THE ELIMINATION OF THE GRADE CROSSING OF THE TOLEDO, PEORIA & WESTERN RAILWAY, AND THE ILLINOIS CENTRAL TRACTION COMPANY AT CANTON, ILLINOIS

BY

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THESIS

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This is to certify that the thesis prepared under my supervision by

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Entitled The Elimination of the Grade Crossing of the lines of the Toledo, Peoria, and Western Railway and the Illinois Central Traction Company at Canton, Illinois.

Is approved by me as fulfilling this part of the requirements for the degree of B.S. in Railway Civil Engineering.

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THE ELIMINATION OF THE GRADE CROSSING OF THE TOLEDO, PEORIA AND WESTERN RAILWAY, AND THE ILLINOIS CENTRAL TRACTION COMPANY AT CANTON, ILLINOIS.

INTRODUCTION.

The conditions existing at the present railway crossing on Main Street, in Canton are such that much time is lost by vehicles, pedestrians, and Traction Company cars waiting for trains to pass the crossing. The highway is also obstructed by trains switching in the yard that must necessarily run past Main Street, in order to run cars upon the first "Body Track." The surrounding conditions present a very formidable, although not impossible problem, and with the constant growth of Canton it will not be long before a subway will be required at this point. Therefore, if it is to be built at all, it is essential that action be taken at once.

LOCATION.

The Illinois Central Traction line intersects the Toledo, Peoria and Western Railway at Main Street, which is the principal thoroughfare of the city. Main Street has two hard roads running into it on the south and one on the north end, and at the south end of Main Street is the city's principal cemetery. The Traction line connects several mining towns lying to the south of Canton with other mining towns lying to the north of the city. Reference to Plate 1 in the back of this book will show the surrounding property and streets of this portion of Canton.
DESIRABILITY.

A study of the existing conditions will show very plainly that a subway at this point is desirable to all interested parties, and in fact it is almost essential.

The city is indirectly affected by the delay caused by the passing of long slow freight trains, which often times must be stopped at the crossing in order to allow the train-men to secure orders at the depot before advancing. The Traction Company is directly affected by the delay of cars while a freight train blocks the crossing, also by the time lost while the conductor runs ahead to see if the crossing is clear. The Toledo, Peoria and Western is also affected, as it is prohibited by city ordinance from blocking a crossing more than five minutes, and this interferes with switching movements. Besides the delay in switching, a flagman is required at this crossing, who must be paid by the Toledo, Peoria and Western Railway. Together with the above considerations, we must not lose sight of the danger to life that is always imminent at "Grade Crossings."

LEGAL PHASES. (Revised Statutes of Illinois, Chapter 24.)

In 1899 the State Legislature passed the following bill:-

In cities of a population of 10,000 or under (according to the last United States Census,) no ordinance for making any improvements shall be adopted unless a majority of resident property owners affected by such improvement shall petition for same.

In cities with a population of less than 50,000 the city council shall provide by ordinance that the Mayor appoint a
Superintendent of Streets and a City Engineer to act with himself as a Board of Local Improvements. No ordinance for any local improvement to be paid wholly or in part by special assessments or special taxation shall be considered or passed by the city council, of any such city, unless the same shall first be recommended by the Board of Local Improvements. A petition for any such local improvement shall be addressed to said board. Said board shall have the power to originate a scheme for any such local improvement, either with or without petition, and shall adopt a resolution describing the proposed improvements, which shall at once be described to the records of the board. When the proposed improvements will require that private property be taken or damaged, such resolutions must describe the property proposed to be taken for the purpose. The board shall cause an estimate of the cost of the proposed improvements (omitting land to be acquired) to be made by the City Engineer, and made a part of the record of the resolution. The board shall also fix a day and hour for public hearing against the proposed improvement sufficient to cause the board to abandon it. It is modified if necessary and submitted to the City Council. If it is necessary that private property be taken or damaged, a petition shall be attached to ordinance praying that steps be taken to ascertain the just compensation to be made to said property owners, and also to ascertain what property will be benefitted by such improvements and the amount of such benefits.

DISPOSITION OF STUB TRACK.

The Stub Track shown on Plate 1 was used while the Illinois
Central Electric was under construction. Since building operations have been suspended the connection with the Toledo, Peoria and Western has been removed. As this track is practically useless it can be removed when the subway is constructed.

PROVISION FOR ACCESS TO PRIVATE RESIDENCES ON MAIN STREET.

The sidewalks will not conform with the grade of the pavement, the greatest difference in elevation of the two in front of any residence being only three and eight tenths feet (3.8 ft.) as is shown in plates 3 and 4; therefore, it will not be necessary to provide steps from the sidewalk to the street. In order to secure access to the houses from the sidewalks, steps will be required, which will range in height from one and six tenths feet (1.6 ft.) to six feet (6 ft.) The sidewalks will be laid next to the street's retaining wall, thus preventing the destruction of valuable trees that would be destroyed in case the sidewalks were laid on the present alignment on the proposed grade.

DAMAGE TO PROPERTY.

It is a difficult task to estimate with any degree of accuracy the damage that would be sustained by abutting property from the proposed improvement. With the proposed pavement and sidewalk grades none of the abutting property owners would be shut off from the street, and lots would gain a frontage of about eight feet (8 ft.), and then the beautiful maple trees that line each side of the street would be saved. Due to the fact that some of the property owners might claim dam-
ages, it would be advisable to set aside three thousand dollars ($3,000.00) to cover all possible claims that might arise.

**HEAD ROOM.**

The minimum clearance allowed for electric cars—fifteen feet (15 ft.)—was used in fixing the proposed grades. The sidewalk has a clearance of eight feet (8 ft.) which is considered sufficient for all pedestrians.

**WIDTH.**

Plate 1 shows Main Street to be sixty-six feet (66 ft.) from property line to property line, with a thirty foot (30 ft.) pavement, leaving an eighteen foot (18 ft.) parking on each side. With the proposed change the pavement will be thirty feet (30 ft.) wide with eight feet (8 ft.) on each side for retaining walls and sidewalks, making the total width forty-eight feet (48 ft.)

**GRADIENT.**

At the north approach of the Illinois Central Electric the proposed grade is 1.0\% and at the south approach the proposed grade is 2.16\%. These grades are shown on plate 3. The present grade on the Toledo, Peoria and Western is (-1.0\%) to the west of the crossing for two thousand feet (2,000 ft.) and then on a (-0.7\%) grade for one thousand five-hundred feet (1,500 ft.). East of the crossing the present grade is (+0.25\%) to the east. The proposed change will give (-1.0\%) grade to the west for three thousand five-hundred feet (3,500 ft.) and a (-0.33\%) grade to the east for four-hundred feet (400 ft.) By referring to plate 2 all of the Toledo, Peoria and Western grades can readily be seen.
STEEL FOR TOLEDO, PEORIA AND WESTERN.

Due to the present grades, the imposed conditions require the use of a "Through Plate-girder" in order to secure a minimum depth of floor. The weight of steel in this type of structure is figured from information given by Prof. F. O. Dufour's book on "Bridge Engineering, Roof Trusses," page nine. Weight of steel in a "Through Plate-girder" for Cooper's E 40 loading = 1.4 x 1(123.5 + 10 x 1)

DRAINAGE.

Plate 4 shows the sewer profile under the Illinois Central Electric road-bed. A catch basin can be connected to this sewer which will draw all of the storm water that will ever be collected at the bottom of the subway.

ABUTMENTS AND RETAINING WALLS.

These walls will be made of concrete, and designed so that in the abutments the base of the inner wall will be 70% of the height, while the base of the outer wall will be 55% of the height. The retaining walls are designed so that the base of the inner wall is 60% of the height and the base of the outer wall is 45% of the height. Cross-sections of the abutments and retaining walls are shown on pages 15 and 16

OPERATION OF TRAFFIC DURING CONSTRUCTION.

It is important that the traffic of the Electric and the Steam roads go on uninterrupted during the construction of the subway. According to the following method of construction the traffic of both roads will at no time during the process of construction of the subway be impaired.
The first step would be to excavate for the abutments and build them. After which it would be necessary to provide false work for the Toledo, Peoria and Western. Since the elevation of the Toledo, Peoria and Western must be increased on account of the change in grade, caused by the subway, it is evident that the track will have to be elevated by degrees. The most economical method of providing the dirt for this elevation would be to borrow the necessary dirt from pits along the railroad right-of-way. Then a temporary track for the Illinois Central Electric would be laid on the east side of Main Street, so that excavation could be carried on on the opposite side of the street. It would not be economical to convey the dirt excavated along Main Street to the Toledo, Peoria and Western elevation, hence, unless this dirt could be sold, it would necessarily be wasted. When the excavation, concrete work, and pavement on the west side of the street have been completed, a temporary track could be laid, enabling the completion of the work on the east side of the street. As soon as all of the excavation has been completed to sub-grade, a track for the Illinois Central Electric would be permanently built in the center of the street and all pavement completed.

After the plate-girders have been put in place the floor beams and stringers may be secured and the Toledo, Peoria and Western track laid in a permanent position.

SEWERS.

Upon examination of plate 4 it is evident that the present sewer must be lowered in order to give it sufficient protection.
This can be done by connecting the catch basin on Oak Street with the new catch basin on Maple Street, thus lowering the sewer enough to give it the necessary protection in the subway.

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ten pounds of steel @ $2.00</td>
<td>$120.00</td>
</tr>
<tr>
<td>1,400 cubic yards concrete @ $2.62</td>
<td>$3608.00</td>
</tr>
<tr>
<td>10,000 cubic yards gravel @ $0.20</td>
<td>$2000.00</td>
</tr>
<tr>
<td>3,910 square yards brick pavement @ $1.78</td>
<td>$6803.00</td>
</tr>
<tr>
<td>11,170 square feet of cement sidewalk @ $0.12</td>
<td>$1400.00</td>
</tr>
<tr>
<td>17,000 cubic yards of earth for filling on</td>
<td>$6112.00</td>
</tr>
<tr>
<td>Toledo, Peoria and Western @ $0.36</td>
<td></td>
</tr>
<tr>
<td>941 feet of 1 inch sewer pipe @ $0.24</td>
<td>$226.60</td>
</tr>
<tr>
<td>3 grade crossings @ $90.00</td>
<td>$270.00</td>
</tr>
<tr>
<td>Damage to property</td>
<td>$5000.00</td>
</tr>
<tr>
<td>Engineering and Superintendence 10%</td>
<td>$3250.00</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$84888.00</td>
</tr>
</tbody>
</table>
ESTIMATE OF COST.

43,785 pounds of steel @ $0.03, ...................... 1400.00
1,400 cubic yards concrete @ $8.00, ............... 11200.00
10,800 cubic yards excavation @ $0.30, .......... 3240.00
3,110 square yards brick pavement @ $1.75, .... 5450.00
11,170 square feet of cement sidewalk @ $0.13., 1460.00
17,030 cubic yards of earth for filling on Toledo, Peoria and Western @ $0.30, ..... 5110.00
961 feet of 1 inch sewer pipe @ $0.24½, ....... 240.00
3 grade crossings @ $50.00, ......................... 150.00
Damage to property, .............................. 3000.00
Engineering and Superintendence 10% ......... 3250.00
TOTAL, .......................................... $34500.00
Sections at 100 ft. Stations on T.P & W. R R.
West of the I. C. E. Ry. Crossing.

1" = 10'

Stations - 1+00, 2+00, 3+00 & 4+00

Station 5+00

Station 6+00

Station 7+00

Station 8+00

Station 9+00

Station 10+00

Station 11+00
Station 24+00

Station 25+00

Station 26+00

Station 27+00

Station 28+00

Station 29+00

Station 30+00

Station 31+00

Station 32+00

Station 33+00

Stations 34+00 & 34+77 require no filling.
Sections at 100ft Stations on T.P.&W.R.R. East of the I.C.E. Ry. Crossing

Station 0+25

Station 1+00

Station 2+00

Station 3+00

Station 4+00 requires no filling.
Sections of Concrete
Abutments and Retaining Walls
North of the T.P&W RR Crossing

Scale 1"=10'

Abutments 20 ft long

1"=10'
Station 0+10

1"=10'
Station 1+00

1"=10'
Station 2+00

1"=10'
Station 3+00

1"=10'
Station 4+00

At Station 4+68 the section is 0+00.
Sections of Concrete Retaining Walls
South of the T.P. & W.R.R. Crossing

1" = 10'
Station 0+10

1" = 10'
Station 1+00

1" = 10'
Station 2+00

1" = 10'
Station 3+00

1" = 10'
Station 4+00

At Station 4+63 the Section is 0+00.
Sections at 100ft Stations on I.C.E. Ry.
North of the T.P&W R.R. Crossing.

1"=10'
Section 20ft long

1"=10'
Station 0+10

1"=10'
Station 1+00

1½ 10'
Station 2+00

1"=10'
Station 3+00

1"=10'
Station 4+00

At Station 4+68 the Section is 0+00
Sections at 100ft. Stations on
I.C.E.Ry
South of the T.P.W.R.R. Crossing

1/2' 10 '
Station 0+10

1/2' 10 '
Station 1+00

1/2' 10 '
Station 2+00

1/2' 10 '
Section 3+00

1' 10 '
Section 4+00

At Station 4+63 the Section is 0+00
PROFILE
OF
SOUTH MAIN STREET
CANTON, ILLINOIS
SHOWING
ELEVATION OF PAVEMENT
AND
ELEVATION OF SEWERS
Hor. Scale 1=100
Ver. Scale 1"=1' 4

Top of Rail
Proposed Grade 2 1/2 %
Proposed Grade 10 %
Grade

PLATE 3.
THe SIs-_____

^FLO

_____

3i o -wh l k s. . . .

:. L ..

on

^O U T F I

R I N S'TH E E 'T

cn to

Hor Scale 1"=100

Ver Scale 1"=4

TheSIS

PROFILE

OF

SID-WALKS

ON

SOUTH MAIN STREET

CANTON, ILLINOIS

Alb Haan