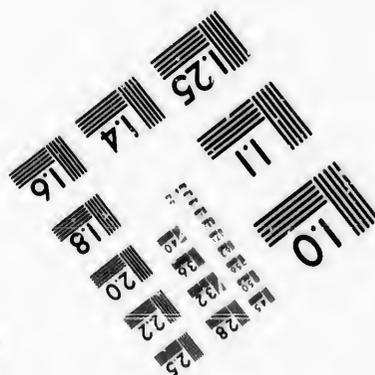
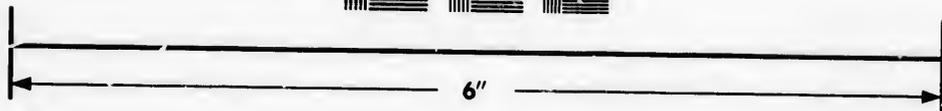
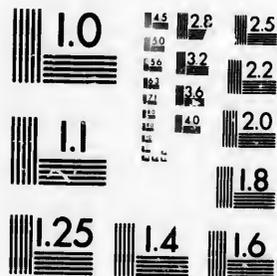


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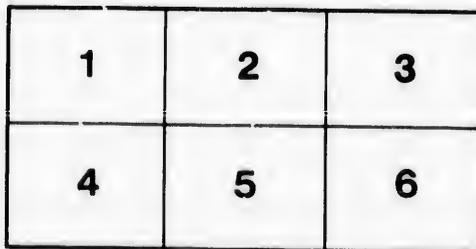
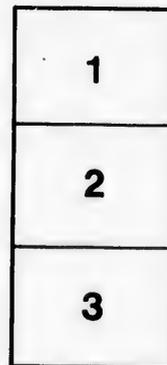
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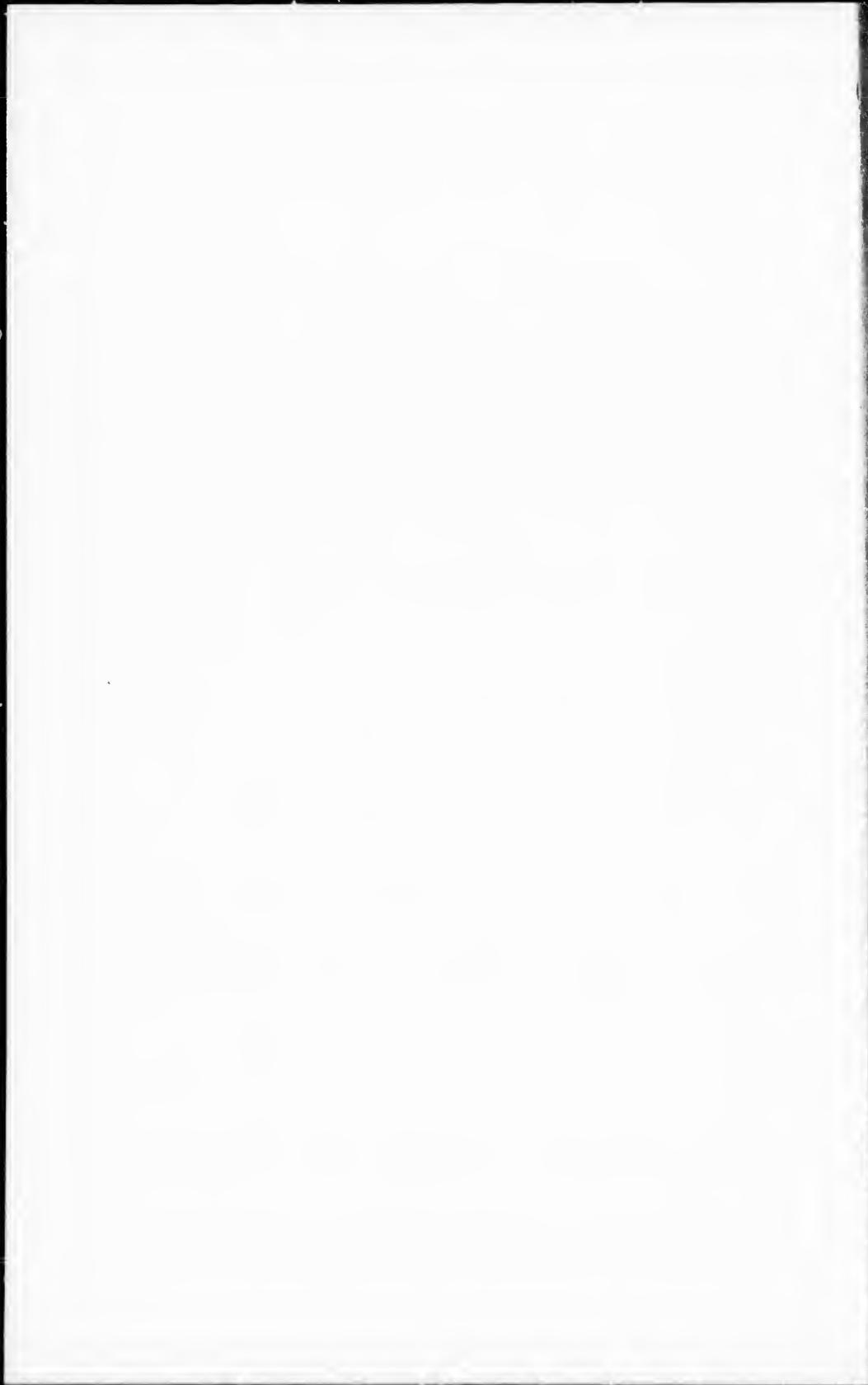
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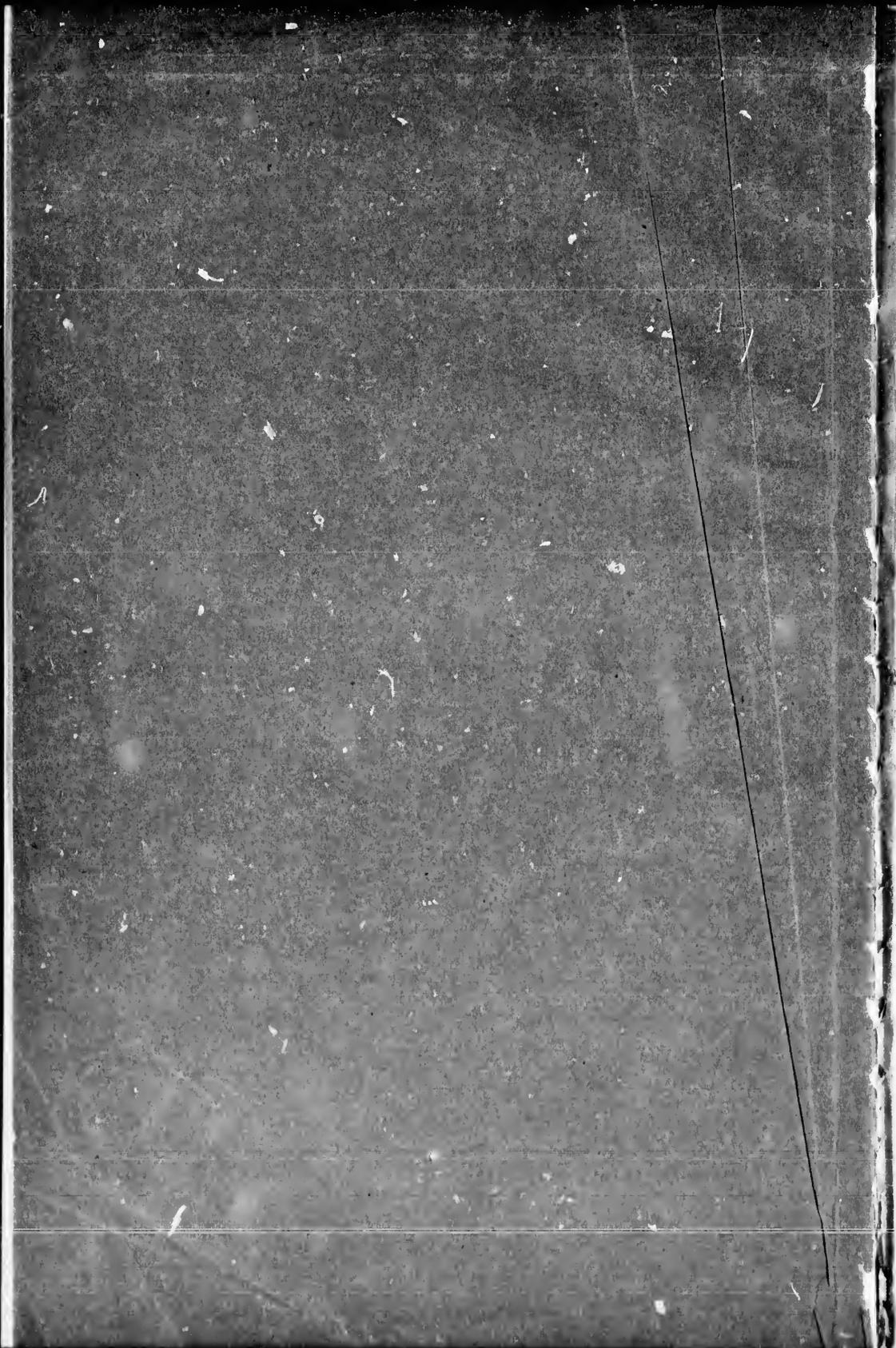
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INSPECTION OF RAILWAY



REPORT
OF AN
INSPECTION
OF THE
NOVA SCOTIA RAILWAY,
1863.

Halifax, N. S., September 16th, 1863.

Sir,—

I have the honor to submit, for the information of the Government, the following report of an Inspection of the Nova Scotia Railway, made in pursuance of my appointment, in a letter dated June 15th, 1863, directing me “to ascertain and report the exact condition of the road, buildings, rolling stock, machinery, and everything connected with the working of the road, and to state if any repairs are immediately demanded, their nature and extent.”

I am, Sir,

Your obd't. servant,

HENRY F. PERLEY.

Honble. CHARLES TUPPER, Provincial Secretary,
Halifax.

REPORT:

For the sake of conciseness I have deemed it advisable to divide the subject of this Report, under the headings of Earthwork, Culverts, Cattle Guards and Public Road Crossings, Bridges, Permanent Way, Fencing and Stations, into separate chapters; and to include the results of the inspection of the Windsor Branch with those of the Main Line, so that the same general remarks may be applicable.

EARTHWORK.

Between Richmond and Bedford the cuttings are principally through rock, or rock and gravel, and, in the case of the last mentioned, the slopes have stood very well. The ditches, however, have been allowed to fill up with wash from the slopes, and in many instances are grown up with grass. They will require a thorough cleaning out to admit of proper drainage.

The embankments are almost all of rock, and are, with but few exceptions, narrower than the specified width of eighteen feet. This is to be deprecated, especially in the case of those embankments which are exposed to the action of the waters of the Basin.

From Bedford to the Junction the character of the cuttings changes to clay and rock. In the Bedford cutting the slopes have slipped very much, especially on the southern side. This, no doubt, is owing to the peculiar nature of the soil, and the severe action of the frost upon it during the spring. As these slips are of annual occurrence, and necessitate the removal of large quantities of stuff to maintain the road in working condition, it is proposed to prevent their recurrence by building at the foot of the slope, and through the whole length of the cutting requiring it, a stone retaining wall, the foundation to be placed at a sufficient depth to ensure stability, and carrying it up to a height of at least three feet above the rails—filling in behind with broken stone, and taking the necessary precautions to ensure proper means of drainage. By this means "slurry" will be prevented from falling into the cutting, the slopes will become flattened and eventually consolidated. A proper stone drain must be provided to carry a small stream of water, which now finds its way down the slope into the cutting.

Through the whole length of Cutting No. 5, or Lily Lake cutting, and immediately under the track, a stone drain or culvert has been constructed to carry the stream flowing from Lily Lake. By this means this cutting is kept dry. The side drains, however, will require cleaning, and proper inlets to the central drain should be made to pass the surface water. A small stream enters this cutting down the slope, and will require a stone drain to lead it into central drain.

Very wide and deep ditches should be cut on either side of the track, through the old ballast cutting, east of Rocky Lake Station.

The drains in all the cuttings are filled up more or less with wash from the slopes, and in some instances have grown up with grass. This was especially noticed in Cut. No. 5, Section No. 5, where the grade being light, every care and attention should be paid to getting clear of the water as speedily as possible.

The embankments are of a fair average width. The heavy embankments near Bedford have been widened with the excavations from the adjoining cuttings. Appearances of grass show themselves on the slopes. The embankment across Lily Lake should be widened with the stuff to be excavated from the Bedford cutting.

From the Junction to the Grand Lake, the cuttings are of the same description as between Bedford and the Junction. The clay cuttings have slipped, more or less, and filled up the drains, and in several instances destroying the ballast. In Cutting No. 13, Section No. 6, it will be advisable to remove a large quantity of earth from the upper side. The expense of a retaining wall in this cutting would not be less than \$1200, and one-half of this sum expended in excavation, would very materially benefit the cutting, as well as affording the means of widening embankments. The drains in the rock cuttings, especially in that at Fletcher's Station, require a thorough cleaning.

The rock embankments on this length are narrow, and may be judiciously widened (where not built across water) by the stuff to be excavated from cuttings and drains. The embankment across the "Big Fill," Grand Lake, is in good order; a regular retaining wall runs the whole length on the Lake side. The embankment Waterloo Cove averages only fourteen feet in width. As it is exposed to the action of a heavy sea in the Lake, and is composed of clay, a retaining wall similar to that at the Big Fill is required.

A number of openings, made through the ballast, have been noticed. From the mode of their construction, they are unsafe; and where it is found impossible to vent the drainage otherwise than at these points, proper stone culverts will be required. The opening of the drains in the cuttings, will dispense with the services of several of these.

From the Grand Lake to Elmsdale, the cuttings are all clay, and slips have taken place in the majority of them. A quantity of excavation is requisite to widen them to their proper width and afford room for the drains. The drains in the shallow cuttings, and in those where the slopes have not slipped, will require clearing out.

The embankments are of a good width, and the slopes of many are very well grassed over. At Gasperaux Lake, the slopes though grassed, have slipped in places, owing to the wash from the Lake. Excavated material can be profitably

employed in widening this embankment on the Lake side. The embankment at the "Mud Hole," is standing well.

Between Elmsdale and Shubenacadie, cuttings No. 5, 7, 10, 19 and 21, section No. 8, have slipped very much and will require a large amount of excavation. Through the remainder small slips must be removed and drains opened and cleaned.

The embankments are of the same general character as heretofore noticed. A catch-water drain will be required on the upper side of the embankment west of the bridge at Andrews', to intercept the drainage from the public road, and lead it into the stream.

Between Shubenacadie and Truro a number of the deepest cuttings have slipped. Cuttings Nos. 10 and 11, section No. 9; Nos. 1, 7, 10, 12, 13, 16, 20 and 23, section No. 10; and Nos. 1, 4, 5, 18, 23 and 24, section No. 11, will require a large amount of excavation. All the drains will require cleaning. In the cuttings near the old Ballast Pit, and at Johnston's road, the drains are much encumbered with the refuse from cordwood, that has been, and still remains piled there.

Where the embankment east of the bridge across the Shubenacadie, comes close to the bank of the river, a continual slip is taking place. This may be prevented in part, if not wholly, by building a rough wall out of the drift timber found on the river's edge, or with old sleepers removed from the track, and filling in between it and the bank with sand. The rip-rap at the foot of the slopes of the embankment at the Shubenacadie bridge, has fallen out of repair, and the bank become reduced in width in consequence; this will require replacing, and the bank to be widened.

The embankment west of the bridge at Polly Bog, has sunk very much. This is owing to the soft nature of the foundation, and the fact that the timbering and brushing of the seat of the embankment was not constructed in accordance with the terms of the specification for that work, is also a cause why so much settlement has taken place. The peaty covering has more or less disappeared, the timbering is exposed, and, by the depression in the track, the ends of the logs are thrown up into the air. This cannot now be remedied.

To raise the track to its original level, and at the same time not to add too great a weight, it will be advisable to use the material found in the drains on account of its lightness; using only such an amount of earth as will be sufficient to protect the slopes from fire, and to fill up directly under the track on top of the present bank. The portion of this embankment east of the bridge, which has been brushed, stands well, but is only eleven feet in width. This should be widened, as there is not a sufficient breadth to retain the ballast. The embankment at Goulds' Bog will also require widening for the same reasons.

The remainder of the embankments are, with but few exceptions, in good order; the slopes are grassing over very well, and apparently have become consolidated. The excavations from the cuttings can be very advantageously disposed of in widening the narrow embankments, especially that one east of Truro Station, as it will not average more than fourteen feet in width.

On the Windsor Branch, the cuttings for about six miles and a half beyond the Junction are principally clay; from thence they are rock, with an overlying stratum of clay, until reaching the Sackville River, when clay again appears, and continues as far as Mount Uniacke. From this point to the St. Croix, the cuttings are through rock; and from the Saint Croix to Windsor, they are through clay and gravel.

The clay cuttings have, with but very few exceptions, slipped, especially cuttings Nos. 8, 11, 18 and 19, section No. 1; Nos. 20 and 22, section No. 2; Nos. 18, 19 and 20, section No. 4; and Nos. 1 and 15, section No. 5.

In cut No. 18, section No. 1, the pressure of the slip has moved the track several feet out of the centre line, and destroyed the ballast. It will be hardly advisable to build a retaining wall in this cutting, for its cost, expended in excavation, will widen the cutting to a great extent, allow room to put the track back to its proper alignment, build slope drains, and afford a large quantity of earth to widen embankments.

In several of the cuttings mentioned the slurry has run down to the ends of the

sleepers, and in one or two instances has flowed over the rail and lodged in the centre of the track. An estimate has been made of the quantity of the stuff to be removed, and also to open proper drains.

Through the clay cuttings where slips have not taken place, and in the rock cuttings, the drains will require a thorough cleaning of the debris, grass, and stones, with which they are partially filled and encumbered.

As noticed on the Main Line, a number of temporary openings have been made for the purpose of passing drainage from one side of the track to the other. Permanent culverts will be required at a few of these points; the others should be closed up.

The majority of the clay embankments will average the specified width of fifteen feet; the points at which they were found the narrowest being at or near the large bridges. The slopes are grassing over very well, whilst those between Newport and Windsor exhibit a luxuriance of growth which, it is to be hoped, will, ere long, extend over the whole length of the line.

The rock embankments, as a general rule, are narrow, in many instances affording too little room for retaining a proper quantity of ballast. These should be widened at as early a date as possible, and where not liable to the action of water, they may be widened with clay. The sides of embankment No. 18, section No. 3, for about 200 feet, are stoned up with a batter of one-half to one. A quantity of loose rock will be required at this point to strengthen these sides. A number of the embankments have settled, thus increasing the inclination of the grades to which they were originally constructed, and, as a natural consequence, offering additional resistance to the traffic over them.

From the peculiar character of the cuttings through the clay, its nature, the avidity with which water is absorbed, the short space of time in which, during and after rain, slurry is formed, the absence of a thorough system of drainage, and the severe action of the frost, all tend to cause slipping in nearly every (clay) cutting on the line. In some instances the slopes have run so much, that the original slopes of one and a half to one, are now reduced to three and four to one. The quantity of excavation to be removed, amounting to 23,781 cubic yards on the Main Line, and 10,913 cubic yards on the Windsor Branch, or a total of 34,694 cubic yards, is all that will be sufficient to restore the cuttings to the specified width of twenty-two feet, and to construct side ditches. Its being excavated will not prevent future slips, but if carefully done may render them less injurious in their effects.

Mention has been made of small streams of water finding their way down the slopes into the cuttings. Where it is not possible to divert them, proper stone channels should be built, and the sides of the drains in the cuttings protected from wash by a small quantity of rip-rap. Above the platform at Fletcher's Station, a stream of water falls into the cutting, runs under the platform, and thence between the main line and siding for a distance, where it crosses the siding by means of a wooden trunk, and is thus led away. On examination it was found that this stream had originally passed through a wooden drain under the road leading into the station yard, and thence by an open ditch to the lowest side of the line. The drain under the road, however, has become stopped up; the upper end has been cut away, and the stream allowed to find its way into the cutting.

In many instances the embankments in siding ground act as dams to collect and retain the water from the rising ground above, and not being provided with proper means of carrying it away, the water must filtrate through the embankment, and by capillary action saturate it completely, causing the ballast to become dirty and unsuitable, decay in the sleepers, disarrangement of the track, and increased wear and tear. Too much care and attention cannot be paid in obtaining good, ample, and sufficient drainage. Water is the greatest enemy a railway has to contend against, and in becoming free from its effects, whether as rain, snow, or ice, a road at once rises above the standard of American railways generally, both as regards construction, a diminution in wear and tear, and in the expenses of operating the same. Messrs. Colburn and Holley, two American Engineers, who have made a thorough examination of the European Railway system, state in their work on "The Permanent Way, &c., of European Railways," on the subject of

"Drainage":—"To no detail of the road-bed is more attention paid by English and French Engineers, than to those necessary for the removal of water. This is the great destroying element in all earthy structures. The history of all failures of earthworks shows the disasters consequent upon inadequate *drainage*; and, it may be added, a large part of the continual heavy expense of maintenance of our lines can be traced directly to the same source."

"The action and effects of water, although daily exhibited, may be briefly recapitulated":—

"Water, running on the surface, dissolves and washes the earth, soaking the road-bed and choking the ditches; when soaked, the road-bed loses its firmness, and the ballast sinks irregularly. This displaces the track, thus increasing the resistance and adding greatly to the wear and tear both of track and machinery. Where the ballast sinks, many of the sleepers will be left clear and hanging by the rails. These, on the passage of a train, deflect deeply, thus opposing a heavy grade against the wheels. This is proved by the oozing of mud from under the ends of the sleepers in wet weather, and the dissipation of clouds of dust in dry seasons."

"Water, standing in contiguity, is equally injurious. No matter what may be the height of an embankment of loam, sand, or clay, water, if in reach of it, will rise to the top, being carried by absorption, and will produce all the effects just stated. Water not only destroys the cohesion of the material of the road-bed, but swells its bulk. It is sure to displace the best laid track."

"In cuttings, water will thus convert the whole road-bed into mud. Whenever this dries in the sun it is partly dissipated in dust, while clayey soils will shrink and crack in every direction. The slopes, already worn into gullies by the action of running water, will also fill with dust."

"On the other hand, frost setting in just after a heavy rain, or while the road-bed is otherwise soaked from standing water, will heave the track irregularly, and hold it there as rigid as rock. No condition can be worse. When, in the following spring, the frost is coming out of the ground, and the road-bed is washed by the thaws from adjacent lands, the earthwork reaches its complete stage of saturation. Stratified soils will thus slip if ever."

"In an economical view, the damage occasioned by water is far greater than the utmost cost of its removal. It does not need extreme conditions to produce the effects stated. Partial saturation, occasional washing of banks, and moderate rigidity in winter, are all sufficient to disturb the tracks, although perhaps not to an inconvenient extent; and in such case the iron is more or less bruised, the fastenings strained, the chairs broken, the ties rotted, the resistance, and thereby the consumption of fuel increased, and the whole wear and tear enhanced."

The practice at present pursued in clearing out cuttings, does not remove a sufficient quantity of stuff to free the ballast, nor provide sufficient room for proper ditches. The excavation should be carried down to such a depth and width as to have the ditches altogether below the formation level of the cutting, and afford a free escape for drainage.

The manner in which stuff excavated from the cuttings has been deposited, and left on many of the embankments, is to be deprecated. In many instances it has been shovelled or tipped off the trolleys or cars, and left in heaps, forming an impervious dam on either side of the ballast, and thus preventing the escape of water. Where it has been levelled down, it has only been done so down to a level with the top, and, in some instances, with the bottom of the sleepers. It should be borne in mind that the top of the embankments, or formation level, is (where there is a full quantity of ballast) *two feet* below the top of the rail, and that any earth over that height is of no use, and is highly injurious to the ballast and maintenance of the track.

The practice of depositing slurry and excavated material, on the slopes of embankments, which, though somewhat narrower than the specified width of eighteen feet, are well grassed over, should be prevented, unless arrangements are made to widen them to a full width throughout.

In widening high embankments, the practice of "benching," and loosening the old hard surface of the slopes before any material is deposited upon them, should

be adopted. By these means the earth may be retained where actually required, become assimilated with the body of the bank, and not washed down to the foot of the slope during the first shower. The practice of piling wood on top of and in the deep cuttings on the line, especially on the Windsor Branch, should if possible, be prevented. The appearance of danger, if not danger itself, may therefore be avoided.

CULVERTS.

The Culverts are, in the aggregate, in a fair condition. Some were found which will require repairs and rebuilding, and others, which, though not needing repairs at present, will need attention. The principal expense will be for new culverts to replace the temporary expedients that have been alluded to; also for opening and cleaning out many of the drains leading to and from the present structures.

The covered drain carrying the stream from Lily Lake down cutting No. 5 may be deemed a culvert. It is 1950 feet in length and from three to three and a half feet in depth. The walls are of dry rubble, and are built at such a width apart, as to bring the rails directly over them, and thus sustain the passing load. It is covered with hemlock plank three inches thick, and on this a layer of ballast. On examination the plank covering was found to be very much decayed, and has broken down in places. To re-cover this drain will necessitate the shifting of all the ballast, and it may be of the track itself. A careful inspection of this drain should be made at stated periods, and reports made to the Commissioner's office.

Owing to a slip in the slope of the embankment covering the arch culvert near Stewiacke Station, a piece of coping has been forced off, and the rest displaced. The apron of the culvert is covered with earth. The pressure of the banks behind the eastern wing on the north end, and the western wing on the south side, is gradually forcing them outwards; they will require watching. A small run, (carrying the drainage from the cutting to the westward), down the slope of the embankment, vents itself into the stream at the end of the western wing wall on the south end; the wash has carried away the pillar entirely. The drainage from the cutting may be carried across the track by a proper culvert, and led directly to the river. The river slope of the embankment should be evenly trimmed and sodded, to prevent, if possible, a recurrence of slipping and filling up of the channel.

The pillars to the wing walls of the arch culverts on embankments Nos. 8 and 12, Section No. 10, shows signs of separation from the main walls, not having been bonded into them at the time of construction.

The culverts on the Windsor Branch are, with allowance for ordinary wear and tear they are subject to, in fair order, and require but a small outlay. A few new ones will be needed to replace temporary structures before alluded to.

CATTLE GUARDS AND ROAD CROSSINGS.

The cattle guards at the public road crossings are of three kinds—stone, wooden, and a combination of wood and iron castings of a peculiar shape.

A few of the guards built of stone, will require repairs, the walls in some instances having given way. The hemlock stringers over those between Richmond and Bedford require immediate renewal. The wooden guards are in good order. The combination guards are very much out of repair, owing to the decay of the plank platform and the consequent loosening of the castings. At present they are unserviceable, and should be replaced by others of stone or wood. A gate should be placed across the siding at Bedford leading to the Mill, in lieu of the present guard.

Many of the plank crossings are in a dilapidated state, and should be replanked. The same remarks will apply to the cattle guards on the Windsor Branch—merely stating that there are not any at all at the public road at Mount Uniacke Station. A small bridge built over the stream crossing the north approach of the Ponhook road, has been allowed to fall sadly out of repair. The masonry in the walls of the abutment and pier is being gradually washed away by the action of the stream; and the planking (which is covered with a very heavy

layer of earth) is broken down at the sides in consequence. An estimate has been made for the repairs required, in the event of the Department being responsible for its maintenance. The stringers over the girders at this road are hemlock, and will require replacing by those of pine. Fresh planking for crossings will be required in some instances.

BRIDGES.

Between Richmond and Bedford, there is but one small bridge—at the Tannery—which is in good order.

The bridge across the Sackville River at Bedford will require watchfulness and attention. The southern side of the second pier from the west end of the bridge, is cracked. The crack has evidently been pointed up, but has opened again, thus showing that failure is still going on. The northern side of the east pier shows still worse signs of failure, the joints of the masonry having opened considerably, and some of the block in course show fractures. These cracks should be carefully cleaned out and well "pointed" with good cement. An inspection should be made at stated periods and the then existing state of the bridge reported to the Commissioner's office. Symptoms of further failure can easily be detected by the cracking of the pointing. The superstructure is in good order. The handrailing will, however, require painting.

The wing walls of the bridge over the Dartmouth road are spreading outwards, and cracks show themselves in the masonry. As this is caused by an inward pressure, it may be found necessary to remove a portion of the filling, in case it appears that spreading still goes on. The cracks should be pointed, and inspected at the same time as the Sackville Bridge. The large quantity of earth resting on this bridge should be removed, and proper sills placed under the track.

The bridge carrying the Cobeguid road over the railway, will require a few of the joints of the masonry to be raked out and repointed. One of the parapets on the north abutment is somewhat displaced, and will require setting back.

The plank covering on the Beaver Bank Brook bridge is entirely decayed, and will require renewal; otherwise the bridge is in good order.

The Rawdon River bridge, the girder bridge, and the public road bridge near Fletcher's Station, are in good order.

A small bridge at the Grand Lake, near Nichols', will require an additional quantity of rip-rap to make up the deficiency at the eastern abutment.

The wing retaining walls to Hall's occupation bridge appear, from the character of the work, the quality of the stone used, and the want of bond with the main walls, to have been added after the final completion of this bridge. One of them has tumbled down, and the others do not appear very sound. The masonry of the main walls requires pointing. The superstructure is sound and good.

In the upper Shubenacadie bridge, cracks were observed in the face of the western abutment; and in both ends of the eastern pier, extending from the water line to the top. These will require pointing and inspection as before recommended.

In both the abutments and piers, portions of the masonry which abut against the sides of the girders, are giving away, and must eventually fall. The cause of this is their proximity to the girders, and being subject to more or less vibration with them during the passing of trains; the acute angle at which the points have been cut to suit the skew of the bridge, and the failure of the mortar, giving them but little bearing. Their loss will not detract from the strength of the bridge, but will materially destroy its appearance, and admit water into the hearting of the piers and abutments. An estimate has been made for repairs. All the joints of the masonry will require to be raked out and carefully pointed; superstructure good.

Between Enfield and Elmsdale stations, there are four occupation bridges, and one for the passage of a stream; and are all of the same style, class of masonry, and superstructure, as that described over Hall's road. The wing retaining walls are standing pretty well. The main walls require pointing; superstructures good.

The bridge across the Nine Mile River is a composite structure, having stone abutments with land spans on pile-bents, on either side of the river, stone piers across the water-way and at the extreme eastern end. The masonry in both the

abutments, and in all the piers, save one, is sound, and only requires pointing, after having had a quantity of moss raked out of the joints. The foundation course of the second pier from the western end of the bridge, has been exposed by the force of the current; for during a freshet the full force of the stream must be exerted against this pier, owing to its position in the river. Immediate action should be taken to protect it, by carefully building a quantity of sound, heavy stone, around the exposed part, and extending the same protection up stream until it joins the bank of the river, filling in behind with loose rock. A settlement in the track has taken place over the third pile bent from the west, evidently caused by a failure in the piles. Thickness pieces must be placed on top of the rail sill and under the rail, to bring it up to a right level.

This bridge has been tested by passing a locomotive over it at different rates of speed. Notwithstanding the extra struts which have been placed under it since its construction to counteract excessive deflection, a large amount of deflection still takes place during the passage of a locomotive at a high rate of speed. Its proximity to Elmsdale station requires the trains to pass over it at a slow rate, otherwise it would be highly advisable to adopt it as a rule to be strictly observed.

The channel of the river should be kept perfectly clear, and any accumulation of drift stuff against the piers avoided.

A small bridge in embankment No. 2, section No. 8, and the bridge at Barney's Brook, will require pointing.

Between Barney's Brook, and the Blackburn pile bridges, there are three small bridges, two of which, with the exception of requiring pointing, are in good order. The foundation courses of the third (peg 637, embankment No. 20) are exposed, the earth having been scoured away by the action of the stream. This should be protected by filling in between the abutments with stone, hand set. The joints of the masonry will need raking out and pointing.

The masonry of the pile bridge (peg 690, embankment No. 21) will need pointing. The piles and superstructure are still sound. This bridge has been tested, and an amount of deflection found, which must be expected from bridges constructed in the manner this is.

In the bridge at peg 700, a much larger amount of deflection in the stringers was observed, especially so in the spans at the eastern end. The piles in the eighth bent from the western end, have sunk, (the southern pile under the track more than the others,) so much so, that the walings have been broken, and a depression in the track has taken place. Inclined struts from the bottom of the neighboring piles, notched into the head of the damaged one, with new walings at the top and bottom of the bent, will be necessary for repairing and strengthening this point. A pile in the ninth bent will also require the same style of support, and one pair of new walings. The depression in the track may be remedied by packing-pieces placed under the rail.

The masonry in the small bridges between the pile bridges and Shubenacadie, will require pointing. The stringers on the bridge at Andrews' should be raised to admit of more waterway; this can easily be done, as the track is placed on sleepers, which rest directly on the stringers.

The bridge across the public road at Shubenacadie is in one span of twenty-five feet, with stone abutments and wooden superstructure. A crack extends from the ground line to the top of the face wall of the west abutment, and the north wing shows signs of spreading. A portion of the masonry will require pointing, and the cracks should be carefully cleaned out and pointed up, and the same precautions used as recommended for the Sackville bridge. The superstructure is very light for the span, and should be further strengthened by placing struts under it.

The girder bridge across the Shubenacadie is in good order.

The masonry in the small bridges, three in number, between Shubenacadie and Stewiacke, requires fresh pointing. The superstructures are in good order.

The west abutment of the Stewiacke bridge shows evident signs of failure. It has sunk bodily, with an inclination to the rear, and laterally down stream, destroying the alignment, and causing a serious depression in the track. The east abutment and the pier do not show any signs of settlement.

The question of repairs to this bridge is one of importance, for besides the

possibility of having to rebuild the whole of the abutment (in case settlement is still going on) the iron girders are now suffering severe injury.

The girders are continuous over the whole length of the bridge, and with the settlement of the abutment, the portion over the western span sinks, and partakes of the lateral movement also. Owing to these causes, an undue and severe strain is brought upon them at the western edge of the pier; one that they were never calculated nor constructed to withstand. The safety of the girders imperatively demands that instant attention be paid to their present state. I should therefore recommend that they be lifted and replaced to their original alignment, and thus relieved.

At present the girders can be moved on the girder seat, which will necessitate the taking down of a portion of the masonry, and rebuilding it again; but if settlement still continues it will then become necessary to rebuild the abutment.

The wooden bridge at Polly Bog is standing well. The whole of the small bridges between Polly Bog and Truro, will require pointing, otherwise they are in good order.

A small bridge on the Windsor branch, near the Junction, will want pointing, and a new covering of plank. Slight repairs to the masonry in bridge at peg 315, are needed. The stringers on the bridge at peg 545 are double, and do not set fair on one another. Owing to this a large amount of deflection takes place in the upper stringers during the passage of the trains. Proper packing should be inserted between them, and the stones at present there removed.

The bridge across the Sackville will require a quantity of pointing, otherwise it is in good order.

Between the Sackville and pile bridges, there are two bridges of small spans, which will not require any outlay.

The pile bridge is composed of framed wooden abutments, resting on rock foundations, built up for that purpose, and pile bents, in spans of twenty feet each. The foundation is soft and peaty, and not of such a nature as to afford in any great degree, steadiness or lateral support to the piles. On examination it was found that the stone packing under the face of the west abutment has disappeared. The stringers on the fourth bent from the eastern end of the bridge have been wedged up on top of the piles and walings; some of the wedges are gone. The ninth bent from the same end has settled bodily down, and the track in consequence has been packed up to its proper level.

The bridge has been tested by passing a locomotive, fully wooded and watered, over it at different rates of speed. Whilst moving at a rate of three miles an hour, no amount of depression was perceptible, but at twenty-five miles an hour the stringers exhibited a large amount of deflection. Over the fourth bent the whole superstructure settled bodily down, springing back again after being relieved of the load; and the movement of the west abutment showed plainly the want of the packing under its front. A large amount of lateral motion was also observed. The yielding nature of the foundation, the want of corbels under the centre stringers to give stiffness and support where most required, and the fact that the stringers are spliced in every span, all tend to make this bridge very flexible, and not at all calculated to stand the passage of trains at high rates of speed.

The masonry in the bridge in embankment No. 16, section No. 3, will require pointing. The superstructure is of wood, and in good order.

The Jordan bridge, and the small bridges between it and Big Bog Brook bridge, are in good order.

The plinth of the southern pier of the Big Bog Brook bridge, is slightly cracked. This should be pointed up and inspected at stated periods. With this exception the masonry is in good condition. The planking is entirely decayed, and requires renewal; and in doing so, the space between the rail-sills should be left entirely open, and between the rail-sills and hand-railing the planks placed one inch apart. The decay of the flooring of this and the St. Croix bridge may be attributed to the coating of gravel which is now spread on them. A number of the cross bruces in the hand-railing are displaced, and will require renewal. An amount has been placed in the estimate for pointing this hand-railing.

The flooring on the St. Croix bridge will require renewal for the reasons stated above. The masonry and superstructure are good.

Between the St. Croix and Windsor there are a number of small bridges, all in a fair state of repair. The wing retaining walls, which have apparently been added to the main structure at a later date, are built of a stone which is much affected by exposure, and is rapidly disintegrating under the influence of the weather.

The wing walls of the Winkworth road bridge will require pointing. One of the caps, and a portion of the ashlar in one of the pillars, have been displaced and fallen into the cutting.

The pointing required on the different bridges ought to be done this season, and before the frost sets in. The joints should be carefully raked out, and then filled with cement mixed to a proper consistency.

Preparations should be made for gradually filling up the embankment at the pile bridges on the Main and Branch. They cannot be considered as permanent structures, neither is there any need for the large openings in the banks in which they are placed. The question of renewing the wooden superstructure of very many of the bridges, is one of importance. The average life of a wooden bridge is given at fourteen years, and as many of the bridges on the line have been built for six, seven, and eight years, respectively, but a few years can elapse before re-construction must take place. The use of hemlock for stringers, as on many of the small bridges on the Windsor branch, is to be deprecated; pine stringers should be substituted with as little delay as possible.

PERMANENT WAY.

The state of the track on the Main line is not at all good, whilst that on the Windsor branch is somewhat worse. The want of care and attention in keeping up the joints is plainly discernible, and though the general alignment of the road has been, with but few instances kept, crooks and bends appear in the rails themselves. These defects are the cause of an increased wear and tear to the rolling stock and the track itself, lateral and oscillatory motion in trains whilst in motion, and an increase in the resistance to be overcome by the locomotive.

Many of the rails in the Station yards at Richmond and Windsor show signs of the severe usage they must undergo, owing to the sharpness of the curves, and being subject to such a constant shunting and passing of trains and engines. From Richmond to the Junction, especially on the curved portions of the road around the Basin, a large amount of wear and tear was noticed; and in many of the rock cuttings, the want of a full amount of ballast shows itself in the state of the track. It will be just however to state, that this portion of the track being common to both the Main and Branch lines, is subject to double duty. From the Junction to Truro, the rails, with exceptions here and there, are still sound and serviceable. It is to be regretted that the rails on the curved portions of the road, have never been bent to suit the different curves in which they are laid; they now form chords of an arc, instead of the arc itself, and so materially add to the resistance offered to the passing train.

Between the Junction and Windsor, the more ample quantity of ballast should have been taken advantage of, in maintaining the track in better order than it is. The length and steepness of many of the grades on this portion of the road require the track to be kept in as perfect condition as possible; but such has not been the case.

Many of the rails between Richmond and the Junction, and Newport and Windsor, have been turned.

In very many places the "shims" used during the winter in raising and packing the rail on top of the sleepers, still remain. It is customary to remove these as early in the spring as possible, and pack the sleeper up to its full bearing under the rail with ballast. Their presence at this season of the year betrays negligence.

One thousand two hundred and sixty-two broken chairs were found on the Main line, and six hundred and thirty on the Windsor branch. They will require replacing with as little delay as possible.

The imported elm wedges as they gradually wear out, are being replaced by others made of haematac. This wood is too soft to stand the driving required to keep them tightened up, and in a very little while they become useless. The great expense of the imported wedges may preclude the idea of obtaining a further supply, an efficient substitute might however be found, in those made of the elm, oak, or beech of this Province, sound and free from sap and shukes, and after being well seasoned, boiled for a period in coal tar. This will have a tendency to harden and preserve the wood, and be the means of retaining them more firmly in the chairs. The experiment can be tried at a very small expense.

A number of *intermediate* chairs are used in lieu of the proper joint chairs, between Enfield and Elmsdale. As they were never intended to answer for this purpose, they should be removed at once.

On the Main line twenty-one thousand one hundred and sixty-nine, and on the Windsor branch fourteen thousand three hundred and seventy-five, or a total of thirty-five thousand five hundred and forty-four (35,544) broken, decayed, and un-serviceable sleepers, will require to be replaced. Many sleepers were found split lengthwise, owing to their having been packed only under the edges, instead of under the full breadth, with ballast; no support was thus afforded directly under the chair, and in consequence it, by the weight of passing loads, has split the sleeper, causing it to assume a concave surface on top. The quantity of sleepers to be replaced may appear large, but were it possible to see all parts of each sleeper now in the road, the number would be still further increased; for it was particularly noticed, where repair-gangs were inserting new sleepers, and the ballast had been cleaned away to admit of a more thorough examination, that sleepers, which on their top surface had all the appearance of soundness, were entirely decayed and un-serviceable underneath.

The life of sleepers is given as seven years, where they are laid down in a natural state, and the percentage of renewals each year amounts to 14.28 per cent. Assuming the total number of sleepers now in use in the road to be 206,000, the quantity to be replaced annually, taking the life at seven years, will be 29,417. The quantity to be replaced being 35,554, the percentage becomes equal to 17.258 per cent; and at this rate the whole of the sleepers must be entirely renewed every five years and ten months. This either proves that the wood of which the sleepers are made is not durable, or that decay and un-serviceableness is hastened and facilitated by the want of drainage and proper care in packing and boxing, and in instances from an insufficient quantity of ballast.

A more satisfactory article of sleepers may be obtained from hemlock, than is now being supplied, by only accepting those sawn or hewn from straight, green, thrifty trees, just large enough to make one sleeper. This will ensure a greater amount of soundness and strength, than in those which are sawed out of very large trees, and cannot be otherwise than shaky and deficient in strength. The economy of obtaining haematac and pine sleepers, or even those of cedar, may be seriously considered.

The practice of driving the spikes, at present in use, without first boring the sleeper with a proper sized augur to receive them, is decidedly unsatisfactory. A number of new sleepers were found to be split and much damaged from this cause.

The road from Richmond to the Junction will require an additional quantity of ballast to make up for depreciation and loss. The insertion of new sleepers, unless care is taken in doing so, has a tendency to raise the track, and as a consequence reduces the quantity of ballast requisite for packing and boxing. The ballast has also been destroyed in many of the clay cuttings and in embankments, by the slips that have occurred in the one case, and by carelessness in depositing the excavated material in the other. Between the Junction and Elmsdale, ballast is much needed, especially through the rock cuttings. As the facilities for procuring ballast between Elmsdale and Truro, are better, a greater quantity and of a better quality has been used. A sufficient quantity to fully box the road and replace injured portions will be required.

Additions to the ballast on the Windsor Branch will be required through many of the rock cuttings on either side of Mount Uniacke; where it has been destroyed

by slips in the clay cuttings; or reduced in quantity by lifting the track. The Windsor ballast is of an excellent quality, and the ballast pit is in such a position, that any quantity may be obtained with every facility.

Where the ballast has remained undisturbed for some time, it has grown over with grass, and in instances, small alder bushes are growing up in it between the rails. This all requires cleaning and loosening.

FENCING.

The fencing along the main line has suffered very materially from the action of frost, the slipping of cuttings, and by fire. In the first case, the posts do not appear to have been sunken into the ground the specified depth of forty-two inches, or below the action of the frost; but have been found in many instances, (where the fence was prostrate), to be sharpened to a point and to have been inserted from eighteen inches to two feet into the ground. By the action of the frost, a very large portion has been raised from the ground, so much so, as to permit the passage of the smaller class of animals freely under it; and in some instances to cause it to become much distorted, and in places prostrate. Where slips in cuttings have extended back to the fence, the posts have been undermined, and exposed, and failure has taken place. The fencing has suffered more from fire on the Windsor Branch than on the Main Line. Repairs have been made but at best they are only temporary. Where extensive repairs are to be made, a framed post, sill and brace or T will give much more satisfactory results than a post sunk in the ground, though entailing a very slight increase in the expense. This result may be seen, in those in use on the Windsor Branch.

The pole fencing between Gasparanx Lake and cutting No. 13, section No. 7, is of a very temporary description, and must, ere long, give place to a more substantial structure.

Portions of the fencing have been entirely removed at the Tannery beyond Richmond, at Malcom's and at Smith's Brick works, and the premises of the railway made common use of. At the Tannery, the fence enclosing that establishment joins into the railway fence on either side, and may be deemed satisfactory. At Malcom and Smith's brick works, there are not any enclosing fences, and in the case of the last, use is made of the railway premises as a road to cart clay from the pit to the works, and several portions of the fence at the point where the clay is excavated, have been removed. Many of the gates at the occupation roads are very much distorted by the frost and will require repairing. A number were found open.

The board fence between the Junction and Windsor has suffered severely from fires; and has been replaced at those points by temporary fences of poles. A large portion of the fence has been built with framed T's, and has stood well—the portion built with posts is much distorted and in places overthrown. The pole fencing is of a temporary description. About seven miles on either side of the line between Mount Uniacke and Newport, is unfenced.

STATIONS.

With the exception of the engine houses at Richmond and Truro, the buildings at the different stations on the main line are in fair order, wanting but little else in the way of repairs other than is called for by the ordinary wear and tear, which buildings of that class are subject to.

The passenger house, store house, and one or two small buildings in the yard at Richmond, should have a coat of whitewash. The roof of the store house should be painted at once. The large store house on the wharf, now empty and unused, should have the broken glass replaced, and be securely locked up.

The engine house has received damage from two large boulders, containing nearly a cubic yard each, which have slipped from the top of the excavation, and fallen against the wall of the building. One boulder has struck a granite window sill, broken it in two—forced it into the building, carrying with it the window frame, and has also pushed in a portion of the brickwork below the window. The other boulder has struck the wall to the westward of the damaged window, and

has driven in a portion of the brickwork, though not entirely. In both cases a part of the cement coating has been destroyed. The brick drain around the northern and western sides of the building is completely choked up with the wash and detritus from the bank, thus preventing the free escape of water.

To remedy this defect and prevent any future injury to the building by falling stones or boulders, the earth should be excavated from off the rock, and back for the distance of four feet from the face, sloped back with a slope of one and a half to one. By this means a shelf will formed, that will offer the means of retaining any wash or detritus. All loose rock and boulders lying near the top of the excavation should also be removed.

The symmetry of the dome roof is destroyed by the settlement of four of the "hip pieces," and by others having assumed a convex form. The hip pieces that have given way, have settled at the points where they "butt" or join, and are much depressed.

As this failure has never been noticed by any of the railway employees, until pointed out at the time of the inspection, it is not known at what time, the settlement took place, whether it has been gradual or not, whether the set has become permanent, or that settlement is still going on.

On reference to the specification attached to the contract for the construction of this building, it may be found specified,—“The framing of the dome to be executed with the greatest care, the purlins to be tenoned into the hip pieces, so that the end pressure of the purlins shall be continuous all round. To strengthen these, pieces will be carefully secured across the angles of the purlins and filling in pieces as shewn, so that the inside of the dome will form on its plan a polygon of forty sides. These pieces will be 3 inches and 2 inches thick, and will vary in depth from 13 inches to 7 inches, according to depth of panel. It is absolutely necessary in framing this roof, that every joint fits with the utmost precision.” These “pieces” have been omitted in the construction of the dome, as it was deemed impossible to insert them in the manner specified. It is to be regretted that some other plan had not been adopted in lieu of the one specified; for it is very evident that they were fully intended for the purpose of stiffening and strengthening the dome. The necessary repairs requisite to this building should be proceeded with at once, especially in strengthening the dome.

The “capping pieces,” or the beams which rest directly on the top of the iron columns, and support the ends of the trussed girders of the flat roof, shew a considerable amount of deflection. This may be permanent, yet periodical examinations should be made, to ascertain if it is so, or not. If not, further strengthening and support will be requisite.

A truss rod to one of the girders of the flat roof is broken, and requires repairing and replacing.

The position of the forges at present erected, and in use in this building, is to be deprecated. As the building was never constructed to answer as a smithy, it will either be advisable to erect a suitable building for that purpose, and remove the forges into it, or the portion of the building now occupied by them should be closely boarded off, and proper smoke flues and ventilators provided.

The roof of the engine house at Truro is tinned, and leaks badly, especially on the southern side. It will be advisable to remove the tin entirely, and substitute shingles, giving them a good coating of metallic paint.

The traffic at Enfield Station demands a more suitable and secure building for the comfort of passengers and storage of freight, than the one at present in use.

A small amount will be requisite to make the building at Rocky Lake fully answer the purpose of a Station, by a ticket office, freight room, &c.

The expenditure required for repairs at the other Stations will be for replacing glass, locks, bolts, plastering, singling, water pipes, corner posts on building to protect them from damage by loaded teams, and for renewals of platforms.

The Station buildings at Beaver Bank and Newport will only require a small expenditure to replace wear and tear. At Mount Uniacke the foundation under the front of the station house has disappeared, and the building has settled on that side in consequence. Attempts have been made to secure it by placing sleepers under it, but without avail. A proper stone foundation is required, and the build-

ing restored to its proper level. The platform in front is gradually inclining towards the track, and must eventually be re-built. Owing to this movement the scales which are inserted in the platform are subject to more or less disturbance and disarrangement.

The buildings composing the terminal station at Windsor are in good order. Some of the tie-beams in the principals of the main roof of the passenger house, show signs of spreading at the splices, and one of the struts has fallen down. The roof of the wings is covered with tin, and complaints were made that a large amount of leakage took place during rain, especially at the junction with the main building. On examination it was found that only from one to one and a half inches of the tinning is turned up against the main building to act as a flashing. This is too little, and may be remedied by the insertion of a strip of tin of sufficient width, and placed in a proper manner. The tin roofs will require a coat of paint, as they show signs of rust.

The doors at either end of the building have lately been put in order, and the building can now be securely closed.

It may not be inappropriate here to remark that a check should be placed at once on the crowd of boys who frequent the station house at Windsor on the arrival of the trains, for the purpose of obtaining the portorage of passengers' luggage. It is annoying in the extreme, and the same rule which is so strictly enforced at Richmond with regard to hackmen, may be most satisfactorily applied at Windsor, to the benefit of the travelling public, and the comfort of those engaged in the duties of the road at that station.

The wharves and freight houses at Richmond and Windsor are in good order.

The only watering stations in constant use are those at Richmond, the Junction, and Polly Bog, on the Main line, and at Stillwater on the Windsor branch. The tank at Truro has been put in order, and is now kept filled. Those at Elmsdale, Mount Uniacke, and Coone's tank, are not now in use. There is a tank house at Shubenacadie, but no tank. At the Junction there is an extra tank and tank house, which, owing to a failure in the supply pipe, is not used. The pumping at this station is done by steam, at the others by hand. If Polly Bog is to be retained as a permanent watering station, other and more effectual means should be adopted for arresting and retaining the water of the brook, and rendering it secure from the effects of ice or freshets. The old tank and house at the bridge near this station should be taken down, or it must eventually fall.

The woodsheds on the line are in good order, and adapted for the service intended. The doors have been taken off those at Windsor and at the Junction, and lie piled up on the ground; they would have been less liable to damage if they had been placed under cover.

The amount required to replace and restore the road into a good working condition may appear large, but the fact must be taken into consideration that no large sum has been expended at any one time, with this view, since its final completion. The slips in cuttings that have regularly ensued each successive spring, the time spent in their removal, which otherwise should have been occupied in repairs to the track, the loss and depreciation of the ballast, the want of proper drainage, have all tended to reduce the standard of the road, and necessitates a seemingly large expenditure to place it in as good order and working condition as when first completed.

INSPECTION OF RAILWAY.

15

ESTIMATE OF AMOUNT REQUIRED FOR REPAIRS, RENEWALS, &c., ON THE MAIN LINE.

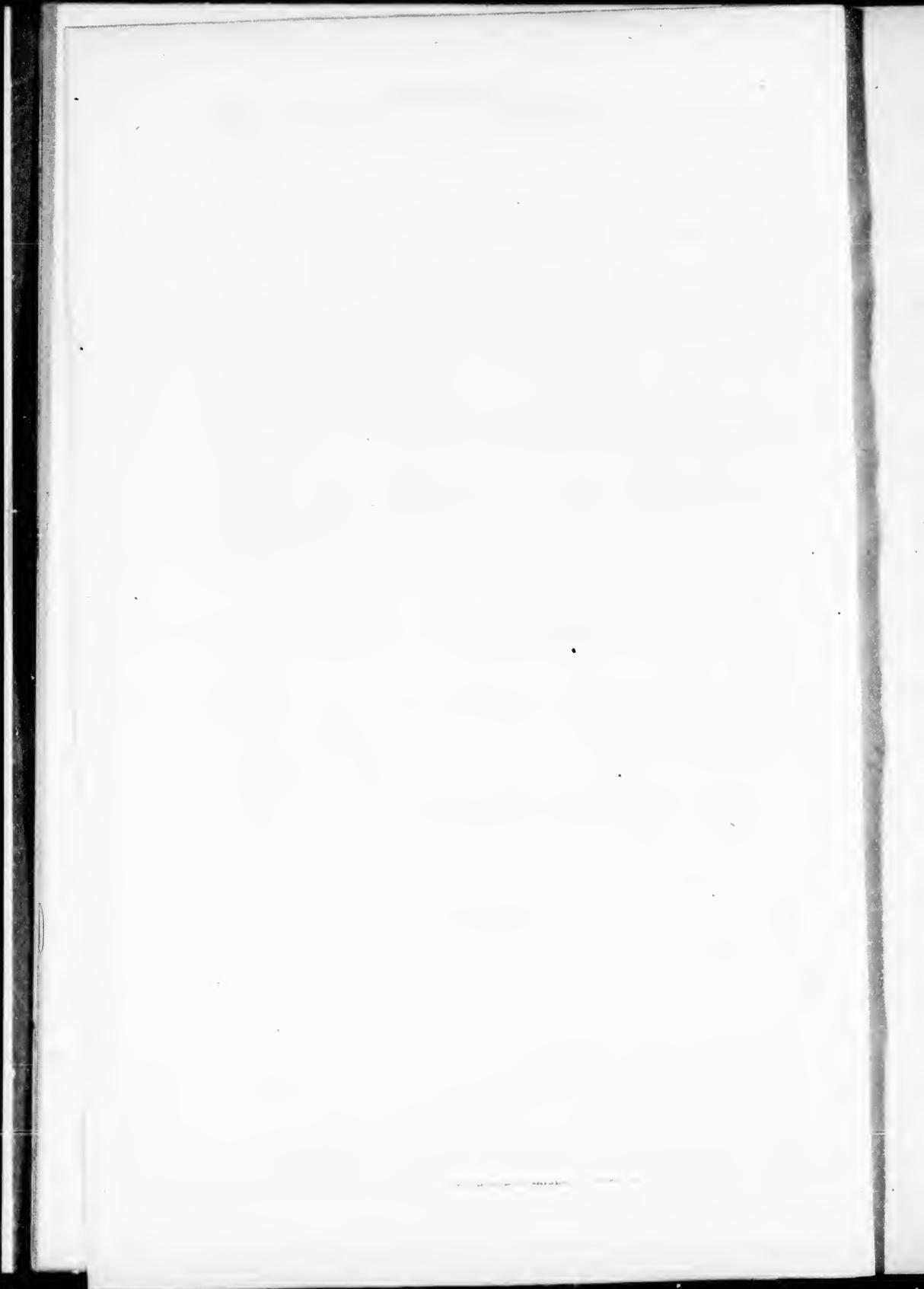
23,781	Cubic yards earth excavation from cuttings,	\$0 30	\$7,134 30
3,487	“ “ “ embankments,	0 10	348 70
8,373	“ raising and widening “	0 20	1,674 60
24,815	Lineal yards cleaning ditches in cuttings,	0 06½	1,612 97
1,006	“ catchwater drains,	0 13	130 78
1,688	Slope drains,	0 40	675 20
45,450	Cubic yards ballast,	0 62½	28,406 25
21,169	No. sleepers,	0 35	7,409 15
1,262	No. chairs = 31,756 lbs. at per 2,000 lbs.	35 00	555 73
	Repairs, &c., to culverts,		1,053 36
	Ditto. to cattle guards, &c.,		741 80
	Ditto. to bridges,		1,518 17
	Ditto. to fencing,		1,141 37
	Ditto. to stations,		2,233 80
	Retaining wall, Bedford cutting,		2,545 95
	Sea do. Waterloo Cove embankment,		488 00
	Covering drain, Lily Lake cutting,		585 00
	Miscellaneous,		48 80
	Superintendence, &c., &c., 10 per cent,		5,830 39
			<u>\$64,134 32</u>

ESTIMATE OF AMOUNT REQUIRED FOR REPAIRS, RENEWALS, &c., &c., ON THE WINDSOR BRANCH.

10,913	Cubic yards earth excavations from cuttings, at	\$0 30	\$3,273 90
222	“ rock to support embankment,	1 00	222 00
9,112	Lin. yards clearing ditches in cuttings,	0 06½	592 28
1,000	“ slope drains,	0 40	400 00
23,812	Cubic yards ballast,	0 62½	14,882 50
14,375	No. sleepers,	0 35	5,031 25
629	“ chairs, = 15,830 lbs. at per 2000 lbs.	35 00	277 02
	Repairs, &c. to culverts,		147 50
	Ditto. to cattle guards, &c., &c.,		285 77
	Ditto. to bridges,		371 51
	Ditto. to fencing,		435 50
	Ditto. to stations,		338 85
	Superintendence, &c., &c., 10 per cent.		2,625 81
			<u>Total, \$28,883 89</u>
	Amount required for Main Line,		\$64,134 32
	Do. do. for Windsor Branch,		28,883 89
			<u>Total amount, \$93,018 21</u>

In assuming the care and responsibility of making this inspection, I was fully aware of the nature of the duty to be performed; and in the statements made I have been guided by my own judgment and experience, and where questions of cost and expenditure have arisen, I have endeavored to make them with a due regard to economy, and a rigid adherence to the actual requirements of the road.

HENRY F. PERLEY,
Civil Engineer.



REPORT OF INSPECTION OF ROLLING STOCK OF THE NOVA SCOTIA RAILWAY.

Shediac, 29th July, 1863.

SIR,—

In compliance with the request of the Government of Nova Scotia, conveyed to me in a communication from W. H. Keating, Esq., Deputy Secretary, dated the 1st inst., I have, as far as circumstances would permit, examined the "Rolling Stock and Machinery of the Nova Scotia Railway," and have now to submit my report thereon.

In assuming this duty, I fully explained the difficulties attending a proper examination, and the impossibility of arriving at their *real* condition, inasmuch as the machines could not readily be taken apart, and the opportunity of a detailed inspection afforded.

As a result, therefore, of the necessarily cursory character of the examination, I here present an approximate estimate of the cost of repairs requisite to put the rolling stock in good order:

Locomotives Nos. 1, 15, 16 and 17, say	\$2,200 00	
Do. Nos. 2, 3, 4 and 5, say	800 00	
Do. Nos. 9, 13 and 18, say	500 00	
		\$3,500 00
Eight first class cars, say		1,600 00
Eight second class cars, say		1,100 00
Eleven box freight " say		350 00
Nine cattle " say		200 00
Fifty platform " say	\$200 00	
Thirty-four platform " say	1,300 00	
		\$1,500 00
Three snow ploughs,		50 00
Seven pairs driving wheels, and three pairs truck or tender wheels, need new tyres, and one pair trailing wheels need to be repaired,		2,100 00
Total,		\$10,400 00

Locomotives Nos. 6, 7, 8, 10, 11, 12, 14, 19 and 20, are apparently in good order; Nos. 2, 3, 4 and 5, are "Tank Engines," and not being adapted to the traffic, have not, as I learn, been in service for a length of time; No. 16 is now undergoing repairs, but Nos. 1, 15, and 17, not having been in use for some time, are in a bad state from rust and dirt. No. 15 is deficient in a cylinder cock and rod, big end brasses, seven gland nuts, one heater cock, and one brake rod. From No. 17, a cylinder head, a brass casing for the same, main connection and side rod, (broken pieces there) one cross-head slide, sixteen gland nuts, feed and heater pipes, one heater cock, one heater and one gauge cock plug, one tallow cock, and two short connecting pipes of pumps, are gone.

Nos. 9, 13, and 18, are in sufficiently good condition to be used in case of emergency, but need to be repaired directly.

The others, excepting those in good order, are quite unfit for service.

These estimates include the cost of painting and varnishing, which they require.

Of the first class cars, Nos. 4 and 7 are in good order; and of the estimate to make the others so, \$1000 may be set down as necessary to paint and varnish them, of which they stand much in need. Twenty new wheels, one new axle, and sixteen rubber springs are required.

Besides other repairs, the second class cars need thirty-three new wheels, and with the exception of the inside of one, require to be painted and varnished throughout.

Thirteen of the box freight, and ten of cattle cars are in good order; the balance of these, besides other repairs, need twenty-one new wheels.

Thirty-four of the platform cars are in bad order, and need thirty-five new wheels, in addition to being otherwise thoroughly repaired. Fifty others of this class are in what may be termed *fair* condition, but need repairs in planking, brake gear, &c. The remaining cars of this description appear to be in good order.

I deem it necessary to remark, that though many of the cars are considered as in working order, and could not be properly reported otherwise, (for, although worn and in some instances partially decayed, they have not reached that condition where a largo outlay could be justified,) yet some of them are so deteriorated as *soon* to need extensive repairs, particularly in renewals of wheels.

The snow ploughs are in general good order. The estimate is principally for varnishing.

In the engine house at Richmond are eight pairs driving and trailing, and three pairs of truck or tender wheels, the tyres of which are, for the most part, worn out. To replace these, will, I think, cost the amount here named. Besides these I found two pairs of drivers tyred in good order; I also found fifteen pairs of engine, truck, and tender wheels, available for service, but which are partly worn.

I may remark that the leathers in the axlo boxes require to be renewed; and that the platform cars should be cleaned and washed after being in the service of the track. They would thus be better preserved, and their condition more readily seen.

In arriving at the estimates here given, I have been guided (except in so far as the painting is concerned, for the cost of which I am indebted to Mr. Jones, clerk in the Locomotive Department), by the cost of doing such work elsewhere than in your Province. It may however be, that with the facilities which the admirably appointed repair shop attached to the Nova Scotia Railway afford, the estimates will prove large; as a rule, however, estimates seldom exceed the reality, and I have no reason to suppose that they will in the present case.

It is at all times a very difficult matter to arrive at the cost of work to be done, and particularly so in regard to repairs to Railway rolling stock.

Before concluding this report I desire to bear testimony to the very gentlemanly and cheerful manner with which the Locomotive Superintendent, Mr. Johnston, afforded the necessary facilities to prosecute this examination.

I have the honor to be, Sir,

Your obedient servant,

H. A. WHITNEY.

To the Hon. PROVINCIAL SECRETARY }
of Nova Scotia. }

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