

## CTPAC-SC PROPOSAL

SUBJECT: Load Transfer on Close Coupled Crane Carriers & Dolly Combinations

DATE: 10.13.04

POLICY: Permit Manual Policy No. 305.4.4 (CTPAC WG9 – 101304 – 001)

---

### I. OBJECTIVE

To change the language of Section 305.4.4 of the Transportation Permits Manual to incorporate Caltrans' existing policy allowing for Load Transfer with close coupled axle groups. Specifically, Sections 305.3.4<sup>1</sup> & 305.3.6 should allow for *load transfer on "purple" weight crane carriers with close coupled axles<sup>2</sup> and that the boom dolly<sup>3</sup> used in conjunction with these carriers be eligible for extralegal "green" weight.*

In addition to the aforementioned change, a methodology would need to be developed by Caltrans and industry to calculate the allowable load transfer in these situations.

At the present time, it appears that the crane manufacturers, working in conjunction with Caltrans, has developed a methodology that should help increase the efficiency of determining what type of permit is available for a given crane and dolly combination, and consequently lighten the burden currently felt by both industry and Caltrans.

At this point, it should also be emphasized that this Proposal is not meant to conflict in any way with TPPM 2004 - 01 (Crane Boom Dolly Weight Limits).

This Proposal is meant instead to deal solely with the issue of load transfer and dolly weight when close coupled axle groups are present on a "purple" weight carrier.

---

<sup>1</sup> Formerly T.P.M. § 305.3.4.

<sup>2</sup> See Caltrans T.P.M. § 902.2.

<sup>3</sup> See Caltrans T.P.M. § 901.5.

## **II. BACKGROUND**

Over the years, a large number of intermediate<sup>4</sup> capacity "purple" weight crane carriers designed for use in the United States and Europe obtained transportation-related permits for use in the state of California. During this time, certain intermediate carriers needed the combination of close coupled load transfer on the carrier with extralegal "green" weight on the dolly to obtain a permit in the state of California.

While this has been allowed on a number of occasions by Caltrans, no clear policy and underlying methodology exists in these situations. As such, the crane and dolly manufacturers currently find themselves lacking the certainty necessary to bring these cranes into California.

Without a clearly delineated policy on these aforementioned issues in the T.P.M., manufacturers will not be able to make accurate decisions regarding the importation and placement of the cranes into the stream of commerce in California.

In addition, if this policy is not allowed going forward, crane owners as a whole may also be prejudiced if they cannot permit a "purple" weight crane carrier in a manner that has been previously allowed in California.

## **III. EXISTING DOCUMENTATION**

### **A. Dolly Weight**

§ 305.3.6 of the T.P.M., as originally written, stated that "the gross weight imposed on the highway by the wheels of any one axle of a boom dolly or a boom trailer shall not exceed 18,000 pounds and the gross weight upon any one wheel or wheels supporting one end of such axle, and resting upon the roadway shall not exceed 9,500 lbs."

In May of 1999, Caltrans oversaw a field test on a purple weight Grove model GMK 6300B truck crane with a boom dolly artificially loaded to "purple" weight. In response to favorable test results, Caltrans granted extralegal "green" weight on the boom dolly of the Grove GMK6300B crane. This policy has been applied to a variety of crane and dolly configurations since then, and on April 24, 2000, §305.3.6 was changed<sup>5</sup> to read as follows:

---

<sup>4</sup> For purposes of this request, the term "intermediate" is used to define "purple weight" carriers under 400

With the exception of truck cranes with "purple" weight carriers with hydrogas suspension, and air ride suspension on the boom dolly, the gross weight imposed by the highway by the wheels of any one axle of a boom dolly or boom trailer shall not exceed 18,000 pounds and the gross weight upon any one wheel or wheels supporting one end of such axle, and resting upon the roadway shall not exceed 9,500 pounds. Truck cranes with "purple" weight carriers with hydrogas suspensions, and air ride suspension on the boom dolly, may qualify for green weight on the dolly axles. The Office of Structures Maintenance and Investigations will determine the appropriate vehicle configuration (9-axle "purple", 7-axle "purple", etc.) to be used for routing.

## **B. Load Transfer**

§ 305.4.4 of the T.P.M., also as originally written, states in part as it relates to load transfer:

Truck cranes equipped with four-axes or more which meet the following requirements may be allowed a load transfer from one end of the carrier to the other if:

- ❑ Axle width is at least 10'-0" measured from outside to outside of the widest part of the tires (not to include load-induced tire bulge).
- ❑ Equipped with four tires per axle. When equipped with floatation-type tires of a minimum size of 18 x 19.5 only two tires per axle are required.
- ❑ Equipped with tires that have a minimum cross-section of 14 inches.
- ❑ No close coupled axle groups.

Beginning in 1994, Caltrans allowed load transfer for the Demag AC335, an All Terrain Crane ("AT Cranes") with a "purple" weight carrier, and non-close coupled axles. As a result of this, a number of AT Cranes started to enter the State of California.

In 1996, Caltrans allowed load transfer on the Demag AC665, a "purple" weight carrier with close coupled axles.<sup>6</sup>

In approximately July of 1998, the Grove 6300 series AT crane needed load transfer on a "purple" weight carrier and close coupled axles. On September 3, 1998, Caltrans allowed for 7,000 lbs. load transfer on the close coupled "purple" weight carrier.

---

<sup>6</sup> The Demag AC665 had the boom removed and no dolly was used. Thus, load transfer was given to the close coupled carrier. This is the only example in the section where a crane-dolly configuration was not used.

As mentioned previously, in May of 1999, in response to a favorable field study, Caltrans granted extralegal "green" weight on the boom dolly of the Grove GMK6300B crane.

In reliance of the aforementioned progression of permit policy, over a dozen AT machines have entered the state of California during this time frame.

In November 2001, an inquiry to Caltrans was made regarding load transfer on a 6-Axle "purple" weight carrier, the Liebherr LTM 1300/1, with close coupled axles. Due to the boom weight of the LTM 1300/1, corresponding "green" weight on the boom dolly also was necessary.

Caltrans informed the parties that as long as the other requirements delineated in T.P.M § 305.4.4 were met, load transfer would be allowed on the carrier and "green" weight would be allowed on the boom dolly. On December 18, 2001, a single trip permit was issued for the aforementioned crane and dolly configuration.

On September 17, 2002, a single trip permit was issued for the 6-Axle Liebherr LTM 1250/1, another "purple" weight carrier in the same situation.

In October of 2003, Caltrans dealt with a similar situation on a Terex-Demag AC350, which was brought into California in reliance of the aforementioned load transfer policy.

#### **IV. CURRENT PRACTICE**

It is our understanding, based on conversations with a number of Caltrans personnel, that while load transfer has been allowed in these situations in the past, this load transfer policy currently remains in flux as it pertains to future configurations.

##### **A. Development of Load Transfer Methodology.**

In July of 2003, sample carrier spacings were submitted to the Division of Structure Maintenance for review and analysis. Based at least in part on these samples, Division of Structure and Maintenance started to look at developing a load transfer methodology for close coupled situations.

In approximately January of 2004, a draft proposal, raising many of the same issues delineated in this current proposal, was sent to CTPAC Work Group 9<sup>7</sup> for feedback on the development of a load transfer methodology for "green" weight dollies used in conjunction with "purple" weight crane carriers.

---

<sup>7</sup> Work Group 9 consists of the following members: Mike Vlaming, Bill Johns, Mike Mortenson, Bob Shepard, John Bray, Anthony Gugino, Ron Kimes, and Dave Maggiora.

In April of 2004, the aforementioned proposal was supplemented to include a load transfer example for the purposes of further illustrating and delineating the issue.<sup>8</sup>

Over the next couple of months, the crane manufacturers continued to work with Caltrans on the development of this load transfer policy.

Mr. Anthony Gugino of Caltrans Division of Structure Maintenance, developed an initial proposal for determining the load transfer on a close-coupled carrier for use in California. In this initial proposal, Mr. Gugino proposed that the maximum over chart allowable for any given set of carrier axle spacings could be 7%.

Pursuant to this initial proposal, the manufacturers went ahead and analyzed seven (7) different carriers for use in California to determine the effect such a limitation would have. Six of the seven carriers analyzed were already permitted for use in California. A summary of these results was sent to Mr. Anthony Gugino, Mr. John Bray, and Mr. Michael Vlaming.<sup>9</sup>

After review of the seven different carriers, it appeared that the 7% limitation proposed by Caltrans had been exceeded on previous occasions, with the maximum over chart allowable previously permitted by Caltrans at 7.7%.

At the CTPAC meeting on July 13, 2004, Mr. John Bray, Mr. Anthony Gugino, Mr. Robb McGhie, and Mr. Michael Vlaming interacted regarding the aforementioned findings and it was decided that both the crane manufacturers and owners would consult individually and/or collectively regarding a limitation over chart allowable they felt would be appropriate.

With this in mind, the crane manufacturers looked at the situation presented by the six-axle crane carrier previously given a permit at 7.7% over chart allowable for a given set of axle spacings. The quantitative aspects of this situation are as follows:

- Chart Allowable: 56,613 lbs.
- Field Weight / Measurement: 60,980 lbs.
- % Over Chart Allowable: 7.7%

The crane manufacturers felt, based on design and manufacturing experience, that an additional 445 lbs. (.8%) over the previous allowable of 7.7%, while it did not account completely for the weight variations present in steel and the scale-related variations often seen, would be a valid compromise for at least three reasons.

First, the additional .8% over previously allowed weights (a combined value of 8.5%), does give the manufacturers *some* flexibility to account for weight and scale variations that occur both at the manufacturing and field measurement stages.

---

<sup>8</sup> See Attachment A.

<sup>9</sup> See Attachment B.

Second, this value would give potential new crane owners the ability to buy machines previously permitted by Caltrans, thus keeping a playing field amongst competitors.

Third, the manufacturers are cognizant and sensitive to the fact that Caltrans Division of Structure Maintenance has bridge design-related limitations that influence the amount over chart allowable that can be given in this situation.

Based on the foregoing, the manufacturers feel an 8.5% limitation over chart allowable would be a valid and pragmatic compromise at this point in time.

At the present time, the manufacturers, after informing the crane owners of this proposed limitation over chart allowable, did not hear any objection from the crane owners regarding this limitation.

## V. PROPOSED CHANGES

### A. Load Transfer

#### I. Section 305.3.4

Section 305.3.4 of the T.P.M. currently reads as follows:

Truck cranes having an axle or axle group whose suspension is dependent upon pneumatic or hydraulic devices to carry any portion of its weight shall not be allowed a load transfer.

Truck cranes equipped with four-axles or more which meet the following requirements may be allowed a load transfer from one end of the carrier to the other if:

- Axle width is at least 10'-0" measured from outside to outside of the widest part of the tires (not to include load-induced tire bulge).
- Equipped with four tires per axle. When equipped with flotation-type tires of a minimum size of 18 x 19.5 only two tires per axle are required.
- Equipped with tires that have a minimum cross section of 14 inches.
- No close coupled axle groups.

*The first change requested would be to remove the close coupled restriction contained in Bullet 4, § 305.3.4 of the T.P.M.*

*The second change request, with respect to Bullet 2 of § 305.3.4 of the T.P.M., would be to recognize current Caltrans policy of allowing load transfer on carriers equipped with all-terrain mobile crane tires with a cross section width of 445mm. See T.P.P.M. 2000-6.*

Section 305.3.6 Bullet Point Three of the T.P.M. currently reads as follows:

- Four-axes or more cranes are allowed a maximum GVW determined from the standard overload charts for orange, green or purple...Load transfer does not increase the allowable gross vehicle weight but rather redistributes axle loading group weights. Load transfer is limited to 7,000 pounds for purple and 6,000 pounds for green with the following limitations on individual axle loading groups:

	Maximum Green Load (Pounds)	Maximum Purple Load (Pounds)
Tandem Axles	47,000	54,300
Tridem Axles	51,700	59,500

If the axle loading groups of the carrier are close coupled, the applicable load Transfer is added to the allowable chart weight of the close coupled axles. In any case, the maximums shown above shall not be exceeded.

The third change request, with respect to *to § 305.3.6 of the T.P.M., would be to change the last paragraph of Bullet Point Three of Section 305.3.6 to incorporate the following:*

Purple weight carriers used in conjunction with green weight boom dollies, notwithstanding the foregoing restrictions contained in this section and consistent with the methodology delineated in Appendix 6 of the Transportation Permit Manual, shall be allowed a load transfer not to exceed 8.5% over the applicable chart allowable for a given set of carrier axle spacings.

In addition to the aforementioned changes, any feedback regarding any inconsistencies with other portions would be welcomed so they can be eliminated at this time.

## VI. JUSTIFICATION FOR CHANGE AND/OR CLARIFICATION

“Purple” weight crane carriers designed for use in both the United States and Europe have different axle spacings and boom weights.

Many of these carriers, due to their combination of axle spacing and boom weights, are well under California allowables on their front axles, and over allowables on the rear axles of the carrier to varying degrees. These carriers are, however, under the allowable carrier gross for a given set of carrier axle spacings. Attachment A provides an example of this situation.

The pavement-friendly boom dolly used in conjunction with many of these carriers is designed to meet the “green” weight limitations established pursuant to T.P.P.M. 2000-2. These weights on the dolly are necessary due to the weight of the boom in these situations.

Without the combination of load transfer on the close coupled “purple carrier” and “green” weight on the dolly, many of these cranes, which were previously legal, will not be roadable in the state of California.

As mentioned previously, crane manufacturers and owners as a whole will be prejudiced if they cannot permit a “purple” weight crane carrier in a manner that has been previously allowed in California.

A load transfer methodology that is compatible with Caltrans’ bridge design limitations has been developed and as the information contained above shows, can be delineated to allow for these crane and dolly configurations on a general and a consistent basis.

It is our hope that this methodology can be implemented, at least on an interim basis, until the Appendix 6 examples are generated and the relevant portions of the permit manuals are changed.

**Requestor’s Name**

W. John Bray (Liebherr Cranes)

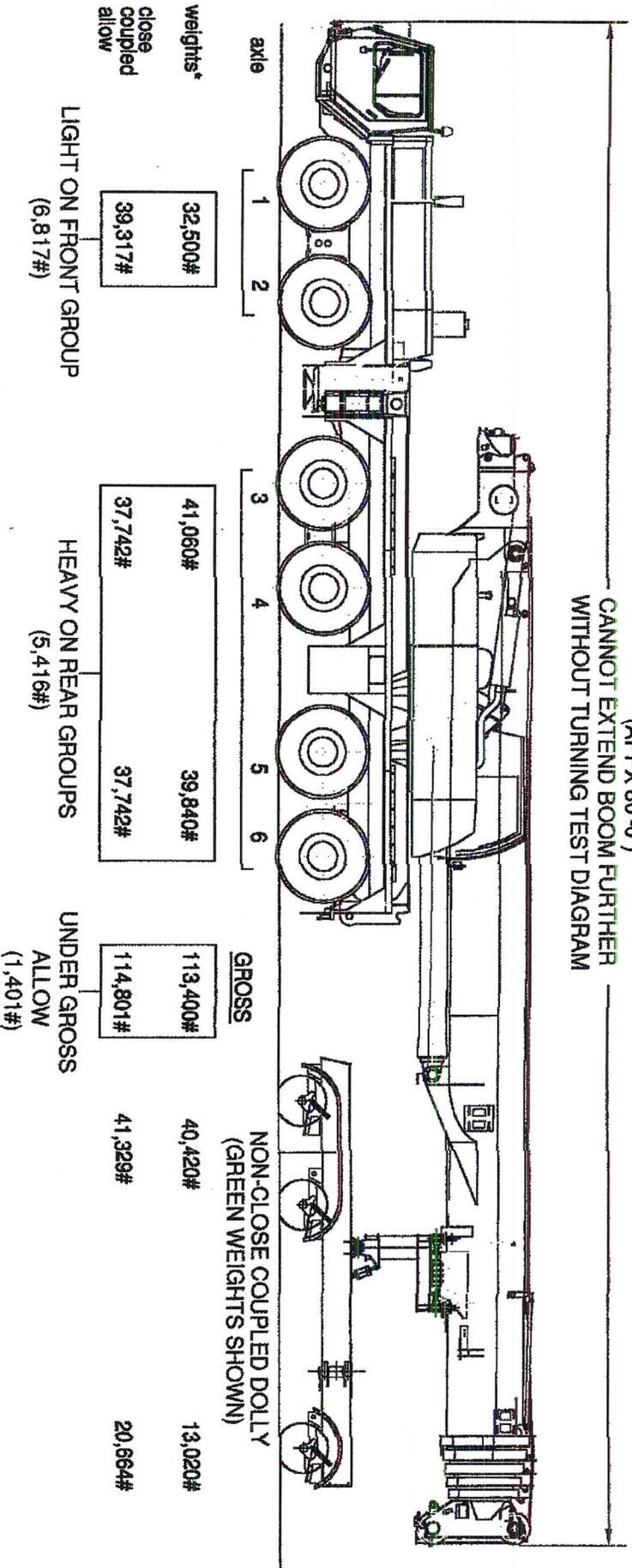
ATTENTION

# ATTACHMENT A LOAD TRANSFER EXAMPLE CTPAC-SC PROPOSAL

4.19.04

THUS, WHEN THE BOOM IS ROTATED OVER THE REAR OF THE MACHINE FOR USE IN CALIFORNIA (AND OTHER STATES), THE FOLLOWING OCCURS:

(APPX 80'-0")  
CANNOT EXTEND BOOM FURTHER  
WITHOUT TURNING TEST DIAGRAM

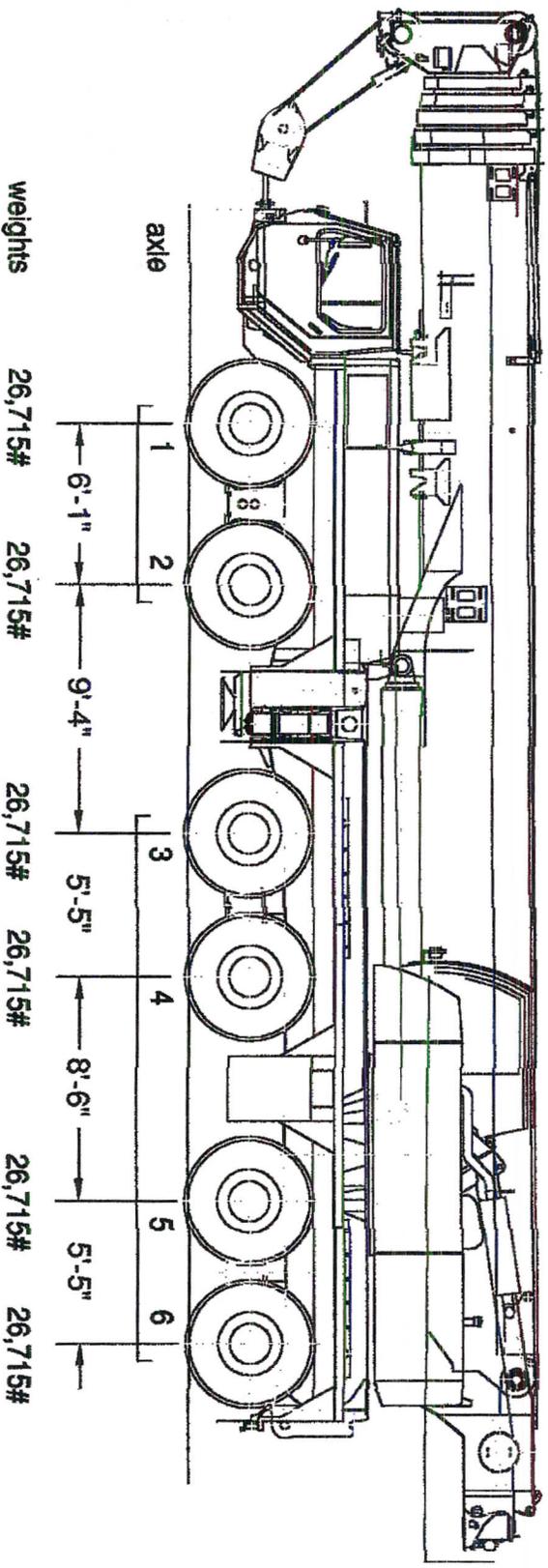


Due to carrier geometry, weights, and overall length, you can't transfer enough weight from the carrier to the dolly. As such, load transfer is imperative even with purple weights on the dolly.

\*Weights reflect subtraction of hookblock (2,450#) and addition of boom dolly (9,000#).

ATTACHMENT A  
LOAD TRANSFER EXAMPLE  
CTPAC-SC PROPOSAL  
4.19.04

**SAMPLE CARRIER**



CARRIER CHARACTERISTICS

1. Hydrogas crane carriers are designed to have the same axle weights with the boom over the front.
2. Per Caltrans load transfer requirements, sample carrier is 10'-0" wide.

# **ATTACHMENT B**

# ROBB TECHNOLOGIES, LLC

## MEMORANDUM

TO: Anthony Gugino / John Bray  
FROM: Robb McGhie  
RE: Load Transfer Methodology  
DATE: 7.10.04

---

It is my understanding that Caltrans has developed an initial proposal for determining the load transfer on a close-coupled crane carrier for use in California.

It is my further understanding, after a number of conversations with Anthony regarding this issue, is that Caltrans has determined that the maximum over chart allowable for any given set of carrier axle spacings is to be no greater than 7%.

With this in mind, I analyzed seven (7) different carriers for use in California to determine the effect such a limitation would have. Six of the seven carriers have already been permitted for use in California. A summary of my results is as follows:

<u>6 Axle Carriers</u>	<u>Max % Over Chart Allowables</u>
#1 6-Axle	1.5%
#2 6-Axle	7.7%
#3 6-Axle	0.5%
#4 6-Axle	0.0%
#5 6-Axle	7.3%

\* No field weights taken. Based on theoretical configurations only.

<u>7 Axle Carrier</u>	<u>Max % Over Chart Allowables</u>
#6 7-Axle*	6.0%

\* No field weights taken. Based on theoretical configurations only.

<u>8 Axle Carrier</u>	<u>Max % Over Chart Allowables</u>
#7 8-Axle**	6.8%

\* Actually 9 axle carrier with axle 4 raised. Boom removed from machine.

## **ROBB TECHNOLOGIES, LLC**

### **CONCLUSION**

After review of the seven different carriers, it appears that the 7% limitation described above has been exceeded on previous occasions. As such, continued dialogue on how to handle these machines now and in the future needs to be determined. In addition, the advantages and limitations on increasing the threshold may also want to be pursued so that both industries' and Caltrans' perspectives on this issue are fully understood.

8275 South Eastern Avenue, No. 105 • Las Vegas, NV 89123

OFFICE: 702.938.0456 • FAX: 702.938.1022

E-mail: [mcghier@aol.com](mailto:mcghier@aol.com)