

RAILROAD WORK

1. GENERAL

1.1 Description

- .1 Work includes, but is not necessarily limited to the following items:
 - .1 Reconstruction of the GWWD rail siding from station 1+00 to station 6+10.247, for a total distance of approximately 511 m. This Work includes the removal of the existing 60-lb per yard rail, ties, and other track material; excavating and disposing to the reach the top of the proposed subgrade; compacting subgrade, supplying and installing woven geotextile fabric, supplying and installing new sub-ballast and ballast material; and finally installing and supplying 100-lb rail PW, new ties, and other track material (specified below). The Work will include supplying and installing new 85/100 lb compromise bars at station 1+00 and station 6+10.247. No work will be required on the existing Number 9 Turnouts, at both the westerly and easterly ends of the siding.
 - .2 Installation of one Number 9 100-lb per yard Crossover (two Number 9 Turnouts and tangent) between the mainline and siding. The distance between mainline and siding (track centre) equals 4.297 m (14'-1^{1/8}""). It is located at station 2+51.620 (west point of switch of turnout) to station 3+08.367 (east point of switch of turnout) for a total distance of approximately 57 m of track. This Work includes re-building a portion of the mainline track, in the vicinity of the westerly switch, from 85-lb per yard to 100-lb per yard. 85/100 compromise bars shall be installed east and west of the westerly point of switch in order to transition from 100-lb per yard back to the existing 85-lb per yard.
 - .3 Supply and installation of track, ties, ballast, sub-ballast and other track material within the Railcar Shelter structure.
 - .4 Supply and installation of a 150 mm sub-drain system between the mainline rail and siding rail along the north wall of the Railcar Shelter structure. This runs from approximately station 3+98.2 to 4+52.8 for a total distance of approximately 54.6 m. An additional section of sub-drain system shall be supplied and installed along the south side of the new rail siding, at the south edge of sub-ballast layer, keyed into the clay layer. This section will tie into the manhole located at the northwest corner of the Railcar Shelter. This length is approximately 91 m.
 - .5 Supply and installation of Derails are to be installed in accordance with Manufacturer's instructions and meet the requirements of the Canadian Pacific Railway.

1.2 Job Conditions

- .1 Examination
 - .1 Visit the Site and note all characteristics and irregularities affecting the Work of this Section.

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- .2 To proceed with the Work will mean acceptance of the conditions, and failure to comply with the above will in no way form the basis for any claim.
- .2 Protection
 - .1 Use all means necessary to protect all material of this Section before, during, and after installation, and to protect all objects designated to remain.
 - .2 In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the Contract Administrator at no additional cost.
- .3 Railway Safety and Coordination
 - .1 The project will require work to be carried out in the vicinity of tracks operated by the GWWD Railway. The Contractor will be required to carry out the work so not to interfere with railway operations.
 - .2 The Contractor, when constructing trackage and turnouts on or near operating trackage, shall ensure safe and clear passage of all train traffic.
 - .3 The Contractor shall not undercut mainline track.
 - .4 The Contract Administrator, after consulting with the GWWD Railway will, when required, endeavour to allow the Contractor to block the affected track or tracks for the number of consecutive hours required to perform the Work indicated on the Drawings.
 - .5 During this track block time, no rail traffic shall pass through the construction area except in case of emergency.
 - .6 The Contract Administrator shall notify the Contractor, at least seven hours in advance, of the approximate hours of commencement and of the extent of the track block. The hour of commencement shall be confirmed to the Contractor 60 minutes prior to actual commencement as shall be the hour when the tracks must be open and ready to receive rail traffic.
 - .7 The Contractor shall provide the Contract Administrator a minimum of 48 hours advance written notice of the day on which Work requiring a track block is to be carried out and shall not commence any Work requiring such a track block until the Contractor has received confirmation from the Railway that the block is in effect. Any delays to the Contractors operations due to the prohibition of these track blocks shall not be the basis for a claim.

1.3 Reference Standards

- .1 AREMA Manual for Railway Engineering, Part 4 Track Construction and Trackwork Plans
- .2 CP Rail System Plan No. T-14-66-4 – Standard No. 9 Turnout with 16’-6” Switch Points
100 lb CP-RE Rail.

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- .3 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate, ASTM Designation C88
- .4 Standard Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing, ASTM Designation C117
- .5 Standard Test Method for Lightweight Particles in Aggregate, ASTM Designation C123
- .6 Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate, ASTM Designation C127
- .7 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine, ASTM Designation C131
- .8 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates, ASTM Designation C136
- .9 Determination of particle shape - Flakiness index, British Standard BS EN 933-3:1997
- .10 City of Winnipeg standard construction specification CW 3120 – Installation of Subdrains

1.4 Field Samples

- .1 Material Samples
 - .1 At a minimum of two weeks prior to the start of the work, the Contractor shall submit 75 kg sample of sub-ballast and ballast material specified for testing.
 - .2 Samples are to be shipped pre-paid or deliver in tightly closed containers to testing laboratory designated by the Contract Administrator
 - .3 Costs for analyses will be paid by the City

2. PRODUCTS

2.1 Steel

- .1 Rail
 - .1 All rail shall be partly worn (PW) 100 lb RE
 - .2 Vertical head wear shall not exceed 8mm for 100 LB RE head free (HF) and 11 mm for 100 lb RE.
 - .3 Rail used shall be without known defects (and may only contain bends that can be straightened easily).

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- .4 Joint batter is not to be in excess of 3 mm
- .5 Rails of different manufacturer should not be mixed in any stretch.
- .6 The position of brand marks should be uniform in the same line of rail.
- .2 Number 9 Crossover
 - .1 The Crossover shall consist of two No. 9 Turnouts, 16 ft 6 inch Points, Rigid Bolted Frog, 100 lb RE Rail. Layout and materials shall abide by CP Rail System drawing no. T-14-66-4 for a Standard No. 9 turnout unless noted otherwise in this specification.
 - .2 Switch point guard shall be a Western-Cullen-Hayes Model FM Switch Point Guard or approved equal
- .3 Switch Stands
 - .1 Switch stand shall be new Racor 36-E Trihandle or approved equal in accordance with B6.
- .4 Splice Bars
 - .1 Partly-worn toeless 4-hole splice bars
 - .2 New track bolts and washers: bolt diameter 25.4 mm
- .5 Tie Plates
 - .1 14 inch tie plates on turnouts
 - .2 11 inch tie plates on 100 lb tracks
- .6 Rail Anchors
 - .1 Rail anchors shall be new improved Fair anchors and will be applied to all trackage and through all turnouts
- .7 Spikes
 - .1 Spike shall be new 150 mm spikes and will be applied to both 14 inch tie plates and 11 inch tie plates. Two per plate required.
- .8 Derails
 - .1 The west derail should be a Hayes Model EB Size 6 LH derail complete with Hayes Derail Wheel Crowder and Target Stand.

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- .2 The east derail should be a Hayes Model EB Size 6 RH derail complete with Target Stand

2.2 Wood

.1 Track Ties

- .1 Track ties shall be new No. 2 softwood treated ties.

.2 Switch Ties

- .1 Switch ties shall be new hardwood switch ties.

2.3 Crush Rock Ballast

- .1 The Contractor, shall supply, haul and distribute all track ballast required for the Works.
- .2 Railway ballast shall be composed of hard, strong and durable particles, clean and free from injurious amounts of deleterious substances and conforming to the following requirements of this Specification:

<u>Material</u>	<u>Maximum percent by mass</u>
Soft and friable places	5.0
Material finer than 75 sieve	2.0
Clay lumps	0.5

- .3 The percentage of wear shall be less than 32 percent, as determined by the LA Abrasion Test, ASTM Designation C131
- .4 The soundness loss shall be less than 13.0 percent, as determined by the magnesium sulphate soundness test for coarse aggregate, ASTM Designation C88
- .5 The railway ballast shall contain less than 5 percent by mass of flat pieces. In case of dispute, the test method "Determination of particle shape - Flakiness index", British Standard BS EN 933-3:1997, shall be used
- .6 The minimum bulk specific gravity shall be 2.60, ASTM Designation C127
- .7 At least 60 percent of the railway ballast shall have 2 or more fractured faces
- .8 Railway ballast shall conform to the following gradation in accordance with ASTM Designation C136 and C117:

<u>Canadian Metric Sieve Size</u>	<u>Percent Passing</u>
50,000	100
38,000	90 - 100

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25,000	20 - 55
19,000	0 - 15
9,500	0 - 5
75	0 - 2

2.4 Sub-ballast

- .1 The granular material supplied shall be crushed or screened pit run gravel conforming to the following gradation:

Canadian Metric Sieve Size	Percent Passing
75,000	100
25,000	60 - 90
4,750	35 - 60
75	0 - 5

- .2 The granular material shall not contain more than 3 percent organics by mass as determined by ASTM C-123.

2.5 Sub-drain Fabric

- .1 Sub-drain Fabric to be as per City of Winnipeg Standard Construction Specification CW 3120.

2.6 Sub-drain Material

- .1 Sub-drain Material to be as per City of Winnipeg Standard Construction Specification CW 3120.

2.7 Sub-drain Pipe

- .1 Sub-drain Pipe to be as per City of Winnipeg Standard Construction Specification CW 3120.

3. EXECUTION

3.1 Protection of the Cell 1 Outlet Pipe (located at station 1+88)

- .1 As indicated on the Drawing there are certain areas in which construction vehicles are off limits to the Cell 1 Outlet Pipe. This is a very fragile pipe that can not tolerate the weight or impact of construction equipment. The Contractor must access the area east of the Cell 1 Outlet Pipe by the designated crossing only. Any material added to the top of the pipe must be completed with equipment that can access the area remotely or by hand methods.
- .2 The use of specialized equipment or hand methods will be considered incidental to the Work.

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3.2 Steel

.1 Rail

- .1 The Contractor shall lay rail as specified and as directed by the Contract Administrator.
- .2 Gauge of track must be laid to be 1435.1 mm with maximum tolerance + 3mm. Gauge of track after laying must be uniform.
- .3 Rails will be laid with staggered joints; the stagger between joints in opposite rails will not be less than 3658 mm except when otherwise authorized by the Contract Administrator.
- .4 Cutting and drilling of rail shall be performed using rail saws and rail drilling equipment. Under no conditions shall welding equipment be used to cut rail or cut holes in rail.
- .5 On completion of the rail laying, the track must be surfaced and lined if necessary, as soon as possible, to avoid damage to the rail.
- .6 The Contractor will line all trackage conforming to the line established by the Contract Administrator with a tolerance of ± 13 mm.
- .7 The derails shall be installed according to Manufacturer's instructions and meet the requirements of the Canadian Pacific Railway – Standard Practice Circular No. 22.

.2 Number 9 Turnout

- .1 The turnout must be installed in accordance with accepted Standard Practice and the standard plan contained in the AREMA Portfolio of Track Plans.
- .2 Supply and installation of a switch point guard is required.
- .3 Turnout stockrail must be horizontally bent as shown on the standard plan by an approved type of rail bender.
- .4 Switch points must fit snugly against the stock rails for the entire length of the planning.
- .5 Switches, frogs and guard rails must be fully bolted. All bolts must be provided with a spring washer or cotter pin, and must be kept tight.
- .6 The distance between the gauge side of a frog and the bearing side of the guardrail must be maintained at 1387 mm. If the gauge of track is increased the flangeway at the guard rail must be increased by the same amount.
- .7 Frog guard rails must be fully spiked inside and outside.

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- .8 The top surface of the switch points shall be installed 6mm higher than the stock rail. Switch points must be installed with the proper thimble at the heel casting.
 - .9 Switch point and guard rail faces should be lubricated.
 - .10 Line, surface and gauge through turnouts must be accurately maintained. The Contractor will line all turnouts with a tolerance of ± 13 mm.
 - .11 A detailed inspection of all turnouts shall be made and deficiencies rectified to the satisfaction of the Contract Administrator.
- .3 Switch Stands
- .1 Switch rod bolts, and connecting rod bolts, except the bolt under the switch stand, must be installed with the nut on the upper side to permit ready inspection of the cotter pin. The connecting rod bolt under the switch stand must be installed with the head on the upper side. All connecting and switch rod bolts must be installed with cotter pins. Switch stands must be fully spiked, bolted, or lagged down.
 - .2 Switch stands, switch plates, connecting rod bolts and spring frogs must be properly lubricated after assembly.
 - .3 Targets and locks installed.
- .4 Splice Bars
- .1 Partly worn splice bars may be used. Splice bars shall be toeless and must be applied before the rail is spiked.
 - .2 Rail joints must be fully bolted and the bolts tightened to the proper torque. When installed, the fishing surfaces of rail joints must be lubricated with grease and the threads of bolts lubricated with oil. All joints, except insulated joints, must have their fishing surfaces lubricated with grease.
 - .3 New track bolts and washers are to be supplied. Install bolts with alternate nuts on the inside of the track. Strike both bars with a sledgehammer during the tightening process to help seat the bars properly. Do a final re-tightening of the two middle bolts.
 - .4 Bolts in the rail joints shall be tightened in the following sequence:
 - .1 The two bolts at the centre of the bar
 - .2 The second bolt from the end of each rail
 - .3 The third bolt from the end of each rail
 - .5 Bolts must be torqued to the following specification:

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<u>Bolt Diameter</u>	<u>Torque (N-m)</u>
25	750

- .6 An approved lubricant will be applied at the joints.
- .7 Fibre or hardwood shims must be used to obtain proper expansion space. Expansion shims must not be removed until the rail is properly spiked, bolts tightened and rail anchors applied. The required expansion space will be determined by the Contract Administrator at the time of construction.
- .5 Tie Plates
 - .1 All tracks and turnouts shall be tie plated with partly worn double shouldered tie plates
 - .2 Tie plates that are bent, broken or badly corroded must not be used
 - .3 Use two plates per tie on tracks and follow standard plan layouts for turnout tie plates
 - .4 Tie plates must be installed so that:
 - .1 The cant of the rail is inward
 - .2 The tie plates are centred on the tie
 - .3 The outside shoulder of the tie plate has a full bearing against the base of the rail
 - .4 No portion of the shoulder at the tie plate will be under the base of the rail
 - .5 The plates provide a flat, uniform bearing on the tie
 - .5 Tie plates must be installed in continuous stretches.
 - .6 Tie plates having different slopes on the rail seat must not be mixed together in the same stretch of track. Tie plates must have a cant of 1:20.
- .6 Rail Anchors
 - .1 Anchors applied to any one tie should be of the same type
 - .2 To avoid tie skewing, rail anchors must be installed in the same direction against the same tie on the opposite rail
 - .3 Rail anchors must not be applied where they are inaccessible for visual inspection
 - .4 Sufficient rail anchors shall be applied through both tracks of turnouts, and on each side of turnouts to prevent rails from moving sufficiently to disturb location of switch points or frogs. The number and distribution of anchors to be applied will be as follows:

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<u>Application</u>	<u>Requirement</u>
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Track	4 boxed anchors every second tie
Turnouts	8 anchors every second switch tie or as shown on the standard plans or as directed by the Contract Administrator, including the switch point area using anchors which will not interfere with the points

- .5 When installing rail anchors ensure the base of the rail is reasonably clean or it will not accept the anchor
- .6 Anchors must be applied so as to have full bearing against the tie or tie plate. Before applying anchors which bear against the tie plate, the tie plate should be properly placed and spiked
- .7 Anchors should be applied on the gauge side of the rail
- .8 Care must be taken when applying rail anchors to ensure that they are not over driven. They must be applied and removed with the proper tools. When they are applied by machine, the machine must be properly adjusted

.7 Spikes

- .1 Before spikes are driven, ties should be properly spaced and square to the rail
- .2 Tie plates must be centred on the tie and provide a full bearing with the tie
- .3 Uniform track gauge must be maintained when spiking, and must be checked by use of a standard track gauge
- .4 The number of spikes to be used shall be as follows:

<u>Application</u>	<u>Requirement</u>
Tangent and curved track	2 spikes per rail, 4 per tie
Special trackwork frogs, switches, frog guard rails, etc	fully spiked in all plate holes provided except where twin tie plates are used where one spike per plate end shall be used

- .5 When 2 spikes per rail, 4 per tie are used, they must, where possible, be staggered so that the field side spikes are on the same side of the same tie and the gauge side spikes are on the other side of the same tie
- .6 When laying rail, spikes must not be driven until splice bars have been bolted in place
- .7 When spiking, care must be taken not to strike the rail, fastenings, or signal appliances with the spiking tool

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- .8 Spikes must not be driven against the end of splice bars and must not be driven in the slots of slotted splice bars
- .9 Spikes may be driven by use of a Standard Spike Maul or by machine but in either case:
 - .1 Spikes must be driven with the head pointing to the rail
 - .2 Spikes must be started and driven vertically and square to provide a full bearing against the edge of the base of rail
 - .3 Spikes must not be driven to contact the top of the base of the rail. They should be so driven as to allow not more than 4.76mm clearance between the underside of the head of the spike and the top of the base of rail. Properly adjusted stops must be used on power operated spiking machines
 - .4 Spikes must be driven into sound wood

3.3 Wood

- .1 Track Ties
 - .1 The Contractor must install new No. 2 softwood treated ties at right angles to the rail. Ties shall be spaced at 2980/mile or at 21 1/4" centre to centre for the siding.
 - .2 On each side of each grade beam for each entrance to the Railcar Shelter the tie configuration shall be as follows, starting at the grade beam and working away:
 - Two 14' ties, two 12' ties, two 10' ties, and finally transitioning back to 8' ties
 - .3 Treated ties must not be handled with a pick, shovel or other tool that may cause damage to the tie. Ties must not be allowed to become centre bound. Track ties must be laid with the heart side facing down.
 - .4 The end of the track ties should be lined true on the south side of the entire length of the track.
 - .5 When ties are respiked, the spike holes must be plugged. Where rail is re-laid and ties not replaced, ties must be adzed a minimum amount to give uniform bearing for the tie plates. All adzed surfaces of ties must be coated with an approved preservative.
 - .6 All ties installed on existing track must be thoroughly tamped and spiked before the close of the day.
- .2 Switch Ties
 - .1 The requirements of Clause 3.2.1 Track Ties shall apply to switch ties, except gauge, spacing, and the layout must be in accordance with standard plans.

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- .2 Turnout ties must be firmly tamped for 400 mm on either side of the Mainline and Turnout rails. Head block ties must be firmly tamped as above with the voids filled on the remainder of the tie. Ties must be installed using spacing straps and lag screws

3.4 Crush Rock Ballast

- .1 The Contractor will place the ballast on top of the skeleton track and lift the track to top of ballast.
- .2 The Contractor shall place and distribute the ballast in sufficient quantities on trackage and turnouts to achieve the required lift, as determined by the grade of the stakes, and to conform to the ballast sections as shown on the drawings and as directed by the Contract Administrator.
- .3 The Contractor is cautioned that damage caused by his equipment to track and turnouts during the distribution of ballast will be repaired by the Contractor at his expense, as directed by and to the satisfaction of the Contract Administrator.
- .4 The Contractor will raise all trackage and turnouts with the ballast to provide a minimum depth of 350 mm from the top of the tie on all trackage and turnouts to top of sub ballast or to such depth as shall be directed by the Contract Administrator. Ballast shall be laid in lifts, not exceeding 150 mm in thickness.
- .5 Ballast shall be well packed or tamped with tamping machines or other approved mechanical tamping equipment as directed from a point 400mm inside each rail for 2440mm ties, on both sides of the ties to the end of the ties. Tamping will not be permitted at the centre of the tie between the above stated limits. The centre shall be tamped simultaneously and tamping inside and outside of the rail shall be done at the same time. Turnout ties are to be firmly tamped for 400mm on either side of the mainline and turnout rails. The areas under the frog, guard rails and heel castings must be hand tamped with bars or mechanical hand tampers. Hand tamping will be permitted only for minor tamping work.
- .6 The Contractor shall trim the ballast to allow for 300 mm of shoulder and two (2) horizontal to one (1) vertical side slopes. The Contractor will dispose of any surplus ballast after trimming the ballast section as directed by and to the satisfaction of the Contract Administrator

3.5 Sub-ballast

- .1 The Contractor shall spread and blade the sub-ballast material to form layers conforming to the required cross section and grade as shown on the drawings. The sub-ballast shall be placed in 150mm layers. Each layer shall be compacted to its full width by rolling with a vibratory roller to a minimum of 95 percent of the maximum dry density as determined by the Standard Proctor Compaction Test (ASTM D698, latest edition). The vibratory roller shall meet the following minimum requirements:
 - .1 Vibratory force: 4500 pounds per cycle per foot width (65.8 kN per m width)

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.2 Vibratory frequency: 1600 cycles per minute.

- .2 Rolling shall continue until a satisfactory compacted grade is obtained. In general, a minimum of four complete passes by the roller shall be given. The Contractor shall maintain the sub-ballast layer in a clean condition, free-draining and unfouled by the addition of other material until final acceptance of the work. Any portion of the sub-ballast layer which becomes fouled shall be replaced by the Contractor at his expense.

3.6 Installation of Sub-drains

- .1 Complete installation of sub-drains in accordance with City of Winnipeg Standard Construction Specification CW 3120.

3.7 Excavation and Track Disposal

- .1 The material excavated from the existing roadbed shall be removed and hauled to an existing disposal site, located just west of the Deacon Booster Pumping Station.
- .2 The 60lb and 85 lb rail and other track material shall be piled neatly adjacent to the railway siding, at a location designated by the Contract Administrator. This material will then be picked up by GWWD railway personnel. All ties from retired track are to be disposed of by the Contractor offsite in an approved and environmentally responsible manner

3.8 Subgrade

- .1 Subgrade shall be constructed in accordance with City of Winnipeg Standard Construction Specification CW3170-R3. The subgrade in which the new spur line will be installed shall be compacted in accordance with CW 3170-R3.
- .2 Measurement and payment clauses of CW3170-R3 shall not apply.
- .3 All topsoil and organic growth within the limits of embankment construction shall be excavated and disposed of offsite.
- .4 Embankments shall be constructed from suitable clay materials from the building excavation. This clay is located on the west side of Deacon Booster Pumping Station.
- .5 A woven geotextile that meets the approved products list as specified in CW3130-R1 shall be utilized as shown on the drawings.

END OF SECTION