



Track Construction Specification

Section 34 72 00

Revision 00
September 2026

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Section 34 72 00

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Amendment Record

Amendment in Clause No.	Date of Amendment	Description of Changes
Rev 00	September 2026	Initial release for publication.

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Acronyms and Abbreviations

Table 1: Acronyms and Abbreviations

Abbreviation	Full Name
AREMA	American Railway Engineering and Maintenance-of-Way Association
ESD	Engineering & Safety Division
ASTM	American Society for Testing and Materials
CROR	Canadian Rail Operating Rules
CSA	Canadian Standards Association
CWR	Continuous Welded Rail
IFC	Issued for Construction
MTO	Ministry of Transportation Ontario
MTS	Metrolinx Track Standard (Heavy Rail)
OMC	Optimal Moisture Content
OPSS	Ontario Provincial Standard Specifications
OPSD	Ontario Provincial Standard Drawings
OTM	Other Track Material
PRLT	Preferred Rail Laying Temperature
ROW	Right-of-Way
SPMDD	Standard Proctor Maximum Dry Density
UPE	Union Pearson Express

Definitions

Table 2: Definitions

Term	Definition
Ballast	A layer of coarse material, such as gravel or crushed stone, placed beneath railway tracks to provide stability, distribute loads, and aid in drainage.
Continuous Welded Rail (CWR)	Rail that is welded into lengths of 400 ft (122 m) or greater.
Destressing Rail	The operation of removing or adding steel in CWR, to make the longitudinal thermal stress equal (within specified limits) to what it would be if laid stress-free at the Preferred Rail Laying Temperature. Refer to MTS Section 4.9.
Geotechnical Engineer	A licensed Professional Engineer (P.Eng.) in the Province of Ontario, qualified by education and experience in Geotechnical Engineering, and responsible for evaluating subsurface conditions, interpreting soil and rock mechanics, and providing recommendations for earthworks, foundation design, slope stability, subgrade preparation, and related construction activities.
Subballast	A layer of finer material, typically granular materials, placed under the ballast to improve drainage, provide additional support, and enhance track stability
Subgrade	The prepared surface that lies directly beneath any sub-ballast layer and therefore forms the foundation of the track structure and bears the static and dynamic loads from tracks and locomotive vehicles and is typically consists of native soils.
Special Trackwork	Special Trackwork in this specification is referring to Turnouts and Crossovers
Soft spot	A soft spot is a localized area within the subgrade, subballast, or ballast where the material lacks the bearing capacity or stiffness required to support track loads and to be verified with an experienced Geotechnical Engineer or their designate proposed by a geotechnical engineer in writing.

1. General Requirements

1.1 Description of Specification

- 1.1.1 This specification outlines the requirement for the construction of ballasted track and special trackwork, including but not limited to the following:
- a) Placement and construction of Subgrade and Subballast including compaction and proof-rolling;
 - b) Hauling, loading, transportation and on-site storage of construction materials, equipment and tools;
 - c) Track removal, undercutting, and realignment;
 - d) Track construction, ballasting, surfacing, and track stabilization;
 - e) Installation of special trackwork such as turnouts, crossovers;
 - f) Rail installation, welding and destressing;
 - g) Installation and removal of temporary crossings;
 - h) Drainage works associated with the track structure as specified and works required to maintain existing drainage during construction;
 - i) Quality-assurance testing, certification, and hand-over documentation in accordance with Section 4 and the RC-503 Rail Corridor Asset Handover Protocol;
 - j) Preparation of as-built and Record Drawings after completion of track construction activities.
- 1.1.2 All Metrolinx approvals required as part of this technical specification must be provided by Metrolinx ESD – Track Department.

1.2 Reference Standards

- 1.2.1 This Specification includes references to other publications. These references are noted in the text as appropriate. All tests must be carried out in accordance with the latest revision of the standard test methods referred to in this Specification. In the event of conflict, the most stringent requirement must apply.
- a) Metrolinx Track Standards (Heavy Rail) RC-0506-02TRK;
 - b) Metrolinx Track Subballast Specification 34 11 26.16;
 - c) Metrolinx Track Ballast Specification 32 11 25;
 - d) Metrolinx Rail Specification 34 11 13.23;
 - e) Metrolinx Special Trackwork 34 11 23;
 - f) Metrolinx Concrete Tie Specification 34 11 33.1;

- g) Metrolinx Timber Tie Specification 34 11 33.2;
- h) Metrolinx Anti-Trespass Panels Specification 34 72 19;
- i) Metrolinx Fencing and Gates Specification 32 31 19;
- j) Metrolinx Ballast Mat Specification 34 82 13;
- k) Metrolinx General Guidelines for Design of Railway Bridges and Structures, RC-0506-04STR;
- l) Metrolinx General Engineering Instructions (Internal document) - To be requested from designated Project delivery team;
- m) Metrolinx Welding Manual, RC-0506-02TRK-01;
- n) Metrolinx Rail Corridor Asset Handover Protocol, RC-0503-01;
- o) Project-specific Specifications:
 - Clearing and Grubbing;
 - Site Grading;
 - Excavation and Fill;
 - Dewatering; and
 - Excavation, Trenching and Backfilling;
- p) Transport Canada Grade Crossings Standards;
- q) GO Transit Grade Crossing Design Standard, RC-0506-05RCM-01;
- r) American Railway Engineering and Maintenance-of-Way Association (AREMA);
- s) American Society of Testing and Materials (ASTM) Standards;
- t) ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort;
- u) ASTM D6938, Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Mustow Depth); and
- v) ASTM D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).

1.3 Reference Forms

1.3.1 The following forms and templates must be used during track construction activities:

- a) Rail laying form;
- b) Thermite welding form; and
- c) Rail destressing form.

- 1.3.2 The forms can be accessed through the Metrolinx Technical Standards page using the following link:

<https://www.metrolinx.com/en/metrolinx-technical-standards/engineering-and-architectural-standards/track/track-forms>

1.4 Rail Corridor Asset Handover Protocol

- 1.4.1 All works are to be delivered in line with the Metrolinx Rail Corridor Asset Handover Protocol (RC-0503-01). The purpose of the Metrolinx Rail Corridor Asset Handover Protocol is to outline railway-specific criteria for the transfer of responsibility and handover of railway components from construction teams to operations. This protocol applies to complete infrastructure assets and systems applicable for Track & ROW, Signal and Communications, and Civil Structures components and is applicable to GO/UPE heavy rail contracts.

- 1.4.2 Maintenance responsibilities between In-Service and Handover shall be as per Metrolinx Rail Corridor Asset Handover Protocol (RC-0503-01).

- 1.4.3 The following forms and templates must be used for placing track infrastructure in service as well as handover of track infrastructure to the Asset Owners:

- a) In-service notification;
- b) In-service Certificate; and
- c) Handover Certificate.

- 1.4.4 The forms can be accessed through the Metrolinx Technical Standards page using the following link:

<https://www.metrolinx.com/en/metrolinx-technical-standards/engineering-and-architectural-standards/rail-corridor-asset-handover>

1.5 Equipment and Workforce

- 1.5.1 As a minimum, the Contractor must be prepared to provide the following equipment for track construction activities:

- a) One (1) Mechanical high-production tamper capable of lifting, lining, and tamping track to appropriate class of Track (1-5) railway standards and production rates;
- b) One (1) Mechanized high-production on-track ballast regulator;
- c) One (1) Dynamic stabilizer for ballast consolidation;
- d) One (1) Welding truck capable of performing Electric Flash-Butt field welding (not applicable for jointed track);
- e) Two (2) Thermite-welding crews (not applicable for jointed track).

- 1.5.2 All equipment shall be tested, fuelled and adequately maintained prior to any major work block.
- 1.5.3 As a minimum, the Contractor must be prepared to provide the following Workforce for track construction activities:
- a) The Contractor must have sufficient labour and equipment to work at more than one (1) location along the corridor at a time and to meet Project schedule requirements;
 - b) All operators of on-track equipment must hold a valid CROR certificate and be trained and qualified to operate on-track equipment;
 - c) The Contractor must have at least one (1) mechanic on duty equipped with sufficient spare parts during track closures to prevent delays caused by equipment failures;
 - d) Anyone working within the Metrolinx right-of-way, under any form of track protection on a Metrolinx site, or on Metrolinx-owned rail infrastructure (e.g., bridges, tunnels) must carry a valid Personal Track Safety (PTS) identification card and be qualified to work in the corridor, around live trains, and on active railways.
- 1.5.4 The Contractor must ensure that the Track Specialists/Inspectors responsible for the rehabilitation, and construction, and/or inspection of track owned and maintained by Metrolinx, must comply with Metrolinx Track Inspection Guidelines Competency Management Procedure and requirements in MTS Section 2, including:
- a) Minimum Training Requirements; and
 - b) Must demonstrate competency compliance in intervals not exceeding 365 calendar days.
- 1.5.5 The Contractor shall be responsible for locating all utilities and signal cables and must assign qualified signal personnel to support track-work activities where signal support is required.
- 1.5.6 The Contractor must provide a full-time, qualified and licensed surveyor for marking out track alignment and profile geometry, and location of other track components as per the IFC drawings.
- 1.5.7 The Track Supervisor as defined in the Contract shall be on site at all times during the performance of the work. If the Track Supervisor is unable to be present on site, the Contractor shall have a designated supervisor on site at all times during the performance of the Work who qualifies as a Competent Supervisor (as defined by the Ontario Health and Safety Act) and is in possession of all of the following qualifications and certifications:
- a) Canadian Rail Operating Rules (CROR)
 - b) Track Inspection Guidelines (TIG)
 - c) Continuous Welded Rail (CWR)

1.6 Handling of Materials

- 1.6.1 The Contractor must handle Owner and Contractor supplied materials in a manner to prevent damage.
- 1.6.2 The Contractor must ensure the rail corridor is kept clear for rail operations and must not store anything within the clearance envelope.
- 1.6.3 The Contractor must ensure that railway access roads or drainage paths will not be blocked with equipment or stockpiles of material.
- 1.6.4 The Contractor must ensure that all track materials are secured daily to prevent displacement by wind, trains, vandalism or theft; loose items to be placed in locked bins or removed from site.
- 1.6.5 The Contractor must ensure that equipment must be of the correct type and capacity for the intended purpose and must conform to all Occupational Health & Safety (OH&S) standards.
- 1.6.6 Track materials, especially concrete ties and turnout panels, must be handled using spreader bars or similar devices to adequately distribute the load. The proposed handling method for track materials must be submitted to Metrolinx for review and approval prior to use on site. Track turnouts must not be dragged or mishandled to avoid damage or alignment problems.
- 1.6.7 The weight of track materials and/or turnout panels must be known and compared with load chart of the crane to be used prior to attempting a lift.
- 1.6.8 Individual pieces of rail must be moved using appropriate rail equipment such as rail tongs. Dragging rail is not permitted.
- 1.6.9 Track materials stored onsite must not be driven over by equipment under any circumstances, as this practice may result in unnecessary damage.
- 1.6.10 If, in opinion of Metrolinx or their Consultant, materials become damaged during transportation or handling and can no longer meet the specified requirements, the Contractor must immediately remove the material from site and replace the materials at no additional cost to Metrolinx.

2. Track Earthworks

2.1 General

- 2.1.1 This section specifies the execution requirements for site preparation such as excavation, subgrade preparation, backfilling and compaction. All related track specific earthwork activities must comply with the MTS, and IFC drawings.

2.2 Subgrade Preparation and Placement

- 2.2.1 The subgrade must be inspected and proof-rolled under the supervision of an experienced Geotechnical Engineer or their designate (confirmed in writing) prior to commencement of works. The quality of the subgrade must be assessed, and if found unsatisfactory, remedial measures must be determined on site with the Geotechnical Engineer, based on the approved remediation measures provided in the geotechnical reports.
- 2.2.2 For proof rolling, the Contractor must use roller of 45,400 kg gross mass with four pneumatic tires each carrying 11,350 kg and inflated to 620 kPa. Four tires must be arranged abreast with center to center spacing of 36 in (915 mm) maximum. The base of the excavation must be proof rolled with heavy compactors (minimum 10,000 kg).
- 2.2.3 In areas not accessible for rolling Equipment, the Contractor must compact to the specified density with power operated portable plate compactors.
- 2.2.4 During proof rolling, spongy, wet or soft/loose spots should be sub-excavated to stable subgrade or as recommended in the geotechnical reports and replaced with approved backfill material, compatible with subgrade conditions, as directed by the Geotechnical Engineer.
- 2.2.5 The exposed subgrade must be protected from frost penetration. If frost penetrates the exposed subgrade (e.g., left uncovered overnight in freezing temperatures), the frozen soil/material must be sub-excavated, removed and replaced with new granular material in lifts not exceeding 6 in (152 mm) in thickness.
- 2.2.6 Subgrade compaction must meet the requirements stipulated by the Geotechnical Engineer as per Table 3. Where subgrade compaction strength is found to be less than these requirements, placing a non-woven geotextile and biaxial geogrid is recommended to prevent pumping of the fines to the Subballast and to provide additional strength to the subgrade. The placement of non-woven geotextile and biaxial geogrid is subject to the Geotechnical Engineer's approval. Alternatively, additional sub-excavation may require at the Geotechnical Engineer's direction.
- 2.2.7 The sub-excavation must be backfilled with new granular material in lifts not exceeding 6 in (152 mm) in thickness, refer to Table 3. Repairs shall be made such that the subgrade is smooth, firm, and meets density requirements. If the subgrade is found to be dusty, it should be sprinkled with water prior to placing Subballast.
- 2.2.8 In case of rain, the subgrade may experience softening at the surface; further sub-excavation may be required in order to achieve an approved subgrade. To avoid this situation, the subgrade must be covered immediately with Subballast after each section of subgrade is completed.

- 2.2.9 Approved granular material must be placed in 6 in to 12 in (152 mm to 305 mm) lifts from the bottom of the excavation to the underside of the Subballast, in accordance with OPSS 1010 and the Geotechnical Engineer's direction.
- 2.2.10 Persistent subgrade issues (such as soft spots, frost heave, or 'mud boiling') must be remedied by one or more of the following:
- a) Implementing open drainage ditches sized and graded to collect and convey surface water away from the track structure;
 - b) Installing lateral subsurface drainage systems at specified intervals alongside or beneath the track bed to intercept and remove groundwater; and
 - c) Retaining a qualified Geotechnical Engineer to investigate the affected areas, evaluate root causes, and prescribe appropriate remediation measures.
- 2.2.11 The Contractor must ensure that finished subgrade, ditches and slopes to be within 5/8 in (15 mm) of design as indicated on the drawings but not uniformly high or low.
- 2.2.12 Where geotextile is required for additional slope protection, measures to accommodate a high water table should be taken. This may include the introduction of a non-woven geotextile between the layers of subgrade and topsoil in accordance with the geotechnical reports.
- 2.2.13 Following proof-rolling, the finished sub-grade surface must be inspected and accepted by the Geotechnical Engineer before any Subballast is placed.

2.3 Subballast Placement

- 2.3.1 Subballast material must be supplied, transported, stockpiled and stored in accordance with Metrolinx Track Subballast Specification 34 11 26.16.
- 2.3.2 Subballast shall be placed in uniform lifts not exceeding 6 in (152 mm); lifts may be reduced to 3 in (76 mm) where necessary to achieve full compaction. Each lift shall be compacted to the density specified by the Geotechnical Engineer (Table 3) before placing the next lift. Subballast must not be placed on uneven, muddy, frozen, or waterlogged subgrade.
- 2.3.3 All exposed Subballast must be proof rolled prior to proceeding with new track construction. Any areas exhibiting 'soft spots' must be immediately reported to the Geotechnical Engineer prior to proceeding with the work. If the Contractor is directed to undertake addressing of 'soft spots', sub-excavation and the replacement of Subballast must be carried out in accordance with this Specification and under direct supervision of the Geotechnical Engineer.
- 2.3.4 The Contractor must make provision to protect the Subballast layer from contamination and any deterioration of its quality. Any distortion or contamination of the Subballast must be rectified by excavating ≥ 6 in (152 mm) and backfilled with fresh Subballast and must be recompacted.

- 2.3.5 Vehicular traffic on the newly prepared Subballast is to be avoided and confined to the designated corridor access as described in the approved Project Traffic Management plan.
- 2.3.6 The Contractor must be responsible for maintaining a firm, true and smooth surface compacted to the required density until track Ballast is placed on the Subballast.
- 2.3.7 Disturbance to foundations, retaining walls, drainage or other adjacent works shall be avoided during placement.
- 2.3.8 The Contractor must ensure the finished Subballast surface is within 3/8 in (10 mm) of the designed elevation as indicated but not uniformly high or low.

2.4 Compaction

- 2.4.1 The Contractor must shape and roll alternately to obtain smooth, even and uniform compaction.
- 2.4.2 The Contractor shall apply water as necessary during compaction to obtain the specified density and must avoid oversaturation of the material.
- 2.4.3 In areas not accessible for rolling Equipment, the Contractor must compact to the specified density with power operated portable plate compactors.

Table 3: Compaction requirements

Material / Location	Lift Depth (mm)	OMC	SPMDD	Test Reference
Earth Cut - Disturbed areas and subgrade	N/A	±2%	Minimum 98% SPMDD	Proof - roll
Earth Fill (Granular A, Granular B, Subballast)	150	±2%	Minimum 98% SPMDD	Compaction, 25 m grid, per lift ASTM D1557
Culvert Bedding	150	±2%	Minimum 98% SPMDD	ASTM D1557
Culvert Backfill	150	±2%	Minimum 98% SPMDD	ASTM D698

- 2.4.4 For culvert installation refer to Metrolinx General Guidelines for Design of Railway Bridges and Structures.
- 2.4.5 Material for culvert bedding and backfill must be well-graded, pit-run sand and gravel with a maximum particle size of 4 in (102 mm) and no more than 8% passing a No. 200 sieve.

3. Railway Track Structure

3.1 General

- 3.1.1 Track construction must be performed in accordance with applicable standards including but not limited to standards listed under Section 1.2 Reference Standards including flagging and signals support.
- 3.1.2 The Contractor shall be responsible for transportation of all track materials, including loading and unloading to the site.
- 3.1.3 The Contractor shall follow the track construction staging specified in the Contract Drawings and avoid any changes. Should the Contractor choose to change the construction staging, the Contractor must be responsible to provide a complete design stamped by a Professional Engineer licensed in Ontario at no cost to Metrolinx. Also, the Contractor must be responsible for all consequences that may occur due to the proposed change.
- 3.1.4 The Contractor is advised that cold weather/winter works may be required as part of the scheduled Work. Additional effort or working days expended as a result of making provisions for working in cold weather/winter conditions must be the Contractor's responsibility.
- 3.1.5 Unless otherwise approved by the Metrolinx ESD - Track, existing ballast must not be reused for new track construction and/or rehabilitation.
- 3.1.6 The Contractor shall ensure that their work does not negatively affect the rail corridor drainage or adjacent drainage and restore any drainage structures / ditches following their work.

3.2 Track Removal

- 3.2.1 The Contractor must supply all labour, tools, and equipment for the removal of existing track to facilitate the replacement of the track structure as specified on the IFC drawings.
- 3.2.2 Cutting and drilling of rail must be in accordance with MTS Section 4.
- 3.2.3 The Contractor must remove rail and appropriately store or stockpile it for reinstallation if applicable following replacement of ties, ballast and OTM. Reuse of existing rail must conform to MTS Section 4 requirements.
- 3.2.4 The Contractor shall remove all ties, ballast and OTM to the extents indicated in the IFC drawings.
- 3.2.5 Ballast removal must be undertaken with the utmost care to ensure no damage occurs to the underlying Subballast.

- 3.2.6 Removed ties, ballast and OTM must be removed from the site and disposed of to an appropriate receiving facility in a manner acceptable to the Regulatory Environmental Agency having jurisdiction.
- 3.2.7 The Contractor must provide a clearance certificate, including end location and quantities, to Metrolinx that all ties, ballast and OTM have been disposed of according to regulations.
- 3.2.8 Ballast removal must be completed in accordance with requirements in MTS Section 11.
- 3.2.9 Upon inspection by a qualified Track Inspector, other removed track materials must become the property of Metrolinx and placed in a designated stockpile area. Certain materials may be assigned to the Contractor at the sole discretion of Metrolinx.

3.3 Turnout and Crossover Removal

- 3.3.1 The Contractor must supply all labour, tools, and equipment for the removal of existing turnouts. Including the installation of mainline gap closure for removed turnouts, salvage and cutting of existing turnouts into panels, loading, hauling and unloading of panels in designated storage areas, all as specified on IFC drawings. This shall include flagging and signals support.
- 3.3.2 Unless having been replaced through other processes, existing ballast under removed turnouts and crossovers must be removed to a depth of 12 in (305mm) below underside of the ties and replaced with new ballast.
- 3.3.3 Cutting and drilling of rail must be in accordance with MTS Section 4.
- 3.3.4 Prior to cutting of turnouts into panels, all ties must have fasteners re-set, bolts tightened, and box anchored.
- 3.3.5 Unless otherwise approved by Metrolinx, removed panels must be loaded, hauled, unloaded and appropriately stockpiled as a complete unit for re-use at a location to be designated by Metrolinx.
- 3.3.6 Handling, loading and unloading of turnout panels must conform to **Section 1.6 Handling of Materials**
- 3.3.7 The Contractor must replace any mainline gap with new ties, rail, ballast, and surface, line and stabilize the new track. Track panels may be used to facilitate track construction within the approved track blocks or track closures.
- 3.3.8 All mainline gap replacement must include field welding to restore CWR. Destressing of track must be performed at the time of field welding.

3.4 Track Undercutting and Track Realignment

- 3.4.1 The Contractor must perform a track condition survey prior to commencement of any construction activities such as undercutting and realignment of existing track. The condition survey must contain:
- a) An assessment of the existing track ties with a number recommended for replacement;
 - b) An assessment of the condition of rail and fasteners such as spiking patterns and anchors; and
 - c) An assessment of the ballast condition for the shifted/realigned track.
- 3.4.2 The Contractor shall supply all labour, tools, and equipment for realignment of existing track, loading, hauling, unloading, spreading, lifting, tamping, lining, stabilizing and regulating the ballast to bring the track to final grade lines after ballasting.
- 3.4.3 The Contractor must replace broken anchors. The spikes must be re-set on existing ties to ensure that track structure is maintained during lining. Track must be brought to appropriate standards for the class of track and additional spikes placed as directed by Metrolinx.
- 3.4.4 Track undercutting to replace existing ballast with new ballast must be completed in accordance with MTS Section 11.5 and to the extents indicated in the IFC drawings.
- 3.4.5 The Contractor must restore the ballast section in conformance with the MTS and must include any ballasting required to fill tie cribs and shoulders.
- 3.4.6 The Contractor must surface, line, regulate and stabilize relocated track in accordance with the MTS Section 12.
- 3.4.7 The Contractor must not attempt to realign track in frozen conditions unless cold-weather precautions deemed acceptable to Metrolinx are in place to ensure the existing track structure is not damaged.

3.5 At-Grade Crossings

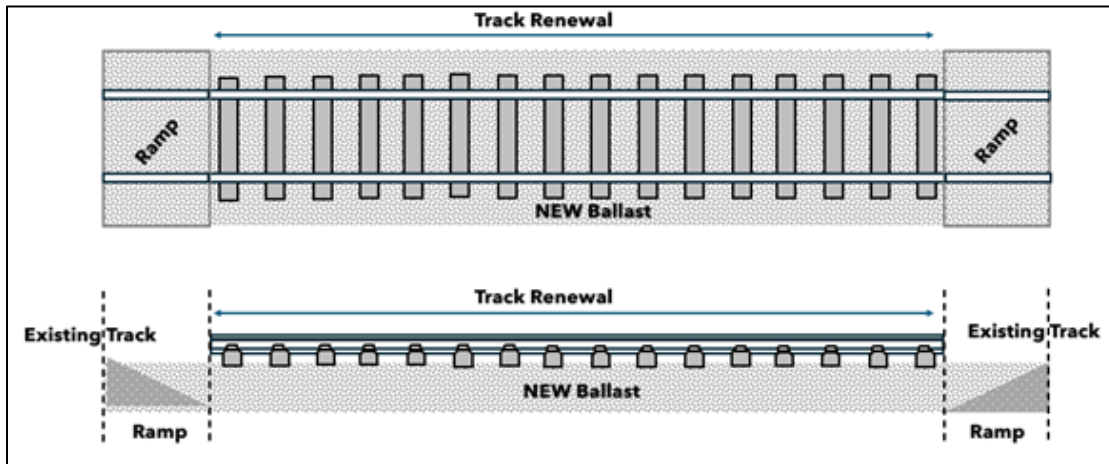
- 3.5.1 All at-grade road crossings must comply with Transport Canada Grade Crossing Standards and GO Transit Grade Crossing Design Standard, RC-0506-05RCM-01 and MTS Section 14.
- 3.5.2 All temporary timber crossings must be constructed as per MTS Sections 14.6, 14.7 and Standard Plan GTS-2301.
- 3.5.3 Installation and construction of fencing, gates and anti-trespass mats in proximity of at-grade crossings must follow Metrolinx Fencing and Anti-Trespassing Requirements Standard.

- 3.5.4 The Contractor must ensure that all steel tracked equipment does not come into contact with the rails at any time when traversing the crossing, as this could result in malfunction of the railway train signal system and damage the track structure. The Contractor must supply and place rubber matting/wood planking to protect the rails when crossing with steel tracked equipment. The bottoms of traffic barrels are not acceptable for this purpose.
- 3.5.5 Edge of road lines and edge of sidewalk lines shall be painted using white thermoplastic road paint on every crossing. The Track ID shall be printed on the road surface in the middle of each crossing and track. Where tracks are numbered this shall be in the form of the number, where tracks use cardinal direction use the single letter abbreviation, where single tracks are present use "M" and "nm" (in lower case).
- 3.5.6 Markings and cross hatching shall be installed as per requirements of RC-0506-05RCM-01 GO Transit Grade Crossing Design Standard.
- 3.5.7 A 4" (101.6mm) conduit shall be installed adjacent to the track at grade crossing with the ends marked by stakes for routing of signal cables.
- 3.5.8 Any Temporary Crossings required during construction activities shall be compliant with requirements of RC-0506-02TRK Metrolinx Track Standard Section 14.6.
- 3.5.9 Crossing ties must be composed of 9 ft (2.74 m) long hardwood ties and must be spaced at 18 in (457 mm) on center throughout the crossing.
- 3.5.10 Crossing ties in concrete tie territory must be composed of 10 ft (3.05 m) long hardwood ties.
- 3.5.11 Crossing ties must extend at least five (5) ties beyond the end of the crossing surface, including sidewalks and MUP.

3.6 Ballast Ramp Construction

- 3.6.1 Ballast ramps are a transition between new and old material composition to help reduce the potential for differential settlement (and Track faults). The ballast ramp helps to minimize this issue by ensuring a gradual change in ballast depth or material, allowing the track to settle more evenly and reducing the likelihood of large differential settlements. These must be installed when Ballast is renewed to support the transition between new and old. This arrangement is shown in Figure 1 .

Figure 1 Ballast Ramp arrangement at the ends of a track renewal



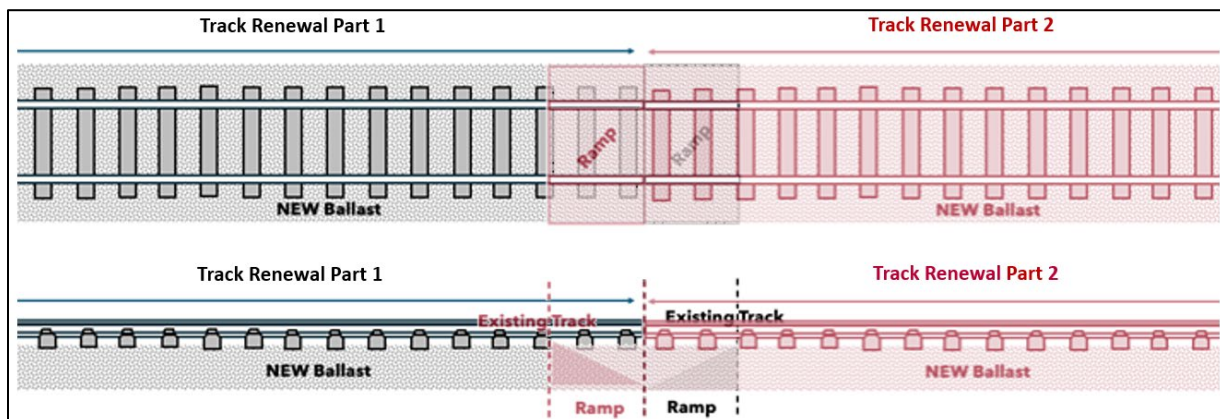
3.6.2 The length of the Ballast Ramp shall be determined by the track speed as per Table 4: Ballast Ramp Lengths.

Table 4: Ballast Ramp Lengths

Track speed	30 mph and below	31 mph - 60 mph	> 60 mph
Length of Ballast Ramp	5m	10m	15m

3.6.3 When starting or ending track renewal where a ballast ramp has previously been installed these should be overlapped to ensure the original material is fully replaced. This arrangement is shown in Figure 2.

Figure 2 Ballast Ramp arrangements when track renewals overlap



3.6.4 Ballast ramps are for the purposes of construction methodology only and are not permitted to be used as an end of track device. All end of track devices must comply with MTS Section 10.7.

3.7 Ballast Mat

- 3.7.1 If Ballast Mat installation is required as part of the IFC drawings, the supply and installation of ballast mats shall be as per Metrolinx Ballast Mat Specification 34 82 13.

3.8 Ballast Placement

- 3.8.1 The Contractor must supply all labour, tools, and equipment for hauling, unloading, spreading, lifting, tamping, lining, stabilizing and regulating the ballast.
- 3.8.2 New Ballast must be supplied in accordance with Metrolinx Track Ballast Specification 32 11 25.
- 3.8.3 Ballast unloading and distribution must be performed in accordance with MTS Section 11 and IFC Drawings.
- 3.8.4 Pre-condition assessment must be completed on the ballast for all adjacent tracks. At the discretion of Metrolinx, ballast shoulder cleaning of the existing ballast may be undertaken.
- 3.8.5 The Contractor must shape the finished ballast section in conformance with the GTS-2205 and must include any ballasting required to fill tie cribs and shoulders.
- 3.8.6 Ballast must be consolidated with a mechanical Dynamic Stabilizer.
- 3.8.7 Ballast depth is measured from the bottom of the tie to the top of Subballast layer. In the case of steel ties, it is measured from the bottom side of the top of steel tie.
- 3.8.8 Before commencing ballasting or surfacing, the Contractor shall line the track to within 1" (25 mm) of final horizontal alignment, and ties shall be spaced in accordance with MTS Section 9.
- 3.8.9 Excavation activities must be completed with the tolerances in Table 5:

Table 5: Earthwork Construction Tolerances

Earthwork	Construction Tolerances
Width (Subballast or Subgrade)	+/-100mm (measured from end of tie position as per IFC design)
Cross-slope (Subballast or Subgrade)	+/- 0.15% from designed cross-slope (e.g. design cross-slope: 3%, then acceptable tolerance is 2.85% and 3.15%)
Minimum Ballast Layer Depth	+/- 25mm (from IFC design value)
Total Excavation Depth	+/-25mm (from IFC design value)

- 3.8.10 After the approval of the Subballast by Metrolinx, 50% of the Pre Ballast layer shall be uniformly spread and compacted to establish a controlled and stable surface for track placement.
- 3.8.11 Ballast shall be placed in uniform lifts not exceeding 6 in (152 mm); and shall be compacted using a pneumatic roller having an operating mass ≥ 9 short tons ($\approx 18\,000$ lb), or a vibratory compactor having both static operating mass $\geq 5\,000$ lb, and rated centrifugal (dynamic) force $\geq 18\,000$ lb.
- 3.8.12 The Contractor shall ensure that the surface of the ballast is flat and is deemed to be suitable to support a tie, in order to facilitate tie plate installation.

3.9 Track Construction

- 3.9.1 The Contractor must supply all labor, tools, and equipment for the loading, hauling and unloading of track panels and conventional track as specified on IFC Drawings.
- 3.9.2 Concrete ties must be supplied and installed in accordance with Concrete Tie Specification 34 11 33.13 and MTS Section 9.3;
 - a) The Contractor shall use spreader bars or similar devices to adequately distribute the load for distributing ties.
- 3.9.3 Timber ties must be supplied and installed in accordance with Specification 34 11 33.2 and MTS Section 9.1;
 - a) Rail anchoring for CWR track must be undertaken in accordance with MTS Section 10.2, Rail Anchors.
- 3.9.4 Steel ties must be installed in accordance with the manufacturer's installation manual and MTS Section 9.5.
- 3.9.5 Permanent steel ties must not be installed on in crossings or on main track, unless approved in writing by the Director, Engineering–Track.
- 3.9.6 Tie Handling
 - a) Unnecessary rehandling and dropping of ties must be avoided;
 - b) Damaged ties must be replaced; and
 - c) If adjacent ties are left "hanging" (unsupported by ballast) after placement, they must be tamped fully seated on the ballast. Ties shall only be placed on ballast that supports the full length of the tie to avoid conditions that might cause damage to the tie.
- 3.9.7 Ties must be spaced as per MTS Section 9. Proper tie spacing, and tie counts must be validated and verified prior to the ballasting of the track.
- 3.9.8 Joint bars that are installed permanently, shall be new and the spray painted white between the two middle bolt holes.

- 3.9.9 Field welds on adjacent rails must be staggered by 4 ft (1,219 mm) or a minimum of two (2) tie cribs.

3.10 Installation of Special Trackwork

- 3.10.1 Turnout installation must include the supply of all labour, tools, and equipment for the loading, hauling and unloading of panelized turnouts and installation of turnouts at location indicated on IFC drawings, (this includes but is not limited to rods, helper rod assemblies, stands, modifications to accommodate switch heaters, crossover tie arrangements and all other appurtenances).
- 3.10.2 Where new turnouts and/or track panels are installed, existing ballast must be replaced for a minimum of 12" below bottom of tie, unless a condition assessment is completed and test results indicate that the existing ballast meets Metrolinx Track Ballast Specification requirements.
- 3.10.3 The installation of turnouts must be in accordance with MTS section 13.2 - Installation of Turnouts and the associated GO Transit Standard Plans and shop drawings.
- 3.10.4 Rail gaps at turnout ends must be field welded to mainline CWR. Turnouts must be destressed in accordance with MTS Section 13.3.
- 3.10.5 Turnout installation must include the removal, transportation and storage of the temporary switch stands and switch circuit controllers once the permanent switch machine has been commissioned.
- 3.10.6 The head blocks for the turnouts, must be of sufficient length, up to 22' (6.7 m) long, and installed on edge to accommodate a dual control switch machine on the normal closed point side and a high mast rigid switch stand, type 36E, on the opposite side. Tie No. B shall be 14' (4.3 m) to accommodate the Switch Circuit Controller (SCC). All remaining switch ties must be as laid out on standard plans, properly spaced and square to through track.
- 3.10.7 Locate the turnout ties within 1/2 in of their designed location relative to the Point of Switch. Orient turnout ties perpendicular to the tangent defined by the straight stock rail, plus or minus 1/2 degree, unless otherwise stated on the approved Shop Drawings.
- 3.10.8 The Contractor is responsible for the modifications required to accommodate the Snow Clearing Devices, including duct work and helper rods for the turnouts.
- 3.10.9 The Contractor must surface, line, regulate and stabilize turnouts in accordance with MTS Section 12.
- 3.10.10 Prior to the turnout being placed into service, a detailed turnout inspection must be conducted between Metrolinx, and the Contractor as per MTS Section 13.2.

- 3.10.11 Where a switch point is required to be replaced, the corresponding stock rail shall also be replaced. Unless the stock rail is new, has minimal wear and permission is obtained in writing from the Director, Engineering–Track.
- 3.10.12 All switch heaters that are removed shall be reinstalled and commissioned prior to Winter months as defined by the Track Standards.
- 3.10.13 Where work occurs in Winter months as defined by the Track Standards, the Contractor shall ensure that during times the switch heaters are not functioning, there is a plan to remove snow from the switch points and frogs during a snow event or blowing snow event.

3.11 Surfacing, Tamping, and Lining

- 3.11.1 The Contractor shall supply all labour, tools, and equipment to bring the track to final grade after ballasting.
- 3.11.2 All track surfacing activities near or adjacent to rail platforms must conform to Track Standards Section 12.
- 3.11.3 Final surfacing must be in accordance with the latest edition of MTS Section 11.2 and Section 12. The Contractor shall ensure that, on completion of surfacing, the surface is in compliance with Track Standard Section 16.2 and if applicable, Track Standard Section 19.
- 3.11.4 A tamper, ballast regulator and dynamic track stabilizer must be used for all ballasting and surfacing operations.
- 3.11.5 Ties pulled loose during surfacing must be corrected and re-secured.
- 3.11.6 When surfacing near high-risk locations MTS Section 12.2 and Track Standards Section 12.3 must be followed.
- 3.11.7 When mechanically surfacing the track, the tamping heads must be adjusted for the increased width and depth of the concrete tie. When using ballast regulators on concrete ties, the plow must be modified to avoid contacting, removing or damaging the rail clips. The ballast regulator operator must inspect the track for missing rail clips after the initial plow operation of the regulator. The Employee in charge must inspect the track for missing rail clips behind the ballast regulator.
- 3.11.8 The Contractor must make an additional final, lift, line, tamp and stabilization of all track six (6) to twelve (12) months after track is placed in service to address any settlement of the new/renewed track. The Contractor must ensure that additional ballast is placed as required.
- 3.11.9 Where production tamping equipment cannot access short sections of newly laid track, particularly adjacent to grade crossings and special trackwork, the Contractor must raise and tamp these sections manually.

3.12 Field Welding and Destressing

- 3.12.1 Rail for CWR track must be laid and destressed to the Preferred Rail Laying Temperature (PRLT) in accordance with MTS Section 4.
- 3.12.2 Electric Flash-Butt welding by means of Holland Welder or an approved equivalent is required for CWR. The final destressing welds by means of Thermite Welding, or approved equivalent, are acceptable and must be in accordance with the latest edition of Metrolinx Welding Manual.
- 3.12.3 For destressing of special trackwork, refer to MTS Section 13.3 - Destressing at turnout;
- 3.12.4 For destressing of rail at grade crossings, refer to MTS Section 14.5 - Destressing for At-grade Road Crossings; and
- 3.12.5 All welds shall be ultrasonically inspected by a Class 1 Canadian Railway approved rail flaw detection service. An inspection report must be submitted indicating a successful ultrasonic inspection of all welds. In case of defective welds, the type of defect must be identified and a remedial action must be implemented as per MTS Appendix I - Remedial Action for Rail Defects.

3.13 Track Construction Tolerances

- 3.13.1 MTS Appendix O, Table O-2 Construction and Rehabilitation Tolerances establishes the governing geometry, alignment, elevation, gauge and surface limits for track construction.

3.14 Drainage

- 3.14.1 Culvert and surface drainage must follow MTS Section 15.12 Culverts and Drainage, Section 21.3 Track Bed and ROW Drainage and Section 21.4 Installation and Extensions of Culverts.
- 3.14.2 Drainage works shall protect the integrity of the track structure by intercepting and conveying surface and subsurface water away from the formation.
- 3.14.3 Ditches must be constructed at a uniform grade, with no low sections to prevent the track or other equipment from being submerged and water to be accumulated in puddles.
- 3.14.4 The Contractor shall ensure that groundwater from adjacent track beds does not drain into the new track bed during construction affecting the subgrade and new granular fill.
- 3.14.5 The Contractor shall install permanent and temporary drainage in advance of earthworks to keep the subgrade dry and control water inflows.

- 3.14.6 The contractor shall ensure that finished subgrade drains positively to ditches or culverts. No ponding is permitted within the track zone.

4. Commissioning

- 4.1.1 The Contractor shall plan, coordinate, and implement the required track inspection and Commissioning activities at all stages of Construction in accordance with Contract Documents and the Metrolinx Asset Handover Protocol.
- 4.1.2 The Contractor must obtain an in-service certificate prior to placing any track into service.
- 4.1.3 Tests and inspections must be made both during the progress of the Contract and after completing installation of equipment and must consist of factory tests of Contractor furnished equipment, circuit breakdown tests, wiring verification tests, continuity tests, resistance tests, voltage and current tests, applicable locking tests, operating tests, simulation tests, and other electrical and mechanical tests and inspections
- 4.1.4 Tests, test procedures, test reports, and other documents required herein may be separated or combined in a logical structure in accordance with the Contract Documents.
- 4.1.5 Each Contractor furnished component and unit of the wayside signal and grade crossing system shall have an inspection performed at its point of manufacture, and evidence of this inspection and acceptability shall be indicated on the item where practicable.
- 4.1.6 All testing and commissioning shall be carried out in the presence of Metrolinx personnel or an approved delegate, unless otherwise agreed. This shall be recorded in the manner required in the Contract Documents. No part of the signal system shall be placed in service without an authorized Metrolinx representative being present and witnessing the in-service tests.
- 4.1.7 All track inspections that are performed shall be conducted by a qualified and certified Track Inspector. All inspections shall be recorded in writing and submitted to Metrolinx with any noted defects or deficiencies included.

5. Quality Assurance

5.1 Application

5.1.1 Quality Management

- a) The Contractor must develop and implement a Quality Assurance Plan to ensure materials and workmanship meet all specified requirements; and
- b) Include testing/inspection frequencies, responsible personnel, and methods of control for subcontractors.

5.1.2 Audits and Records

- a) The Contractor shall keep all Quality Assurance documentation and records of testing on site and make these available to Metrolinx upon request.
- b) Metrolinx may perform audits or surveillance at any time.

5.1.3 Inspections and Testing

- a) Metrolinx may inspect materials and track construction activities at any stage. The Contractor must provide full access to the work and all relevant documentation.

5.1.4 Non-Conformance Reports (NCR)

- a) The Contractor shall issue a Non-Conformance Report (NCR) for any work or material found not to achieve the requirements as specified in this specification.

5.1.5 In-Service Certificates

- a) Before track is placed in service, a Track Inspection Guidelines (TIG) qualified person must perform a detailed inspection.
- b) The Contractor and Metrolinx will sign the Track In-Service Certificate if the track is deemed to be safe for train operations.
- c) Deficiencies must be corrected within an agreed timeframe (e.g., 21 days), and the final in-service report submitted promptly.

5.2 As-built and Record Drawings

5.2.1 The Contractor shall document all changes from the IFC drawings up to and including the preparation of As-Built or Record Drawings.

5.2.2 The Contractor shall keep a record of the as-built condition and the reasons for any changes from the IFC drawings including all revisions authorized. Where the as-built condition deviates from the IFC Drawings, but remains within the design and specification tolerances, and meets the applicable Standards and/or Specifications, engineering acceptance by Metrolinx is not required. The Contractor shall ensure that that drawings are marked up with relevant information required to represent the as-built condition, highlighting all differences from the IFC drawings.

- 5.2.3 Upon completion of the work for each stage of the track construction, the Contractor must provide the as-built information, collected by a licensed surveyor (Ontario Land Surveyor) to the responsible Engineer of Record to incorporate the as-built condition into the Record Drawings, which are required to be signed and sealed by the responsible Engineer of Record.
- 5.2.4 The survey data must meet the minimum requirements set below:
- a) All horizontal positioning and elevation values to be provided to 3 decimal places;
 - b) In tangent track, top of both rails, in the same track cross-section, at minimum 10m intervals;
 - c) In station platforms, top of both rails and platform edge, in the same track cross-section, at minimum 5m intervals; and
 - d) In curved track (spiral and curve), top of both rails, in the same track cross-section, minimum 5m intervals; minimum 6 shots per curve regardless of length.
- 5.2.5 The following details must be included in the as-built reports:
- a) Top of rail elevation and horizontal position, including both top of low rail (control rail) and high rail; top of rail elevation must be captured at the center of the rail head;
 - b) Location and details of turnouts including where feasible point of switch (PS), point of frog (PF), heel of frog (HF) and last long tie (LLT);
- 5.2.6 Location of switch blowers/melters and other wayside devices where applicable;
- a) Location of all special track materials such as insulated joints, transition/compromise rails, and transition tie sets;
 - b) All rail weights;
 - c) Location and content of track geometry tags;
 - d) Centerline alignment, calculated as the mid-point between the two top of rail points;
 - e) Horizontal positioning offset value and direction (right/left in the direction of increasing mileage/stationing) between the as-built track centerline and the design track centerline;
 - f) Top of rail elevation difference between the As-built Elevation versus Design elevation (low rail to be used as the control rail);
 - g) As-built superelevation (in curved track) and cross-level (in tangent track);
 - h) Distance between track centers;

- i) Track/Platform (GO and UP platforms) clearances to include;
 - i. Distance between top of rail to top of platform edge;
 - ii. Distance between track centerline to platform edge;
 - iii. Clearances to all adjacent, overhead structures and signal components;
 - j) Report of all rail flaws, including of rail material reused in the project; and
 - k) A Track Geometry Report shall be produced as per Metrolinx Asset Handover Protocol.
- 5.2.7 The above information to be provided in following forms:
- a) Tables;
 - b) 2-Dimensional and 3-Dimensional CAD (.dwg) drawings;
 - c) 3-Dimensional CAD (.dwg) drawings to include 3D polylines for top of rails;
 - d) Points File (.pts) where applicable; and
 - e) PDF drawings.

End of Section