

## HOPPER ENGINEERING ASSOCIATES

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March 3, 2016

### **VIA ELECTRONIC MAIL**

Mr. Nick Vincenti  
Greetings Media, LLC  
C/O Chrystal Gyger - Battlebots Season 2  
3000 Olympic Boulevard  
Building 5, Suite 2525  
Santa Monica, CA 90404

Subject: Roof Capacity of LA Hangar Studios Stage B at 2533 Medford Street, Los Angeles, CA

Reference: Site Visit; N. Vincenti and J. Maas; February 29, 2016

Dear Mr. Vincenti:

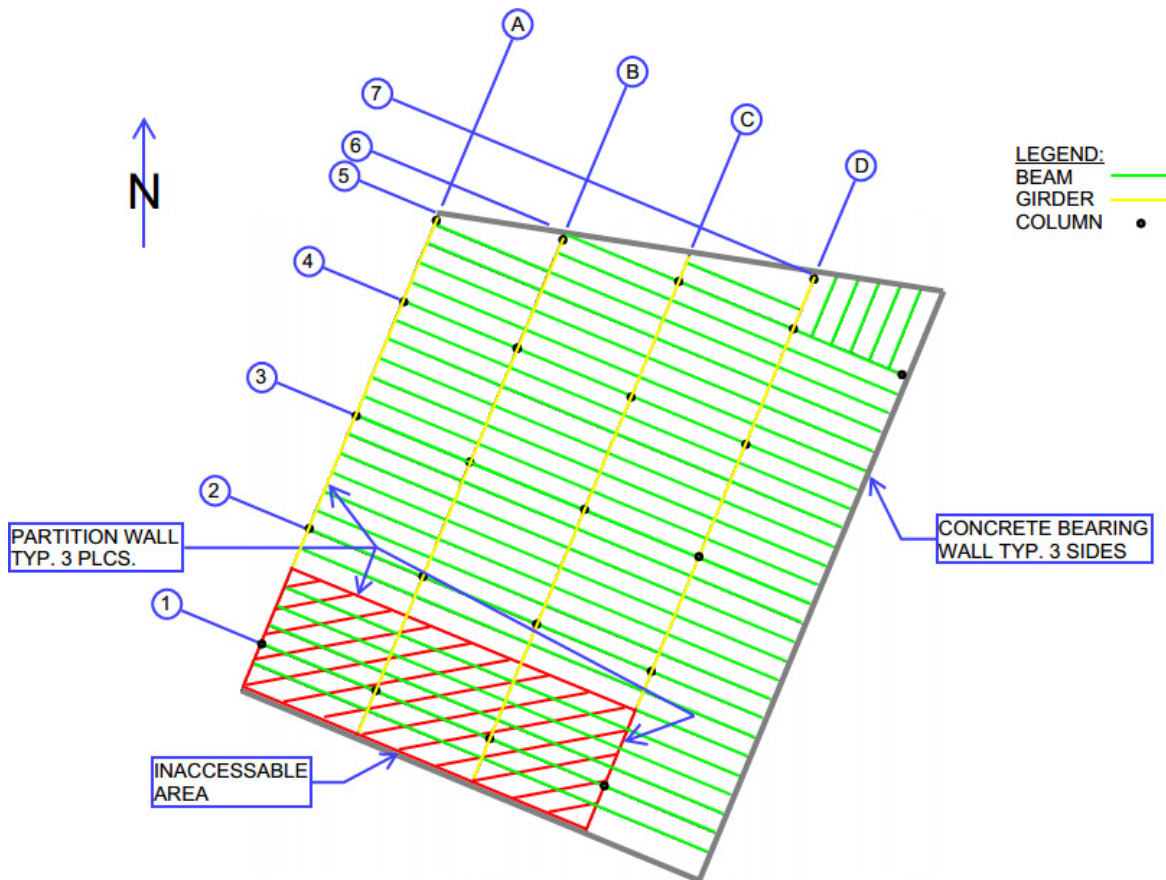
Hopper Engineering Associates conducted a visual inspection and subsequent structural analysis of the existing roof structure on LA Hangar Studios Stage B at 2533 Medford Street, Los Angeles, CA. Greetings Media, LLC has proposed using the roof structure to support production live loads or a pipe grid for the "Battlebots Season 2" production. Please allow this letter to serve as a summary of our inspection, analysis, and subsequent recommendations.

The roof in question covers a room roughly 148'-4" wide and 192'-0" long. The roof is clad with composition roofing material over 1/2" plywood supported by 2x4 wood joists spaced at 2'-0" on center. The joists are supported by glued laminated timber (glulam) beams spaced at 8'-0" on-center which vary in size from 3-1/8"x24" to 5-1/8"x28.5". The beams span roughly 25'-0" to 48'-0" depending on their location on the roof and are supported by glulam girders which vary in size from 6-3/4"x24" to 6-3/4"x36". The glulam girders span up to 48'-0" between steel columns except at the perimeter of the structure where they are supported by concrete walls. Figure 1 shows these roof structural elements. A portion of the roof structure was inaccessible during our site survey due to existing partition walls. The inaccessible area includes the hatched area on Figure 2 as well as the roof northwest of Column Line A on Figure 2. No HVAC units or additional loads were observed on the roof on Stage B.

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**Figure 1: Existing Roof Structure on Stage B**



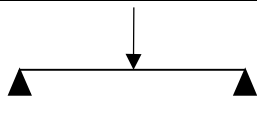
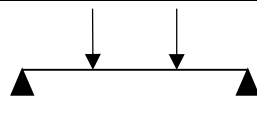
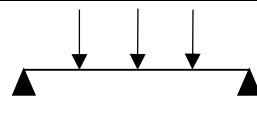
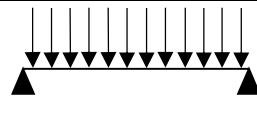
**Figure 2: Existing Roof Structure on Stage B Plan View**

Our analysis has shown that the existing roof is structurally adequate to support the live loads shown in Table 1 and 2. The enclosed connection detail, with a maximum load rating of 1200 lbs, can be used to support the point live loads shown in

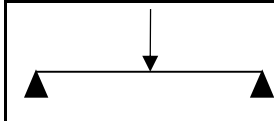
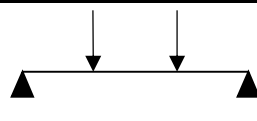
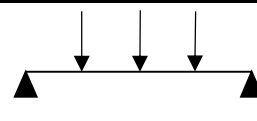
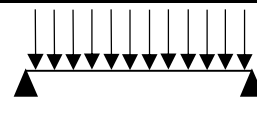
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Table 1 and 2. If the point live load is expected to exceed 1200 lbs, please consult the engineer of record.

**Table 1 – Beam Allowable Point Loads (All Glulams Except Those on Column Lines B, C, and D)**

MAXIMUM ALLOWABLE POINT LOADS			MAXIMUM ALLOWABLE UNIFORM LOAD
CENTER POINT	THIRD POINT	QUARTER POINT	
			
1 @ 1500 LBS	2 @ 800 LBS	3 @ 550 LBS	35 LBS/FT

**Table 2 – Girder Allowable Point Loads (Glulams on Column Lines B, C, and D)**

MAXIMUM ALLOWABLE POINT LOADS			MAXIMUM ALLOWABLE UNIFORM LOAD
CENTER POINT	THIRD POINT	QUARTER POINT	
			
1 @ 3500 LBS	2 @ 3500 LBS	3 @ 2400 LBS	200 LBS/FT

Our analysis also included a proposed pipe grid to be installed on the existing roof structure. The pipe grid will be constructed from two 21'-0" long 1-1/2"Ø Sch. 40 steel pipes installed end-to-end on each of the 48'-0" long 3-1/8"x24" glulam beams. Each pipe will be hung from the glulam beams via chain at three locations: roughly 3'-0" from the ends and at the midspan of the pipe. The short span 3-1/8"x24" glulam beams at the northeast corner of the roof in Figure 2 were analyzed for one 21'-0" long 1-1/2"Ø Sch. 40 steel pipe supported as described above. Our analysis has shown that the existing structure is structurally adequate to support the proposed pipe grid with 3 pounds per square foot (psf) of uniformly distributed live load. This load rating equates to 24 pounds per foot of uniformly distributed live load on each pipe. The pipe grid live load ratings are based on a couple of conditions:

- 1) The working load capacity of all rigging components used for the pipe grid is 1000 lbs minimum.
- 2) The attachment of the pipe grid rigging to the 3-1/8"x24" glulam beams is made with a horizontal 1/2"Ø shouldered through-eyebolt installed at the centerline of the beam.

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All of the analysis results contained herein are based on several important factors:

- The live loads are applied for a maximum duration of 1 year. If a longer load duration is expected, please consult the engineer of record.
- The aforementioned load ratings are mutually exclusive, and includes the code required roof live load of 12 psf. If a load plan utilizing a combination of the aforementioned live load ratings is proposed, the engineer of record must assess the structural adequacy of the existing roof structure to support the live loads.
- All roof drainage must be checked for blockage to avoid rain water retention.
- Our analysis assumes that the existing roof structure in the aforementioned inaccessible area is similar to the existing roof structure on Studio B. Prior to the installation of live loads on Studio B, the inaccessible area must be verified similar to the accessible roof and checked to ensure that any existing live loads on the roof do not exceed the live load ratings contained herein.

Thank you for your consideration in this matter. If you have any questions, please contact the undersigned.



Very truly yours,

A handwritten signature in black ink that reads "Justin Maas".

Justin Maas  
Professional Engineer  
CA PE License 84316

Enclosure

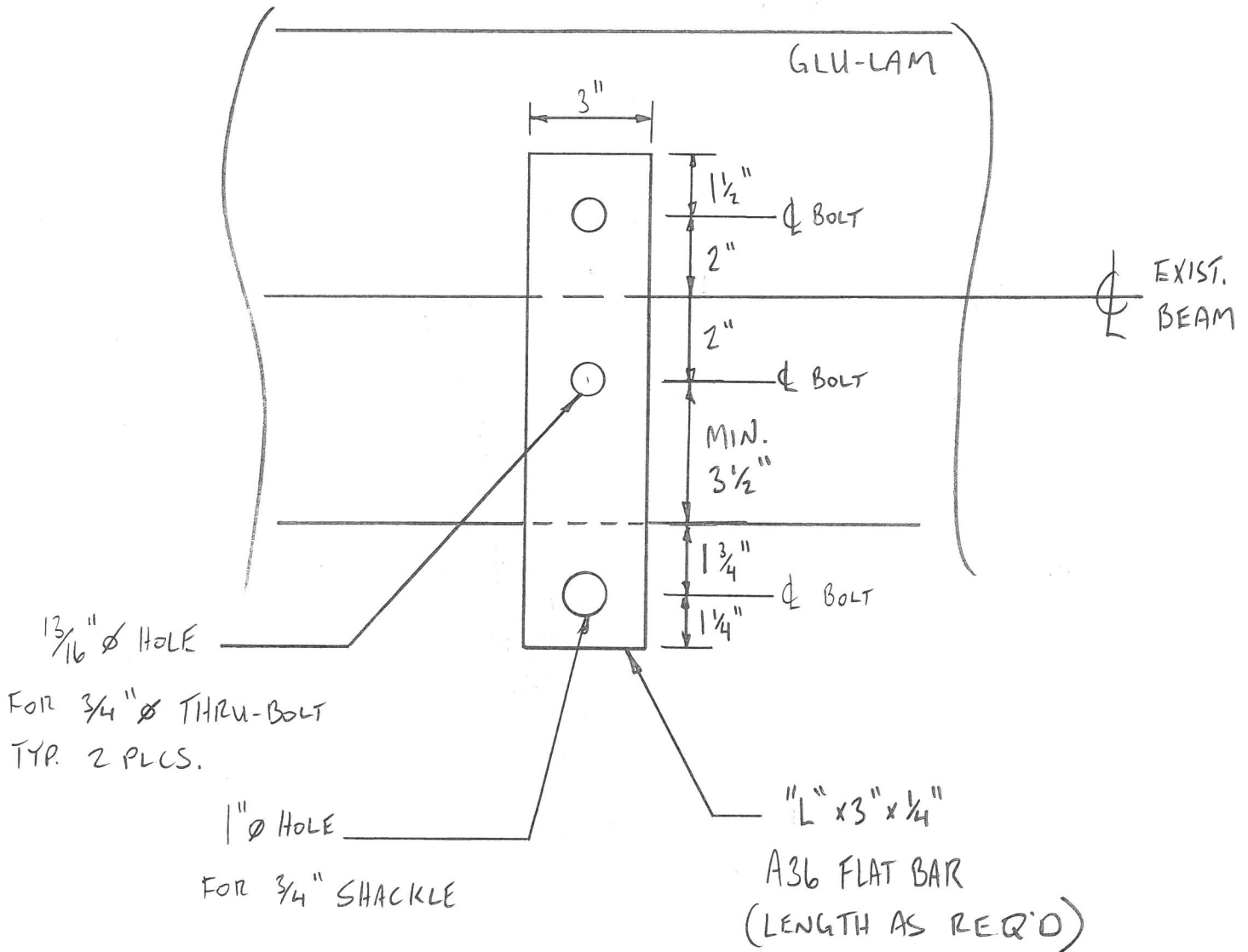
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 CALCULATION SHEET

CALCULATION NAME: FLAT BAR RIG POINT

PAGE: 1

DATE: \_\_\_\_\_ CALCULATION NO: \_\_\_\_\_

REV: Ø



FLAT BAR DETAIL

SCALE: 3" = 1'-0"

NOTE: USED FOR DEAD HUNG LOADS ONLY