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**DELIVERY OF MATERIALS REQUIRED FOR THE MAINTENANCE AND REPAIR OF PAVED ROADS IN THE CENTRAL AREA OF THE KINGDOM OF POLAND AFTER THE FALL OF THE NOVEMBER UPRISING**

**Summary.** The article explores the stress-strain state of the pneumatic flexible shaft coupling of the tumbling mill drive using a software of finite element analysis. The study has revealed that the stress-strain state of the pneumatic flexible shaft coupling is characterized by an uneven general and local distribution of stresses. Areas of maximum stress and strain in the pneumatic flexible shaft coupling have been defined. The study allowed for changing the geometry and reducing the mass of the disc of the pneumatic flexible shaft coupling with a slight change in stresses and strains. The results of the study can be applied to the design of pneumatic flexible shaft couplings and serve as a basis for further research.

**Keywords:** pneumatic flexible shaft coupling; finite element method; geometry; stress; strain; displacement

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## 1. PUBLIC TENDER PROVISIONS RELATING TO THE DELIVERY OF MATERIALS FOR THE CONSERVATION AND REPAIR OF THE KINGDOM OF POLAND'S MAIN ROADS IN LIGHT OF THE ADMINISTRATIVE COUNCIL'S DECISION OF 28 MAY 1833

Although, in the Vienna Congress Kingdom of Poland, detailed provisions regarding THE auction of supplies of materials for the conservation and maintenance of the country's main roads were carefully prepared and introduced, in the initial period of the so-called Ivan Paskevich period, tenders were generally held according to the Administrative Council's decision of 16/28 May 1833<sup>2</sup>.

The entire procedure was usually practically carried out in such a way that the Department of Industry and Trade of the Government Committee for Internal, Spiritual and Public Enlightenment Affairs gave notice to the general public of the exact amount of materials required in a given year for the proper maintenance of roadways. Usually, these specifications were limited to a description of the provision of certain amounts of "natural or artificial gravel", as well as "the amount of the remaining former deliveries of stone material that had to be crushed at a particular stretch of the road(s)". Most often, such information was provided with a clause stating that the government reserved the right to increase or decrease the amount of required stone material, although by no more than one third of the general amount previously announced<sup>3</sup>.

The relevant data were usually printed, at the end of each year, in the relevant provincial journals, in order to notify entrepreneurs about the exact date and place concerning each tender and the conditions, or rather possibilities, for entering the whole auction process. Thus, it can be easily stated that a period of just over two weeks was usually considered to be quite sufficient for a wide range of industrialists to prepare the necessary documentation and submit their offers. As for the rules, the declarations sent after the fixed date, even if they were sent directly to ministerial offices (i.e., to the supervising authority of any activity in the field of transportation with the Government Committee for Internal, Spiritual and Public Enlightenment Affairs), had to be considered invalid, even if they "were more favourable than others". The last clause, at the same time, suggested that even those offers that arrived after the pre-term deadline would be somehow carefully studied by the state administration. Incidentally, it seems that such strange behaviour turned out to be the norm in the post-uprising kingdom. Nevertheless, it was a rather common and fully accepted practice among entrepreneurs to submit their offers in sealed envelopes, which were addressed to individual voivodship local authorities, or provincial commissions, and marked with the wording, "Declaration for bidding on N to be held on day N".

The decision of the Administrative Council of 16/28 May 1833 specified the scope of the data that any offer to supply materials required for the maintenance of roads should typically contain. Namely, each entrepreneur was required to include the following in his written offer:

- a) his name, surname and place of residence;
- b) the date and place of writing out the declaration;
- c) a statement on his submission to all stipulations and reservations specified in the terms of the public tender;
- d) confirmation given by the local treasury census bureau concerning the deposit of the sum of money (bid bond) required to participate in the auction.

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<sup>2</sup> *Official Journal of Mazovian Voivodeship*, 2 December 1833, No. 115: 1679. *Official Journal of Mazovian Voivodeship*, 24 August 1835, No. 205: 1053, 1055-1056.

<sup>3</sup> *Official Journal of Mazovian Voivodeship*, 2 December 1833, No. 115: 1667.

It was extremely important to provide some specific data in the declaration referring to the “space” of the paved road, which the applicant proposed to repair/maintain, and the exact number of cubic fathoms of natural or artificial gravel (saber), expected to be provided by him. It was also necessary to state the amount of stones that the entrepreneur agreed to crush in order to produce the so-called ordinary artificial gravel. The authorities, in particular, clearly demanded that everyone participating in public tenders should write down the specific amount of money (in Polish currency) that the bidder expected to receive in return for delivering one cubic metre of natural gravel, as well as the amount for the supply of one cubic fathom of artificial gravel. Similarly, the cost of one cubic fathom of crushed “public treasury” (i.e., owned by the state) stones had to be specified separately. The numbers given were to be written in letters, i.e., in whole words.

It was often customary that participation in the tender organized for the supply of materials needed for the maintenance of roads was confirmed by post. The bid bond could also have been paid in the same way. Therefore, the Administrative Council decided on 28 May 1833 that individuals submitting their offers must clearly specify in their declaration whether, in the event of losing the tender, they expected the amount of the deposit paid to be returned in the same (postal) way, or whether their bid bond was to be “kept until the entrepreneurs’ personal appearance”. The legislator provided the possibility of accepting only those declarations that were written “with no doubts”, without any deletions, and signed by the applicant himself. Failure to meet any of the above conditions made the declaration invalid according to the power of the law.

The amount of the bid bond enabling participation in the tender for the supply of materials needed for the maintenance of Polish paved roads was usually set at one tenth of the declared value of the entire “transportation project”, the complete performance of which was declared by the applicant. The authorities were obliged to calculate this amount according to the price offered by the entrepreneur himself. The bid bond was paid to the local voivodeship main office or the district taxation office. Only a receipt issued by either of these two institutions and attached to the declaration constituted proof of payment of the deposit. The required sums were expected to be paid “in real money”. It was also possible to submit mortgage bonds from Warsaw’s Land Credit Cooperative Society, set up in 1825, i.e., a mortgage lending institution for bigger landowners. The value of these bonds was calculated according to the nominal value stated by the local stock exchange market description, which was valid at the relevant time.

Any initial information about tenders for the delivery of stone materials for road maintenance and conservation had to be subsequently supplied to the offices of individual provincial commissions or the Directorate of Land and Water Communications in Warsaw. These data were to relate to the terms “regarding the delivery dates, and other details of contracts, eventually to alter”<sup>4</sup>.

## **2. PRIMARY PUBLIC TENDERS FOR THE SUPPLY OF STONE MATERIALS FOR NECESSARY REPAIR AND MAINTENANCE OF PAVED ROADS AFTER THE NOVEMBER UPRISING**

The introduction by Warsaw’s Administrative Council in May 1833 of some new and detailed bidding regulations did not mean that, before that date, there were no public tenders

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<sup>4</sup> *Official Journal of Mazovian Voivodeship*, 2 December 1833, No. 115: 1678-1680.

for the supply of materials necessary for the proper maintenance of roads in areas occupied by the Russian First Active Army in the Kingdom of Poland. On the contrary, at the very beginning of the post-revolutionary period, i.e., after the suppression by the Russians of the Polish November Uprising of 1831, the invading tsarist occupying authorities decided to allow the Polish autonomous administration to take some measures to secure the condition of the main roads in the kingdom, with a special emphasis on Mazovian Province, which was the most important economically and strategically. Thus, initially, on 3 January 1832, the Ministry of Interior, i.e., the Government Commission for Internal Affairs and Police, issued a Rescript No. 2 821/1 792 (numbered since 16 September 1831) ordering the auction of materials necessary for the “preservation” of roads located in the Mazovian Voivodeship, and especially in the vicinity of the capital, Warsaw.

As a result, according to the note given by the Mazovian Voivodeship Committee of 13 January 1832 and signed by Presidential Secretary Kożuchowski, these bids were set to take place in the commission’s office, located at 646-647 Przejazd Street. They were to be carried out personally by the Provincial Commissioner of the Mazovian Administrative Department. With the apparent difficulty in becoming acquainted with the exact conditions of the tender simply by reading official journals (it was, however, possible to know the terms of the bid by personally visiting the offices of the Mazovian Provincial Committee), it was announced that, in order to participate actively in public tender, it was necessary to present a paid tender deposit equal to one tenth of the amount of the contract being auctioned. The very date of the two bids was set for 1 and 2 February 1832, at 10 a.m. on each day. What was extremely important was that the legislator somehow anticipated the possibility of not securing bids that were acceptable to the government. Thus, it was stated, *expressis verbis*, in the bidding conditions that “if till the noon of each day no competitor would appear in the office equipped with the proof of a previously paid bid bond ... then the bidding protocol would be inevitably closed”<sup>5</sup>. Indeed, the worst expectations became a reality, as it soon turned out that “the bidding for the delivery of materials for the preservation of paved roads in this voivodeship did not reach its goal and result”. Under these circumstances, on 17 February 1832, the Government Commission for Internal Affairs and Police issued Rescript No. 766, ordering preparations to take place throughout the rest of February and the beginning of March 1832 concerning any further tenders for the delivery of materials necessary for the proper maintenance of Mazovian Voivodeship and Warsaw circumference roads.

In connection with the above, the Warsaw Voivodeship Commission issued, for publication in several official national periodicals, some announcements on the planning of such in-kind bidding with regard to the submission of sealed declarations by bidders. The place for submitting declarations and conducting the entire tender, as well as the person solely responsible for conducting it, obviously remained unchanged. The same applied to the time division of the tender, which was split into two instalments, to be implemented on 8 and 9 March 1832. Entrepreneurs once again had to deposit, in cash, a bid bond to the value of one tenth of the entire contract and deliver (by 1 p.m. on each auction day) it “sealed in an envelope, and written without any corrections declaration”, along with the final proposal for the exact amount of money required to deliver stone materials to one of road stations listed in the tender.

According to the remarks of the Mazovian Voivodeship Commission of 23 February 1832, its President Rajmund Rembieliński warned entrepreneurs of the possibility of receiving

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<sup>5</sup> *Universal Journal*, 22 January 1832, No. 21: 82.

bidding offers that did not contain the exact “percentage” of the proposed withdrawal of a competitor from the original bid amount<sup>6</sup>.

The entire public tender offer related to the public procurement event on 8 and 9 March 1832 was as follows.

Tab. 1.

The public tender for the delivery of natural or artificial gravel and stones necessary for the maintenance of main roads in the Mazovian Voivodeship in 1832, according to the public tender of 8 March 1832<sup>7</sup>

Route	Fathoms of natural gravel	Fathoms of artificial gravel	Fathoms of crushed stones	Sum for one fathom (in Polish złote, grosze)
I. Lublin route a) from Warsaw to Piaseczno			402	86, 22
II. Cracow route a) from Warsaw to Sękocin - from Versts 1-4 inclusive	137	275		75/75
III. Roads around Warsaw				
a) Wilanów road	22			78, 22
b) Młociny road	119			60
c) Bielany and Marymont roads	66			60
d) Powązki road	28			60
e) Wołyń Military Guard road	3			60
f) Lithuanian Military Guard road	7			60

Tab. 2.

The public tender for the delivery of natural or artificial gravel and stones necessary for the maintenance of main roads in Mazovian Voivodeship in 1832, according to the public tender of 9 March 1832<sup>8</sup>

Route	Fathoms of natural gravel	Fathoms of artificial gravel	Fathoms of crushed stones	The sum for one fathom (in Polish złote, grosze)
I. Poznań route				
a) from Warsaw to Błonie	492	111		66, 22/66, 22
b) from Błonia to Sochaczew	472			36
c) from Sochaczew to Łowicz			471	22

<sup>6</sup> *Universal Journal*, 3 March 1832, No. 61: 248-249.

<sup>7</sup> *Universal Journal*, 3 March 1832, No. 61: 248.

<sup>8</sup> *Universal Journal*, 3 March 1832, No. 61: 248-249.

d) from Łowicz do Zduny			167	29, 25
e) from Zduny to Belno			135	22
f) from Belno do Kutno			144	22
g) from Kutno do Krośniewice			122	22
h) from Krośniewice to Kłodawa			223	22
i) from Kłodawa to Choiny			140	22

The authorities also stipulated that the gravel intended for the proper maintenance of roads circumferencing the capital (including the Młociny, Bielany and Marymont routes) and some military camp roads had to be excavated and transported from the state-owned Młociny Mine. On the other hand, in order to deliver gravel to the section of the Kalisz-Poznań route, especially in the area stretching from the Błonie locality to the town of Sochaczew, it was necessary to dig gravel out of the terrain belonging to another state-owned facility, Topolowo Mine. However, when any bidder offered to provide gravel material from his own mining area, he would receive priority status in winning the tender. This was the case even if a competitor's prices were slightly higher than those offered to entrepreneurs who intended to supply gravel from the state mines<sup>9</sup>.

### 3. DELIVERIES OF STONE MATERIAL FOR ROAD MAINTENANCE AND REPAIR IN MAZOVIAN VOIVODESHIP FOR 1834

In the *Official Journal of the Mazovian Voivodeship*, printed on 2 December 1833, a summary by the Government Commission for Internal, Spiritual and Public Enlightenment Affairs was presented, which include a preliminary illustration of the amount of stone material, necessary for the proper maintenance of paved roads in this region of the country through the whole of 1834. This specification included: a) natural and artificial gravel; b) possible selection of these two types of gravel; c) chipping (crushed stone or rock) or remains from the former supply of stones. The Ministry of Interior simultaneously reserved the right to increase or reduce by one third the quantity of the ordered deliveries and works<sup>10</sup>.

Tab. 3.

The public tender for the delivery of natural or artificial gravel and crushed versions of previously supplied stones necessary for the maintenance of main roads in Mazovian Voivodeship in 1834<sup>11</sup>

Route	Fathoms of natural gravel	Fathoms of artificial gravel	Fathoms of natural or artificial gravel	Fathoms of crushed stones

<sup>9</sup> *Universal Journal*, 3 March 1832, No. 61: 248-249.

<sup>10</sup> *Official Journal of Mazovian Voivodeship*, 2 December 1833, No. 105: 1676-1677.

<sup>11</sup> *Official Journal of Mazovian Voivodeship*, 2 December 1833, No. 105: 1677-1678.

I. Kowno route				
a) from Praga to Jabłonna	100			
b) from Jabłonna to Zgierz			115	
II. Brześć Litewski route				
a) from the road to Janków to the border of Warsaw District			200	70
b) from Mingosy on the border of Stanisławów District			350	110.5
III. Lublin route				
a) from Warsaw to Piaseczno			180	
b) from Potychez to Mniszów			38	
IV. Cracow route				
a) from Warsaw to Sękocin				
- from Verst 1-5 inclusive			58	
- from Versts 6-16 inclusive		155		
V. Kalisz to Poznań route				
a) from Warsaw to Błonie				
- from Versts 1-5 inclusive		100		
- from Versts 6-16 inclusive			320	
b) from Błonie to the border of Warsaw District			100	
c) from Verst 3 to Sochaczew			230	
d) from Sochaczew beyond Łowicz to the border of Sochaczew District			284	
e) from Verst 79 in the direction of Kłodawa on the border of Gostyń District				364.5
f) from Verst 140 to Chojny on the border of Łęczyca District				80
VI. Gdańsk route on the right bank of the Vistula River	129			
a) from Jabłonna to Modlin				
VII. Roads around Warsaw				
a) Wilanów road	9			
b) Młociny, Bielany and Marymont roads	142			
c) Military camp roads and Parysów road	34			
Roads and squares around Łazienki Palace	35	27		
VIII. Additional requirement of the delivery of 130 wagons of gravel, with 16 ft <sup>3</sup> in each of them				

As is visible from the collected data, the Government Commission for Internal, Spiritual and Public Enlightenment Affairs, in the procurement of materials required for suitable road maintenance in Mazovian Voivodeship, most often did not make a difference as to whether natural or artificial gravel should be used. In addition, it should be similarly assumed that the solution applied in 1833/1834, in reference to this central region of the country, represented an model to be sanctioned in other years, both in this and in other areas of the Kingdom of the Poland, during the military rule of another Russian Prince of Warsaw, General Paskewich.

Subsequently, on 14 March 1834, the Government Commission of Internal, Spiritual and Public Enlightenment Affairs issued Rescript No. 1 907/3 867, ordering an auction to take place for the supply of 96.625 cubic fathoms of artificial gravel, obtained by crushing granite stones, which was intended for the ongoing repair of the Kalisz-Poznań route, between the town of Kłodawa and the locality of Chojne. The ministry additionally decided at the same time to undertake some other repair works, on this occasion to be commenced a) on the roads around Warsaw, b) on the Lublin route; c) and on other sections of the Kalisz-Poznań route. In view of the above, the Mazovian Voivodeship Commission issued, on 24 April 1834, Note No. 21 426, signed by its President, Count Potocki, announcing the public tenders that would be executed in the offices of this institution on 16 May 1834 (at noon).

The tender (with negative bidding) was to start with a total amount of 27,310 Polish zloty and 29.5 grosze. Of course, the offer with the lowest amount proposed was destined to win. Delivered in sealed envelopes, written offers were only accepted if the bidding entrepreneur was able to present proof of the bid money paid<sup>12</sup>.

#### **4. DELIVERIES OF MATERIALS NECESSARY FOR THE REPAIR AND MAINTANANCE OF PAVED ROADS IN MAZOVIAN VOIVODESHIP IN 1836-1837**

According to the information presented on 1 August 1835 by the Government Commission for Internal, Spiritual and Public Enlightenment Affairs, delivery of maintenance and repair materials for paved roads for the period of 1836-1837 was jointly anticipated. The relevant public tender competition was to be carried out in such a way that, until noon on 7 September 1835, suitable declarations were to be placed at the office of the Mazovian Provincial Commission. Submitted offers had to include the price of both natural and artificial gravel. These declarations had to be additionally accompanied by security deposits with a value of 10% of the amount of the offered prices for all materials, while the exact content of the government offer was available for inspection each day (except holidays) from 8 a.m. to 4 p.m. As announced, the state authorities needed to provide “natural or artificial gravel, depending on the entrepreneur’s choosing” for road maintenance<sup>13</sup>.

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<sup>12</sup> *Universal Journal*, 4 May 1834, No. 121: 627.

<sup>13</sup> *Official Journal of Mazovian Voivodeship*, 24 August 1835, No. 205: 1053.



Tab. 4.

The public tender for the delivery of natural or artificial gravel and crushed versions of previously supplied stones necessary for the maintenance of main roads in Mazovian Voivodeship in 1834, according to the additional public tender of 16 May 1834<sup>14</sup>

Route	Bidding sum (in Polish grosze)	Bid money (in Polish złote)
<b>I. Roads around Warsaw</b>		
a) Bielany, Młociny and Marymont roads	484, 7	49
b) Road leading from Powązki Warsaw's city gate to Parysów	1, 572, 4	158
<b>II. Kalisz-Poznań route</b>		
a) from Warsaw to the border of Sochaczew District	114, 20	12
b) from Verst 80 to Verst 140	6,870, 26	687
c) from Verst 140 to Verst 159	4,358, 27.5	436
<b>III. Lublin route</b>		
a) from Warsaw to Piaseczno	1,371, 5	137
b) from Potycze to Miuszewo	12,539	1,253

Tab. 5.

The public tender for the delivery of natural or artificial gravel and crushed versions of previously supplied stones necessary for the maintenance of main roads in Mazovian Voivodeship during 1836/1837 on the following tracks: Kowno route; Brześć Litewski route; Lublin route<sup>15</sup>

<sup>14</sup> *Universal Journal*, 4 May 1834, No. 121: 627.

<sup>15</sup> *Official Journal of Mazovian Voivodeship*, 24 August 1835. No. 205: 1053-1054.

Route	Versts	Fathoms of natural or artificial gravel	Fathoms of crushed stone	
<b>I. Kowno route</b>				
a) from Praga to Jabłonna	1-14	320	1	
b) from Jabłonna to Zgierz	14-23	160		
<b>II. Brześć Litewski route</b>				
a) from Praga to Miłosna				
	1-5	130	From Miłosna to Mingosy - 32	
	5-16	220		
	16-17	15		
b) from Miłosna to Mińsk	17-34	240		
c) from Mińsk do Koussin	34-50	230		
d) from Koussin to Mingosy	50-65	210		
<b>III. Lublin route</b>				
a) from Warsaw to Piaseczno				
	1-5	120		
	5-14	180		
b) from Piaseczno to Góra	14-30	130		
Caldaria	30-43	130		
b) from Góra Caldaria to Mniszów (Mniszew)	43-47	30		
<b>IV. Cracow route</b>				
a) from Warsaw to Sękocin				
	1-4	100		
	4-8	80		
	8-16	120		
	16-27	120		
b) from Sękocin to Tarczyn	17-40	130		
c) from Tarczyn to Grójec	40-61	180		
d) from Grójec to Falenica	61-63	13		
e) from Falenica to Białobrzegi				

Tab. 6.

The public tender for the delivery of natural or artificial gravel and crushed versions of previously supplied stones necessary for maintenance of main roads in Mazovian Voivodeship during 1836/1837 on the following tracks: Kalisz-Poznań route; industrial route; Gdańsk route; Modlin route<sup>16</sup>

Route	Versts	Fathoms of natural or artificial gravel	Fathoms of crushed stones
I. Kalisz-Poznań route	1-14	330	
a) from Warsaw to Ołtarzew	14-24		
b) from Ołtarzew to Błonie	24-31	205	
		120	
c) from Błonie to Sochaczew	31-48	145	
d) from Sochaczew to Łowicz	48-72	275	31
e) from Łowicza to the border of Sochaczew District	74-79	60	
f) from the border of Sochaczew District to Płocka Dąbrowa	79-94	60	119
g) from Płocka Dąbrowa to Kutno	94-114	160	118
h) from Kutno to Krośniewice	114-126	-	
i) from Krośniewice to Kłodawa	126-140	100	76
j) from Kłodawa to Chojny	140-159	130	135
II. Industrial route			
a) from Łowicz to the border of Sochaczew District	72-90	200	
b) from the border of Sochaczew District to the border of Rawa District	90-112	185	
c) from the border of Rawa District to the border of Kalisz Voivodeship	112-133	240	
III. Gdańsk route on the right bank of the Vistula River			
a) from Jabłonna to Modlin	Distance of 13 versts	220	
IV. Gdańsk route on the left bank of the Vistula River			
a) from Warsaw to Młociny	1-6	140	
b) from Młociny to Kazuń	6-26	290	

<sup>16</sup> Official Journal of Mazovian Voivodeship, 24 August 1835, No. 205: 1054-1055.

Tab. 7.

The public tender for the delivery of natural or artificial gravel and crushed versions of previously supplied stones necessary for maintenance of main roads in Mazovian Voivodeship during 1836/1837 on the following tracks<sup>17</sup>

Route	Versts	Fathoms of natural or artificial gravel
I Radzymin route		
a) from Praga to Radzymin	1-19	330
II. Roads around Warsaw		
a) Bielany road		50
b) Marymont road		16
c) Wilanów and Siedlce roads		15
d) Military camps roads		25

Accordingly, one of leading figures on the Government Committee of Internal Affairs, Felix Łubieński, in a text he wrote on 15 August 1835, strongly emphasized the need to fully comply with all the terms of above-described public tender<sup>18</sup>.

##### **5. CONTRACT SIGNED BETWEEN THE GOVERNMENT COMMISSION FOR INTERNAL, SPIRITUAL AND PUBLIC ENLIGHTENMENT AND THE ENTREPRENEUR S.N. POSNER**

Although most tenders eventually brought about relatively positive results, several years of experience gained in the first half of the 1830s with public bidding for the supply of materials necessary for repairing and maintaining Polish paved roads (especially in the central part of the kingdom) revealed some obvious flaws on the entire system. Based on this observation, mostly with the purpose of thwarting further practices bearing the characteristics of the collusion of bidding, the Directorate of Land and Water Communications and the Government Commission for Internal, Spiritual and Public Enlightenment Affairs finally implemented, in 1836. some drastic countermeasures, aiming to reduce this problematic phenomenon.

Such possibilities were opened up when a few formally competing entrepreneurs approached the ministerial office, proposing to carry out a comprehensive conservation of paved roads in the whole of the kingdom to eventually ensure long-term general stone material delivery intended for use by the Directorate of Land and Water Communications. Among these persons was S.N. Posner, who, at least in the view of Warsaw's transportation administration authorities, presented the most favourable conditions for such an overall approach from the government's perspective. As a result, the Government Commission for Internal, Spiritual and Public Enlightenment Affairs concluded an appropriate agreement solely with this entrepreneur, which was subsequently approved by country's official civil

<sup>17</sup> *Official Journal of Mazovian Voivodeship*, August 24, 1835. No 205: 1055.

<sup>18</sup> *Official Journal of Mazovian Voivodeship*, August 24, 1835. No 205: 1058.

government, the Administrative Council.

On the basis of the contract signed, Posner, accepted and embraced his commitment to provide the state transportation administration with stone material necessary for the further maintenance of Polish paved roads for 10 years (i.e., during the period 1836-1845). At the same time, the Warsaw authorities received some strong financial guarantees from the entrepreneur concerning the accuracy of his economic promises. Indeed, during 1836, he was already agreeing to deliver goods (stone material) at prices that were, on average by 17% less than those applicable in the previous. As a result, the Ministry of Interior not only secured the Public Road Fund against further, uncontrolled financial loss, but also managed to achieve savings on material supplies, estimated in this case at over 200,000 Polish zloty per annum<sup>19</sup>.

That said, both the Directorate of Land and Water Communications and the Government Commission for Internal Affairs were not entirely satisfied with the basic deal struck with Posner. In order to expand the anticipated gains, the Ministry of Interior especially wanted to continue maintaining some of the benefits that could possibly result from the ongoing open public tenders for the delivery of stone material necessary for the maintenance and repair of paved roads. For this reason, in the contract signed with Posner, it was stated that the Government Commission for Internal, Spiritual and Public Enlightenment Affairs would take into consideration the annual conduct in all governorates of the kingdom concerning local bids, in which other entrepreneurs would be able to apply for the delivery work of the described materials, but only if they were able to offer lower prices than Posner. Any eventual financial benefits that would have arisen from carrying out these local auctions would be divided equally between the state administration and Posner himself. This so-called “main administrator”, having assured for himself the right to participate in governorate bidding, thus obtained prerogatives to prevent possible collusions; at the same time he was able to influence the price fluctuations (reduction) of scarce stone material. Indeed, only during a few preliminary local public tenders, implemented in 1836 just after the agreement between the Ministry of Interior and Posner was signed, did the bidding prices for services for supplying stone materials required for the maintenance of paved roads turn out to be “quite different”, compared with previous times. As reported by the Ministry of Interior, it became clear that “the bidders even offered prices that were 11% lower than those offered by the main administrator [i.e., Posner]”<sup>20</sup>.

## 6. CONCLUSIONS

Absolutely necessary for the maintenance of the main road infrastructure in the Kingdom of Poland at acceptable and sustainable level, the delivery of stone materials was secured in the first half of the 1830s by a) the initial continuation of pre-revolutionary solutions and b) the introduction of new bidding regulations in May 1833. It soon turned out, however, that the copious bid rigging among bidders made the process of supplying of these scarce materials relatively costly. Thus, in the mid-1830s, the Directorate of Land and Water Communications and - superior to this transportation institution - the Government Commission for Internal, Spiritual and Public Enlightenment Affairs at least partly solved this problem by concluding a

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<sup>19</sup> Central Archives of Historical Record in Warsaw. *Druga Rada Stanu Królestwa Polskiego: 1836*. Signature 104: 344.

<sup>20</sup> Central Archives of Historical Record in Warsaw. *Druga Rada Stanu Królestwa Polskiego: 1836*. Signature 104: 345.

10-year agreement to supply different types of gravel and crushed stones on a national scale with the energetic entrepreneur, S.N. Posner. Furthermore, this entrepreneur also enjoyed the right to participate in (and control) local tenders for the delivery of road materials. As a result, in 1836 alone, savings were reported, which were equal to 28% of the sum previously paid for the supply of materials necessary to maintain and repair major roads.

The significance of this undoubted economic success, however, was somewhat diminished, especially when taking into account the overall reduction in the activities of the Directorate of Land and Water Communications, which was already visible at the very beginning of the second half of the 1830s. The above factor, of course, does not fundamentally change the positive assessment of the actions undertaken by both the Directorate of Land and Water Communications and the Ministry of Interior in the scope of streamlining and reducing costs in the supply of stone materials necessary for the proper functioning of Polish roads in the first years after the fall of the November Uprising. These were the processes, where the diligent observation of diverse impediments and improprieties, especially occurring in the central part of the country, largely contributed to a general improvement and the discovery of suitably positive solutions.

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