FORSGREN Associates Inc.

MEMORANDUM

DATE: April 21, 2014

TO: Shanon Murgoito, P.E., ITD

FROM: Larry Evans, P.E. / Barrie Jo Moss, EIT / Christopher Atkinson, EIT

RE: Phase I Permit Assistance: Calumet Reactor Perkins 409-000 Rev 02 Truck Configuration, Bridge Factor vs. Truck Factor Comparisons

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Forsgren Associates has finished its review of the bridge factor vs. truck factor comparisons for the Calumet Reactor Perkins 409-000 Rev 02 Truck Configuration (referred to herein as the "truck configuration"). Per our scope of work, we have determined truck factors for the truck configuration supplied by Perkins (attached as Figures 1-3) and have compared them to the bridge factors from the latest ITD bridge factor list published March 31, 2014. The bridges reviewed and compared to the truck factors were those along the following route.

Route Description

The route will begin at the Port of Lewiston and proceed on US-95 bypassing structures 10520 and 18480 (see Figure 4) and then continue on to Sandpoint. Just before Sandpoint the US-95 Northbound structure 33700 is bypassed using the southbound off-ramp structure 33705. The route will continue on US-95 to the SH-200 interchange and proceed east on SH-200. In order to bypass structure 19050 near Hope the SH-200 Business Loop will be taken. The truck configuration will return to, and remain on SH-200 until the Idaho/Montana border.

Pre-Screening of Structures

Sixty-five structures along the given route were screened for conditions that would preclude Truck Factor vs. Bridge Factor screening. The bridges which are not included in the factor screening are summarized below and detailed in Table 1.

- Six continuous bridges require further analysis per ITD policy.
- One bridge on SH-200B (Bridge 19080) does not have a load rating and will be crossed using a temporary ramp bridge over the structure.
- Nine short-span bridges currently have no bridge factor assigned by ITD, and by their policy do not require further analysis if bridge conditions are sufficient.
- Two bridges require an update of the existing load rating to reflect an increased fill height over the structure.

Bridge Factor vs. Truck Factor Comparison
The truck factors computed for the Mammoet Calumet Reactor Configuration have been compared to the bridge factors from the latest ITD bridge factor list published on March 31, 2014 for the bridges on the proposed route. The bridge factors for bridge key nos. 33710 and 33715 were determined from the load ratings developed as part of the Mammoet Calumet Reactor T04 Rev 00 Phase III analysis.

Following ITD policy, if the truck factor is higher than the bridge factor for a given span length, then the bridge has been marked as "RFA" to indicate that the bridge requires further analysis with that particular truck configuration. If the bridge factor is greater than the truck factor for a given span length, the bridge should be OK for use by that particular truck configuration based solely on the factor comparisons.

Truck factor vs. bridge factor comparison results for the 47 remaining structures of the 65 total bridges are summarized in Table 2. One structure (bridge key 18520) is recommended for further analysis based on the factor comparisons.

Review of Bridge Conditions
The condition factors provided by ITD for all the bridges on the route were reviewed. The six structures below have ITD condition factors less than 5. The inspection reports were reviewed for these structures to determine if the condition or deterioration is anticipated to inhibit the bridge performance. The deterioration of these structures is summarized as follows:

- 18535: The structure is a reinforced concrete slab bridge with a deck rating of 4 and a superstructure rating of 4. There is cracking and some exposed rebar in various locations. The concrete deterioration appears to be localized and the rebar section loss appears to be minimal. The deterioration is not anticipated to affect the performance of the structure with the given truck configuration. The bridge does not warrant further analysis. It is recommended that the truck configuration proceed at no more than 10 mph down the center of the roadway.
- 18580: The structure is a reinforced concrete frame with a substructure rating of 4. The low rating is due to undermining of the footings from scour and minor scaling and rock pockets. No settlement of the structure is reported. Because the structure has a 10ft span length the Perkins Truck configuration will not significantly increase the live load on the bridge above normal legal truck loading. The bridge does not warrant further analysis. It is recommended that the truck configuration proceed at no more than 10 mph down the center of the roadway.
- 18590: The structure is a reinforced concrete frame with a substructure rating of 2. This is due to undermining from scour along the footings and minor spalling. However, it is reported that there is no settlement of the structure. Because the structure has a 10ft span length the Perkins Truck configuration will not significantly increase the live load on the bridge above normal legal truck loading. The bridge does not warrant further analysis. It is recommended that the truck configuration proceed at no more than 10 mph down the center of the roadway.
- 18602: The structure is a corrugated steel culvert with a rating of 3. This is due to deterioration of connections, and cracking near the floor of the culvert. Given a fill

of over 4ft and a span of 12ft it is anticipated the load will distribute through the soil and the structure will not see an increase in live load due to the Perkins truck configuration above normal legal truck loading. The structure does not require further analysis. It is recommended that the truck configuration proceed at no more than 10 mph down the center of the roadway.

- 18603: The structure is a corrugated steel culvert with a rating of 4. The low rating is due to deterioration of connections, and cracking near the floor of the culvert. Given a fill of over 4ft and a span of 12ft it is anticipated the load will distribute through the soil and the structure will not see an increase in live load due to the Perkins truck configuration above normal legal truck loading. The structure does not require further analysis. It is recommended that the truck configuration proceed at no more than 10 mph down the center of the roadway.
- 18700: The structure is a reinforced concrete frame with substructure rating of 4. The low rating is due to some minor cracking, spalling and rock pockets caused by improper consolidation during construction. It is not anticipated that the reported deterioration will affect the bridge performance. The bridge does not warrant further analysis. It is recommended that the truck configuration proceed at no more than 10 mph down the center of the roadway.

Review for Eccentric Loading on Substructures

A check for potential eccentric loading using photographs, inspection reports, or plans of bridge substructures was also conducted. The plans of the following four structures were acquired from ITD for closer examination: 18652, 33510, 33550 and 19065. Based on this review, the bridge piers of structure 19065 (3.6 miles west of Clark Fork) will be subjected to eccentric loadings sufficient to warrant further analysis. This bridge is a 3-span, continuous, curved, multi-cell reinforced concrete box structure with single column piers. Specific permit load locations will be recommended to apply the live load close to existing pier columns of the other structures. These recommendations will be summarized and provided with the Phase II packet.

Conclusion

Per ITD policy nine structures require further analysis. These bridges are listed in Table 3 along with the cause for further analysis being required.

ITD will do its own review of all bridges along the route with the truck configuration and may require further analysis of any bridges along the route in addition to those recommended by Forsgren Associates in this Phase I review, screening and analysis.

Table 1. Structure Pre-Screening

Route	BrKey	Location	Span	Status
US-95	18525	11.7 N. MOSCOW	12	Update existing model to match change in fill height, RFA
US-95	18547	16.8 N. MOSCOW	13	No bridge factor, no analysis reqd.
US-95	18575	1.1 S. TENSED	44	Continuous, RFA
US-95	18595	6.8 N. TENSED	12	No bridge factor, no analysis reqd.
US-95	18602	0.6 S. PLUMMER	18	No bridge factor, no analysis reqd.
US-95	18603	@ PLUMMER SCL	18	No bridge factor, no analysis reqd.
US-95	18604	@ PLUMMER SCL	13	No bridge factor, no analysis reqd.
US-95	33495	PLUMMER NCL	12	No bridge factor, no analysis reqd.
US-95	18612	0.6 N. WORLEY	16	No bridge factor, no analysis reqd.
US-95	33550	8.0 N. WORLEY	310	Continuous, RFA
US-95	18705	0.1 S. COCOLALLA	22	Update existing model to match change in fill height, RFA
US-95	18715	1.0 S. SANDPOINT	81	Continuous, RFA
US95 SB OFF RAMP	33705	IN SANDPOINT	279	Continuous, RFA
SH-200	33795	6.1 E. PONDERAY	13	No bridge factor, no analysis reqd.
SH-200	19041	3.1 W. HOPE	12	No bridge factor, no analysis reqd.
SH-200B	19080	IN EAST HOPE	31	Structure cannot be modelled, to be bridged by Mammoet
SH-200	19065	3.6 W. CLARK FORK	142	Continuous, RFA
SH-200	19071	CLARK FORK WCL	210	Continuous, RFA

RFA = requires further analysis,

Table 2. Bridge Factor/Truck Factor Comparison Results

Route	BrKey	Milepost	Location	Bridge Factor	Span	Factor Test
US-95	18487	329.481	15.2 N. Lewiston	990	74	OK
US-95	18491	330.401	13.3 S. Moscow	3561	26	OK
US-95	18496	332.370	11.5 S. Moscow	1791	12	OK
US-95	18501	332.993	2.5 S. Genesee	3130	14	OK
US-95	18506	334.050	3.54 S. Genesee	3130	11	OK
US-95	18511	344.004	At Moscow SCL	837	64	OK
US-95	18518	344.786	At Moscow SCL	1240	27	OK
US-95	18520	352.855	6.9 N. Moscow	617	24	RFA
US-95	18531	360.285	14.3 N. Moscow	1616	134	OK
US-95	18535	360.460	14.5 N. Moscow	722	20	OK
US-95	18540	361.280	1.9 E. Potlatch	1240	20	OK
US-95	18545	361.541	15.6 N. Moscow	824	48	OK
US-95	18550	373.190	9.0 S. Tensed	1051	10	OK
US-95	18555	373.960	8.2 S. Tensed	1153	10	OK
US-95	18560	375.070	7.1 S. Tensed	1240	16	OK
US-95	18565	378.050	4.1 S. Tensed	1240	10	OK
US-95	18570	378.667	3.5 S. Tensed	1015	70	OK
US-95	18580	381.639	0.6 S. Tensed	1240	10	OK
US-95	18585	386.183	4.0 N. Tensed	1132	10	OK
US-95	18590	388.588	6.4 N. Tensed	987	10	OK
US-95	18600	393.350	1.6 S. Plummer	840	68	OK
US-95	18605	398.752	3.3 S. Worley	1240	16	OK
US-95	33500	407.285	3.6 N. Worley	1102	115	OK
US-95	33510	409.370	6.0 N. Worley	1604	110	OK
US-95	33540	415.497	12.7 N. Worley	1478	64	OK
US-95	18646	416.874	14.1 S. Coeur D'Alene	1542	68	OK
US-95	18648	417.359	13.6 S. Coeur D'Alene	2984	11	OK
US-95	18649	417.803	13.5 S. Coeur D'Alene	2964	10	OK
US-95	18652	420.730	9.7 S. Coeur D'Alene	1216	105	OK
US-95	18665	421.324	9.6 S. Coeur D'Alene	1166	64	OK
US-95	18670	426.491	4.1 S. Coeur D'Alene	1053	69	OK

Table 2. (Continued)

Route	BrKey	Milepost	Location	Bridge Factor	Span	Factor Test
US-95	18675	428.981	1.3 S. Coeur D'Alene	1090	44	OK
US-95	18680	429.398	WCL Coeur D'Alene	926	129	OK
US-95	18685	429.617	In Coeur D'Alene	1391	85	OK
US-95	18690	430.592	In Coeur D'Alene	865	59	OK
US-95	33565	444.026	3.5 S. Athol	2079	25	OK
US-95	18693	446.197	1.5 S. Athol	1240	12	OK
US-95	18695	456.847	0.2 N. Careywood	824	20	OK
US-95	18700	458.240	1.6 N. Careywood	1240	20	OK
US-95	18711	465.040	1.0 N. Westmond	1290	130	OK
US-95	33710	474.112	In Sandpoint	1554	65	OK
US-95	33715	474.242	In Sandpoint	1380	13	OK
US-95	33720	474.816	At Ponderay SCL	2265	14	OK
SH-200	19035	38.660	7.1 E. Ponderay	926	59	OK
SH-200	19046	42.270	3.0 W. Hope	1529	79	OK
SH-200	19060	47.275	1.1 E. East Hope	1240	17	OK
SH-200	19076	55.456	Clark Fork ECL	1341	120	OK

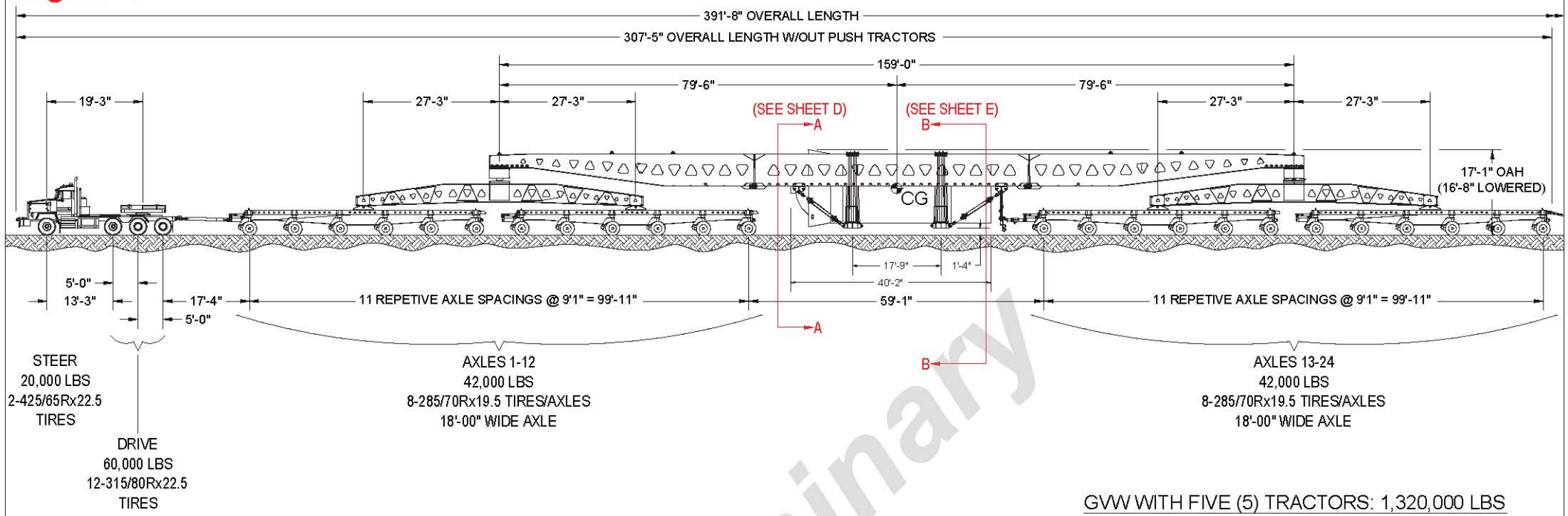
RFA = requires further analysis

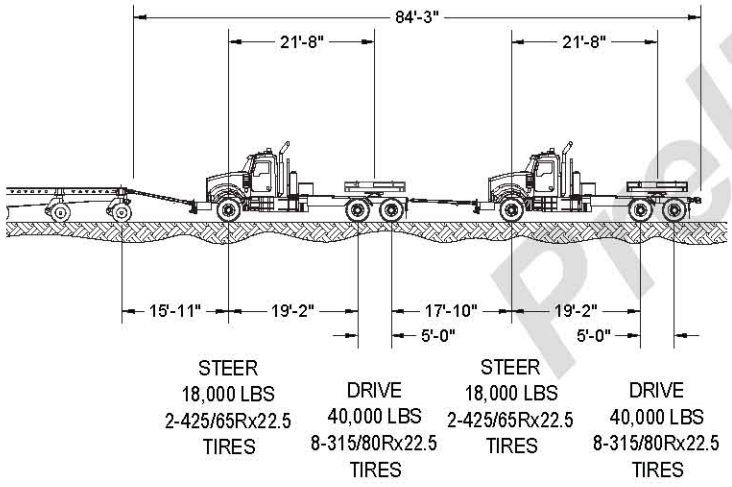
Table 3. Bridges Requiring Further Analysis

Route	BrKey	Location	Span	Controlling Condition
US-95	18525	11.7 N. MOSCOW	12	Update existing model to match change in fill height
US-95	18575	1.1 S. TENSED	44	Continuous
US-95	33550	8.0 N. WORLEY	310	Continuous
US-95	18520	6.9 N. MOSCOW	24	Truck Factor vs Bridge Factor
US-95	18705	0.1 S. COCOLALLA	22	Update existing model to match change in fill height
US-95	18715	1.0 S. SANDPOINT	81	Continuous
US-95	33705	IN SANDPOINT	279	Continuous
SH-200	19065	3.6 W. CLARK FORK	142	Continuous; Evaluate Eccentric Pier Loading
SH-200	19071	CLARK FORK WCL	210	Continuous

Figure 1

PERKINS SPECIALIZED TRANSPORTATION LAYOUT





WEIGHT PER TRACTOR, 2 TRACTORS SIDE BY SIDE, SEE SHEET B FOR DETAILS

GVW WITH FIVE (5) TRACTORS: 1,320,000 LBS

192 TIRES, 24 AXLE LINES
285/70R X 19.5 TIRES
AIR BRAKES ALL AXLES
STEERING ON ALL AXLES
HYDRAULIC SUSPENSION CARRIES EQUAL WEIGHT ON ALL TIRES

ORIGIN INFORMATION		DESTINATION INFORMATION	
Shipper:	-	Consignee:	-
Address:	-	Address:	-
City/St:	WILMA, WA	City/St:	GREAT FALLS, MT
Zip:	-	Zip:	-
Contact:	-	Contact:	-
Tel Num:	-	Tel Num:	-
Fax Num:	-	Fax Num:	-

CUSTOMER	SHIPMENT DESCRIPTION		PERMIT INFORMATION	
MAMMOET CANADA WESTERN LTD.	LENGTH	40-02"	LENGTH	391' 08"
12920 33RD ST NE	WIDTH	15'-06"	WIDTH	20' 00"
EDMONTON, AB	HEIGHT	15'-06"	HEIGHT	17' 01"
T6S 1H6	WEIGHT	503,774 LBS	REAR O.H.	00' 00"
ROD CABLE	JOB NO.	-	WEIGHT	SEE ABOVE
TEL: 780 485 8551	MOD NO.	-		
FAX: 780 417 9623	MARK NO.	-		
CELL: 780 718 4900	Prepared by:	DLD	Date: 01-27-14	Scale: NONE
rod.cable@mammoet.com	Reviewed by:	BJA	Date: 01-27-14	
	Approved by:	-	Date: -	

...WHEN EXECUTION MATTERS MOST

ELEVATION VIEW REACTOR

NOTES:
ALL DIMENSIONS ARE IN LOADED CONDITION. SOME DIMENSIONS MAY VARY SLIGHTLY PRIOR TO LOADING DUE TO CAMBER.

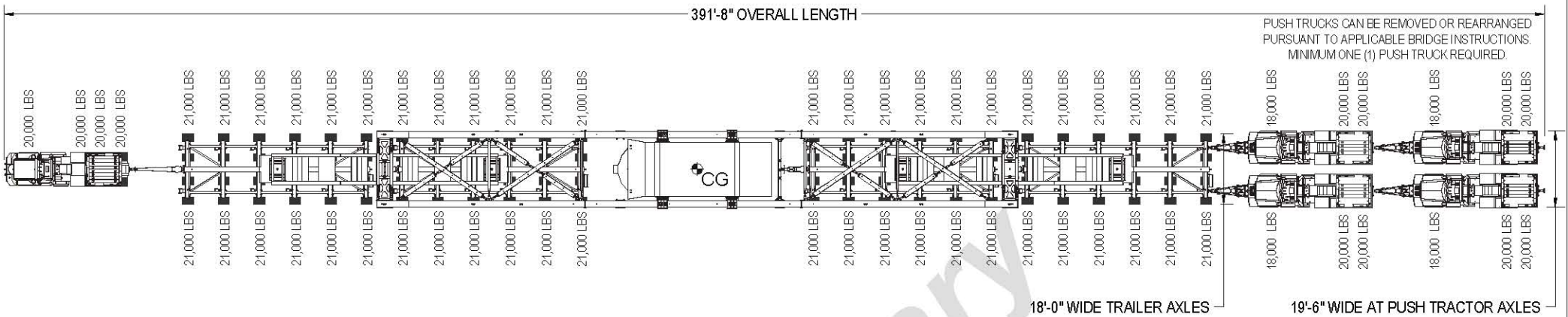
Rev 1	DLD	Date: 02-05-14	UPDATE TO CARGO WEIGHT
Rev 2	DLD	Date: 04-02-14	UPDATED TO INCLUDE SECUREMENT DETAILS
Rev 3	-	Date: -	-

PERKINS SPECIALIZED TRANSPORTATION CONTRACTING
NORTHFIELD, MN
1-877-PERKINS
www.heavyhaul.com

Quote #	107574
Project #	409-000
Work Order #	-
Drawing #	L00A3112-A

Figure 2

PERKINS SPECIALIZED TRANSPORTATION LAYOUT



GVW WITH FIVE (5) TRACTORS: 1,320,000 LBS

TOTAL RIGHT FILE	504,000 LBS
TOTAL CENTER FILE	80,000 LBS
TOTAL LEFT FILE	504,000 LBS
GVW W/OUT PUSH TRACTORS	1,088,000 LBS
PUSH TRACTORS (4)	232,000 LBS
TOTAL GVW	1,320,000 LBS

192 TIRES, 24 AXLE LINES
285/70R X 19.5 TIRES
AIR BRAKES ALL AXLES
STEERING ON ALL AXLES
HYDRAULIC SUSPENSION CARRIES EQUAL WEIGHT ON ALL TIRES

ORIGIN INFORMATION		DESTINATION INFORMATION	
Shipper:	-	Consignee:	-
Address:	-	Address:	-
City/St:	WILMA, WA	City/St:	GREAT FALLS, MT
Zip:	-	Zip:	-
Contact:	-	Contact:	-
Tel Num:	-	Tel Num:	-
Fax Num:	-	Fax Num:	-

CUSTOMER
MAMMOET CANADA WESTERN LTD.
12920 33RD ST NE
EDMONTON, AB
T6S 1H6
ROD CABLE
TEL: 780 485 8551
FAX: 780 417 9623
CELL: 780 718 4900
rod.cable@mammoet.com

SHIPMENT DESCRIPTION		PERMIT INFORMATION	
LENGTH	40-02"	LENGTH	391' 08"
WIDTH	15'-06"	WIDTH	20' 00"
HEIGHT	15'-06"	HEIGHT	17' 01"
WEIGHT	503,774 LBS	REAR O.H.	00' 00"
JOB NO.	-	WEIGHT	SEE ABOVE
MOD NO.	-		
MARK NO.	-		

Prepared by: DLD	Date: 01-27-14	Scale: NONE
Reviewed by: BJA	Date: 01-27-14	
Approved by: -	Date: -	

PERKINS ...WHEN EXECUTION MATTERS MOST

PLAN VIEW REACTOR

NOTES:
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Rev 1	DLD	Date: 02-05-14	UPDATE TO CARGO WEIGHT
Rev 2	DLD	Date: 04-02-14	UPDATED TO INCLUDE SECUREMENT DETAILS
Rev 3	-	Date: -	-

PERKINS SPECIALIZED TRANSPORTATION CONTRACTING
NORTHFIELD, MN
1-877-PERKINS
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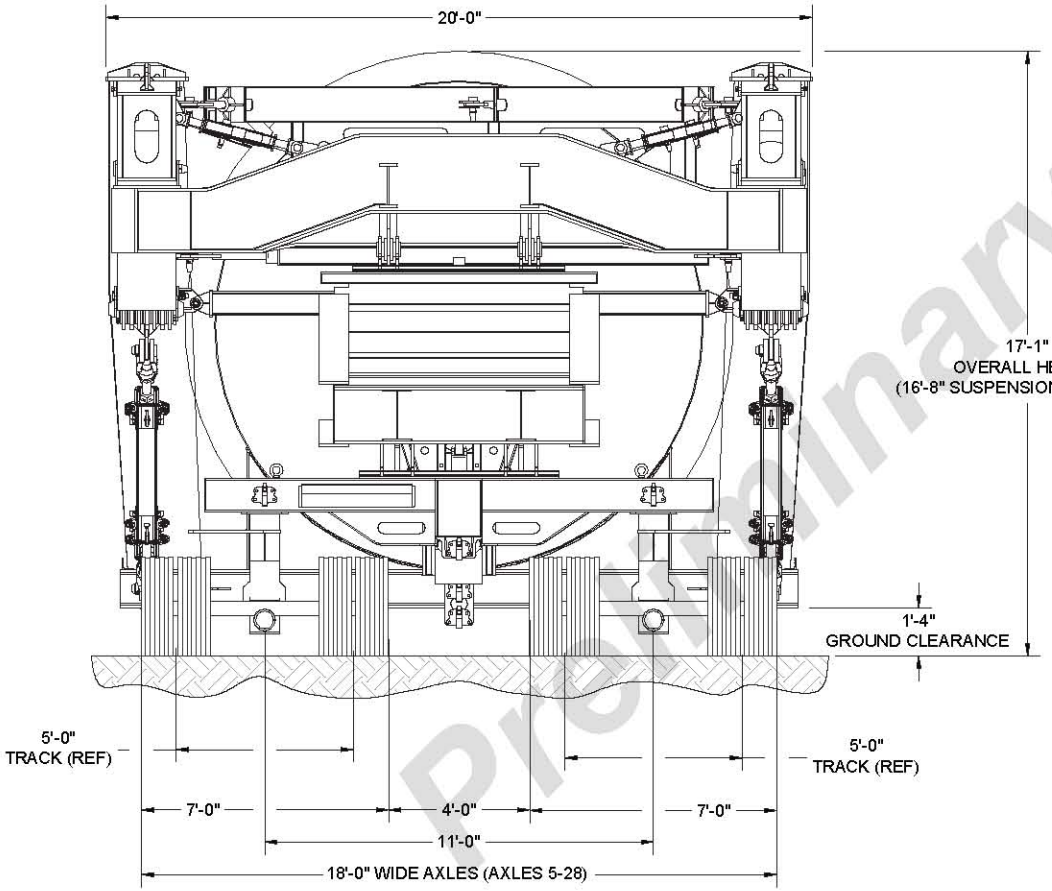
Quote #	107574
Project #	409-000
Work Order #	-
Drawing #	L00A3112-B

Figure 3

PERKINS SPECIALIZED TRANSPORTATION LAYOUT



END VIEW

GVW WITH FIVE (5) TRACTORS: 1,320,000 LBS

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STEERING ON ALL AXLES
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ORIGIN INFORMATION		DESTINATION INFORMATION	
Shipper:	-	Consignee:	-
Address:	-	Address:	-
City/St:	WILMA, WA	City/St:	GREAT FALLS, MT
Zip:	-	Zip:	-
Contact:	-	Contact:	-
Tel Num:	-	Tel Num:	-
Fax Num:	-	Fax Num:	-

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ROD CABLE	JOB NO.	-	WEIGHT	SEE ABOVE
TEL: 780 485 8551	MOD NO.	-		
FAX: 780 417 9623	MARK NO.	-		
CELL: 780 718 4900	Prepared by: DLD	Date: 01-27-14	Scale: NONE	
rod.cable@mammoet.com	Reviewed by: BJA	Date: 01-27-14		
	Approved by: -	Date: -		

...WHEN EXECUTION MATTERS MOST

END VIEW — REACTOR

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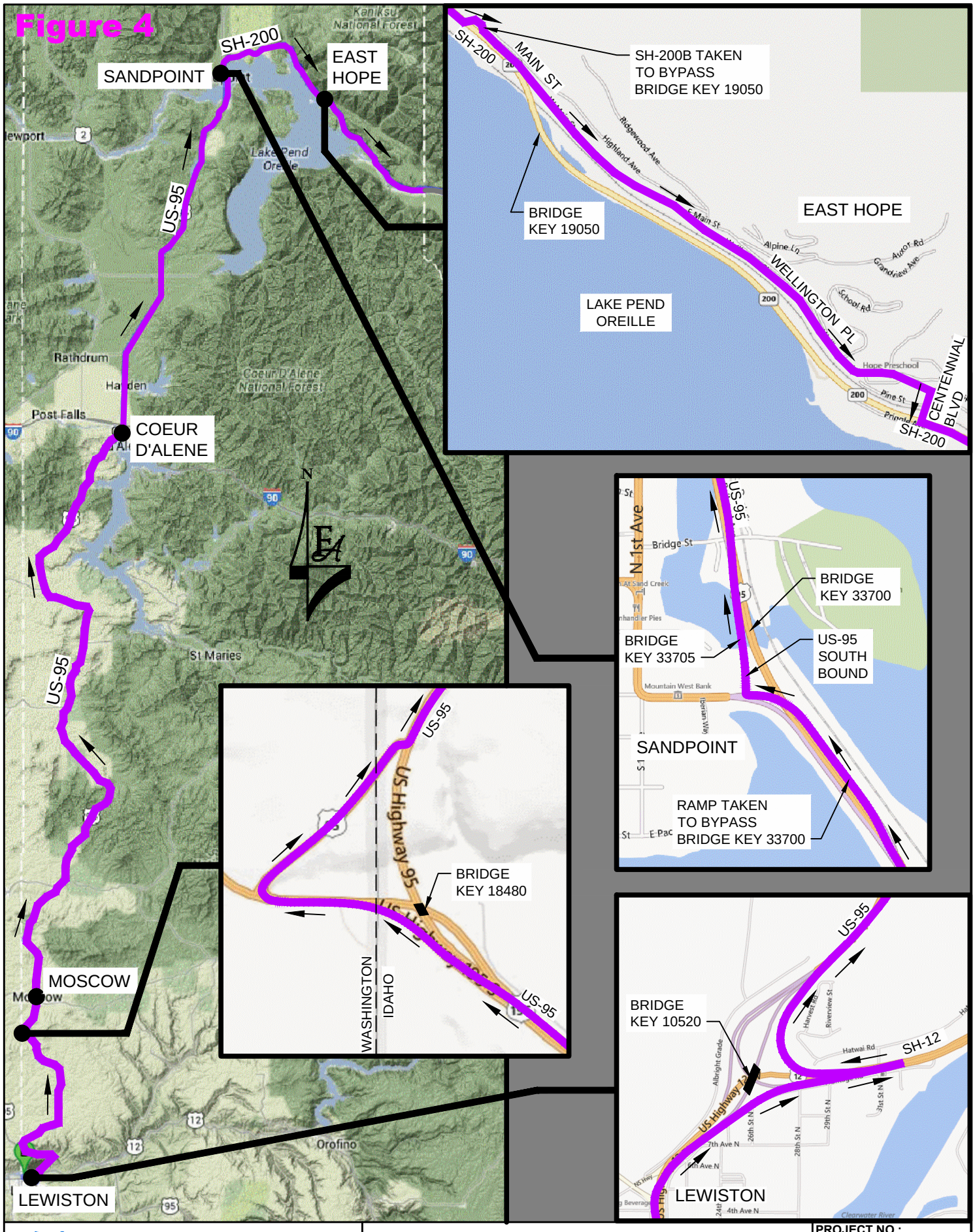
Figure 4



FORSGREN Associates Inc.	PERKINS OVERSIZE LOAD	PROJECT NO.: 213177
	US-95/SH-200 ROUTE	SHEET NO.

P:\213177 - Mammoet Permit Assistance\CADD\Submittal Drawings\Lewiston - SandpointLewiston - Sandpoint.dwg 4/17/2014 10:05 AM RBLAZICEVICH