Corporate Policies and Procedures				
DEPARTMENT: Public Works and Engineering				**POLICY #:** PW-01
POLICY: Roadway Classification and Design				
DATE CREATED: April 2001	**REVIEW DATE:** February 2023	**REVISION DATE:** May 2023	**COVERAGE:** All County Roads	**PAGE #:** 1 of 11

POLICY STATEMENT

The County of Renfrew (County) believes that a roadway network performs most efficiently and effectively when the roads comprising that network are designed, built and operated to serve their intended purposes.

A classification system designates roads into different groups according to the type of service each group is intended to provide. By grouping roads with similar function and adopting a consistent set of standards, the County of Renfrew can improve transportation planning, road design, road maintenance, and road operations.

Therefore, this Policy dictates hierarchical systems of roadway classification, which shall apply to all roadways in the County Road system for maintenance and design.

POLICY DEFINITIONS

Arterial: Roads whose primary function is to move traffic. Property access is very much a secondary consideration and may be restricted. A distinction may be made between major and minor arterials depending on the volume and nature of the traffic.

Collector: Roads whose function is both traffic movement and property access. A balanced approach between these often conflicting needs is to be taken.

Laneways: Roads typically found in an urban environment providing access to the rear of properties in the town core areas.

Local Roads: Roads whose function is primarily to provide access to property. Traffic movement is very much a secondary consideration.

Rural Roads: Roads passing through largely undeveloped areas and having an open drainage system.

Seasonal Roads: Roads typically of the rural variety which are not maintained during the winter months. In the months during which the roads are accessible they serve the same function as a local road.

Semi-Urban Roads: Roads passing through areas where the degree of development is approaching full development along a substantial portion of its length and may include those portions within an urban municipality or settlement. Such roads generally have an open drainage system but may be approaching or meeting warrants for drainage by closed (piped) systems. For Design Classification purposes, these roads are grouped with Rural Roads.

Significant Weather Event: An approaching or occurring weather hazard with the potential to pose a significant danger to users of the roads within a municipality.

Urban Roads: Roads passing through areas where the degree of development is at or near full development along a substantial portion of its length and shall include those portions of road within an urban municipality or settlement. Such roads generally consist of curbs and gutters adjacent to the travelled portion of the road. Drainage is generally accommodated by a closed (piped) system.

POLICY CONTENT

1.0 MAINTENANCE CLASSIFICATIONS

Ontario Regulation 239/02, Minimum Maintenance Standards for Municipal Highways, under the Municipal Act provides a classification system for roads which must be used in establishing the minimum maintenance standards for all municipal roads.

The County shall annually review the classifications of County Road sections based on Regulation 239/02 and ensure the 'maintenance classification' for each section of road is up to date. The County also has approved 'Roadway Service Standards' which were developed to meet or exceed the requirements of Regulation 239/02. The County shall adhere to the requirements of the County Roadway Service Standards, as amended.

2.0 DESIGN CLASSIFICATIONS

For design and asset management planning purposes, all roads in the County's Road system shall be classified according to their roadside environment and function within the system. In establishing the design classification of County Road sections, the characteristics provided in Table 1 and Table 2 shall be used for rural roadways and urban roadways respectively.

The characteristics for design classifications of County Roads dictated in Table 1 and Table 2 have been adapted from the Transportation Association of Canada (TAC) Geometric Design Manual. Table 1 and Table 2 of this Policy are for establishing the design classification for County Roads only. When undertaking design for County Roads or considering requests which would result in changes to County Roads, the additional restrictions recommended by the TAC Geometric Design Manual for each road classification shall be taken into consideration.

The Design Classifications shall be used to establish consistent minimum design criteria and target lifecycle Best Practices for County Roads.

The Director of Public Works and Engineering, or designate, shall maintain the roadway ongoingly. Major review and updates to this Policy shall be undertaken in conjunction with each rationalization update, which is to be conducted every five years, or as directed by County Council.

Table 1
RURAL ROAD DESIGN CLASSIFICATIONS

TAC Classification (County Design Class)	Freeway (R4)	Arterial (R3)	Collector (R2)	Local (R1)
AADT	≥12,000	<12,000	<5,000	<1,000
Posted Speed (km/h)	50 – 120	50 – 90	40 – 80	40 – 80
Connections	freeways, arterials	freeways, arterials, collectors	arterials, collectors, locals	collectors, locals

Table 2
URBAN ROAD DESIGN CLASSIFICATIONS

TAC Classification (County Design Class)	Freeway / Expressway (U4)	Major Arterial (U4)	Minor Arterial (U3)	Collector (U2)	Local (U1)	Lane (U1)
AADT	>12,000	12,000 – 30,000	<12,000	<5000	<3,000	<500
Posted Speed (km/h)	80 – 110	50 – 80	40 – 80	40 – 80	≤50	≤30

TAC Classification (County Design Class)	Freeway / Expressway (U4)	Major Arterial (U4)	Minor Arterial (U3)	Collector (U2)	Local (U1)	Lane (U1)
Connections	freeways, arterials	freeways, arterials, collectors	freeways, arterials, collectors	arterials, collectors, locals	collectors, locals	locals, lanes

3.0 DESIGN STANDARDS

Design standards for roads relate to safety and the longevity of the road in its current and future uses. The design standards for County Roads have been developed to ensure consistency across all sections in the system and that the design and construction of County Roads is becoming of their purpose, improving safety for all users.

3.1 Minimum and Desired Standards

The design standards for County Roads are based on the design classification of the individual road sections and have been developed incorporating MTO Design Manuals, the TAC Geometric Design Guide for Canadian Roads, and AASHTO Guide to Design of Pavement Structures. The minimum and desired standards considered in the design of County Road sections shall be as per Table 3.

Table 3
Minimum and Desired Design Standards

Standard	Rural		Urban	
	Minimum	Desired	Minimum	Desired
Design Speed (km/h)	R1 – 60 R2-R4 – 80	90	50	60
Lane Width (m)	3.25	3.5	3.25	3.5
Hardened Shoulder / Clearance Width (m)	0.5	R1 and R2 – 1.0 R3 and R4 – 1.5	0.1	1.0
Overall Shoulder Width (m)	1.5	2.0	N/A	N/A
Alignment Adequacy	Fair with Warning Signs	Good	Fair with Warning Signs	Good

Standard	Rural		Urban	
	Minimum	Desired	Minimum	Desired
Right of Way (ROW) Width (m)	20	26	20	26
Surface Composition (mm of HMA)	R1 – 30 R2 – 80 R3 – 120 R4 – 130	R1 – 50 R2 – 100 R3 – 130 R4 – 140	U1 – 50 U2 – 80 U3 – 120 U4 – 130	U1 – 80 U2 – 100 U3 – 130 U4 – 140
Base Composition	150mm Granular 'A' over 350mm Granular 'B' or equivalent sub-base			

*Unless identified otherwise, values apply to all Design Classifications
*HMA = Hot Mix Asphalt

The County's Asset Management Plan does not incorporate growth and typically project costs are based on rehabilitation to similar geometry. As such, though capacity is evaluated during road section evaluations, it is not considered during design of a road section. Where minimum design standards are determined to not being met on a road section, efforts shall be made to have this corrected during design and construction on that road section and budgeted for accordingly.

When determining the design standard to be utilized, the County shall consider a twenty (20) year forecast of growth in traffic based on historical data. A typical value to be utilized is a growth rate of 1.5% unless determined otherwise based on increased growth in certain areas of the County.

3.2 Desired Road Cross-Sections

Included as Appendix A is a drawing illustrating the desired typical cross-sections for each design class. Circumstances may arise where the dimensions shown in the desired cross-sections may not be met; however, the proposed altered cross-section shall provide equivalent or greater strength of the corresponding desired typical cross-section and meet all other minimum design standards for the design classification of the road.

4.0 BEST PRACTICES

Best Practices should be structured with the goal that the right treatment takes place during the correct conditions for the lifecycle of a road in order to ensure that the return on investments in the County Road system is maximized. Achieving the recommended Best Practices outlined in this section may be limited due to the availability of funding or the prioritization of safety improvements. However, these Best Practices shall be used as a guideline when updating the County's Capital Asset Management Plan for Roads.

4.1 Road Improvement Methods

There are various types of improvement methods available in order to improve the condition of roads, and others continue to be developed. County of Renfrew staff shall continue to monitor new improvement methods which come available in the market and may present opportunities for Council consideration to pilot methods which may be considered viable economically and of benefit to County Roads.

The typical improvement methods currently considered on County Roads are provided in Table 4.

Table 4
Available Road Improvement Strategies

Improvement Type	Typical Improvements	General Description
Maintenance	- Crack Sealing; - Patching	Operational maintenance to seal cracks and patch potholes.
Preventative Maintenance	- Microsurfacing; - Surface Treatment Overlay; - Slurry Seal	Capital 'maintenance' to seal the roadway and prolong the service life of asphalt.
Minor Rehabilitation	- HMA Overlay; - Mill and Pave	Capital resurfacing to prolong service life of road overall. Will include drainage improvements.
Major Rehabilitation	- Pulverize and Pave; - Base and Surface	Capital replacement of surface with base rehabilitation and/or

Improvement Type	Typical Improvements	General Description
		stabilization. Will include drainage improvements.
Reconstruction	- Full Reconstruction; - Partial Reconstruction	Replacement of surface, unsuitable base material, and drainage infrastructure.

Each improvement type provides certain benefits when applied at the appropriate time in the lifecycle of a roadway; however, there are also certain restrictions which must be considered when planning road improvements as provided below.

Maintenance improvements are typically relatively the lowest cost improvement type and provide the greatest return on investment (ROI) if undertaken as soon as necessary. Maintenance improvements, early in the lifecycle of the road surface, will prevent accelerated deterioration of the surface from water infiltration and freeze-thaw action. However, undertaking maintenance later in the lifecycle of the road, when the Pavement Condition Index (PCI) has fallen below 85, should only be considered as a holding pattern as it would no longer provide the increased service life it would if done sooner. Maintenance improvements should be planned to occur throughout the life of a road as needed but prioritized 4 – 5 years after a new surface is applied via minor rehabilitation, major rehabilitation, or reconstruction.

Preventative maintenance improvements are typically the lowest cost Capital improvement which can be undertaken on roads. Preventative maintenance treatments will seal all cracks in the surface of the roadway to prevent water infiltration and significantly decrease deterioration from freeze-thaw action. However, undertaking preventative maintenance on a roadway with a PCI below 70, poor drainage, evident base issues, or poor alignment should only be considered as a holding pattern as it would not substantially improve the roadway or extend its service life. In order to maximize ROI, preventative maintenance should be planned to occur 8 – 10 years after a new surface is applied via minor rehabilitation, major rehabilitation, or reconstruction, when the PCI is 70 – 85.

Minor rehabilitation improvements typically come at a mid-range cost but can substantially prolong the service life of a road if completed at the right time in its lifecycle. Minor rehabilitation will provide a new surface and added strength to the roadway. However, undertaking minor rehabilitation on a roadway where there is evident base issues or where the PCI has fallen below 50 should only be considered as a holding pattern as it would only temporarily improve the road condition and relatively low service life extension for the expense. In order to maximize ROI, minor rehabilitation should be planned to occur 18 – 22 years after a new surface is applied via major rehabilitation, or reconstruction (8 – 14 years after preventative maintenance), when the PCI of the road is 50 – 65.

Major rehabilitation improvements typically come at a higher-range cost but will completely replace the road surface and substantially prolong the service life of a road so long as the base granular of the road are structurally sound. However, a greater treatment than major rehabilitation should be considered if there are poor alignments, a large amount of urban drainage infrastructure in poor condition, or substantial base issues over a large section of the road. In order to maximize ROI, major rehabilitation should be planned take place after the PCI has fallen below 45.

Reconstruction is the highest relative cost road improvement type on any road class. It will require complete removal and replacement of the existing surface, a substantial amount of base granular, and most if not all drainage infrastructure. Reconstruction should only be considered on roads with poor alignment, completely deteriorated/poor base structure, poor drainage infrastructure, and/or where minimum design standards cannot be achieved using another method. In order to maximize ROI, reconstruction (if required) should be planned to occur after the PCI has fallen below 40.

4.2 Lifecycle Management

Managing the lifecycle of a roadway involves following Best Practices, to ensure that the treatment being applied for a particular section of road is appropriate for the condition and design standard for the road, and that it is the most cost-efficient treatment at that stage in the road's lifecycle.

Figure 1 below, provides a graphical comparison of three different lifecycle scenarios, comparing the age of a road with its condition. The three different scenarios are as follows:

- "Do Nothing" – lifecycle of a newly constructed road where no improvement takes place at any point throughout its design life;
- "No Major or REC" – lifecycle of a newly constructed road where no large capital costs are incurred through Major Rehabilitation or Reconstruction and only Preventative Maintenance or Minor Rehabilitation takes place throughout the design life of the road; and
- "Best Practices" – lifecycle of a newly constructed road where the 'return on investment' is prioritized and the most beneficial improvement type takes place at the correct moment in the design life of the road.

It should be noted that reconstruction should still be considered where a roadway has significant base issues, unsafe alignment, or other issues which cause the road section to not meet minimum design standards. Following reconstruction, the lifecycle could then be managed to target the Best Practices scenario.

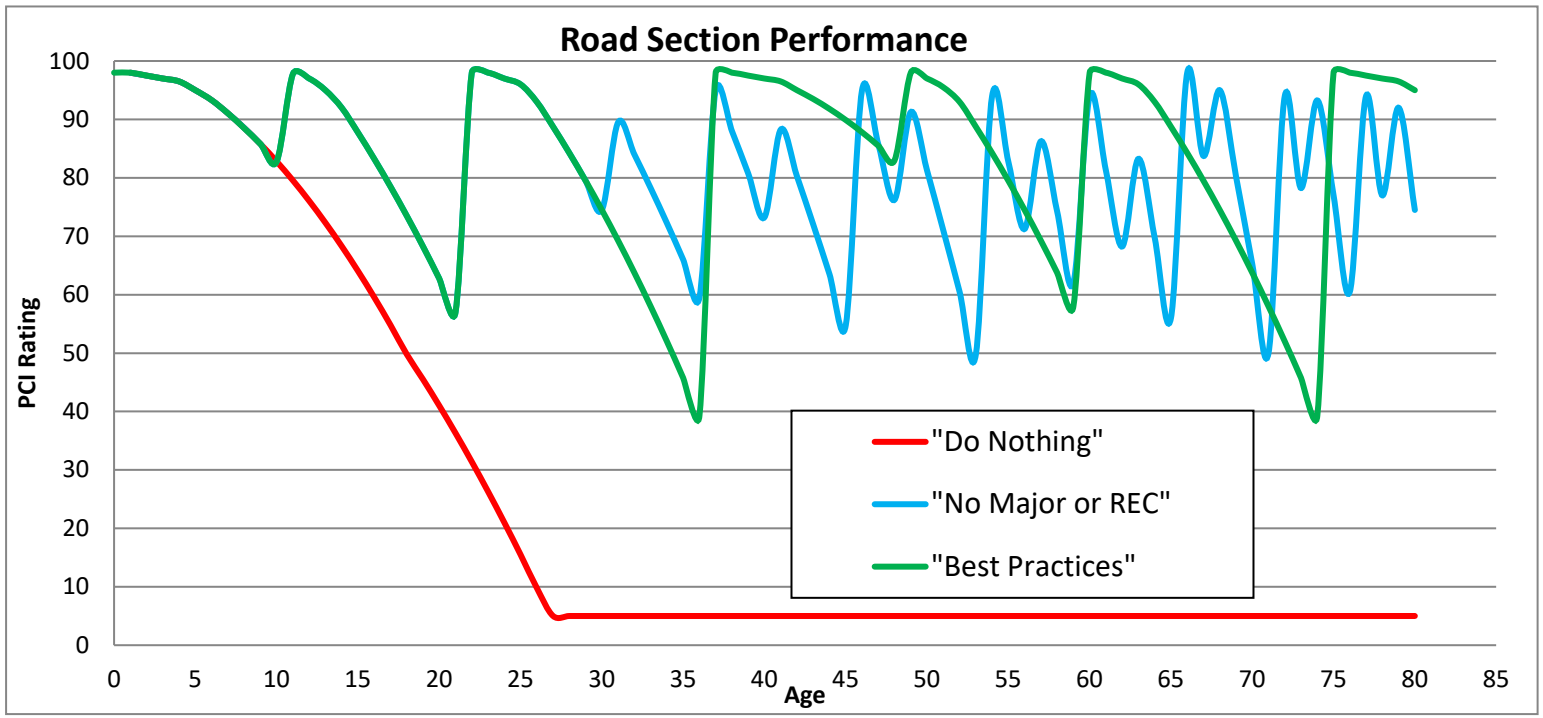
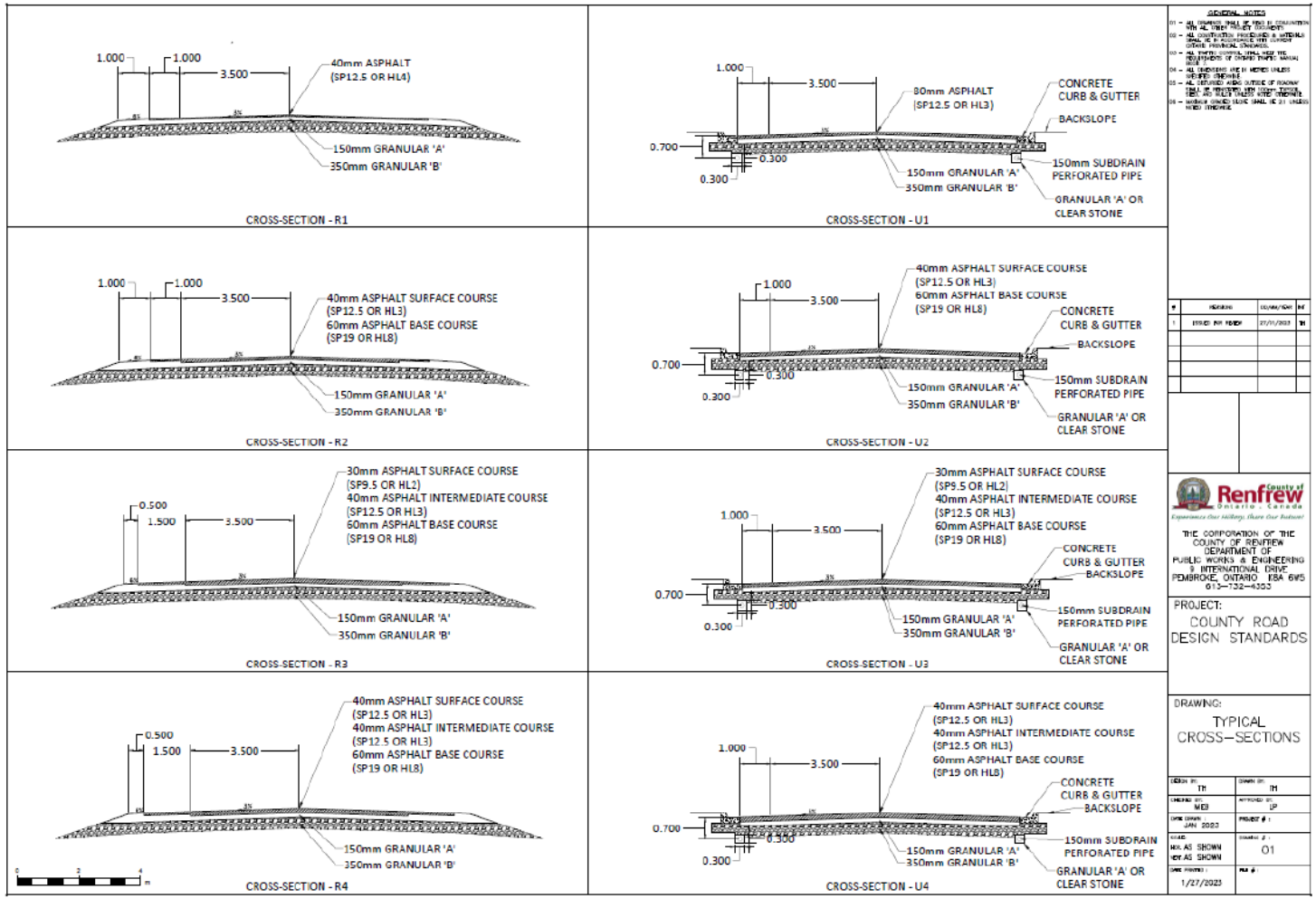


Figure 1 - Graphical comparison of road deterioration based on different Lifecycle Scenarios

Appendix A


1.000
1.000
3.500
40mm ASPHALT
(SP12.5 OR HL4)
150mm GRANULAR 'A'
350mm GRANULAR 'B'
CROSS-SECTION - R1
1.000
3.500
80mm ASPHALT
(SP12.5 OR HL3)
CONCRETE
CURB & GUTTER
BACKSLOPE
0.700
0.300
0.300
150mm SUBDRAIN
PERFORATED PIPE
150mm GRANULAR 'A'
350mm GRANULAR 'B'
GRANULAR 'A' OR
CLEAR STONE
CROSS-SECTION - U1
1.000
1.000
3.500
40mm ASPHALT SURFACE COURSE
(SP12.5 OR HL3)
60mm ASPHALT BASE COURSE
(SP19 OR HL8)
150mm GRANULAR 'A'
350mm GRANULAR 'B'
CROSS-SECTION - R2
1.000
3.500
40mm ASPHALT SURFACE COURSE
(SP12.5 OR HL3)
60mm ASPHALT BASE COURSE
(SP19 OR HL8)
CONCRETE
CURB & GUTTER
BACKSLOPE
0.700
0.300
0.300
150mm SUBDRAIN
PERFORATED PIPE
150mm GRANULAR 'A'
350mm GRANULAR 'B'
GRANULAR 'A' OR
CLEAR STONE
CROSS-SECTION - U2
0.500
1.500
3.500
30mm ASPHALT SURFACE COURSE
(SP9.5 OR HL2)
40mm ASPHALT INTERMEDIATE COURSE
(SP12.5 OR HL3)
60mm ASPHALT BASE COURSE
(SP19 OR HL8)
150mm GRANULAR 'A'
350mm GRANULAR 'B'
CROSS-SECTION - R3
1.000
3.500
30mm ASPHALT SURFACE COURSE
(SP9.5 OR HL2)
40mm ASPHALT INTERMEDIATE COURSE
(SP12.5 OR HL3)
60mm ASPHALT BASE COURSE
(SP19 OR HL8)
CONCRETE
CURB & GUTTER
BACKSLOPE
0.700
0.300
0.300
150mm SUBDRAIN
PERFORATED PIPE
150mm GRANULAR 'A'
350mm GRANULAR 'B'
GRANULAR 'A' OR
CLEAR STONE
CROSS-SECTION - U3
0.500
1.500
3.500
40mm ASPHALT SURFACE COURSE
(SP12.5 OR HL3)
40mm ASPHALT INTERMEDIATE COURSE
(SP12.5 OR HL3)
60mm ASPHALT BASE COURSE
(SP19 OR HL8)
150mm GRANULAR 'A'
350mm GRANULAR 'B'
CROSS-SECTION - R4
1.000
3.500
40mm ASPHALT SURFACE COURSE
(SP12.5 OR HL3)
40mm ASPHALT INTERMEDIATE COURSE
(SP12.5 OR HL3)
60mm ASPHALT BASE COURSE
(SP19 OR HL8)
CONCRETE
CURB & GUTTER
BACKSLOPE
0.700
0.300
0.300
150mm SUBDRAIN
PERFORATED PIPE
150mm GRANULAR 'A'
350mm GRANULAR 'B'
GRANULAR 'A' OR
CLEAR STONE
CROSS-SECTION - U4
GENERAL NOTES
01 – ALL DISTANCES SHALL BE METRIC IN CONJUNCTION WITH AN IMPERIAL EQUIVALENT
02 – ALL CONSTRUCTION PROCEDURES & MATERIALS SHALL BE IN ACCORDANCE WITH CURRENT ONTARIO PROVINCIAL STANDARDS
03 – ALL TRAFFIC CONTROL SHALL MEET THE REQUIREMENTS OF ONTARIO TRAFFIC MANUAL BOOK 7
04 – ALL DIMENSIONS ARE IN METRES UNLESS SPECIFIED OTHERWISE
05 – ALL DISTURBED AREAS OUTSIDE OF ROADWAY SHALL BE RESTORED WITH TOPSOIL, SEED AND MULCH UNLESS NOTED OTHERWISE
06 – MINIMUM GRADES SHALL BE 2% UNLESS NOTED OTHERWISE
REVISION DD/MM/YEAR BY
1 ISSUED FOR REVIEW 27/01/2023 TH
THE CORPORATION OF THE COUNTY OF RENFREW
DEPARTMENT OF PUBLIC WORKS & ENGINEERING
9 INTERNATIONAL DRIVE
PEMBROKE, ONTARIO K8A 6W5
613-732-4353
PROJECT:
COUNTY ROAD DESIGN STANDARDS
DRAWING:
TYPICAL CROSS-SECTIONS
DESIGN BY: TH
DRAWN BY: TH
CHECKED BY: MEB
APPROVED BY: LP
DATE DRAWN: JAN 2023
PROJECT # :
SCALE: HOR. AS SHOWN VER. AS SHOWN
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