

SUPPLEMENTAL MATERIALS

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Navier's 1832 Contributions to the Finance, Governance, and Evaluation of Public Works

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1 **Preface and translation notes**

2 In 1832, the French journal *Annales des Ponts et Chaussées* published a paper by the engineer
3 Claude-Louis Navier entitled “On the Execution of Public Works, Particularly Concessions”
4 (Navier 1832). Although known to almost every engineer for his fundamental work on fluid
5 mechanics, Navier was active more broadly in forming today’s fields of structural engineering,
6 transportation engineering, and engineering management, as well as fluid mechanics.

7 The contributions of Navier’s paper to economics and public policy are noted by Ekelund
8 and Hébert (1999). Many engineers of the early and mid-1800s era, particularly from the *École*
9 *des Ponts et Chaussées* and the *École Polytechnique*, made contributions that became
10 fundamental to many fields within and outside of engineering.

11 The present paper is translated from the original French to make this work more available
12 to engineers, economists, and scholars of infrastructure economics and policy, for hydraulic
13 engineers interested in the broader contributions of founders of fluid mechanics, and for
14 engineers and engineering students generally to show how many great engineers contribute as
15 serious generalists. The fundamental approaches to public works finance, evaluation, and
16 governance introduced in Navier’s paper remain relevant today.

17 This translation is for contemporary engineering and public policy readers. Therefore,
18 when several ways of translating were available, English wording was chosen to make the
19 meaning more readable and understood for modern professionals and students. (This process
20 made me sympathetic to the difficulties of creating useful translations.) Some calculation notes
21 are omitted, and other footnotes are incorporated into the text to follow ASCE publication
22 standards. Jay Lund, D. Member, ASCE

23

24 **“On the Execution of Public Works, Particularly Concessions”**

25 Claude-Louis Navier (1832)

26 *On public works, and the main goal that must be proposed in their execution*

27 The works that are the responsibility of road and bridge administration are mainly for
28 transportation and communications. The roads, bridges, navigation of rivers, canals, docks, ports,
29 and railways are to facilitate the transportation of goods.

30 The first point to which attention should be made seems to *be the importance of easy and*
31 *cheap transportation*. It would be superfluous to reproduce the principles of economic policy
32 which have been long available in several works. Few people today are unaware that the progress
33 of a state's wealth depends mainly on two causes, the division of labor and the employment of
34 natural forces in the execution of work. In effect by the division of labor and the use of natural
35 forces, one manages to produce at low cost, and therefore multiply more and put within reach of
36 a greater number of people, the objects necessary or useful in life and welfare of humans, this is
37 to say, the objects that have value and which constitute social wealth. But the action of these two
38 causes depend, in one part on the abundance of capital which farmers and manufacturers can
39 have, and of the extent of the market, this is to say of the territory over which each producer can
40 buy raw materials and sell manufactured products. The more considerable is this market
41 territory, the more possible it is to apply capital, the establishment of machines, or in general the
42 processes suitable for manufacturing more extensively, and with greater economy, all items of
43 consumption. But the extent of the market itself is obviously regulated by the condition that the
44 expenses of manufacturing plus the cost of transport not exceed the current price of the
45 merchandise. It is therefore essential to make the costs of transport as small as possible.

46 Here is an important remark to give these ideas precision. Generally, the costs of transport

47 for goods are composed of two parts: 1° the expenses to establish and maintain the road or route,
48 that are ordinarily the charge of the state or the communes; 2° the costs of transport, whether
49 paid by the freight forwarder or the carter. These two elements of expense finally fall back as a
50 charge to the society, and it is essential to diminish both. But from the principles above, one must
51 focus primarily to reduce the latter. In fact, although any economy is advantageous to society, in
52 that it allows greater consumption, or favors the accumulation of capital, the private economy
53 which pays transport expenses is much more important than any other, since it has an immediate
54 effect on the price of the commodity, and consequently on the size of the market.[Note: These
55 principles are not entirely consistent with those admitted by various engineers, for example by
56 the commission that presented the Rapport sur la police du roulage, 22 April 1828. (Printing
57 Royal. - December 1828, page 11.) In differing in opinion on this point we do not believe in lack
58 of respect due to the members of the commission.

59 In the report, when one wants to appreciate the results of several measures relating to the
60 administration of roads, one combines the expenses which in each case will be borne by the
61 government and those which will be borne by trade, and the results are compared. But this
62 comparison does little, in our opinion, to give a just idea of the influence of these measures on
63 public prosperity because we think that expenses charged to trade are much more harmful than
64 others.

65 We add that after having established in this way that the proposed reduction in transportation
66 price will cause an annual loss of three million (Rapport précité, page 14), one nevertheless
67 concluded it is appropriate to adopt this measure. But it seems that one has not given a
68 consideration that should perhaps not be neglected; it is that after the reduced weight of vehicles,
69 and the improvement which results in road conditions, a horse would be able to transport a

70 greater quantity of goods than it does today. Since, out of the approximately 276 million to which
71 the totality of the expenditure is estimated, it is supposed that there are 250 charged to trade, it
72 would be enough to a very small diminution on this part of the expenses to compensate, and
73 beyond, the three million increase that would result from the weight reduction of cars. If this
74 remark has been made, the result of a calculation presented as a main element of the examination
75 of the question would have been better with the definitive opinion given to the Government.]

76 We admit to the principle that the main purpose we should propose in the administration of
77 public works to support transportation is decreasing as much as is possible the cost of transport
78 for the freight forwarder or carter.

79

80 *Of the means to execute public works.*

81 We can distinguish the execution of public works mainly by the following financial means:

82 1° Local taxes or levys;

83 2° The payment of expenses on state funds, these expenses being taken immediately from
84 budgeted funds, or else with funds provided by loans, so interest and reimbursement are taken
85 from budgets in future years.

86 3° Covering expenses with state funds, with the imposition of a toll to reimburse the money
87 spent and to support maintenance costs,

88 4° Execution by way of concession, which requires establishing a toll.

89 We examine these various means, each in turn.

90

91 *On local taxes and levys.*

92 This is the simplest, most effective way, which appears first for the execution of public

93 works. A road is bad, transportation will be interrupted, it is for the inhabitants that this
94 transportation is immediately necessary and which benefit inhabitants by their selling food to
95 passers-by.

96 Local levys made the roads in France, and it is the roads that have made France what it is
97 today. Where would we be if taxes were needed for the road construction expenses required, or
98 wait for entrepreneurs to establish these routes based on speculation?

99 The execution of roads by local taxes, in labor or money, presented some important
100 advantages, which cannot be denied today. It rested on this principle, which still exists in force
101 in other parts of Europe, that the inhabitants of each commune are obliged to maintain their roads
102 in good condition. It followed from there: 1° that there was a way to arrive at the desired result,
103 that is, to have good roads; 2° that there could be a responsibility in this respect, that one knew
104 who to go after when a road was bad. Today with roads being maintained with public taxes, there
105 is no guarantee that one will expend the necessary funds, and the responsibility of the bad state
106 of roads does not rest on anybody. This last circumstance alone suffices to give rise to the fear
107 that it will henceforth be impossible to bring the roads of France to the state desired.

108 The necessity of an obligation and a personal responsibility, relative to the object in question,
109 is an obvious consequence of the effects of the last law on local roads. This law having prescribed
110 that the communes could tax themselves for the maintenance of these routes, but not that they
111 must tax themselves, no result occurred. We never get, it seems, at least positive prescriptions
112 unless we organize a responsibility, so that the municipality has a representative who can be
113 brought before the courts when the roads are not maintained in the manner prescribed by law. It
114 is by provisions of this nature that we have in England major routes in good condition, and local
115 roads as good or better.

116 Removing local levys has been a popular measure. It seems to us a misfortune in the sense
117 that it made the principle appear in France that each commune was obliged to maintain its roads.
118 We have often heard M. Gauthey, who had for a long time directed the administration of levys
119 in the province of Burgundy, assure that it gave rise to no complaint. In most provinces it was
120 less the imposition itself than the injustices and exceptions which excited complaints from the
121 people.

122 There are people who see the levy and taxes to maintain roads as an unjust thing, and to
123 whom it seems that justice requires that the maintenance of roads is paid by those who frequent
124 them. These questions seem to us to be better resolved by consideration of the interests of society
125 than by ideas of justice. But if we wish to examine this question, we will admit that, on the
126 contrary, it is the establishment of a toll which seems unfair. Indeed, the natural right is that
127 everyone is free to go everywhere with what he can carry, or get carried by animals. If, for the
128 benefit of the society, the land has been appropriated, so that one can no longer pass on the roads,
129 at least the freedom to use roads must be preserved. But, it will be said, the use of the roads will
130 soon make them impracticable: this is true, and it may engage those who frequent a path to
131 impose a further contribution as a toll or other means to maintain the road. But it does not result
132 that we have the right to stop others moving, or to force payment for passage, as such a man who
133 today finds the right road, and does not think he has any interest in making it better.

134 The establishment of a toll has been sometimes seen, in some respects more suitable to
135 procure the funds necessary; but it does not seem to us more just: on the contrary.

136 The means of providing suitably for the maintenance of roads in France have now fairly
137 large difficulties, we will think not that the solution is in the general establishment of tolls. It
138 seems to us detrimental to the development of industry and production to impose any new charge

139 on commerce. The establishment of a toll cannot be admitted unless it is used to reduce the cost
140 of transport at least as much as the toll.

141

142 *The execution of works public with state funds.*

143 Public works in France are usually this way. This process has been almost exclusively used
144 for large structures before the revolution, and since that time for such works and roads. The
145 administration and corps of engineers of bridges and roads were created and organized
146 accordingly. Several reasons justify this method which appear to be of great weight.

147 Public transportation works execution using state funds does not imply the necessity of
148 establishing a toll, and it is the only way of doing without it. But in returning to the principles
149 set out at the beginning, and in recalling that the key object is to reduce as much as possible the
150 portion of transportation costs paid by trade, we may consider that the absence of any toll is the
151 only way to get the state the benefits that can result from the construction of large works.

152 Consider what is happens today when one establishes a canal. The substitution of a waterway
153 for a road reduces the costs of transportation about in the amount of 8 to 1; producing a very
154 large economy for commerce. But, because of the rights imposed on canals, transportation costs
155 are all the more reduced in the proportion of 3 to 1, or even 2 to 1; and it often happens in reason
156 of delays and the other inconveniences that transport by water is less advantageous and trade
157 prefers to expedite its goods by road. It follows from this that the construction of the canal
158 becomes almost useless for commerce. And, in general, we can say that the usefulness of existing
159 canals in France is not as large as commonly believed. We spent considerable capital to create a
160 new element of prosperity; but, by the effect of the toll found that the proposed goal was not
161 reached.

162 This leads to a vicious circle, that a toll paid by commerce does not reimburse the capital the
163 gouvernement spent, without considering that the same toll hinders commerce on this new path,
164 and puts obstacles to development that was sought for production, opposing establishing on the
165 canal sufficient use to create the product sought.

166 As for people who, seeing that traffic is not established on the canals sufficient for the duties
167 imposed to reimburse the expenses of construction, would like to remedy them by putting so
168 much tolls on the roads to force commerce to abandon roads and preferentially go to canals, we
169 think that their opinion does not conform with the true interests of the state. [Note: This proposal,
170 reproduced in recent times, had been made in 1786 by Defer de la Nouerre.] The result of this measure
171 would obviously be to hinder trade by preventing it from doing what it deems appropriate to its
172 interests, and to increase transport costs which are now incumbent on it and which form part of
173 price of goods at the place of consumption. Now we must focus, in our opinion, on reducing
174 expenses. Far from proposing to increase them, we should rather inquire whether, for want of
175 other means, it would not be expedient to reduce them by premiums, and thus to favor that
176 particular kind of industry which consists in operating the transport of goods. A similar favor
177 has sometimes been granted to some branches of maritime navigation.

178 Suppose that the government built a canal and then imposed a toll which reimburses the
179 capital and pays maintenance costs, but which makes the transportation expense equal to that of
180 the previous road. No advantage will evidently result from this operation for the development of
181 trade and industry: the country remains exactly in this respect as it was before. The government
182 has shed its money: it has not lost anything or won anything. The same is true of the state: a
183 revenue equivalent to expenditure has been created, and consequently there will be no increase
184 or diminution in public taxes. The only result we have obtained is therefore that a part of the

185 horses and men previously engaged in the transport of goods are now unemployed. Now, it is by
186 no means proved that this is generally advantageous. It is at least conceivable that one could not
187 congratulate oneself for thus rendering efforts useless, that as far as the progress of the
188 industrialist would have immediately procured another occupation. But, as this progress will not
189 occur in the hypothesis which we have admitted, it seems certain not only that we will have
190 worked in vain, and that a real evil for society will have resulted.

191 On the contrary, let us admit that after the construction of a canal, no toll is imposed on it.
192 The key capital, which has been provided by the taxpayers, has come out of government hands,
193 and is not coming back. But the taxpayers benefit from the whole economy on the cost of
194 transport resulting from the substitution of a waterway for a dirt road. It is sufficient for the
195 operation to be advantageous, that this economy compensates the costs of construction and
196 maintenance. Moreover, and this is, according to us, the most important circumstance, the
197 transport costs being reduced to a lesser extent than is possible, the canal then gives commerce
198 and industry all the advantages that can be hoped for.

199 But, it will be said, in acting in this manner, the government is deprived of the sum employed
200 in the construction of the canal, a sum which was in its hands, and is now gone and will not
201 return. We reply to this observation that either the government can do without the sum of money
202 for the general needs of the state, or it cannot. If it can, it is useless to try to draw a second time
203 this sum from the hands of the taxpayers; if it cannot, it is better to obtain it in any other manner,
204 by distributing it over all taxes, than to seek to draw it from a toll. Indeed, and we cannot repeat
205 it too often, this toll tends to annihilate, or greatly diminish, the utility arising from the expense.

206 We emphasize these notions because they seem fundamental. In France, immense capital is
207 being used to establish inland navigation. These canals will have toll charges such that transport

208 costs on trade are reduced, for a large number of goods, about half. Now, if commerce could not
209 expect further advantage from the construction of canals, it would have been easy to obtain it at
210 much less expense. It was sufficient to improve the construction of the roads to ensure that a
211 horse had carried twice as much freight: the expense would have been infinitely less, and the
212 operation would not have required the same time or encountered the same obstacles.

213 There are reasons according to which it may seem appropriate in some cases to establish
214 moderate tolls. For example, it can be said that a toll on a canal is the most certain means of
215 providing for maintenance costs and ensuring conservation of the structure. Yet this would be
216 true only so long as the proceeds of the toll would not enter the coffers of the government and
217 would be designated to a special fund. Otherwise maintenance is not more secure than all other
218 public expenses.

219 These ideas on the administration of public works do not agree with recent practice; but it
220 appears nevertheless that is not always far. Effectively soldiers made the canal of Briare, and
221 the government has provided the greater part of the expenditure for the canal of Midi, without
222 seeking to recoup these funds. [Note: Riquet has only provided two million on fifteen. The king and
223 the province of Languedoc have given the rest.] Tolls were considered primarily on this last canal
224 for ensuring maintenance, and it has left the administration and operation to the Riquet family.

225 In summary, the absence of any toll, or the reduction of the toll to the lowest possible rate,
226 and for providing at most maintenance costs, is necessary for establishing transportation to
227 produce the benefits expected. This condition can be met when expenses are taken from public
228 funds, and can only be so in this case, the result is a powerful motive for preferring this mode of
229 execution to any other.

230 To these considerations that seem to us of great importance, one could add other remarks

231 which lead to the same conclusions.

232 When the execution, and by consequence the direction of public works, is in the hands of
233 the government, it is possible to embrace a grand ensemble, to direct them according to general
234 views, to bind lines of communications to each other so as to increase their usefulness.

235 It is possible above all, and this seems to be essential, to choose points at which the expenses
236 will be carried in a way that favors parts of the realm where help is most needed. Let us suppose
237 that the establishment of transportation never takes place except by private investment and
238 speculation. It is evident that these speculations will be preferred in places where industry and
239 wealth already have made great progress, and these are the only places where private investments
240 can take place. Thus we saw the first railroad companies executed near Saint Etienne and Lyon;
241 and if we have proposed something else, it is only in the directions where there are already
242 transport, imperfect indeed, but which at the present time give rise to considerable transport.
243 Consequently, by abandoning entirely the execution of works to private speculations, two
244 inconveniences would result: 1° this work could only be carried out after the country has already
245 reached a high degree of wealth; 2° the wealth tends to concentrate in points where local
246 circumstances are most favorable. It is, however, in the public interest, on the one hand, not to
247 abandon the country to itself while waiting for the spontaneous effects of the progress of wealth,
248 but rather to excite this progress by every means possible and, on the other hand, to remedy the
249 natural obstacles presented by the poorest regions. By doing so, these areas will enjoy the
250 advantage of belonging to a great nation, whose wealth offers immense resources. Otherwise,
251 they would languish for a long time in a state of poverty and inaction, which they cannot escape
252 by their own efforts today: it would be as valid for them and for the whole kingdom that they
253 would cease to be part of it, because the state would not help them, and their poverty would

254 prevent them from contributing and participating in general prosperity.

255 The reconciliation of what happened in France and England confirms these principles. In
256 France, by means of aid granted from public funds, there have been for a long time several great
257 canals, as well as very expensive and very useful bridges, which today even could not run by
258 way of concession. In England, on the other hand, where the government did not have the power
259 to execute such enterprises, these occur only very late. It was possible to do this only after the
260 time when foreign trade had procured considerable wealth, and the abundance of capital gave
261 rise to the private speculations in question. It was after giving itself the whole world for a market
262 that England found herself rich enough to perfect her internal communications, without any
263 effort by the state, and by this natural effect industrial transportation was left to itself. Since then,
264 wealth has continued to make rapid progress, to which these private investments have
265 contributed: also we are therefore far from wanting to exclude them. But France finds herself in
266 other circumstances: she has not reached the same degree of prosperity. Entrepreneurship and
267 speculation are not developed to the same point. It is hardly outside that it must seek a market
268 capable of giving to its industry the impulse necessary, and which it is ready to receive. It must
269 focus on creating this market inside itself; This can only be done so long as the necessary means
270 are taken to increase the population, and to reduce poverty in the parts of the kingdom which
271 have contributed least to general progress.

272 We shall place here a final remark, which has already been presented with more development
273 by a clever engineer, M. Vallée: it is that by executing the public works with state funds, by
274 means of an organized administration, as is the administration of bridges and roads, the expense
275 of this work must generally be less. Material expenses are the same in all cases, and with regard
276 to operating expenses, which are only a small part of the expenses, experience shows that

277 companies grant engineers and other agents higher salaries than the government does. In
278 addition, the organization and management of great affairs of this nature gives rise to chances of
279 loss, the partners of which must be compensated, and require painful care which must be
280 rewarded. Considerable sums are used for this purpose, or remain in the hands of the bankers, as
281 bonuses to facilitate the placement of shares. The resulting increase in expenditure is borne by
282 the state, and there is every reason to believe that incidental expenses of this nature are much
283 higher than the collection and administration costs of work done by the government. It will not
284 be said, moreover, that private fortunes, which would be created in this manner, are a wealth
285 acquired by the country; because these fortunes are not the result of new production, they come
286 from capital released from the hands of private individuals.

287 Lastly, as to the advantages which, according to some people, result from the intervention
288 of private interest, the advantages which would consist of the fact that the works directed by
289 companies would necessarily be executed with more economy and rapidity than works under
290 public administration, we do not fear to advance that this opinion has no real foundation. In
291 France it is enough for the public administration to desire. It can have the use, more than any
292 company whatsoever, of all the elements of success: experience, superior luminaries, power,
293 wealth, credit, and dedication.

294

295 *On the execution of work by public funds, with reimbursement of expenses using a toll.*

296 Following the considerations set out above, there is little left to say to appreciate this way to
297 proceed. The government, by means of funds raised from the taxpayers, pays the expense of
298 work, and moreover it will be obliged to use these same funds as needed for maintenance. It
299 imposes a toll to pay the expenses it made, and new expenses it is charged with. It is easy to see

300 that, for this operation to not be onerous for taxpayers, the annual saving on transportation must
301 at least equal the interest on capital expended, plus maintenance costs. This remark establishes a
302 limit for tonnage, below which we could not run without disadvantage to the enterprise.

303 We will try to apply these notions to the establishment of canals, to give them more precision
304 and we will use the following data:

305 Expenditure needed for the construction of a league of a great navigation canal, 590,000
306 francs, and, taking into account the cost of operation and loss of interest, 700,000 francs; the
307 annual interest is 35,000 francs.

308 Annual maintenance, expenses of operation and administration for a league of the same
309 canal, 10,000 fr.

310 Expenses paid by the trade for the transport of a barrel of goods, for a league on roads, 1 fr.;
311 on canals, 0.13fr. Economy of this last mode of transport, 0.87 fr.

312 From these data, a canal can be undertaken without loss to the state in any direction, where
313 the quantity of goods transported annually by this canal might equal $45,000/0.87$, or 52,000 tons.
314 If the tonnage is greater, the state will earn a yearly sum equal to the product of 0.87 fr. by the
315 number of barrels transported exceeding 52,000. [Note: We neglect here the economy that the canal
316 can provide on maintenance of roads which it replaces. This consideration decreases tonnage rate
317 indicated by a little.]

318 The consideration of the interest of the state provides no absolute condition for fixing the
319 toll, which is received and paid for by the state itself. It is obvious, moreover, that this toll can
320 not surpass the economy obtained on the cost of transport, so that it must necessarily be
321 understood, in the example we consider, between the 0 and 0.87fr limits. If the toll is nil, the
322 favorite canal produces the most development: if the toll approaches 0.87fr, it will not favor
323 production at all; it will leave the country in the state where it was.

324 The rate of tolls established by the last laws varies much according to the nature of the
325 merchandise. The average term seems to be about 0.16fr. If we wanted the duties collected to
326 reimburse the expenses, that would require an annual transport of 45,000 / 0.16, or 281,000 tons,
327 a quantity much higher than the tonnage which takes place today in France on the most
328 frequented canals.

329 Transporting 52,000 tons, sufficient for the enterprise to be useful to the state, would give
330 annually, at the rate of 0.16fr. for each, only a product of 8,320 francs, which would not be
331 sufficient in general to pay the expenses, maintenance, and administration costs.

332 Perhaps it will be said that the toll of 0.16fr. can be increased, since it seems rather far from
333 the limit 0.87fr. But if we consider the inconveniences of water transport, the excess of length
334 which we are generally obliged to give to the navigable lines, and that in many cases trade prefers
335 the track of earth in spite of the excess expense it entails, it will be judged, on the contrary, that
336 the rates are as high as possible, and we might lose in seeking to make them more productive.

337 We see that enterprises of this kind give very different results according to the point of view
338 under which they are considered. If it is only a question of doing a useful thing for society, a
339 very mediocre tonnage, which can be counted on in a great number of routes, will suffice to
340 justify the expenses; but if it is claimed that funds expended must return to the state by means of
341 a toll, most projects become impossible. Moreover, the very establishment of the toll, as we have
342 said before, greatly diminishes their utility.

343 It appears, moreover, that the Government has no motive for seeking to recoup its funds by
344 means of a toll, rather than by any other way. As soon as one is assured that the project is useful
345 to the country, there can be no objection to charging the expenses all on taxes. On the contrary,
346 it will be judged that it is very advantageous to take this last course, if we take care that, the more

347 economic the transport, and the more the development in production and circulation, which
348 results from the canal, will increase public revenues based on indirect taxes. It seems, then, that
349 the idea of recovering expended funds from a toll is a false view, which can only induce errors
350 very harmful to the good of the state.

351

352 *On the execution of public works by way of temporary or permanent concession*

353 The advantage of this method is that it requires no sacrifice from the state. The work is done
354 without any new expenditure coming to increase public taxes.

355 The main drawbacks are: 1° that the execution of this work requires conditions which are
356 difficult to meet, which prevents the enterprises in question from taking developments which
357 would be desirable for public prosperity; 2° that the establishment of tolls diminishes the
358 usefulness of these projects.

359 For the establishment of a new route by concession to be useful to the country, it is necessary,
360 and it is sufficient, as in the previous cases, that the economy obtained on transportation is at
361 least equal to the interest of the capital spent and increased maintenance costs. It would therefore
362 be found that, in the case of a large shipping canal, it is sufficient if the annual transport exceeds
363 52,000 tons.

364 For this arrangement to be possible, it is necessary that the product of duties imposed repay
365 with earnings the interest of funds spent and maintenance costs. Therefore, in admitting rates
366 established in the last canals, and assuming only 10 p. 100 of benefit, it would be necessary that
367 tonnage should rise moderately to $49500/0.16 = 309,000$ tons. It can be judged from this that
368 there is perhaps no route in France where the execution of a canal, by way of concession to
369 shareholders who rely solely on the toll, is possible; or at least it can be done only in some

370 localities, where the expenses would be much lower than the average term which serves as a
371 basis for calculation, and where the transport would be very considerable. The experience of
372 recent years only confirms the truth of this conclusion too much, since only a very small number
373 of canal concessions have been made, some of which have remained without result, and others
374 do not give shareholders an income proportionate to expenses.

375 From this it is recognized that the establishment of a new route may be useful to the country
376 long before it is possible to carry out this establishment by means of a concession; so that one
377 would do great wrong to adopt this means exclusively. On the contrary, it must be resorted to
378 only in so far as the state of public affairs is absolutely opposed to taking the necessary funds
379 out of the mass of taxes.

380 We will never tire of noticing the difference in the results obtained in these two cases. If the
381 canal is made by the Government, and if no toll is imposed, the cost of transport is reduced
382 moderately from 1 fr. to 0.13 fr. per barrel per league. If the same job is done by a company
383 concessionaire, the expense of transport is reduced by 1 fr. to 0.29 fr. Consequently, if, as seems
384 appropriate, we look at the distance which regulates the extent of the market as being
385 proportional to the expense of the transport, we see that this distance will increase in the first
386 case in ratio 100:13, and in the second case in the ratio 100:29. The geographic extent of the
387 market being proportional to the square of these numbers, we see that it will be five times greater
388 in the first case than in the second. Now, there is every reason to think that the influence of
389 enterprises of this nature on public prosperity is at least proportional to the extent of the market
390 they procure; perhaps it is much larger, because the various parts of the market react to one
391 another. [Note: For manufactured goods, or imported goods, the duty is 0.31fr., the cost of water
392 transport is 0.44fr., or nearly half that of land transport. By the effect of that duty the distance at which
393 the goods can be transported diminishes only in the ratio 100:44., instead of 100:13. Thus the extent of

394 the market for goods of this kind, is about 12 times less than it would be if we did not put any rights on
395 the channel.]

396 It seems that there is less difficulty in concessioning bridges and railways than canals. Note
397 also that it never happens that a state does all that it could and what it should do for his own
398 good. When taxes are already very considerable, it is difficult to increase them to obtain a distant
399 advantage, however secure. Nations are rather disposed to postpone sacrifices imposed from the
400 present to the future, than to submit to present privations to become richer afterwards. So,
401 although it is quite certain to our eyes that the true interest of the state would require that all the
402 expenses necessary for improving transportation be paid for with public taxes, we do not think
403 that it is advisable to exclude concessions. We consider to the contrary that there are many
404 genuinely helpful enterprises which can still be executed by way of concessions; these will
405 always be enough to use the funds the state can spend on these items. As for enterprises which
406 can be the object of profitable speculation, provided that it results in a benefit for the public,
407 although this advantage is much less than it could be, it is obvious that one must not oppose any
408 obstacle, and that they should instead be promoted.

409 But it seems to us that it would be desirable, or that concessions should not be perpetual, or
410 at least that, after a time sufficient for reimbursing expenses at a profit, the duties collected
411 should be reduced to that necessary for maintenance. This provision would remedy the
412 inconveniences inherent in this mode of executing public works, as far as it is possible without
413 rendering it impracticable. It would not stop speculators, and would have a considerable
414 influence, albeit remote, on the progress of wealth.

415

416 *On administrative measures which can be adopted for public works concessions*

417 The concessions system has been developing in France for only a few years, and there has

418 been some hesitation as to how it should proceed.

419 The first concessions were granted by order of the king after a preparatory review, and a
420 discussion with the bidders. It was then considered appropriate, after receiving proposals, to look
421 at them somehow as non-avenues, and to make the company the subject of a public tender, so
422 that the people who had the idea of this company after having made the necessary studies to
423 recognize and demonstrate to the government the utility, and to make sure that it should be
424 profitable for themselves, are found exposed to competition from any other speculator.

425 It was not considered elsewhere that the concessions which in general are a special subject
426 of law, according to the principle that a law is needed only as new loads are imposed on the state.
427 An article inserted annually in the budget law prevents difficulties which could arise relative to
428 establishing tolls. An order of the king is, in all cases, regarded as sufficient, to comply with the
429 law of 8 March 1810, to declare the public utility, and authorize the acquisition of land and other
430 specific properties.

431 When the administration was asked against the use of public tenders, citing the example of
432 the concessions which had not been subjected to it, it was simply replied that the government
433 had thought fit to favor the first speculations of this kind. This result would have not been enough
434 if our laws included a barrier to this submission from proceeding. There is really no such thing,
435 and the government is perfectly free to grant concessions without subjecting them or to compete
436 with them. The only consideration on which we need to focus here is therefore the public interest.

437 In the cases in question, what is called the public interest relates to three objects: 1) the
438 interest of the state, as for the company considered in itself; 2) the interest of the trade in the
439 proper fixing of the rate of tolls; 3) the interest of the shareholders who will take part in the
440 company.

441 The interest of the state mainly requires two things: first, that the enterprise is really useful
442 (for example, by admitting the data exposed above, it would be necessary to be certain, before
443 allowing the establishment of a grand navigation canal, that the transport on the canal will be at
444 least 52,000 tons per year); in the second place, that the execution of this enterprise is sufficiently
445 assured. In fact, the utility of the enterprise can only commit the government to authorize the
446 acquisition of particular properties; and it would not be proper to let work begin, and to denature
447 property, without having a very firm assurance of the certainty that this work will be completed.
448 [Note: Some people, educated and enlightened on other points, have difficulty in admitting this imperative
449 necessity, we shall even say this sacred duty imposed on the government which watches over the public interests,
450 to make sure as much as it is possible, before allowing the execution of a project, that it is useful in the sense that
451 we state here; that is to say, *the economy that it provides to trade on the cost of transport should at least equal the*
452 *expenses that the work will cause.* Some people claim that, provided the trade has grown as a result, there is no need
453 to worry whether this benefit will be due to excessive and disproportionate expenditure; because, they say, the
454 money spent not leaving the country, the company's dealers can lose, but the state does not suffer. We answer that
455 indeed for some ill-conceived speculation, the money even given by the shareholders to pay the workers is not
456 ?????????? found in the hands of those who provided the workers food and clothing. But the loss borne by the state
457 is none the less real: it consists in the work done by the workmen, the value of which is a subsisting bond, since the
458 workers exchange it for money, and we let us suppose here not to have created an annual income proportionate to
459 the sum by which it has been paid. To recognize without a doubt that the state has made a real loss, it is sufficient
460 to suppose that the same workers, paid in the same manner, have been employed to cultivate new lands which will
461 give the proprietors an adequate annual income. It is obvious that the same work, and the same passage of money
462 which has served to pay it from one to another, will have given rise in this second case to the production of a value
463 which does not exist in the first. Thus a work badly applied necessarily causes a true loss to the society. These
464 notions are very familiar to all who have studied the principles of political economy, and it would have seemed
465 useless to recall them if experience had taught us otherwise.]

466 For the interest of trade to be guaranteed, it must be recognized that the proposed toll is as

467 moderate as possible, that is, the profit obtained by the concessionaires does not exceed the limit
468 necessary to admit projects of this nature, with due regard to the uncertainties and chances of
469 loss that will always be unavoidable.

470

471 Finally, with regard to the interests of the shareholders, it may be rightly said that the
472 government must not allow the public to be misled by speculation of this nature, which would
473 expose those who would be involved to losses. But as, in the end, it would not result from this
474 error (provided that the enterprise was useful in itself) that a displacement of capital, something
475 that happens every day without us trying to prevent it, we do not think that the government
476 should be compelled to oppose shareholders who, if they wish, place their funds at a very low
477 interest. But it seems to us that it is its duty to make public the information it possesses, which
478 could serve to enlighten them.

479 From this we think that we must reduce the obligations of the government in three main
480 points: 1° *ensure that the business is useful to the state*, i.e., the savings on transportation will at
481 least equal the construction and maintenance costs; 2° *obtain a guarantee that the business begun*
482 *will be brought to an end*; 3° *recognize that the toll rate is properly established*.

483 The examination of the value of an undertaking, which must consist in an exact comparison
484 between the expenditure and the economy obtained from the transport, and especially the
485 appreciation of the terms proposed for setting the tolls, necessarily require the production of
486 detailed and complete reports on all the works, as well as the information collected on the
487 quantity and price of transportation. We therefore believe that it is a duty for the government to
488 order, as is done in England, the presentation these projects and information, and have them
489 checked and discussed with care.

490 As to the certainty that the enterprise begun will be completed, the sureties which are
491 demanded today for this purpose may not be a sufficient guarantee; and besides, this measure
492 has the disadvantage of engaging and rendering less productive the capital of the persons who
493 are most disposed to employ them in a manner profitable to society. The means which experience
494 has authorized in England, to obtain certitude on this question, seems to us much preferable;
495 perhaps it is the only one which is assured. This means that bidders are required to submit a list
496 of creditworthy persons or commit themselves to provide sufficient funds to cover a considerable
497 portion of the alleged expense, such as 3/4 or 4/5. In this way, false and hazardous speculations
498 are naturally excluded, without any obstacle being brought to a wise and useful enterprise.

499 No doubt the preliminary and in-depth discussion of a big project, as well as the debate about
500 the rate of tolls between the conflicting interests of trade and bidders, are obligations which are
501 difficult to satisfy. Here, moreover, the question of competition arises. While one is considering
502 a proposal, there may be others who are more prone to trade because they will have lower tolls.
503 Determining the party that the government should take on for these opportunities is not without
504 difficulties.

505 These difficulties have lately received a very simple solution, which consists in putting such
506 projects to public auction. But one can not help but find a shocking injustice to those who first
507 present a project. The first idea of a grand project, or the possibility of a grand project; the work
508 of mind, the care, the time, the expense of recognizing this opportunity, and of having it
509 recognized by capitalists and the government, are obviously a right that must not be violated.
510 Moreover, admitting any competitor without a real guarantee of performance, brings much
511 exposure, as has happened, to putting the affairs in the hands of people incapable of driving them
512 to an end. Entrepreneurship is completely discouraged, since the persons most capable of

513 engaging in business of this nature will certainly, when they have a very great chance of seeing
514 them removed after much care, by every man who, having perhaps little to lose, will find himself
515 bolder or less prudent than themselves. Finally, this process gives no real assurance that the
516 interests of commerce will be guaranteed, since it is easy for the competitors, on occasions where
517 they can never be in small numbers, to bid only at prices as high as they wish. [Note: Another
518 downside of auctions is that they necessarily take place on the specifications agreed in advance, which
519 the official who presides over the operation can not change. The slightest difficulty, on which it would
520 be easy to proceed, hinders business or causes long delays].

521 We think that it is not advisable to put in public auction concessions for great works for
522 improving transportation. It remains to be seen how we can reconcile justice with the first bidders
523 and the interest of trade.

524 It seems at first sight that in all cases, at the same price, the first tenderer (assuming the
525 guaranteed execution as stated above) should be preferred.

526 But it may happen that the first bidder does not want to lower its price to the rate offered by
527 those who came last. We believe it is then necessary, if there is a significant difference between
528 the proposed prices, that the government itself judge, by comparing the expenses to the products,
529 what is the appropriate toll rate to give the profit which enterprises of this kind must include. If
530 the first tenderer adopts it, the concession must be granted. In the opposite case, it belongs
531 naturally to those who wish to conform to it. It also should consider ways and performance
532 guarantees to allow, if necessary, a little advantage to those which present more.

533 An examination similar to that which we are discussing is made in England by the
534 committees of the Houses of Parliament, and the business is then debated before the Chambers
535 themselves. As in France the legislature does not take part, in general, in administration properly
536 called, and intervenes only for issues that must be settled by law, it does not follow exactly the

537 same method. It also may be inappropriate for us to rely entirely on government-dependent
538 persons to examine the cases in question, although we would be convinced that this could be
539 done without danger to the public interests. But it would seem that any objection would be
540 avoided by forming numerous commissions, from fifteen to twenty members, for example, in
541 which the engineers belonging to the first grades, and personally disinterested in the question,
542 would be joined by administrators and other independent persons, such as deputies or peers from
543 France. If the results of the examinations are made public, it seems that the government will have
544 fulfilled all the duties imposed upon it, and prevented all objections.

545 It is easy to foresee, moreover, that cases of competition will become very rare in France,
546 when the obligation to submit detailed and complete projects and lists of subscribers who are
547 solvent for the greater part of the expenses will be imposed. We do not fear that it is objected
548 here that the conditions in question will render speculations of this kind too difficult. It is evident
549 that they will not stop those who have in view a truly good and useful business, and who will
550 possess the necessary means to complete the project; more than they will be assured, by
551 presenting themselves first, of obtaining the concession on reasonable terms, and since they are
552 asked only to produce information whose existence is indispensable to them. As for those who
553 are not afraid to engage in businesses without having examined and discussed to have examined
554 and discussed the bases, and without assured means of providing for the expenses, there is no
555 inconvenience in dismissing them. In general the interest of the state will be better guaranteed,
556 if one makes the business less easy and at the same time safer. [Note: The obligation to present
557 detailed projects, when one attends to a concession, is so natural, that in one of the first cases of this kind,
558 that of the Ship Canal Seine, speculators have not hesitated to prepare these projects, which required
559 much care and expense.]

560 It seems to us from the above that it would be appropriate to renounce public auctions, and

561 to recognize a preferential right to the company which first would have asked permission to have
562 the projects by committing to present them within a specified time, supported by a list of
563 subscribers for 3/4 of the alleged expenditure at least. If other companies make the same
564 application, and also produce projects and lists of subscribers before the decision has been given,
565 their competition would be treated in the manner indicated above. The examinations and
566 discussions necessary to strike a fair balance between the interests of the bidders and those of
567 commerce would be entrusted to commissions which would consult directly, if they deem it
568 appropriate, with the local administrations, which would obtain by inquiry or otherwise the
569 necessary information, and whose reports would be published.

570

571 *Summary*

572 We will review here the principal proposals from the preceding:

573 1° The value of public works, aimed to establish transportation, mainly consists in reducing
574 the part of transportation costs charged to commerce. The decrease in this part of transportation
575 expenses is much more important to the progress of agriculture and industry than decreasing the
576 portion of expenses generally supported by the state.

577 2° It would be desirable that the expenditure on the works in question should be from tax
578 payments, which would make it possible not to establish tolls, or to establish only very modest
579 tolls intended to pay only maintenance expenses. These works would then provide all the utility
580 that can be expected. This would accelerate the progress of wealth, and the resources of the state
581 could be brought to those parts where they are most needed.

582 3° The execution of public works by concession must not be excluded; on the contrary, it
583 must be welcomed and encouraged, because the results are useful, albeit in a much lesser degree.

584 4° In granting concessions for the works, the government, the protector of public interests,
585 has duties to fulfill, which consist principally in verifying the general utility of the enterprises,
586 in guaranteeing the interests of commerce by the proper establishment of toll rates, and to ensure
587 the completion of the works.

588 5° These conditions can not be fulfilled without obliging bidders to submit project details,
589 and without subjecting the elements of the enterprise to an in-depth discussion, which may be
590 entrusted to commissions composed in part of independent persons. It is not enough to reduce
591 companies' prices by public bidding.

592

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