January 1, 2024

Stageline Mobile Stage, Inc.
700 Marsolais Street
L' Assomption, Quebec, Canada, J5W 2G9

Attn: Yvan Miron Email: yvan.miron@stageline.com

Re: StageLine ST100 Trailer – Use in the United States
McLaren File No. 103096 Phase 43

Dear Mr. Miron,

McLaren Technical Services (McLaren) has reviewed the ST100 Screen Trailer system for general use in the United States. The calculations and drawings were produced under the direct supervision and responsible charge of the undersigned. The final documents are the result of a comprehensive evaluation by McLaren and include approved revisions as needed resulting from these engineering reviews. **We believe that the erected system will safely support the approved loading and environmental conditions if properly assembled and used in accordance with the manufacturer's recommendations and as noted herein.**

The assessment by McLaren only considers the fully erected ST100 Screen Trailer and the lowered closed trailer configuration with the stabilizers deployed. This review did not consider additional items such as LED screen, hydraulics, auxiliary components, and erection devices. The fabrication, design, and operational procedures meet or exceed the requirements of ANSI E1.21-2020 "Entertainment Technology – Temporary Structures Used for Technical Production of Outdoor Entertainment Events." The design loads were derived from ASCE 7, 2016 edition, and ANSI E1.21-2020. Steel design was performed using AISC-LRFD provisions. Plywood was designed using APA provisions.

The design and construction of the erected ST100 LED Trailer assembly meet the applicable requirements of IBC-2021 Chapter 16, with the following suitable adjustments:

1. The LED Screen tower is erected for a very short time, and trained personnel will take protective actions under specified environmental conditions. Environmental loads in ASCE 7 and IBC, including wind, are based on statistical probabilities that relate to time. Reductions in design loads have been taken using the provisions of ANSI E1.21-2020 to account for such conditions. The wind design loads for the LED Screen tower far exceed the minimum permissible using E1.21-2020.

2. ANSI E1.21-2020 allows reduced wind loads compared with IBC only if the weather is monitored and trained personnel can accomplish specific actions. The procedures in the User's Manual comply with and exceed the minimum requirements of E1.21-2020.

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3. The strength cases were checked using LRFD load combinations. The only exception in the load combination is that the dead load factor was changed from the value in the IBC provisions. The measured dead load is within 1% of the calculated dead load per Stageline documentation. Since the total dead weight never changes, the IBC load factor was deemed overly conservative due to the added confidence in the actual weight and was not used in the calculations; therefore, the IBC LRFD dead load factor 1.2 was changed to 1.1 for the Stageline strength calculations.
4. The stability cases were checked using Allowable Stress Design (ASD) load combinations. The only exception is that the dead load reduction factor was changed from the value in the IBC provisions. The measured dead load is within 1% of the calculated dead load per Stageline documentation. Since the total dead weight never changes and is always present, the IBC reduction was deemed overly conservative due to the added confidence in the actual weight and was not used in the calculations; therefore, the IBC ASD dead load combination factor 0.6 was changed to 1.0 for the Stageline stability calculations, which nonetheless demonstrate a minimum safety factor of 1.5 for stability.

Stageline Mobile Stage Inc. furnished the following material for review:

1. ST100 Screen Trailer U.S. Design Brief Rev-03, dated July 2021
2. Matrix structural computer model analysis results using "Advance Design America" software by Graitec Inc.
3. ST100 Screen Trailer assembly drawings
4. Stageline Mobile Stage Equipment "Wind Resistance and Procedures in Case of Heavy Wind," 2024 edition.
5. ST100 Rigging Restrictions

The ST100 LED Screen Trailer is to be used as a LED support structure for short-term temporary use in outdoor environments. The tower travels as a tractor-trailer; the Certified Operator and crew deploy and erect the tower assembly when it arrives on site. The LED Screen Tower stabilizer legs bear on grade that is suitable to support the tractor-trailer. In conjunction with the Event Producer, the Certified Operator is responsible for confirming that the ground bearing conditions are suitable as per the User's Manual.

The ST100 LED Screen Trailer has four stabilizers, an enclosed trailer, a retractable LED screen via telescoping and 360-degree rotating mast, optional rigging points, and optional fabric wind walls. The trailer is designed for a 100 psf live load on the trailer floor. The total rigging capacity of the ST100 LED Screen Tower is 3275 lbs. The total rigging weight is itemized as one LED screen dead weight of 2875 lbs (screen and hardware) and twelve rigging points with a total capacity of 400 lbs. Please refer to the ST100 LED T100 Rigging Restrictions Manual for guidance on each rigging point allowables. In the extended configuration, a large (up to 325 sq ft and 1420 lbs) LED screen is raised using a telescoping mast through the opening in the trailer roof. The total dead load of the structure, LED screen, and options weighs a total of 17,000 lbs. Each stabilizer pad uses wood pads cladded with sheets of rubber on both the top and bottom surfaces. The rubberized support pads rest between the base of the legs and the ground.

The ST100 LED Screen Trailer is intended to support rigging loads, occupant live loads on the trailer floor, wind, and rain. It is not generally intended to support the weight of snow and

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ice. When used in locations and time periods where snow and ice are a possibility, the system shall be reviewed and approved in writing by a professional engineer for the combined effects of rigged loads, wind, snow, rain, and/or ice.

Users must understand and carefully adhere to the Rigging Diagram provided in the User's Manual. If the desired rigging loads deviate from or exceed those specified on the Rigging Diagram, contact Stageline Mobile Stage Inc. for advice. No adjustments or modifications should be made to the LED Tower without first being reviewed and approved by Stageline Mobile Stage Inc.

As stated in the ST100 LED Screen Trailer Users' Manual, the system must be operated under the supervision of Stageline trained and certified personnel.

The ST100 LED Screen Trailer assembly is designed to resist a service level 45 mph 3-second wind gust with the LED Screen deployed, and service level 35 mph 3-second wind gust with the LED Screen deployed and wind walls in place. If the wind speed is forecast to reach or is approaching 35 mph, all fabric wind walls are removed by a Stageline certified operator. If the wind speed is forecast to reach or is approaching 45 mph, a Stageline certified operator lowers the LED screen and secures the trailer. In the closed position, the trailer is suitable to resist service level winds up to 90 mph.

These service-level wind speeds are equivalent to factored design wind speeds of 115 mph and 58 mph 3-second wind gusts as per ASCE 7-16. (Please note that while ASCE 7-16 references factored wind speeds for load calculation purposes, wind speeds that are actually measured and reported by weather stations and weather information services will be service level wind speeds.) A Stageline Certified Operator is required to monitor wind forecasts from an official weather information service for the entire period the structure is assembled. Stageline recommends that the Operator uses an anemometer to measure the wind on-site for improved real-time wind monitoring. The Certified Operator shall take recommended actions listed in the User's Manual and in the attached "Wind Resistance and Procedures in Case of Heavy Wind" document if wind gusts approaching the applicable limit are possible or measured. Depending on the situation, such actions include removing wind walls, lowering the LED screen or removing vulnerable equipment, and evacuating personnel to a safe distance from the assembly.

Although not ordinarily required by governmental authorities for temporary structures, seismic loads have been considered for moderate and high seismic regions.

McLaren acknowledges that the ST100 Trailer is a piece of equipment that serves the live event industry, and it is not practical to involve engineers in typical usage. As such, it is the responsibility of the Stageline Certified Operator to adhere to the manufacturer's guidelines. In addition, if the ST100 LED screen is part of a larger event with other structures, it is the responsibility of the Event Producer to understand the requirements of the Stageline equipment, understand the responsibilities of the Stageline Certified Operator, and coordinate the Stageline equipment requirements with the event operational management plan.

It is the responsibility of the ST100 trailer Owner to comply with the documented guidelines, including proper use, maintenance, and periodic inspections and testing. Such inspections include visual and functional testing of all hydraulic, structural, and mechanical components. Stageline recommends that such inspections be conducted by qualified

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personnel once every year according to the manufacturer's guidelines. The inspection and testing reports must be filed appropriately, along with the maintenance records of the tower. The ST100 LED screen trailer is required to be inspected every 24 months, at a minimum, by a competent authority for this certificate to be valid. If critical defects were found on the structure during the inspection, repairs and procedures must have been approved by a structural engineer and completed according to professional standards. Inspection, engineering approval (if applicable), and repair documents must be presented upon request.

Please feel free to contact our office if you have any questions about our review.

Very truly yours,

The Office of
McLaren Technical Services, Inc.

William B. Gorlin, P.E., S.E.
Vice President

MGM/WBG/scf

Attachments: Stageline Procedures for Heavy Wind
State P.E. and S.E. Seals

P:\Proj103\103096.43\8. Technical (Rpts, Calcs, Specs)\Reports\2024-01 Renewal\16 - ST100 US Letter 2024-01-01.docx

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Alabama	Arizona	Arkansas
Malcolm G. McLaren, P.E. AL PE #30536-E	William B. Gorlin, P.E. AZ PE #61198	Malcolm G. McLaren, P.E. AR PE #9849
California	**Colorado**	**Connecticut**
Malcolm G. McLaren, P.E. CA PE #C34109	William B. Gorlin, P.E. CO PE #50853	William B. Gorlin, P.E. CT PE #16429
Delaware	**Florida**	**Georgia**
Malcolm G. McLaren, P.E. DE PE #10093	William B. Gorlin, P.E. FL PE #59789	William B. Gorlin, P.E. GA PE #SE048161

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Hawaii	Idaho	Illinois
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION. 04/30/ 2024 Signature Expiration Date of the License William B. Gorlin, P.E. HI PE #13502	William B. Gorlin, P.E. ID PE #13185	William B. Gorlin, S.E. IL SE #081.006019
Indiana	**Iowa**	**Kansas**
Malcolm G. McLaren, P.E. IN PE #60900241	William B. Gorlin, P.E. IA PE #20250	Malcolm G. McLaren, P.E. KS PE #20393
Kentucky	**Louisiana**	**Maine**
Malcolm G. McLaren, P.E. KY PE #13871	Malcolm G. McLaren, P.E. LA PE #29960	Malcolm G. McLaren, P.E. ME PE #12192

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Maryland	Massachusetts	Michigan
Malcolm G. McLaren, P.E. MD PE #10663	William B. Gorlin, P.E. MA PE #52322	William B. Gorlin, P.E. MI PE #6201069762
Minnesota	Mississippi	Missouri
I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA SIGNATURE: NAME: WILLIAM BARRIE GORLIN DATE: 01/01/2024 LICENSE NUMBER: 57934		
William B. Gorlin, P.E. MN PE #57934	Malcolm G. McLaren, P.E. MS PE #12055	Malcolm G. McLaren, P.E. MO PE #023163
Montana	Nebraska	Nevada
William B. Gorlin, P.E. MT PE #20095	Malcolm G. McLaren, P.E. NE PE #11416	William B. Gorlin, S.E. NV SE #10110

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New Hampshire Malcolm G. McLaren, P.E. NH PE #4392	New Mexico William B. Gorlin, P.E. NM PE #23145	New Jersey William B. Gorlin, P.E. NJ PE #24GE05240500
New York William B. Gorlin, P.E. NY PE #067163	North Carolina William B. Gorlin, P.E. NC PE #052635	Ohio Malcolm G. McLaren, P.E. OH PE #E-48017
Oklahoma Malcolm G. McLaren, P.E. OK PE #20741	Oregon EXPIRES: 12/31/24 Malcolm G. McLaren, P.E. OR PE #12000PE	Pennsylvania Malcolm G. McLaren, P.E. PA PE #37653

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Rhode Island Malcolm G. McLaren, P.E. RI PE #8774	South Carolina Malcolm G. McLaren, P.E. SC PE #16783	South Dakota William B. Gorlin, P.E. SD PE #13438
Tennessee William B. Gorlin, P.E. TN PE #123559	Texas William B. Gorlin, P.E. TX PE #122574	Utah William B. Gorlin, S.E. UT SE #188525-2203
Vermont Malcolm G. McLaren, P.E. VT PE #18-0005595	Virginia Malcolm G. McLaren, P.E. VA PE #9787	Washington William B. Gorlin, P.E. WA PE #53601

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Washington D.C.	West Virginia	Wisconsin
Malcolm G. McLaren, P.E. DC PE #007125	Malcolm G. McLaren, P.E. WV PE #14682	William B. Gorlin, P.E. WI PE #48786
Wyoming		
William B. Gorlin, P.E. WY PE #12607		

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Certification 2024

Stageline Mobile Stage Equipment

Wind Resistance and Procedures in case of Heavy Winds

Stageline Mobile Stage Inc. certifies that the components identified below have been specified by the engineering department to meet the following wind resistance and also the NFPA 701-04 and ULC S-109 regulations (Standard Methods of Fire Tests for Flame Propagation of Textiles and Films).

MODEL	WIND Resistance 3S[1]	WIND Resistance (without windwalls) 3S[1]	WINDWALL AREA
SL50 *	77 mph (123 km/h)	102 mph (165 km/h)	200ft^2 (18.6m^2) + 2 x 86ft^2 (8.0m^2)
SL75	77 mph (123 km/h)	115 mph (185 km/h)	200ft^2 (18.6m^2) + 2 x 86ft^2 (8.0m^2)
SL100 (2005)	77 mph (123 km/h)	102 mph (165 km/h)	348ft^2 (32.4m^2) + 2 x 147ft^2 (13.7m^2)
SL100 (2018)	77 mph (123 km/h)	115 mph (185 km/h)	348ft^2 (32.4m^2) + 2 x 147ft^2 (13.7m^2)
SL100MIX	77 mph (123 km/h)	102 mph (165 km/h)	348ft^2 (32.4m^2) + 2 x 147ft^2 (13.7m^2)
SL200	77 mph (123 km/h)	115 mph (185 km/h)	490ft^2 (45.5m^2) + 2 x 198ft^2 (18.4m^2)
SL250 CLASSIC	77 mph (123 km/h)	115 mph (185 km/h)	528ft^2 (49.1m^2) + 2 x 153ft^2 (14.2m^2)
SL250NG	77 mph (123 km/h)	115 mph (185 km/h)	566ft^2 (52.6m^2) + 2 x 243ft^2 (22.6m^2)
SL260	77 mph (123 km/h)	115 mph (185 km/h)	599ft^2 (55.6m^2) + 2 x 257ft^2 (23.9m^2)
SL320	77 mph (123 km/h)	115 mph (185 km/h)	991ft^2 (92.1m^2) + 2 x 600ft^2 (55.7m^2)
PROMOBILE	77 mph (123 km/h)	115 mph (185 km/h)	594ft^2 (55.2m^2) + 2 x 288ft^2 (26.8m^2)
SAM440	77 mph (123 km/h)	115 mph (185 km/h)	1147ft^2 (106.6m^2) + 2 x 731ft^2 (67.9m^2)
SAM450	77 mph (123 km/h)	115 mph (185 km/h)	2 x 594ft^2 (55.2 m^2) + 2 x 621ft^2 (57.7m^2)
SAM550	77 mph (123 km/h)	115 mph (185 km/h)	2 x 690ft^2 (64.1m^2) + 2 x 747ft^2 (69.4m^2)
SAM555	77 mph (123 km/h)	115 mph (185 km/h)	2 x 805ft^2 (74.8m^2) + 2 x 793ft^2 (73.7m^2)
SAM575	77 mph (123 km/h)	115 mph (185 km/h)	2 x 805ft^2 (74.8m^2) + 2 x 793ft^2 (73.7m^2)
SL250/260 Covered Wings	64 mph (103 km/h)	115 mph (185 km/h)	632ft^2 (58.7m^2) + 2 x 112ft^2 (10.4m^2) per side
SAM555 Covered Wings	64 mph (103 km/h)	115 mph (185 km/h)	2100ft^2 (195.1m^2) + 275ft^2 (25.5m^2) per side
SAM575 Covered Wings	64 mph (103 km/h)	115 mph (185 km/h)	2100ft^2 (195.1m^2) + 275ft^2 (25.5m^2) per side
SAM750 (incl. Cov Wings)	77 mph (123 km/h)	115 mph (185 km/h)	2x2075ft^2 (192.8m^2)+ 4x430ft^2 (39.9m^2)+ 2x3177ft^2 (295.2m^2)
HY Tower (screen area)	77 mph (123 km/h)	115 mph (185 km/h)	144 ft^2 (13.4m^2) without ballast, 384ft^2 (35.7m^2) with ballast
FOH2424 (2018)	77 mph (123 km/h)[2]	115 mph (185 km/h)[2]	250ft^2 (23.3m^2)+ 175ft^2 (16.3m^2)+ 2x261ft^2 (24.3m^2)+ 613ft^2 (56.9m^2)
FOH2424	40 mph (64 km/h)[2]	67.5 mph (109 km/h)[2]	297ft^2 (27.6m^2)+ 222ft^2 (20.6m^2)+ 2x238ft^2 (22.1m^2)+ 566ft^2 (52.6m^2)
FOH3224	77 mph (123 km/h)[2]	115 mph (185 km/h)[2]	261ft^2 (24.2m^2)+ 165ft^2 (15.3m^2)+ 2x362ft^2 (33.6m^2)+ 813ft^2 (75.5m^2)
ST100	57 mph (92 km/h)	115 mph (185 km/h)	2 x 30ft^2 (2.8m^2) + 51ft^2 (4.7m^2) + 325ft^2 (30.2m^2)

This equipment must have been inspected within the last 24 months by a competent authority for this certificate to be valid. If critical defects were found on the structure during the inspection, repairs and procedures must have been approved by a structural engineer and completed in accordance with professional standards. Inspection, engineering approval (if applicable) and repair documents must remain available for presentation upon request.

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* Unit #557 and up, [1] 3 seconds wind gust, [2] Ballast weights are required, see Technical Drawings for details

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Procedures in case of Heavy Winds, ST100

Windy weather conditions:

A) During setup and dismantling of the trailer
If wind speeds exceed **40 mph (64 km/h)** or **30 mph (48 km/h)** with banners, trailer installation is not recommended. We strongly suggest you wait until the wind has diminished before completing the setup or dismantling of the trailer.

B) Prior to the start of the event
The Stageline ST100 is designed to resist 3 seconds wind gusts up to 115 mph[1] (185 km/h). However, this wind resistance depends on a proper installation of all support equipment and braces. In any weather conditions, the trailer must be inspected by a certified technician and all its components must be secured.

1. If wind gusts are expected to exceed **40 mph (64 km/h)** or **30 mph (48 km/h)** with banners:
    a) Remove all movable parts i.e. speakers, lighting equipment and banners.
    b) Lower, enclose and secure both screen sections. Outriggers and stabilizers must remain in position.

C) During the event

1. If wind gusts exceed **30 mph (48 km/h):**
    a) Remove all movable parts i.e. speakers, lighting equipment and banners.
    b) Be prepared to lower the screen.
2. If wind gusts exceed **40 mph (64 km/h):**
    a) Lower, enclose and secure both screen sections. Outriggers and stabilizers must remain in position.
3. If wind gusts exceed **50 mph (80 km/h):**
    a) The public and all non-essential personnel must remain at least 100 ft (30 m) away from the trailer.
4. If wind gusts exceed **60 mph (97 km/h):**
    a) All remaining personnel must remain at least 100 ft (30 m) away from the trailer.

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