLD MY BAR

COMMERCIAL APPLICATIONS

PARKING LOTS

CURB & GUTTER

BUILDING SLABS

HIKE & BIKE TRAILS

RESIDENTIAL APPLICATIONS

PATIOS & DECORATIVE

DRIVEWAYS

POOL DECKS

FOUNDATIONS/STEM WALLS

GATORBAR®

AMERICA'S REBAR

100% USA MADE

HUNDREDS OF MILLIONS OF FEET IN CONCRETE

BUILD BETTER WITH AMERICA'S REBAR:

1. LOWER COST

PROTECT MARGINS, PROJECTS, & BIDS with a higher performing, lower cost alternative to steel reinforcement.

PRICE STABILITY. Steel prices change every two weeks and can fluctuate dramatically.

2. STRONGER

MEETS & EXCEEDS PERFORMANCE STANDARDS: ACI440.11, ASTM D7957, AC454, AC521 (pending)

3RD PARTY TESTED PER THE FOLLOWING PERFORMANCE STANDARDS:
ASTM D2584, E1640, E2160, D7205, D792, D7705, D7913, D7617, D570

ICC AC454 CERTIFIED (ESR-4526) for #3 bar. #4 bar pending

BETTER BOND. Increased pull-out strength above ASTM D7957

3. FASTER

ZERO SLIVERS. Sliverless Grip Technology for better handling.

GATORBAR IS LIGHTWEIGHT, reducing install time by over 40%.

LOWER TRANSPORT COST. 400 20-foot pieces of #3 GatorBar can be transported on a ladder rack without going over weight limits.

INCREASE BILLING. Less labor equals more projects completed.

FEWER INJURIES. Lightweight rebar leads to less fatigue and lifting injuries, more productive up-time, and **REDUCED WORKERS COMP.**

NEX An ACI Center of Excellence for Nonmetallic Building Materials MEMBERSHIP

GATORBAR®

GET A GRIP

info@gatorbar.com

906.934.2661 | GATORBAR.COM

HOW TO

CUT

SPACE

GENERAL RECOMMENDATIONS RESIDENTIAL & COMMERCIAL

Flatwork, footers, and walls less than 8' should maintain project's specified spacing and frequency.

For other applications, please contact GatorBar engineers for spacing and frequency recommendations.

TIE

Tie just like steel

CHAIR

Chair up GatorBar for best results

EXHIBIT D – GATORBAR WELDED WIRE MESH REPLACMENT BROCHURE

[Please see attached.]

GATORBAR®

WELDED WIRE MESH REPLACEMENT

AMERICA'S REBAR

Proudly made in Michigan's Upper Peninsula

ICC AC454 CERTIFIED (ESR-4526)
GatorBar #3 only (#4 pending)

An ACI Center of Excellence for Nonmetallic Building Materials
MEMBERSHIP

PRODUCT FEATURES

- **LOWER COSTS** — 35%-45% LABOR SAVINGS
- **STRONGER** — 2X THAN STEEL
- **LIGHTER** — 4X THAN STEEL
- **ZERO SLIVERS** — GRIP TECHNOLOGY FOR BETTER HANDLING
- **RUST FREE** — ZERO CORROSION LONGER LASTING
- **BETTER BOND** — INCREASED PULL-OUT STRENGTH

APPLICATIONS

- ✓ PAVEMENTS
- ✓ PARKING LOTS
- ✓ CURB & GUTTER
- ✓ SIDEWALKS
- ✓ COMMERCIAL FLOORS
- ✓ POURED WALLS
- ✓ FOUNDATIONS & FOOTINGS
- ✓ AND MANY MORE!

WIRE MESH OFFERS MINIMAL REINFORCEMENT

		Engineered Equivalent Spacing	
MESH SIZE & SPACING		#3 GATORBAR	#4 GATORBAR
10 Gauge (.135")	4" OC	31" OC	56" OC
	6" OC	47" OC	83" OC
6 Gauge (.192")	4" OC	15" OC	27" OC
	6" OC	23" OC	41" OC

BASED ON REINFORCEMENT RATIOS

100% MADE IN THE USA

PATENT #9688030B2 | ZERO POLYESTER

HUNDREDS OF MILLIONS OF FEET IN CONCRETE

906.934.2661 | GATORBAR.COM

GATORBAR®

WELDED WIRE MESH REPLACEMENT

AMERICA'S REBAR

Proudly made in Michigan's Upper Peninsula

ICC ES **ICC AC454 CERTIFIED (ESR-4526)**
GatorBar #3 only (#4 pending)

NEX™ An ACI Center of Excellence for Nonmetallic Building Materials
MEMBERSHIP

100% USA MADE

All of GatorBar's manufacturing processes, custom production lines, control systems, and technologies were designed and constructed using American know-how, ingenuity, grit, determination, and American trained and experienced draftsmen, fabricators, engineers, project managers, and service companies.

GatorBar unapologetically bootstrapped itself into a product segment where no one had gone before and became what it is today—America's Rebar.

Wire mesh installation, availability, and pricing challenges create →

GATORBAR SUBSTITUTION OPPORTUNITIES

GATORBAR SUBSTITUTION RECOMMENDATIONS

4" CONCRETE	24" TO 30" #3 GATORBAR
6" CONCRETE	18" TO 24" #3 GATORBAR 24" TO 30" #4 GATORBAR
8" CONCRETE	12" TO 18" #3 GATORBAR 18" TO 24" #4 GATORBAR

100% MADE IN THE USA

PATENT #9688030B2 | ZERO POLYESTER | ICC ES

HUNDREDS OF MILLIONS OF FEET IN CONCRETE

906.934.2661 | GATORBAR.COM

EXHIBIT E – UNIVERSITY OF MIAMI STURCTURES AND MATERIALS LABORATORY CERTIFIED TEST REPORT FOR NEUVOKAS CORPORATION DATED JANUARY 15, 2021

[Please see attached.]

CERTIFIED TEST REPORT

ACCEPTANCE CRITERIA FOR FIBER REINFORCED POLYMER (FRP) BARS FOR INTERNAL REINFORCEMENT OF CONCRETE MEMBERS *FOR GATORBAR™*

- Per ICC-ES AC454 -

Report Number: R-5.10_12-06-19_NEU.2
Date: January 15, 2021

REVISION 2

REPORT PREPARED FOR:

NEUVOKAS™

Neuvokas Corporation
Attn: Matt Kero
3206 #6 Road, Ahmeek, MI 49901
906-231-3844 (Cell); 906-934-2661 (main)
matt@neuvokascorp.com, www.neuvokascorp.com

REFERENCE:

ICC-ES File No. 19-11-13

Quality System: The Structures and Materials Laboratory (SML) maintains a quality system in compliance with ISO 17025-2017, accredited under International Accreditation Service (IAS), testing laboratory TL-478 and qualified laboratory by the Florida Department of Transportation (FDOT) number ISM028. All the test results presented herein are linked through unbroken chain data. Analyzed data is obtained directly from the recorded raw data during testing, from which the test results are presented. This report contains analyzed tabulated data results.

Procedures: All tests and services are done in accordance with the SML Quality Manual (Version 6.0) revised November 30, 2019; relevant standard operating procedures (SOPs); and with the applicable requirements of the reference standard test methods, unless otherwise stated.

Disclosure: This document may contain confidential information; please contact an authorized entity prior distributing. Conclusions reached and opinions offered in this document are based upon the data and information available to at the time of its issue, and may be subject to revision as additional information or data becomes available.

EXECUTIVE SUMMARY

This certified test report is issued as experimental evidence for the material qualification of GatorBar™ manufactured by Neuvokas Corporation to be recognized by the International Code Council Evaluation Service, LLC (ICC-ES), to issue an evaluation service report (ESR) in accordance with and to satisfy the requirements of ICC-ES Acceptance Criteria For Fiber–Reinforced Polymer (FRP) Bars For Internal Reinforcement of Concrete Members (AC 454), December 2020, as described herein.

Based on the results presented herein, it can be concluded that the following nominal FRP bars meet or exceed the requirements based on the specification limits set forth in AC 454 per the test methods included within this report for the follow bar nominal designation:

- M10 (3)

Antonio Nanni
SML Director

ICC-ES AC 454, December 2020
CERTIFIED QUALIFICATION SUMMARY TEST RESULTS

Reference	Property*	Unit SI / US	Bar Size & Properties M10 (3)	AC454 Acceptance Criteria Result
ASTM D2584	Fiber Mass Content	%	80	PASS
ASTM E1640	Mean Glass Transition Temperature (DMA)	°C	117	PASS
		°F	243	
ASTM E2160	Mean Total Enthalpy of Polymerization	J/g	303	n/a
	Mean Degree of cure	%	100	PASS
ASTM D7205	Mean Measured Cross-Sectional Area	mm²	72.4	PASS
ASTM D792		in²	0.112	
ASTM D7205	Guaranteed Ultimate Tensile Force	kN	76.1	PASS
		kip	17.1	
	Mean Ultimate Tensile Strength	MPa	1173	n/a
		ksi	170	
	Mean Tensile Modulus of Elasticity	GPa	47	PASS
		Msi	6.81	
	Mean Ultimate Tensile Strain	%	2.5	PASS
ASTM D7705-A	Mean Alkaline Resistance (Tensile Load Retention)	%	80	PASS
ASTM D7913	Guaranteed Bond Strength	MPa	9.9	PASS
		ksi	1.4	
ASTM D7617	Guaranteed Transverse Shear Strength	MPa	185	PASS
		ksi	27	
ASTM D570	Mean Moisture Absorption at 24 hrs.	%	0.05	PASS
	Mean Moisture Absorption at Saturation		0.23	PASS

*Guaranteed property is equal to mean value minus three standard deviations. Refer to Report Section 1.3 for bar identification

11. BOND STRENGTH – ASTM D7913

11.1. TEST OBJECTIVE

To determine the guaranteed bond strength to concrete by pullout test method for the products under evaluation based on ASTM D7913, as referenced in Table 1.2.

11.2. SPECIMEN PREPARATION & CONDITIONING

The specimens were cut from different randomly selected locations from sample bar to the prescribed dimensions using a high precision blade saw and conditioned, under laboratory ambient conditions for at least 40 hrs. at room temperature 23 ± 3°C (73 ± 6°F) and 50 ± 10% relative humidity. Refer to Table 5.1 which includes the test specimen size (Bonded length), test location and date. Representative pictures of specimens before and after testing are provided in Figure 5.1.

The bar specimens were installed within on solid plain concrete cubes 205 mm (8.00 in.), after applying a steel pipe anchor to one end of the bar. The specimen layout is presented in Figure 11.1, where specimens had a de-bonded length to the concrete, so that the total bonded length to concrete was equivalent to five times the diameter of the bar.

Specimens for each bar size were prepared simultaneously from one single batch of concrete following ASTM C192/C192M-13a, Practice for Making and Curing Concrete Test Specimens in the Laboratory. The 28-day concrete compressive strength was then tested as per ASTM C39, (Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens). Summary results of the compressive strength is provided in Table 11.2. All specimens were conditioned post curing under laboratory ambient conditions at room temperature 23 ± 1°C (73 ± 3°F) and 60 ± 5% relative humidity, for at least 24 hrs. prior testing.

Table 11.1 – Specimen summary information

Specimen ID	Specimen Bonded Length	Test Date mm/dd/yy	Test Location
NEU-3SL1_BS_01 to 05	47.6 mm (1.87 in)	08/24/20	SML

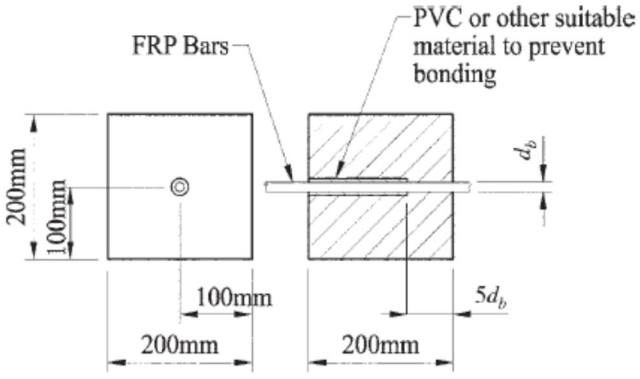


Figure 11.1 – Concrete pullout bond specimen layout and specimen

Table 11.2 – 28-day concrete compressive strength results (ASTM C39) for bond pull out tests

Specimen ID	Cylinder diameter d		Area A		Peak force P_{max}		Compressive Strength f'_c		Failure Mode
	mm	in.	mm^2	in^2	kN	lbf	MPa	psi	
C1	101.74	4.005	8129.0	12.60	258.1	58030	31.75	4606	3
C2	101.13	3.982	8033.2	12.45	261.7	58840	32.58	4726	3
C3	102.08	4.019	8184.5	12.69	262.8	59080	32.11	4657	3
Average	**101.65**	**4.002**	**8115.6**	**12.58**	**260.9**	**58650**	**32.15**	**4663**	
S_{n-1}	0.48	0.019	76.6	0.12	2.4	550	0.41	60	
CV (%)	0.5	0.5	0.9	0.9	0.9	0.9	1.3	1.3	

11.3. TEST INFORMATION

Tests were conducted under laboratory ambient conditions by qualified personnel. The date of each test; technical personnel; variations to the test method as applicable; calibration information for instruments and equipment used in all measurements; identification of the material tested; temperature and humidity of testing laboratory; and other applicable test data or details is provided in the technical data sheet: TDS-NEU-BS.

11.4. TEST SET-UP

Uniaxial tensile load was applied to all specimens. Testing was performed using a screw-driven universal test frame. Tensile load was measured a dedicated donut type load cell in compliance with ASTM E4-10 (Standard Practice for Force Verification of Testing Machines), while the extension (elongation) of the loaded and free end of the specimen was measured using a Liner Voltage Displacement Transducers (LVDTs) in accordance to ASTM E83-10a (Standard Practice for Verification and Classification of Extensometer Systems). The test set up is shown in Figure 11.2. Load was applied in displacement control to effect a near constant strain rate in the gauge section until failure at a constant frame head displacement of 1.3 mm/min (0.05 in./min), producing failure within 1 to 10 minutes.

11.5. CALCULATIONS

The results reported herein have been computed per ASTM D7913 using the parameters defined in Table 11.3.

Table 11.3 - Definitions of calculations for bond strength

Symbol	Parameter	Description
d_b	Diameter	Nominal dimeter of bar based on bar nominal size
C_p	Circumference	Circumference of bar based on nominal dimeter
L	Length	Length of bar bonded to concrete
Fu	Tensile load	Tensile load applied with the load device
A_L	Bar Bond Area to Concrete	Lateral Area = Cp x L
T^B	Bond Strength	$T^B = F / A_L$
T^B_G	Guaranteed Bond Strength	T^B mean value minus three standard deviations

11.6. TEST RESULTS

The experimental tests presented herein for the guaranteed bond strength, T^B, are summarized in Table 11.4, where the AC454 acceptance criteria is based on Table 1 of ASTM D7957 specification, and shall be more than or equal to 7.6 MPa (1.1 ksi), has been met. The primary mode of failure was loss of bond via slippage between the bonded bar and the concrete substrate due to pullout from concrete block. Full test data containing the individual tabulated test results is reported in Chapter 14.

Table 11.4 – Mean bond strength results

Specimen ID	Number of specimens	Guaranteed Bond Strength, T^B		Specification Limit	Acceptance Criteria
		MPa	ksi		
NEU-3S_BS	5	13.38	1.94	≥ 7.6 MPa (1.1 ksi)	PASS

Figure 11.2 – Bond strength test set-up

14.7. BOND STRENGTH – ASTM D7913

14.7.1 - Tabulated results for bond tests per ASTM D7913

Specimen ID	Nominal Diameter d_b		Nominal Circumference C_b		Bonded length l		Nominal Bonded Area A_L*		Peak Load F_u		Maximum Bond Strength τ	
	mm	in.	mm	in.	mm	in.	mm^2	in^2	kN	kip	MPa	ksi
NEU-3SL1_BS_01									20.66	4.64	14.50	2.10
NEU-3SL1_BS_02									20.60	4.63	14.45	2.10
NEU-3SL1_BS_03	9.53	0.375	29.92	1.178	47.63	1.87	1425.1	2.21	19.48	4.38	13.67	1.98
NEU-3SL1_BS_04									17.39	3.91	12.20	1.77
NEU-3SL1_BS_05									17.22	3.87	12.09	1.75
Average									**19.07**	**4.29**	**13.38**	**1.94**
S_{n-1}									1.68	0.38	1.18	0.17
CV (%)									8.8	8.8	8.8	8.8
Guaranteed Bond Strength*											**9.85**	**1.43**

**Condition of acceptance is equivalent to guaranteed bond strength ≥ 7.6 MPa (1.1 ksi)*

14.8. MOISTURE ABSORPTION – ASTM D570/D5229

14.8.1 - Tabulated results for short-term (24 hrs) water/moisture absorption per ASTM D570

Specimen ID	W_d	W_{24}	W_{24}*
	g	g	%
NEU-3SL1_MA-I_01	8.4075	8.4099	0.03
NEU-3SL1_MA-I_02	8.0992	8.1060	0.08
NEU-3SL1_MA-I_03	7.8230	7.8266	0.05
NEU-3SL1_MA-I_04	7.7520	7.7552	0.04
NEU-3SL1_MA-I_05	8.0287	8.0323	0.04
Average	**8.0221**	**8.0260**	**0.05**
S_{n-1}	0.2584	0.2583	0.02
CV (%)	3.22	3.22	42.5

**Condition of acceptance for $W_{24} \leq 0.25\%$*

EXHIBIT F – NEUVOKAS CORPORATION DESIGN AND INSTALLATION MANUAL FOR GATORBAR DATED MARCH 12, 2021

[Please see attached.]

Neuvokas Corporation Design and Installation Manual for GatorBar®

Revision 01 – Released 2021-03-12

Document # D-IM-GatorBar

Questions or Comments can be addressed to Neuvokas Corporation with contact information listed below

Neuvokas Corporation

PO Box 220

3206 #6 Road

Ahmeek, MI 49901

906-934-2661

info@neuvokascorp.com

Company and Product websites

www.gatorbar.com

www.neuvokascorp.com

Contents

1.0 Introduction

The purpose of this design and installation manual is to provide design guidelines as part of ESR-4526 per AC454. This document contains design equations, reference to other design tools, multiple design examples, and installation instructions/guidelines.

This document has been prepared using the following documents.

- ACI Committee 318, "Building Code Requirements for Structural Concrete (ACI 318-14) and Commentary (318R- -14)," American Concrete Institute, Farmington Hills, MI, 2011
- ACI Committee 440, "Guide for the Design and Construction of Structural Concrete Reinforced with FRP Bars
- "Reinforced Concrete with FRP Bars, Mechanics and Design", Nanni, Antonio, Antonio De Luca, and Hany Jawaheri Zadeh, 2014

2.0 GatorBar® FRP Rebar by Neuvokas

2.1 FRP Composite Description

GatorBar® by Neuvokas is a glass fiber reinforced composite rebar that is composed of fiber embedded in a polymer resin. Across the industry these products are known as glass fiber reinforced polymer (GFRP) rebar. At the date of this design manual release GatorBar can be purchased in #3 (0.375 inch) and #4 (0.5 inch) sizes but the ICC-ES evaluation report only covers the #3 rebar size.

2.2 GatorBar® Experimental Properties

The following values have been tested by a certified third party (University of Miami) and a copy of this report is available upon request. Sampling of test specimens was completed per ICC AC85 and ASTM

D7957 requirements. The quantity of specimens for each experimental value were completed following ASTM D7957. Guaranteed properties are equal to the defined ACI 440 nomenclature. It should be noted that the tensile behavior of GFRP bars is characterized by a linear elastic stress-strain relationship until failure.

Property	Test or Calculation Method	Experimental Value	
Fiber Mass Content	ASTM D2584	80	%
Mean glass transition temperature	ASTM E1356	117	DegC
Mean Total Enthalpy of Resin	ASTM E2160	303	J/g
Guaranteed Ultimate Tensile Force	ASTM D7205	17.1	Kip
Tensile Modulus of Elasticity	ASTM D7205	6.81	Msi
Guaranteed Transverse Shear Strength	ASTM D7617	27	Ksi
Guaranteed Bond Strength	ASTM D7913	1.4	Ksi
Mean Moisture Absorption (24 hours)	ASTM D570	0.05	%
Mean Moisture Absorption to Saturation	ASTM D570	0.23	%
Mean Alkaline Resistance	ASTM D7705	80	%
k_b		1.4	

3.0 Installation Instructions

GatorBar® placement in concrete is no different than other composite rebar products. Neuvokas recommends following the American Concrete Institute (ACI) guidelines that are laid out in ACI 440.5-08. Section 3.2 – Bar Placement, which includes the following items

- Tolerances
- FRP reinforcement relocation
- Concrete cover
- FRP reinforcement supports

Other general installation comments are discussed below.

- Field Fabrication. Provide composite reinforcement in accordance with the details shown on the plans. The minimum bending radius is two feet and must utilize the necessary tying and stabilization methods to ensure reinforcement remains in the proper position before and during concrete placement. Field cut reinforcement may be accomplished using high speed grinding cutter, fine blade saw, diamond blade, or masonry blade.
- Handling. Bars can be handled similar to their steel counterparts. Minor scratches and chipping that do not impact performance may be permitted with approval of the Engineer.
- Storage of Reinforcement. Store reinforcement above the surface of the ground on platforms, skids, pallets, or other supports. If stored outside for an extended period of time GatorBar will yellow and it can be covered if desired. Overall strength is not affected by this yellowing and GatorBar does not need to be covered.
- Placing and Fastening. Place all reinforcement within the tolerances recommended in the CRSI "Manual of Standard Practice" unless otherwise specified in the contract documents. Secure reinforcement firmly with mechanical fasteners during the placing and setting of the concrete. Suspend concrete placement and take corrective action if it is observed that the reinforcement is not adequately supported or tied to resist settlement, floating upward, or movement in any direction during concrete placement.
- Ties and Supports. It is recommended that all accessories for use with the bars such as tie wires, bar chairs, supports or clips are either plastic coated steel, stainless steel, galvanized steel or plastic, but that depending on engineering plans or application plain steel may be used. Place all reinforcement in locations as shown on the plans and securely hold in position while placing and consolidating concrete. Fasten bars together with ties at all intersections.
- Lap Splices. Lap splices are the only approved method to tie bars together to make a continuous bar. Mechanical splices are prohibited. Ensure lap length and spacing is as specified in the contract. Provide the same cover clearances for splices that is shown or specified for the reinforcement.

4.0 General Design Considerations

4.1 FRP Bar Arrangement

- For flexural reinforcement, the use of multiple bar layers and bar bundling is permitted.

- For multiple bar layers, the relevant provisions for steel reinforcing bar in ACI 318 also apply to FRP bars. Because FRP materials have no plastic region, the stress in each reinforcement layer varies depending on its distance from the neutral axis. Thus, the analysis of the flexural capacity shall be based on a strain-compatibility approach.

- For bundled bars, all relevant provisions of ACI 318 apply.

5.0 Design Manual

5.1 Flatwork (slab-on-grade)

Neuvokas has worked in this market both commerically and residentially for years and has great success replacing #4 steel rebar with #3 GatorBar and #5 steel with #4 GatorBar. It should be noted that there are a plethora of variables that affect concrete crack control performance and the primary purpose of reinforcement is to control the width and spacing of any crack that forms. Reinforcement does not prevent or eliminate cracking. For additional details on design methods for plain concrete slabs-on-ground ACI 360R can be reviewed.

Utilizing equation A-2b of the ACI 440.1R-15 a slab can be designed for shrinkage and temperature reinforcement. This equation has been modified for composite rebar using an allowable amount of strain and the allowable stress.

$$A_{f,sh} = \frac{\mu L w}{2(.0012 * E_f)}$$

μ = coefficient of subgrade friction

L = Distance between joints, ft

w = dead weight of slab, lbs/ft^2

E_f = Elastic modulus of FRP rebar

$A_{f,sh}$ = cross-sectional area of FRP reinforcement

Using this calculation with an elastic modulus of 6,810,000 psi, dead weight of 145 lbs/ft^3, a 1.5 coefficient of friction, and a distance between control joints of 10 feet a rebar spacing for various concrete thickness can be calculated.

- 4” concrete– 29.9” ocew #3, 53” ocew #4
- 6” concrete – 19.9” ocew #3, 35” ocew #4
- 8” concrete – 15” ocew #3, 26.5” ocew #4

This calculation ensures a sufficient reinforcement to ensure performance of the slab, and to actually calculate the crack width various calculators have been developed to estimate the actual crack width that will form. This calculation is complicated and best determined using these calculators. Once such calculator is the CRCP 10 tool that was developed by the Center for Transportation Research in Austin. Using this tool typically the rebar spacing can be increased by 30% without exceed the recommended crack width recommended by AASHTO for concrete pavements. Based on this in addition to Neuvokas field experience Neuvokas recommends the followings spacing using GatorBar.

- 4” concrete – 24” to 30” #3 GatorBar
- 6” concrete – 18” to 24” #3 GatorBar or 24” to 30” with #4 GatorBar
- 8” concrete – 12” to 18” #3 GatorBar or 18 to 24” with #4 GatorBar

It should be noted that, as is often the case with prescriptive applications, site conditions, load considerations and other items can lead to changing these values for concrete spacing. These values are intended to be starting place for further consideration.

5.2 Footers

In the case of specific design, the engineer of record should be consulted, but in the case of prescriptive footings for light-frame construction (as designated by the IBC) #3 GatorBar can be used replace #4 steel and #4 GatorBar can be used to replace #5 steel.

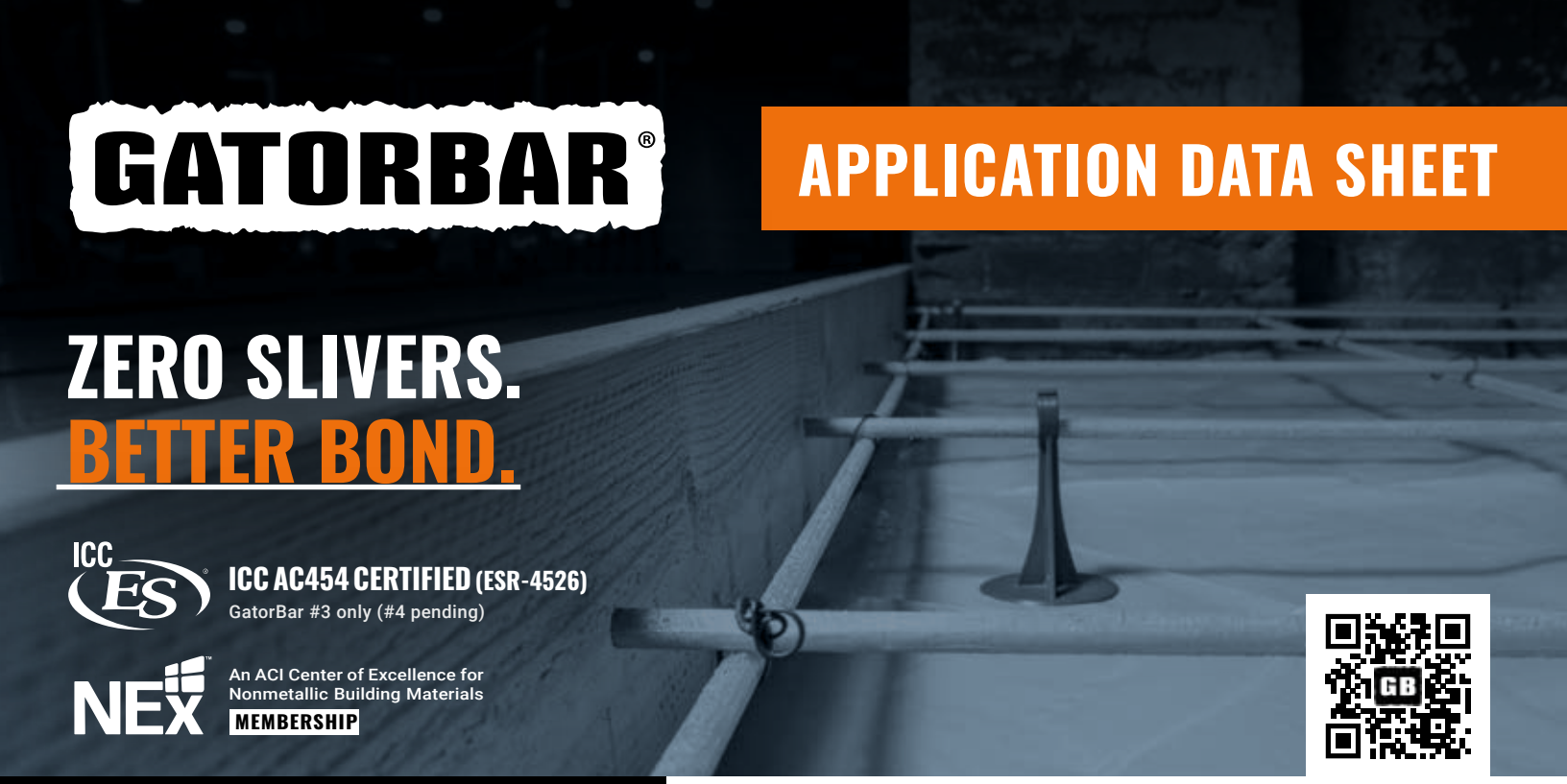
Little engineering data is available on the current design requirements driving steel requirements and the high strength of GatorBar allows the direct replacement.

EXHIBIT G – GATORBAR APPLICATION DATA SHEET

[Please see attached.]

GATORBAR®

APPLICATION DATA SHEET



ZERO SLIVERS. BETTER BOND.

ICC AC454 CERTIFIED (ESR-4526)
GatorBar #3 only (#4 pending)

An ACI Center of Excellence for Nonmetallic Building Materials
MEMBERSHIP

PHYSICAL PROPERTIES

	#3 BAR	#4 BAR
Nominal Diameter	10 mm 3/8 in	13 mm 1/2 in
Weight	.09 lbs/ft (1.8 lbs/stick) >75% Fiber Content	.166 lbs/ft (3.32 lbs/stick) >75% Fiber Content
Guaranteed Tensile Strength ASTM 7205	1100 MPa 155 ksi 17,100 lbs	1100 MPa 155 ksi 30,400 lbs
Tensile Modulus of Elasticity ASTM7205	47 GPa 6.8 x 10^6 psi	49 GPa 7.1 x 10^6 psi
Guaranteed Transverse Shear Capacity ASTM 7617	185 MPa 26.8 ksi 6,800 lbs	185 MPa 26.8 ksi 10,500 lbs
ICC-ESR	AC454 Certified (ESR-4526) for #3 AC521 (#3 & #4 pending)	
Bond Strength ASTM D7913	1100 psi guaranteed for #3 (#4 pending)	
Moisture Content ASTM D570	< 0.25% (both #3 & #4)	
Performance Standards	Above performance criteria are met or exceeded in accordance with ASTM D7957, ASTM D7913, ACI440.11, and AC454	

100% MADE IN THE USA

PATENT #9688030B2 | ZERO POLYESTER

PRODUCT FEATURES

- **LOWER COSTS** — 35%-45% LABOR SAVINGS
- **STRONGER** — 2X THAN STEEL
- **LIGHTER** — 4X THAN STEEL
- **ZERO SLIVERS** — GRIP TECHNOLOGY FOR BETTER HANDLING
- **RUST FREE** — ZERO CORROSION LONGER LASTING
- **BETTER BOND** — INCREASED PULL-OUT STRENGTH

APPLICATIONS

- ✓ PAVEMENTS
- ✓ PARKING LOTS
- ✓ CURB & GUTTER
- ✓ SIDEWALKS
- ✓ COMMERCIAL FLOORS
- ✓ POURED WALLS
- ✓ FOUNDATIONS & FOOTINGS
- ✓ AND MANY MORE!

GATORBAR VS STEEL

Tensile Strength & Weight Comparisons*

STEEL REBAR	#3 GATORBAR		#4 GATORBAR	
(GRADE 60)	STRONGER	LIGHTER	STRONGER	LIGHTER
#3 STEEL	2.7X	4X	4.4X	2.3X
#4 STEEL	1.5X	7.4X	2.5X	4X
#5 STEEL	CALL FOR ENGINEERING ASSISTANCE		1.6X	6.3X

*For crack control consideration. It is not Neuvokas' intent to imply that composite rebar can replace steel in all applications.

HUNDREDS OF MILLIONS OF FEET IN CONCRETE

906.934.2661 | GATORBAR.COM


GATORBAR®
RAINY DAY? TIE ANYWAY.


BUST BAR. NOT YOUR BACK.


DRIVE ON. DRIVE OFF.

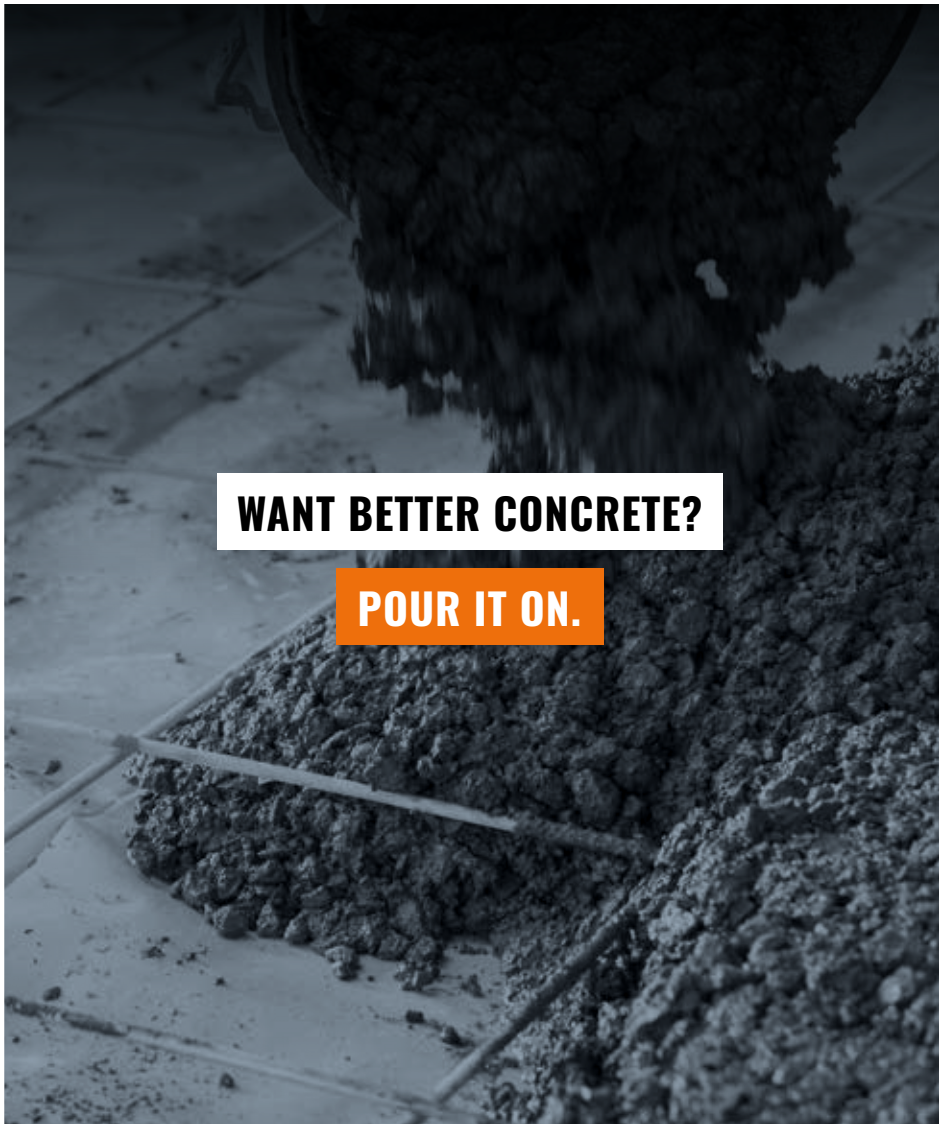

WANT BETTER CONCRETE?
POUR IT ON.

EXHIBIT H – GATORBAR ICC-ES EVALUATION REPORT

[Please see attached]

ICC EVALUATION SERVICE®

www.icc-es.org | (800) 423-6587 | (562) 699-0543 *A Subsidiary of the International Code Council®*

ICC-ES Evaluation Report

ESR-4526

Reissued March 2022

Revised June 2022

This report is subject to renewal March 2023.

DIVISION: 03 00 00—CONCRETE
Section: 03 20 00—Concrete Reinforcing
Section: 03 21 00—Reinforcement Bars

REPORT HOLDER:

NEUVOKAS CORPORATION

EVALUATION SUBJECT:

GATORBAR FIBER-REINFORCED POLYMER (FRP) BAR

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021 and 2018 *International Building Code®* (IBC)
- 2021 and 2018 *International Residential Code®* (IRC)

Properties evaluated:

- Physical
- Structural
- Durability

2.0 USES

The GatorBar fiber-reinforced polymer (FRP) bar is used as tension reinforcements in flexural concrete members such as beams, shallow foundations and one-way or two-way elevated slabs, and as vertical reinforcement in concrete columns and walls in normal-weight concrete, as permitted by Section 104.11 of the IBC. The GatorBar FRP bar may also be used where an engineering design is submitted in accordance with IRC Section R301.1.3 and where approved by the building official in accordance with IRC Section R104.11.

3.0 DESCRIPTION

The GatorBar is fiber-reinforced polymer (FRP) bar that is solid and have circular cross section composed of glass fiber embedded in a resin matrix. Available bar size and properties are provided in Table 1 of this report.

4.0 DESIGN AND INSTALLATION

4.1 Design:

The GatorBar must be designed in accordance with Neuvokas Corporation's Design Manual Document Number D-IM-Gatorbar dated March 12, 2021, Chapter 19 of the IBC (ACI 318-19 for 2021 IBC and ACI 318-14 for the 2018 IBC), and ACI 440.1R-15, as applicable. The registered design professional must be responsible for determining, through analysis, the strengths and demands of the structural elements, subject to the approval of the building official.

The following limitations also apply:

1. The GatorBar is limited for use as (a) tension reinforcement in flexural concrete members; (b) vertical reinforcement in concrete columns and walls.
2. The GatorBar is limited to concrete members in normal-weight concrete.
3. The bond coefficient, K_b of the GatorBar must be 1.4.
4. Bent shapes, continuous closed stirrups and ties (hoops) are outside the scope of this report.
5. There is no restriction for the shape of flexural concrete member cross-section (e.g., rectangular, T-shape, L-shape).
6. For multiple bar layers, the relevant provisions for steel reinforcing bar in ACI 318 must also apply to FRP bars, because the FRP bars have no plastic region and the stress in each reinforcing layer varies depending on its distance from the neutral axis. Thus, the analysis of the flexural capacity must be based on a strain-compatibility approach.

4.2 Installation:

The GatorBar FRP bar must be installed in accordance with the approved drawings and specifications. Reinforcement details, including tolerances, reinforcement relation, concrete cover and reinforcement supports, must comply with the applicable provisions in Chapter 3 of ACI 440.5-08 and Neuvokas Corporation's installation instruction, Document Number D-IM-Gatorbar, dated March 12, 2021.

4.3 Special Inspection:

Special inspection is required in accordance with Table 1705.3 of IBC. The special inspector must verify, but are not limited to, the following:

1. The GatorBar is of the type and size specified and is labeled in conformance with this report.
2. The GatorBar is placed within tolerances set forth in ACI 440.5-08 Section 3.2 and are adequately

ICC-ES Evaluation Reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, LLC, express or implied, as to any finding or other matter in this report, or as to any product covered by the report.

Copyright © 2022 ICC Evaluation Service, LLC. All rights reserved.

supported and secured to prevent displacement during concrete placement.

3. The minimum concrete cover is provided in accordance with ACI 440.5-08 Section 3.3.
4. The placement, quantity and size of the GatorBar comply with the approved drawings and specifications.

5.0 CONDITIONS OF USE

The GatorBar described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 Design and installation must be in accordance with this report, the Neuvokas Corporation's Design Manual Document Number D-IM-Gatorbar dated March 12, 2021 and the IBC or the IRC, as applicable. In case of conflict, this report governs.

5.2 When requested, copies of the Neuvokas Corporation's Design Manual Document Number D-IM-Gatorbar dated March 12, 2021 must be submitted to the code official for each project using the product.

5.3 Complete construction documents, including plans and calculations verifying compliance with this report, must be submitted to the code official for each project at the time of permit application. The construction documents must be prepared and sealed by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.4 The fire-resistance rating of the GatorBar reinforced concrete assembly is outside the scope of the evaluation report, and concrete assemblies with GatorBars are limited to Type VB construction under the IBC or IRC.

5.5 GatorBar must be stored above the surface of the ground on platforms, skids or other supports as close as possible to the point of placement. If stored outdoors, the GatorBar shall be covered with opaque plastic or other types of cover that will protect the bars from ultraviolet rays.

5.6 Use of GatorBar FRP bar in structural members for structures assigned in Seismic Design Categories C through F is permitted when the following conditions are met: (1) structural members are not considered part of the lateral force-resisting system, (2) structural members are not required to be designed to accommodate drifts and forces that occur as the building responds to a seismic event.

5.7 Special inspection must be provided in accordance with Section 4.3 of this report.

5.8 GatorBar is manufactured under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Fiber-reinforced Polymer (FRP) Bars for Internal Reinforcement of Concrete Members (AC454), dated April 2021, including fiber mass content, moisture absorption and alkaline resistance, and quality control documentation.

7.0 IDENTIFICATION

7.1 The GatorBar is identified by packaging labeled with the company name (Neuvokas Corporation) and contact information, product name, bar size, lot number and evaluation report number (ESR-4526).

7.2 The report holder's contact information is the following:

NEUVOKAS CORPORATION
3206 NUMBER 6 ROAD
AHMEEK, MICHIGAN 49901
(906) 934-2661
www.neuvokascorp.com
matt@neuvokascorp.com

TABLE 1—GATORBAR DIMENSIONS AND PROPERTIES

BAR DESIGNATION NUMBER	NOMINAL DIAMETER (in)	NOMINAL CROSS SECTIONAL AREA (in^2)	MEAN MEASURED CROSS SECTIONAL AREA (in^2)*	GUARANTEED ULTIMATE TENSILE FORCE (kip)	MEAN TENSILE MODULUS OF ELASTICITY (ksi)	MEAN ULTIMATE TENSILE STRAIN (%)	GUARANTEED TRANSVERSE SHEAR STRENGTH (ksi)	GUARANTEED BOND STRENGTH (ksi)
3	$^3/_8$	0.110	0.112	17.1	6810	2.5	27.0	1.40

For **SI**: 1 inch = 25.4 mm, 1 kip = 4.45kN, 1 psi = 6.89 kPa, 1 ksi = 6.89 MPa

* Mean measured cross sectional area includes surface deformations.

DIVISION: 03 00 00—CONCRETE
Section: 03 20 00—Concrete Reinforcing
Section: 03 21 00—Reinforcement Bars

REPORT HOLDER:

NEUVOKAS CORPORATION

EVALUATION SUBJECT:

GATORBAR FIBER-REINFORCED POLYMER (FRP) BAR

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that GatorBar fiber-reinforced polymer (FRP) bar, described in ICC-ES evaluation report ESR-4526, has also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2019 *California Building Code* (CBC)

For evaluation of applicable chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) AKA: California Department of Health Care Access and Information (HCAI) and the Division of State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

- 2019 *California Residential Code* (CRC)

2.0 CONCLUSIONS

2.1 CBC:

The GatorBar fiber-reinforced polymer (FRP) bar, described in Sections 2.0 through 7.0 of the evaluation report ESR-4526, complies with CBC Chapter 19, provided the design and installation are in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of CBC Chapters 16, 17 and 19, as applicable.

2.1.1 OSHPD:

The applicable OSHPD Sections and Chapters of the CBC are beyond the scope of this supplement.

2.1.2 DSA:

The applicable DSA Sections and Chapters of the CBC are beyond the scope of this supplement.

2.2 CRC:

The GatorBar fiber-reinforced polymer (FRP) bar, described in Sections 2.0 through 7.0 of the evaluation report ESR-4526, complies with CRC Section R301.1.3, provided the design and installation are in accordance with the 2018 *International Residential Code*® (IRC) provisions noted in the evaluation report and the additional requirements of CRC Chapter 3.

This supplement expires concurrently with the evaluation report, reissued March 2022 and revised June 2022.

ICC-ES Evaluation Reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, LLC, express or implied, as to any finding or other matter in this report, or as to any product covered by the report.

Copyright © 2022 ICC Evaluation Service, LLC. All rights reserved.