

# Public Works Operational Level of Service



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## **1. Purpose, Considerations, and Level of Service**

### **Purpose**

The purpose of this document is to advise Council of the current Level of Service residents and businesses are being provided and to communicate this Level of Service of Public Works annual operations to the residents and businesses throughout Lethbridge County. Municipal roadways are divided into four classifications based on the frequency of maintenance occurrences. These classifications are as follows:

- Classification 1 Roadways
  - High traffic volume (>100 AADT (annual average daily traffic))
  - Important to economic and social activity
  - Thorough connectivity
- Classification 2 Roadways
  - Medium traffic volume (25<100 AADT)
  - Thorough connectivity
- Classification 3 Roadways
  - Low traffic volume (25< AADT)
  - Connectivity
- Classification 4 Roadway
  - Unmaintained or undeveloped road allowance

This classification of roadways will accommodate the majority of traffic. The goal of Lethbridge County is to provide gravel road maintenance as effectively and efficiently as possible to maintain a safe and sustainable transportation network maintenance program for the community. Expectations of gravel roadways are variable throughout the regions of the County and to expect roadways with limited to no wash boarding and rutting should not be expected at all times. The goal of Lethbridge County is to maintain road surfaces at safe driving conditions as often as reasonably possible while working within the limitations of the current Level of Service, resources, budget constraints, economic activity, and weather conditions. With proper use of systematic processes, equipment, personnel, and adequate funding this goal can be obtained. Patience and flexibility is required to adapt to a large variety of circumstances and conditions within the municipality. Maintenance activities provided within the level of service is a guideline of average maintenance, conditions may exist at any time that effect the timing and delivery of services.

Lethbridge County maintains approximately 1782 kilometers (1107 miles, regular – 969 miles, base stabilized 138 miles) of gravel roadways which is separated into 7 grader divisions, with 8 district graders for equipment and 8 operators. Each division ranges in size from 147 to 312 kilometers (92 to 195 miles) due to traffic volumes and intensity.

In addition, Lethbridge County provides maintenance on all hard surface roadways throughout the municipality including hamlets.

### **Plan Considerations**

Lethbridge County considers multiple factors while developing levels of service for gravel roadway grading and gravelling. These factors include, but are not limited to the following:

- Public Safety
- Budgetary amounts for activities
- Industrial Site Activity
- Intensive Livestock Activity
- Intensive Irrigation Crop Activity
- Stable Economic Activity
- Competent personnel
- Ability to maintain emergency services
- Environmental impacts
- Historic weather conditions and temperatures
- Protection of property
- Effective resource allocation
- School bus routes

### **Service Statement**

The grading and gravelling control objectives of the County are to:

- Provide safe travelling conditions for motorists
- Provide cost effective gravel road maintenance services
- Reduce economic losses to the municipality and businesses
- Assist emergency services transportation
- Provide safe, passable roads

Lethbridge County has a commitment to provide effective and efficient gravel road maintenance to its citizens. However, it must be realized that circumstances may delay and/or prevent the completion of this plan 100% of the time. Some circumstances are;

- Unforeseen emergencies
- Services requested/required that are outside of the normal
- Parked or stalled vehicles that restrict operations
- Weather so severe as for crews cannot complete tasks
- Inadequate equipment
- Mechanical failures
- Illness
- Lack of competent personnel
- Lack of materials (gravel)

### **Scope of Responsibility**

Lethbridge County is responsible for maintenance on municipal roads within the municipal boundary. Provincial highways within Lethbridge County boundary are maintained by Alberta Transportation controlled contractors. Lethbridge County does not grade or gravel roadways that are private roadways.

### **Level of Service (LOS)**

It is the expectation of our citizens that we keep all municipal roads sufficiently passable throughout the year. To accomplish this expectation, Lethbridge County will provide, to a reasonable extent, grading and gravelling services consistent with general accepted standard practices. Each year is unique and comes with its own challenges. Challenges that will heavily influence when and what services are delivered include;

- Air and road temperatures
- Precipitation type
- Precipitation amount
- Traffic activity
- Deviation from the defined program
- Availability of supplies
- Availability of personnel
- Availability of equipment

### **Grading and Gravelling Activity**

Grading and gravelling maintenance activities are directed to achieving and maintaining relatively safe traffic movement on Lethbridge County roadways. Therefore, efforts are categorized into 3 roadway classifications for maintenance and a 4<sup>th</sup> for undeveloped road allowance, this is based on historic data and operator feedback.

The maximum level of service is reached when all gravel roadways are on schedule and receiving maintenance activities as outlined in Appendices. The service activities and frequency of each gravel roadway classifications are outlined below:

Classification	Grading Frequency (weeks)	Gravelling Frequency (years)
1	2-3	1-3
2	3-8	3-6
3	8-18	6-10
4	0	0

As an enhanced service, targeted intersection areas that have historically required additional maintenance are stabilized using contract resources to apply MG30 to the roadway surface. This treatment significantly reduces the development of wash boarding in these acceleration and deceleration areas.

Gravel spread rates will vary depending on the existing road conditions, typical road gravelling will be 200-300 tonne per mile. Spot gravelling for specific areas will be as required.

Roadway vegetation control on gravel roads will be through the ASB LOS through submission and approval by the Supervisor of ASB and PW accordingly. Coordination will be established between grading activity and chemical application, primarily focused on low volume roadways.

### **Gravel Pits (County Owned and Operated)**

Lethbridge County owned gravel pits and will be operated in accordance with AEP guidelines for gravel pits. Reporting on activities will be through survey or drone imagery.

Gravel pit maintenance, stripping and reclamation will be done by internal staff. Seeding of topsoil and subsoil piles will be completed by the ASB on an as needed basis.

External contractors will be hired for gravel processing within County aggregate pits.

### **Haul Route Access Network (HRN)**

The Haul Route Network (HRN) is comprised of 138 miles (2020) of 4 inches of stabilized gravel of varying widths from 7-9 meters on County gravel roadways. The Haul Route Access Network will be evaluated on an annual basis to determine mileage to be rehabilitated and recrowned. The number of miles to be repaired will be determined by the shape of the crown, potholing, surface raveling and other surfacing considerations.

The HRN will be adjusted annually for required maintenance depending on the deterioration of the roadways through field evaluation. Attention in the spring will be in addressing the surface of the roadway to address roughness and rideability for the public. The HRN has been classified into 3 priority classes for annual maintenance activities based on traffic volumes:

- Priority 1 – 48 miles
- Priority 2 – 48 miles
- Priority 3 – 42 miles

HRN treatment with calcium stabilization products will be dependent on the cross sectional values of the roadway to be treated. As roads are naturally widened or pushed out (the ideal width being 8 to 8.5 meters wide) they become more difficult to maintain a proper crown, and hence existing gravel mat becomes cost prohibitive for stabilization.

Spring maintenance (April through to June) will involve a water-grade-pack (WGP) practice to bring roadways into a proper shape and address raveling and pothole areas.

Summer maintenance (June through to September) activities will involve calcium injection into the gravel mat through grading or milling activities. The calcium liters applied per square meter will be based on retention of calcium in gravel surface, typical will be estimated at 2 to 3 liters per square meter. As conditions allow additional WGP roadways will be targeted due to deterioration in addition to calcium treated roadways.

Fall maintenance (September through to October) activities will involve WGP treatments of high traffic HRN roadways prior to winter.

As weather allows areas of the HRN that require grading maintenance will be addressed on a case-by-case basis as conditions allow.

Year to year evaluations and data collection of life cycle maintenance requirements will further address the maintenance tactics applied to different sections and whether calcium injection into gravel mat is required.

## **Road Construction and Rehabilitation**

Road construction, rehabilitation and shoulder maintenance will be conducted as required on roadways with consideration for high traffic corridor improvements that address width, geometrics and road material considerations.

Roadways when constructed or rehabilitated will meet a standard road cross section that meets or exceeds the County typical design for gravel roadways. (See attached Appendix 2 for cross section). Roadway design if required by a third-party engineer will be built to design specifications that consider traffic type and quantity on roadway, sightlines, drainage and other associated road construction considerations.

Backslope agreements will be established for projects that require material and sloping outside of the road allowance. Preferably backslope agreements will be entered into with adjacent landowners deferring the purchase of a road allowance widening.

Road allowance widening will be considered for construction projects that require additional width for future roadway development or as required depending on field requirements for material borrow sourcing. Road allowance purchasing typically involves a 5-meter widening on either side of roadway increasing width from a 20-meter road allowance to a 30 meter. Road allowance purchase from adjacent landowner will be based on current assessed value with consideration for land market conditions.

Fencing that is removed for backsloping or construction purposes will be re-established to property line if required at the sole cost of the County. Fencing that can be eliminated as part of project will be treated on a case by case.

Crop damages will be paid for disturbed land outside of road allowance as part of the backsloping required for the project. Crop price per acre will be established through a survey for area of damage, depending on extent this may be done pre and post construction if a discrepancy exists. In consultation with County ASB, establishing a market cost for an agreed upon crop damages payment to landowner will be assessed based on acres damaged. This will be paid the year of construction, if extenuating circumstances or road construction projects that bridge adjoining years will be treated on a case-by-case basis. If a cover crop is to be seeded as a transition this will be in conjunction with the County ASB and the landowner

Seeding of road allowances disturbed by construction will commence upon completion of projects by the County ASB (parameters within ASB LOS) in conjunction with the Public Works department. Areas seeded will be monitored for the re-establishment of vegetation. Topsoil preservation to allow future vegetation growth will be a focus on construction projects. Topsoil material will be stripped from construction sites prior to construction or rehabilitation and then replaced and established on slopes within road allowance and seeded accordingly.

## Culverts

Culverts will be inspected for potential maintenance or replacement on a rotational basis as time allows. Within the County there are over 3,000 culverts combined of centerline (bisecting roadway), approaches (within borrow ditch) and bridge sized (1500mm diameter or larger). Culverts are necessary to accommodate overland drainage water from storm events or spring snow melting.

Culverts will be repaired on a case-by-case basis through prioritization from inspection program, with the priority being given to situations where there may be potential damage to private property, County roads and farmland.

Within the asset management plan these will be planned for replacement on a life cycle rotation or as needed basis. As the soil types and culvert usage varies across the County so will the life span of infrastructure. A typical life cycle for a culvert would be 50 years, higher risk locations that accommodate storm flows or high-level crossing may require different applications.

Culvert marking program has been implemented and the majority of culverts have been marked for visibility for operators and the travelling public. Damaged culverts will not be marked until the damage has been repaired and the culvert end protected.

Culvert types:

- Corrugated steel pipe (CSP)
- Plastic (HDPE) corrugated pipe
- Hardened steel liners

Approaches will be constructed in accordance with **Policy 310 – Approach Construction Guidelines**. Upon completion of residential approach, re-established through construction or replacement through annual program determinations the culvert will be added to the asset management program for life cycle tracking and evaluation.

Typical approach size – 500mm (20”) diameter culvert

Typical centerline size – 600mm (24”) diameter culvert

Larger culverts will be sized as per County, Irrigation districts and/or engineering evaluation to determine flow rates and applicable size and type.

## Signage

Regulatory signs will be erected and placed in accordance with accepted provincial and federal guidelines throughout the County.

All municipal signage will be installed as per the following order:

1. As per County bylaw
2. As per provincial guideline
3. As per **Transportation Association of Canada – Manual of Uniform Traffic Control Devices**

Speed limits will follow design guidelines where applicable and be 80 km/hr unless otherwise posted for all gravel roads.

School and playground zones will follow provincial guidelines for installation.

Residential addressing signage will be replaced as needed upon approval of the Director of Public Operations or designate.

### **Site Triangle Evaluation**

When applicable the County will mitigate or put traffic control devices in place for site triangle concerns that are identified through ongoing evaluations

### **Hard Surface Maintenance and Repairs**

Protective measures and services are applied to hard surfaces to mitigate current and future deterioration as part of the maintenance life cycle for these types of surfaces.

Pothole repairs will be done by contractor or internal staff using a combination of hot mix asphalt and/or cold mix products depending on the evaluation of staff.

Spray patching and crack sealing of all hard surfaces will be done on a rotational basis from visual assessments conducted in the spring to prioritize the deterioration and mitigate potential damages.

Chip seals or oil sealants of roadways will be used as required as a wearing surface to offset or delay future overlays.

### **Dust Control**

Dust control by application of calcium chloride or similar products determined by operations will be provided as a subsidized program with residents making annual applications for a specific distance to be applied on the roadway fronting the applicant's property. Deadline for applications will be April 1 of application year and will be in accordance with **Policy 314 Dust Control**.

Dust control subsidy will be reviewed annually for cost evaluation and approval from council.

### **Road Sweeping**

Road sweeping will be done in the spring for local roads and hamlets. This will be conducted on an annual basis, which will be the primary target or as required if conditions require additional clean up.

Local roads will have paved road shoulders and intersections cleaned from winter debris from sanding activities.

Hamlets and industrial parks will have a third-party contractor operating a street sweeper to clear debris from local streets. Lanes and alleys will not be swept.

### **Line Painting**

Line painting will be in accordance with Alberta Transportation standards for paved road sections with standardized line marking.

Line painting will be completed on all County paved roadways every 2 years. If a roadway is scheduled for an overlay as part of capital infrastructure improvements the roadway will be painted in the given year that improvement is done.

### **Haul Road Agreements and Land Lock Permits**

Haul road agreements will be entered into for landowners restricted by hard surfaces that are banned seasonally or annually. Banned roads limit the movement of implements and supplies.

Land lock permits will be issued to operations who require access for their commodities into and out of their locations.

### **Road Bans**

Road bans for seasonal or inclement weather may be put in place to protect infrastructure as per **Policy 355 – Road Bans**.

Regional road bans within County boundaries will be issued through Transportation Routing and Vehicle Information System (TRAVIS), the provincial road ban site for commercial vehicles.

Due to the large agriculture base and spring seeding the gravel road network will remain ban free unless extenuating circumstances come into effect.

### **Personnel Responsibility**

This document is used by Lethbridge County and has been developed to establish communication channels through which the gravel road maintenance Level of Service can be converted into an effective and understood set of actions. The actions taken by maintenance crews and operators are the result of the directives, policies and procedures established by Council, and administration and approved by the Director of Public Operations.

### **Operators**

The maintenance crews and operators are vital to successful implementation of this existing Level of Service. Maintenance crews and operators are responsible for;

- Providing a timely, effective service for their designated district
- Maintaining equipment
- Documenting maintenance activities
- Maintaining a positive work environment

### **Supervisors**

Supervisors are responsible for:

- Coordination of services to ensure timely, effective coverage as per the Level of Service
- Coordinate with fleet maintenance to ensure proper equipment maintenance is complete
- Collecting and totaling materials used (grader blades, gravel quantities hauled)
- Timely, courteous responses to complaints, requests, and inquiries
- Providing training opportunities for staff
- Maintaining a positive work environment

### **Management**

Management is responsible for:

- Providing adequate resources for operations
- Creating training opportunities for supervisors and operators
- Maintaining material inventories
- Maintaining a positive work environment
- Timely, courteous responses to complaints, requests, and inquiries
- Promote and maintain public awareness and support for gravel road maintenance services

## **2. Equipment Preparation**

All equipment utilized in gravel road maintenance operations are prepared and inspected for readiness and repairs prior and during operations by fleet maintenance.

### **Primary Gravel Road Maintenance Equipment**

Public works uses the following equipment as required;

- 8 – Motor graders
- 1 – Additional Motor grader as required – designated for internal construction projects
- 3 – Highway Tractor with Pup Trailer
- 3 – Highway Tractor with Super B Trailer
- 1 – Water Truck
- 1 – Calcium Application Trucks
- Contract Services for Calcium Applications

### **Primary Base Stabilization Equipment**

Public works uses the following equipment as required;

- 2 – Construction graders
- 1 – Mill Razor Grader mounted

- 1 – Calcium Application Trucks
- 2 – Water Truck
- 1 – Water Tanker
- 2 – Self-propelled pneumatic rollers

### **Primary Road Construction and Rehabilitation Equipment**

Public works uses the following equipment as required;

- 2 – Construction graders
- 2 – Motor scrapers
- 1 – Dozer
- 2 – Tractor w/ pull type padfoot, disc or pneumatic roller
- 1 – Water Truck
- 1 – Tandem

### **Primary Culvert Maintenance Equipment**

Public works uses the following equipment as required;

- 1 – Track excavator
- 1 – Back hoe
- 1 – Tandem
- 1 – Highway tractor and equipment trailer
- 1 - Trench compactor

### **Primary Hard Surface Road Maintenance Equipment**

Public works uses the following equipment as required;

- 1 – Truck mounted spray patcher, crack sealer
- 1 - Trailer for transport of oil products
- 1 – Truck equipped with front mount sweeper

### **Primary Sign Maintenance**

Public works uses the following equipment as required;

- 1 – Truck mounted auger, sign truck

## **3. Travel Restrictions and Road Closures**

Spring road bans will restrict the quantity of gravel to be hauled and will slow the delivery of services accordingly.

During certain weather events it may become necessary to close roadways to traffic. This action will only be taken if extreme weather events deem an area of the County unfit for travel.

#### **4. Service Level Costs**

As service levels change, so do costs and associated risks. A consequence table and risk analysis can be found in Appendix 4.

Costs to deliver the current level of service include:

- Annual Operating budget Grading and Graveling
- Amortization of equipment and facilities
- Shop maintenance
- Gravel purchase, processing, and reclamation costs
- Administration cost
- Fuel
- Wear items
- Oil sealants and patch repair material
- MG30 Stabilization
- Line painting
- Program adjustments

#### **Annual Estimates (2022)**

The overall Public Works budget is **\$10,058,320 (2022)**.

##### **Rural Grading**

Annually, the municipality grades approximately 7217 miles of gravel roadway from March to end of November as outlined in Section 1 – Level of Service and Appendix 1. With program adjustments required for numerous reasons an additional 300 miles of grading could be expected with optimal conditions then totaling 7500 graded miles annually. Winter grading is variable and additional miles that will be graded annually are not included within the core LOS. All items considered in the cost to grade one mile of roadway one time on average is \$195 (based on 2021 averages). Total cost for service allotted to grading is **\$1,650,000 (2022)**.

##### **Graveling**

Annually, the municipality gravels on average 231 miles per year at a rate of 200-300 tonne per mile sourcing gravel from multiple gravel pits throughout the County. This total does not include any program adjustments required for spot graveling or spring frost boils, in addition to poor weather conditions that may increase program level demands. The gravel resources will be a combination of County owned and processed gravel or through contract purchasing through a third party provider. The average cost to gravel one mile of roadway one time is \$5,000 (based on 2020 averages). The cost per tonne of gravel delivered average is approximately \$17. Total cost for service allotted to graveling is **\$1,100,000 (2022)**.

##### **Haul Route Network**

Annually, the municipality maintains a haul route network of 138 miles. These roadways are treated annually in terms of stabilization, grading, graveling and packing maintenance. This total does not include any program adjustments required for spot graveling or spring frost boils. Total cost for service allotted to base stabilization is **\$1,200,000 (2021)**.

### **Rural Road Construction, Culverts and Drainage**

Annually, the municipality builds or rehabilitates gravel roadways that have been identified as projects for internal construction staff. The average cost to build a mile of roadway one time is \$250-400,000. The average cost to rehabilitate a mile of roadway one time is \$35-50,000. Total cost for service allotted to gravelling is \$1,235,000 (2022). In addition, the municipality replaces and/or repairs 40-50 culverts due to age or condition. Total cost for service allotted to culvert replacements is \$400,000 (2022).

### **Signage**

Annually, the municipality replaces and/or repairs 500-800 signs due to age or condition. Total cost for service allotted to sign replacements is \$225,000 (2022).

### **Hard Surface Repairs**

Annually, the municipality repairs hard surfaces that are asphalt or oiled surfaces throughout the municipality. This will involve spray patching and hot or cold mix patch repairs by both internal and external sources. Total cost for service allotted to hard surface repairs is \$350,000 (2022).

## **5. Delay of Maintenance Operations**

Maintenance of roadways is a very challenging task. The work can be rough on equipment and manpower. Delayed services may occur due to the following;

- Weather that is not suitable for maintenance operations
- Road bans
- Stuck vehicles on roadways
- Equipment breakdowns
- Manpower shortage due to sickness, injury, or lack of responsibility
- Manpower shortage due to working outside of “regular working hours and personnel require rest as per OHS regulations
- Operator breaks and vacation
- Obstruction across the road such as downed trees or power lines
- Other municipal emergencies
- Visibility

## **6. Conclusion**

The core of service delivery is a balance between citizen expectations, ability to pay, risk and program delivery. As we as a County continue working toward a functional Asset Management system, the County may consider a citizen survey to further define the Level of Service required by the public. This will help to further analyze the public expectation of services, our ability to pay for the services, and an acceptable level of risk the municipality is willing to accept.

With direction from Council and annual budget allotments the level of service provides a baseline for expected services to the public infrastructure.

## **APPENDIX 1: Grading and Gravelling LOS Targets 2022**

**TABLE 1: Grading LOS Targets 2022**

**PRIMARY GRADING SEASON - March to End of November (approx. 36 weeks)**

		Grading Frequency	Average Frequency	Grading Frequency	TOTAL Mileage Grading	TOTAL Mileage Grading
Units of Measure	miles	weeks	weeks	Per Year	Year	Year
Local Road - Priority 1 (>100 AADT)	150	2-3	3	12	1800	25%
Local Road - Priority 2 (25<100 AADT)	740	3-8	5	7	5180	72%
Local Road - Priority 3 (25 < AADT)	79	8-18	12	3	237	3%
	969	TOTALS			7217	100%

**TABLE 2: Gravelling LOS Targets 2022**

		Gravelling Frequency	Average Frequency	Gravelling
Units of Measure	miles	years	years	years
Local Road - Priority 1 (>100 AADT)	150	1-3	2	75
Local Road - Priority 2 (25<100 AADT)	740	3-6	5	148
Local Road - Priority 3 (25 < AADT)	79	6-10	10	8
	969	TOTALS		231

**TABLE 3: HRN Base Stabilization LOS Targets 2022**

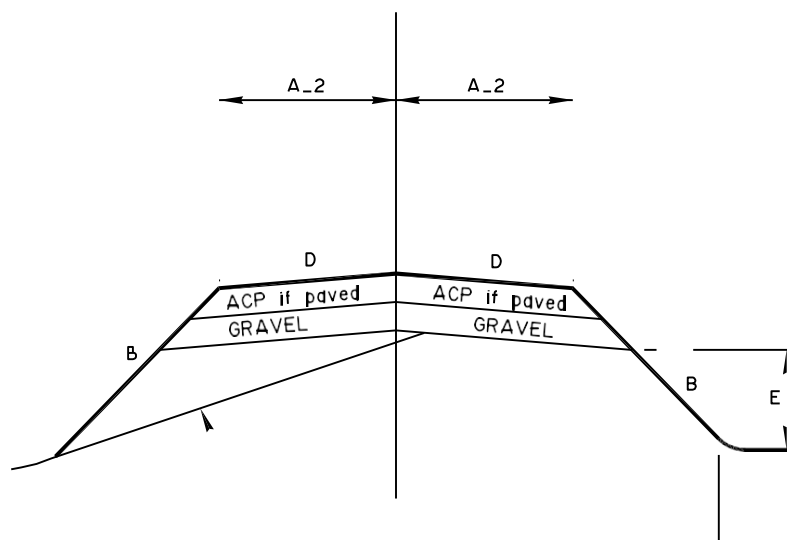
		Stabilization Frequency	WGP Frequency	Cost	TOTAL Cost for Service
Units of Measure	miles	years	years	mile	Program
Haul Routes Priority 1 (>100 AADT)	48	1	0	16000	768000
Haul Routes Priority 2 (<100 AADT)	48	0	3	1300	187200
Haul Routes Priority 3 (<100 AADT)	42	0	1	1300	54600
Haul Routes Variable P1,2, or 3 +15%	138	TBD	TBD	TBD	190200
	138	TOTALS			1200000

## **APPENDIX 2: Construction Guidelines 2022**

**TABLE 4: General Construction Guidelines – Gravel Roads**

	Design Width	Design Speed	Grading Frequency	Gravelling Frequency	Rehab - Base Stabilization	Rehab Road ReConstruction
Units of Measure	meters	km/h	weeks	years	years	years
Paved Road (Greater than 400 AADT)	9	110/80	N/A	N/A	N/A	N/A
Haul Route Network Gravel Base Stabilization	8-8.5	N/A	N/A	N/A	1-3	As required
Local Road - Priority 1 (>100 AADT)	8-8.5	N/A	1-3	1-3	N/A	As required
Local Road - Priority 2 (25<100 AADT)	7-8	N/A	3-8	3-6	N/A	As required
Local Road - Priority 3 (25 < AADT)	7 <	N/A	8-18	6-10	N/A	As required
Undeveloped Road Allowance	N/A	N/A	N/A	N/A	N/A	N/A

### **Typical Cross Section of Roadway**



### **APPENDIX 3: Grader Divisions**

**TABLE 5: Grader Division Summary (2022)**

#### **2022 Grader Division**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>R 6&amp;7</b>	
<b>P1</b>	13	6	22	36	14	15	37	7	150
<b>P2</b>	104	114	79	84	142	72	80	65	740
<b>P3</b>	2	2	0	6	41	10	4	14	79
<b>TOTAL</b>	<b>119</b>	<b>122</b>	<b>101</b>	<b>126</b>	<b>197</b>	<b>97</b>	<b>121</b>	<b>86</b>	<b>969</b>

### **APPENDIX 4: Consequence Table**

<b>Consequence Table - GRAVEL ROADS</b>						
<b>Category</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>Weight</b>	<b>Notes</b>
<b>Operational Impacts</b>	Requires semi annual monitoring or repair	Requires monthly monitoring or repair	Requires weekly monitoring or repair	Unable to maintain or operate OR repair requires greater than one week	0.6	Reactive operational effort above what is routine
<b>Environment</b>	Short term irritant (i.e. Dust)	Prolonged irritant (i.e. Dust) OR Aesthetic impact	Release of harmful substances to environment (i.e. Hydraulic fluid, diesel fuel, etc.)	Release of harmful substances to environment that result in a fine	0.8	AEP, Irrigation Districts Dust control Noise
<b>Safety</b>	Near miss	Minor injuries that do not require medical consultation	Injuries require medical consultation	Many people with major injuries OR fatality	1	Consider all road users - pedestrians, bikes, vehicular. Roads, lights, signs, etc.
<b>Travel Time</b>	Travel time is increased for a period of < 48 hours	Travel time is increased for a period of 48 hours - one month	Travel time is increased for period of one month - four months	Travel time is increased for period of > four months	0.6	
<b>Accessibility</b>	Short term access interruption <10 mins (no alternate route) OR less than 10 households	Short term access interruption 10 min - 1 hour	access interruption 1 - 24 hours	Service interruption to emergency services OR >24 hours	0.8	Access to residences, goods, services, emergency services, other civic services. High weight. Assumption - no

	NTY					alternate route (if there is an alternate route, this is captured under Travel Time)
<b>Service Delivery - Comfort</b>	Minor decrease in ride comfort and confidence	Moderate decrease in ride comfort and confidence. Obstructions visible but alteration in path and speed are not required.	Decreased speed required. Occasional alteration of path.	Frequently alter driving path. Vehicle damage. Major decrease in ride comfort and noise level	0.8	
<b>Staffing</b>	Sick, unable to work for 1 day	Sick, unable to work for 2-5 days	Sick, unable to work for 5-30 days	Sick > 30 days or deceased	0.4	
<b>Reputation</b>	One off localized negative publicity	Short term regionalized negative publicity	Prolonged regionalized negative publicity	Prolonged major reputation damage, prolonged reports in national news	0.4	
<b>Financial</b>	<\$5k	>\$5k-\$100k	\$100k-\$1M	>\$1M	0.8	Reactive costs

Likelihood Table				
	1	2	3	4
	Improbable	Possible	Likely	Almost Certain
Likelihood	Could happen, but probably never will except under exceptional circumstances	The event might occur at some time as there is a history of this event occurring	There is strong possibility of this event occurring as there is a frequent history of occurrence	Very likely. Expected to occur in most circumstances.

## Ranking Matrix

Consequence				
	1	2	3	4
1	1	2	3	4
2	2	4	6	8
3	3	6	9	12
4	4	8	12	16

## APPENDIX 5: Risk Register

<b>Risk Register</b>				
Number	Undesirable Event	Why?	Why?	Why?
1	Gravel Road Failure	Designed as a rural gravel road.	Heavy, frequent traffic at times	Poor weather conditions

Consequence Weighted Consequence Score	Likelihood Score	Risk Score
17.20	3	51.60
		10.00
		20.00
		30.00
		40.00
		50.00
		60.00
		70.00

<b>Risk Treatment</b>		
Current Mitigating Actions	Possible Mitigating Actions	General Notes
Regular grading and gravelling of roadway.	Increase quality of Infrastructure (surface/structure)	Road re-build and Shoulder pull to improve geometry

### **APPENDIX 6: Roadway Classification Maps**

- Lethbridge County Road Grading – Priority Classification
- Grader Districts 1–7 – Priority Classification
- Haul Route (HRN) – Priority Classification
- Spray Patching – Hard Surface Locations

# Lethbridge County Road Grading: Priority Classification

## Legend

### Roads

### Surface Type

- Gravel
- Gravel (Base Stabilized)
- Paved (HMA); Paved (CMA)
- Concrete
- Cement Stabilized
- Provincial Highways

### Priority Class

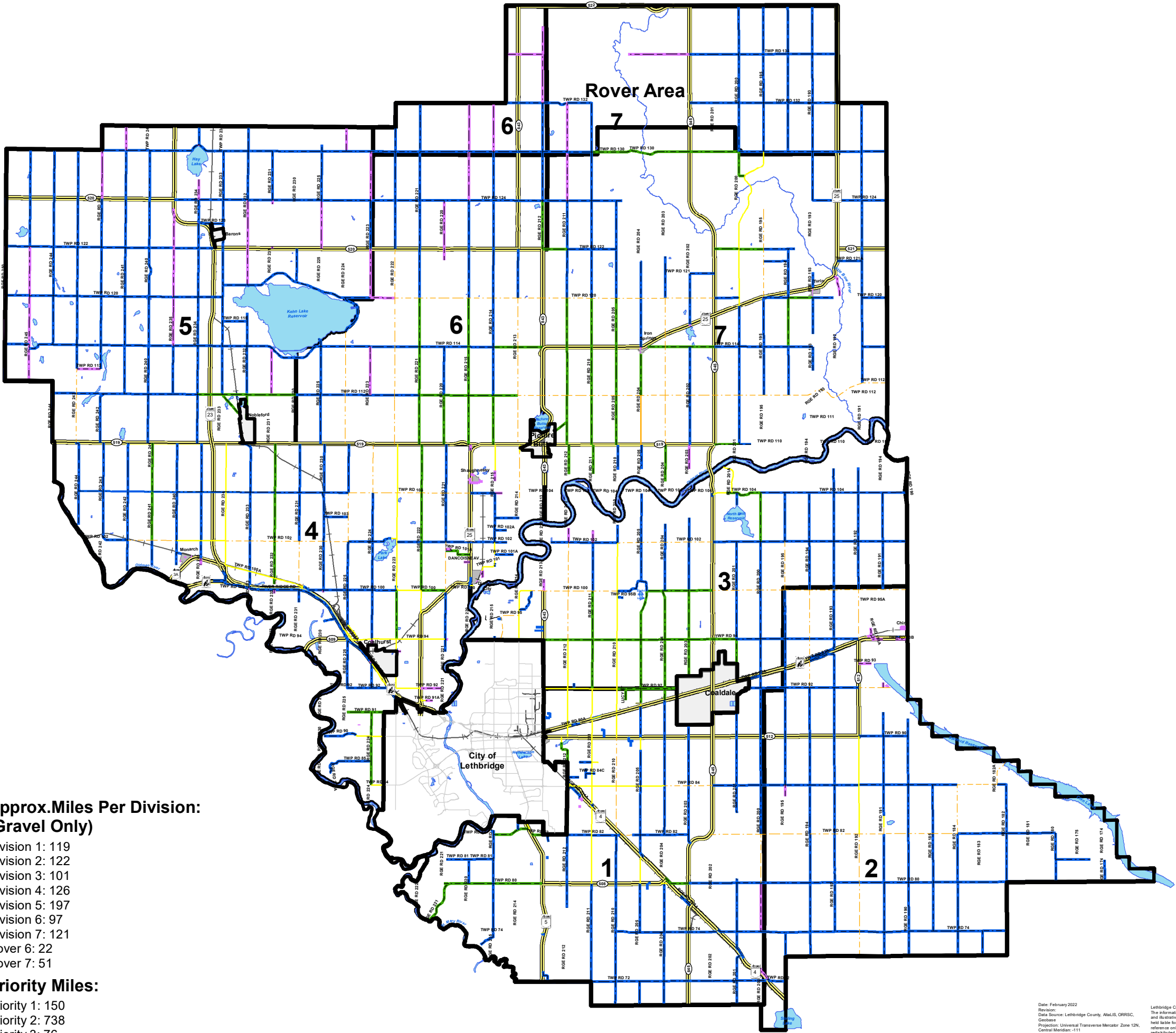
- High (1)
- Medium (2)
- Low (3)
- Grader Division Boundary

## Approx.Miles Per Division: (Gravel Only)

- Division 1: 119
- Division 2: 122
- Division 3: 101
- Division 4: 126
- Division 5: 197
- Division 6: 97
- Division 7: 121
- Rover 6: 22
- Rover 7: 51

## Priority Miles:

- Priority 1: 150
- Priority 2: 738
- Priority 3: 76

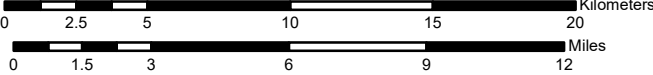


Date: February 2022  
Revision:  
Data Source: Lethbridge County, Atlas, ORRS,  
Geobase  
Projection: Universal Transverse Mercator, Zone 12N,  
Central Meridian: -111  
Scale Factor: 0.9998  
Datum: North American Datum 1983

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1:265,000



## Division 1

## Roads

- - - - - Gravel  
 - . - . - Gravel (Base Stabilized)  
 — Paved (HMA)  
 - - - - - Paved (CMA)  
 — City of Lethbridge  
 — Town/Village  
 == Provincial Highways  
 + + + + + Railway

## Road Priority

- High (1)
- Medium (2)
- Low (3)

**Regular Grading:**

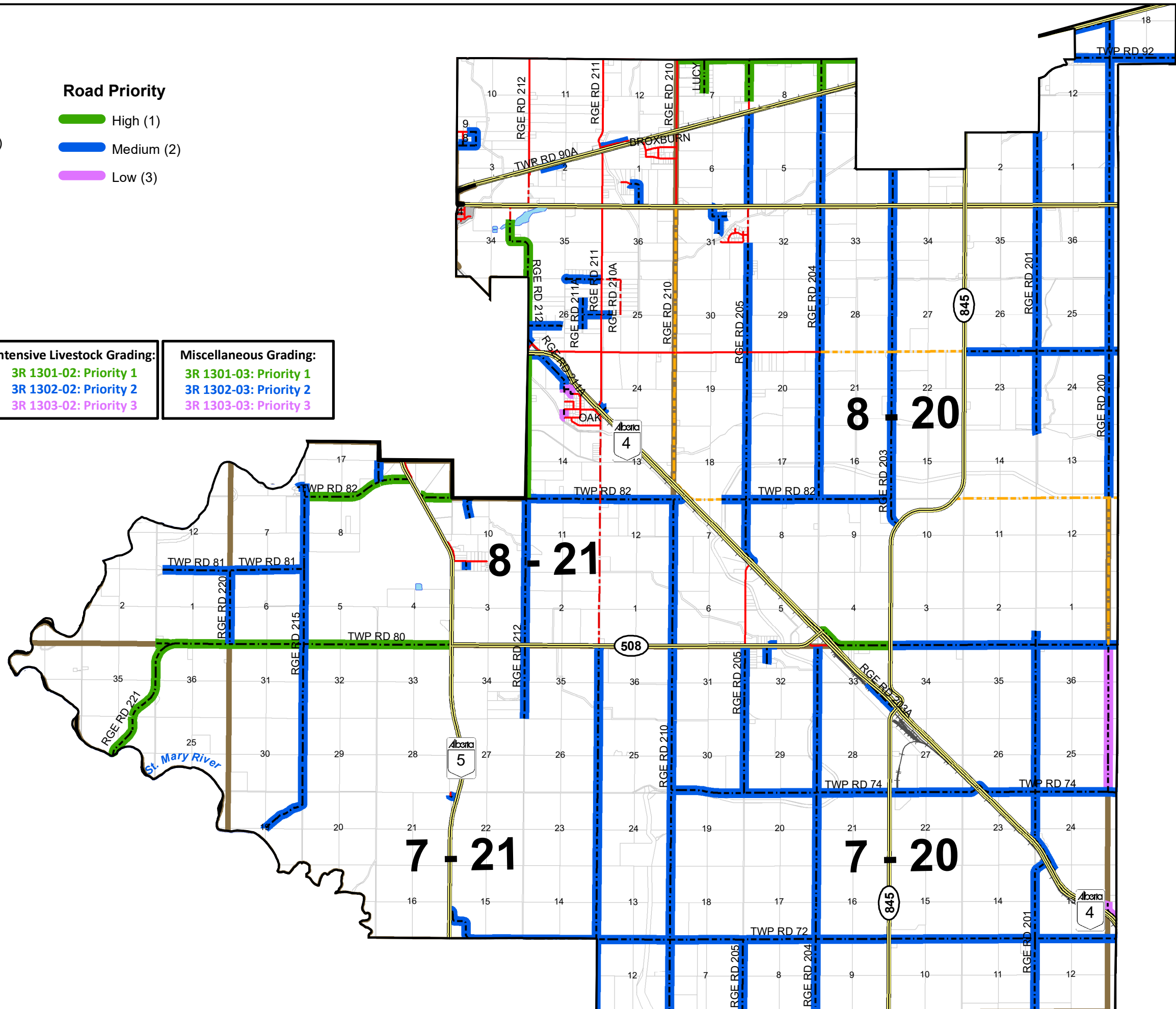
3R 1301-01: Priority 1  
3R 1302-01: Priority 2  
3R 1303-01: Priority 3

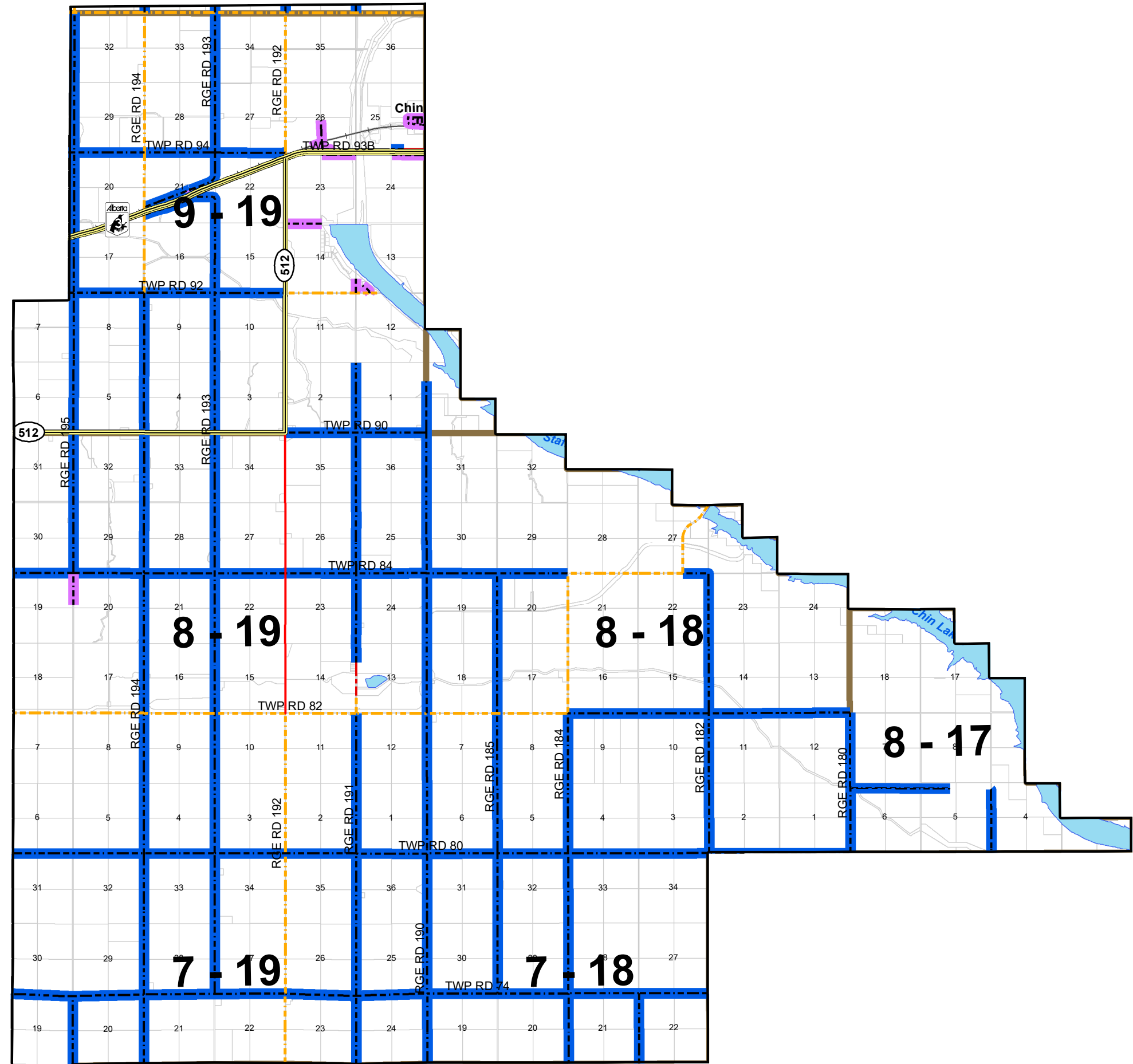
### Intensive Livestock Grading:

3R 1301-02: Priority 1  
3R 1302-02: Priority 2  
3R 1303-02: Priority 3

**Miscellaneous Grading:**

3R 1301-03: Priority 1  
3R 1302-03: Priority 2  
3R 1303-03: Priority 3





Roads

- Gravel
- Gravel (Base Stabilized)
- Paved (HMA)
- Paved (CMA)
- City of Lethbridge
- Town/Village
- Provincial Highways
- Railway

Road Priority

- High (1)
- Medium (2)
- Low (3)

Regular Grading:

- 3R 1301-01: Priority 1
- 3R 1302-01: Priority 2
- 3R 1303-01: Priority 3

Intensive Livestock Grading:

- 3R 1301-02: Priority 1
- 3R 1302-02: Priority 2
- 3R 1303-02: Priority 3

Miscellaneous Grading:




- 3R 1301-03: Priority 1
- 3R 1302-03: Priority 2
- 3R 1303-03: Priority 3

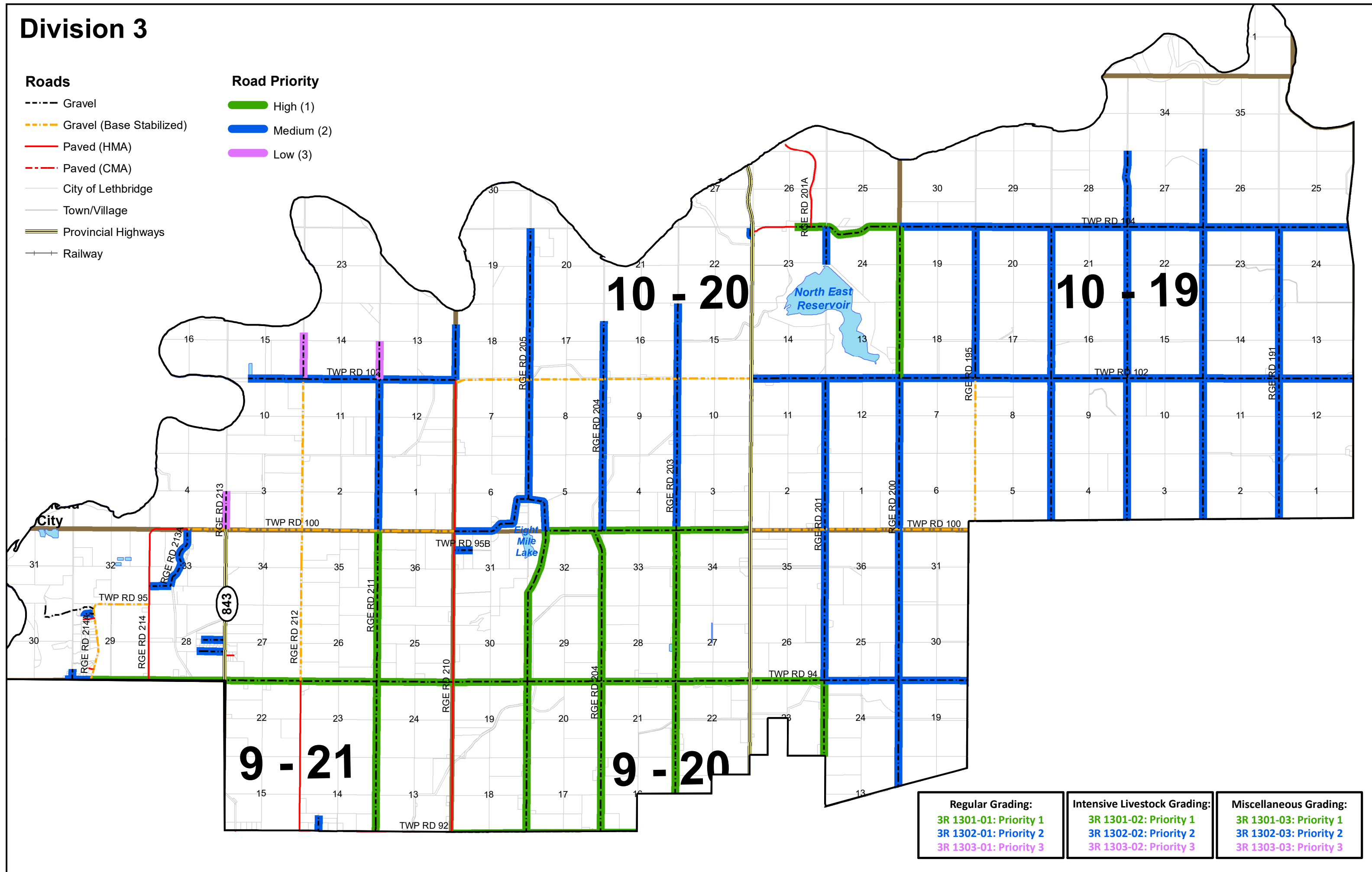
## Division 3

## Roads

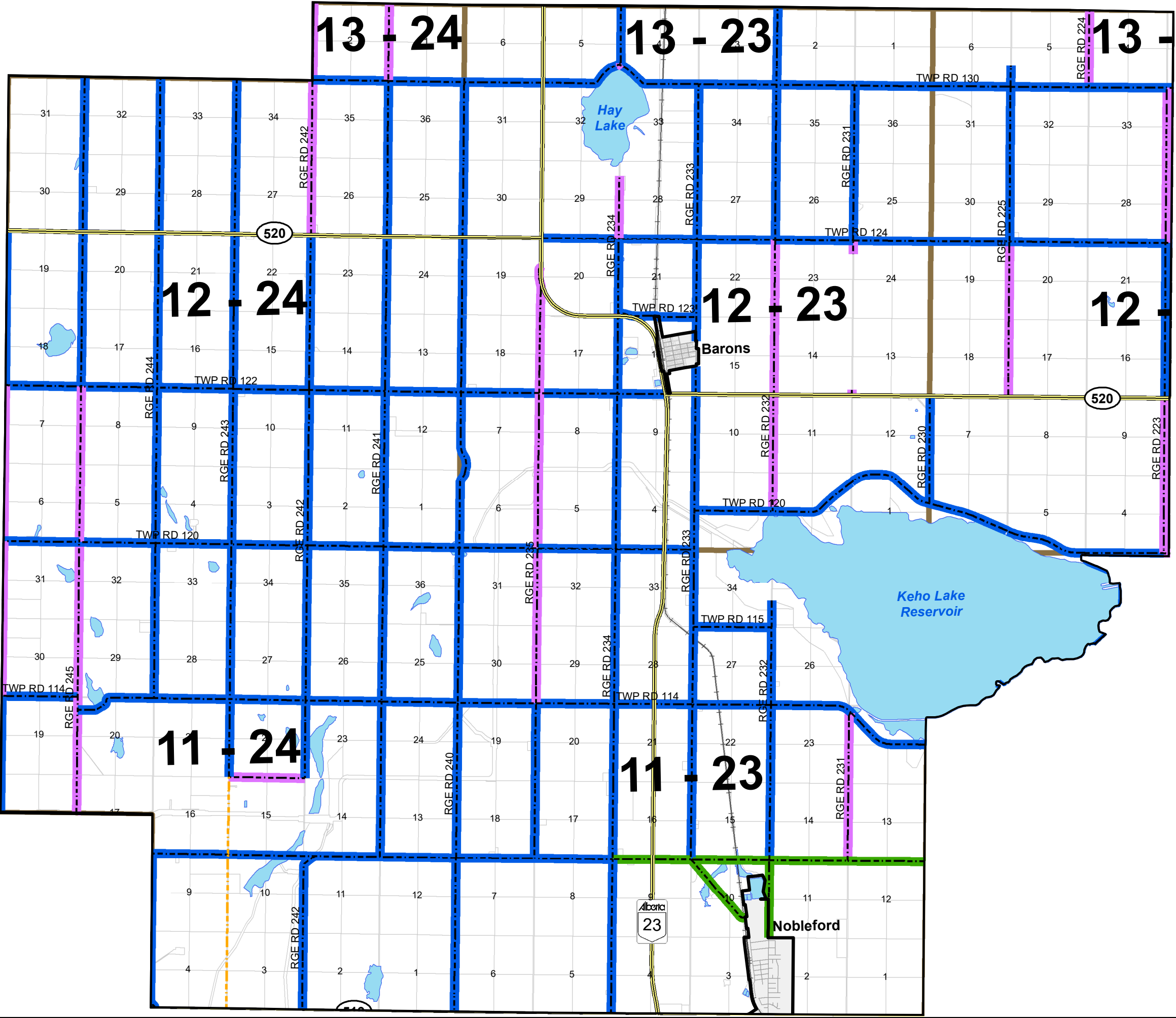
- Gravel
- - - Gravel (Base Stabilized)
- Paved (HMA)
- - - Paved (CMA)
- City of Lethbridge
- Town/Village
- == Provincial Highways
- + + + Railway

## Road Priority

-  High (1)  
 Medium (2)  
 Low (3)



Division 5



Roads

- Gravel
- ..... Gravel (Base Stabilized)
- Paved (HMA)
- - - - Paved (CMA)
- City of Lethbridge
- Town/Village
- ==== Provincial Highways
- + + + + Railway

Road Priority

- High (1)
- Medium (2)
- Low (3)

Regular Grading:

- 3R 1301-01: Priority 1
- 3R 1302-01: Priority 2
- 3R 1303-01: Priority 3

Intensive Livestock Grading:

- 3R 1301-02: Priority 1
- 3R 1302-02: Priority 2
- 3R 1303-02: Priority 3

Miscellaneous Grading:

- 3R 1301-03: Priority 1
- 3R 1302-03: Priority 2
- 3R 1303-03: Priority 3

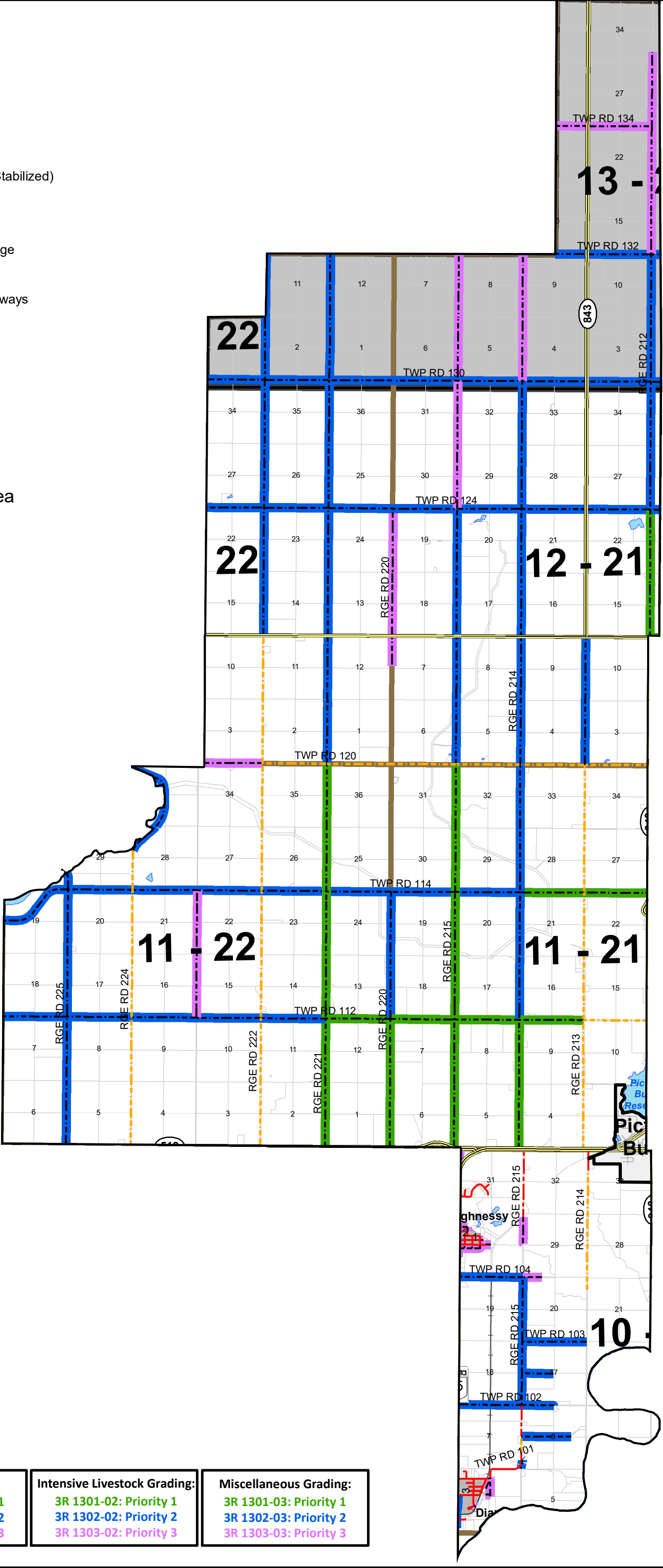
Division 6

Roads

- Gravel
- Gravel (Base Stabilized)
- Paved (HMA)
- Paved (CMA)
- City of Lethbridge
- Town/Village
- Provincial Highways
- Railway

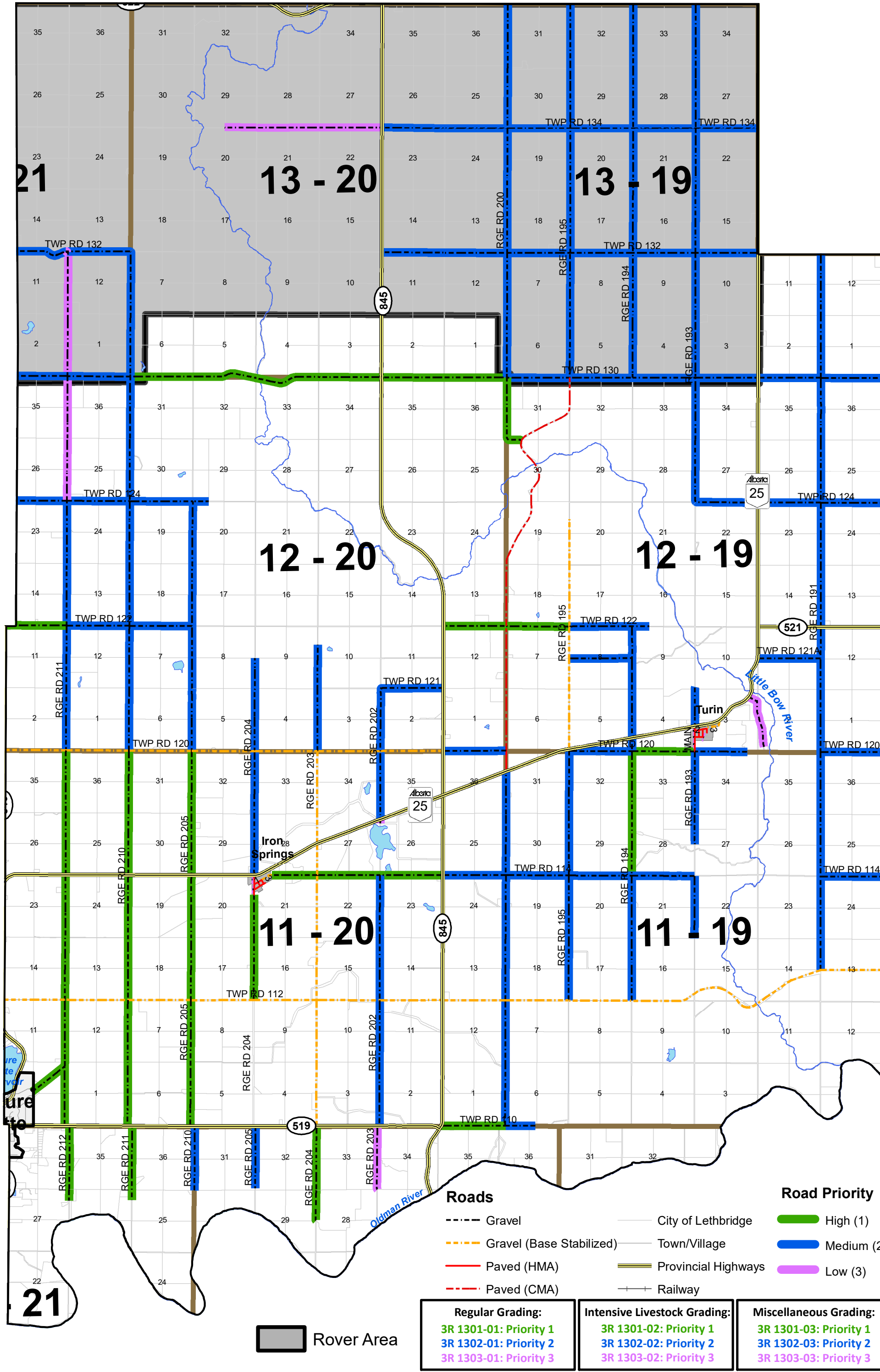
Road Priority

- High (1)
- Medium (2)
- Low (3)
- Rover Area



Regular Grading:	Intensive Livestock Grading:	Miscellaneous Grading:
3R 1301-01: Priority 1	3R 1301-02: Priority 1	3R 1301-03: Priority 1
3R 1302-01: Priority 2	3R 1302-02: Priority 2	3R 1302-03: Priority 2
3R 1303-01: Priority 3	3R 1303-02: Priority 3	3R 1303-03: Priority 3

Division 7



# Lethbridge County Haul Routes: Priority Classification

## Legend

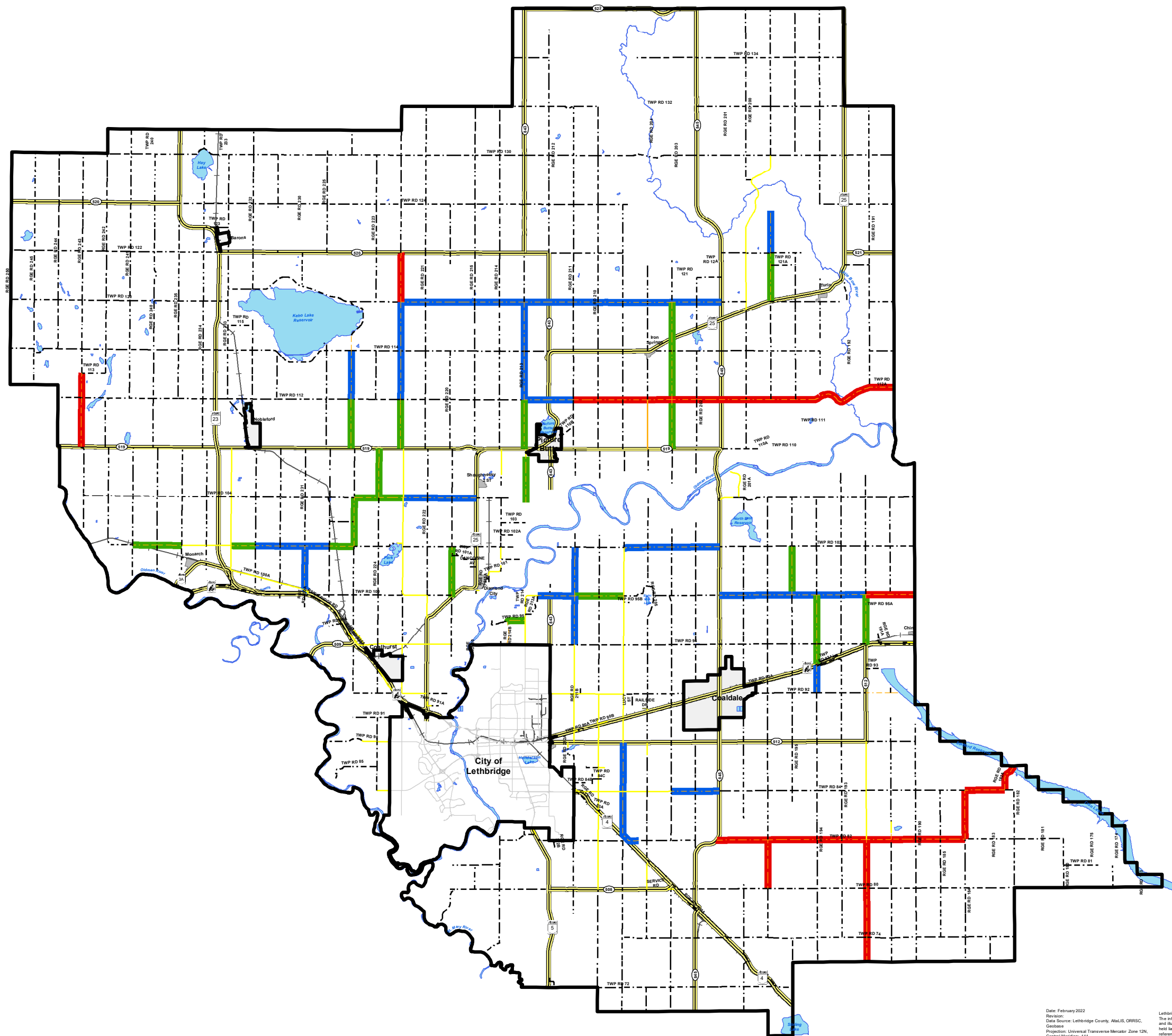
## Roads

## Surface Type

- Gravel
- - - - - Gravel (Base Stabilized)
- Paved (HMA); Paved (CMA)
- Concrete
- Cement Stabilized
- ==== Provincial Highways

## Priority

- 1
- 2
- 3

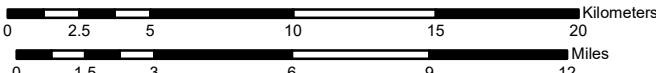


Date: February 2022  
Revision:  
Data Source: Lethbridge County, AltaLIS, ORRSC,  
Geobase  
Projection: Universal Transverse Mercator Zone 12N  
Central Meridian: -111  
Scale Factor: 0.9996  
Datum: North American Datum 1983

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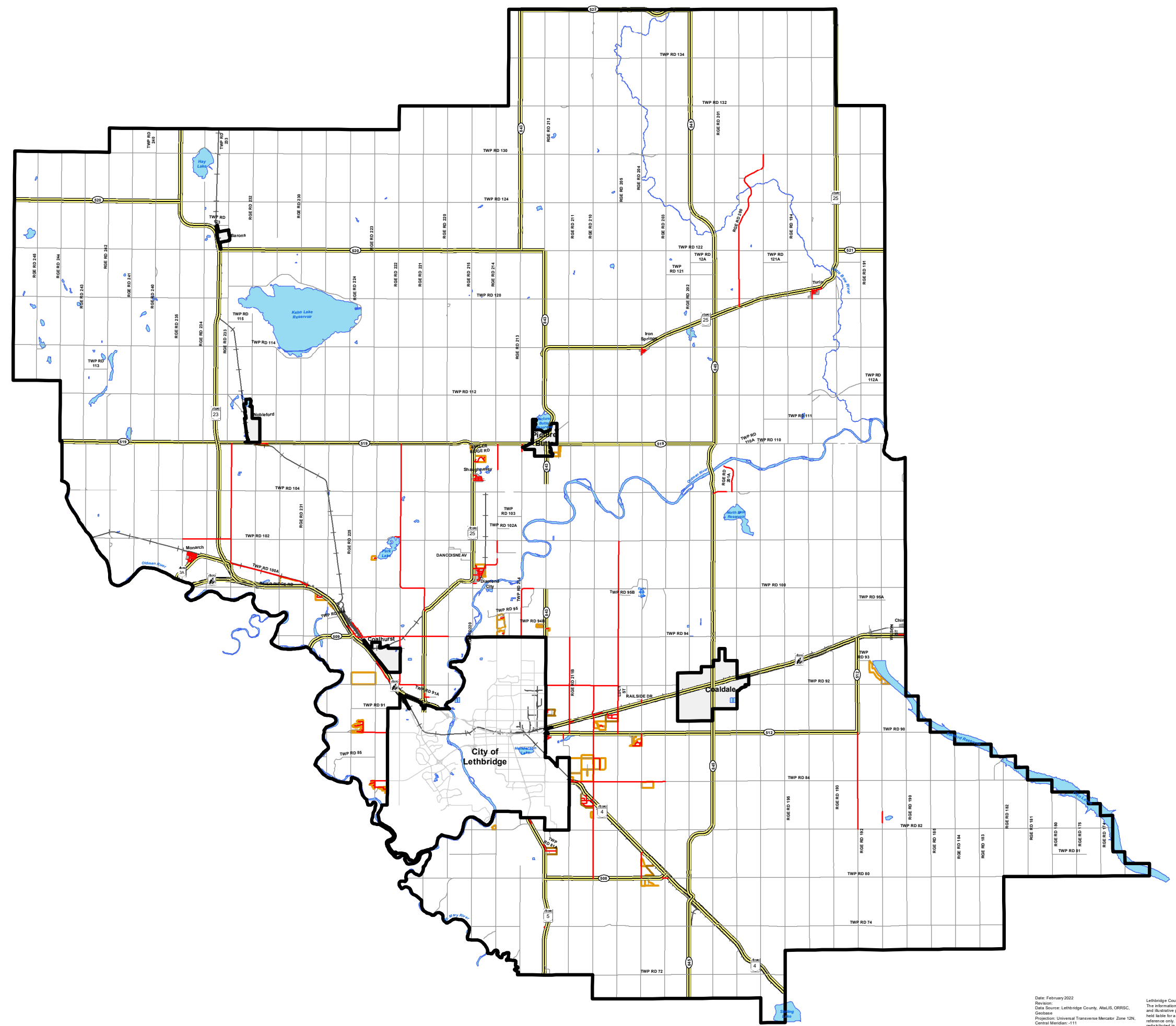
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# Lethbridge County Hard Surface Spray Patching Locations

## Legend

- Paved Surface
- All Other Roads
- Provincial Highways
- Industrial Park
- Subdivision



Date: February 2022  
 Revision:  
 Data Source: Lethbridge County, Atlas, ORRS,  
 Geobase  
 Projection: Universal Transverse Mercator Zone 12N,  
 Central Meridian: -111  
 Scale Factor: 0.9996  
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