



SECTION 6: TRANSPORTATION

6.0 INTRODUCTION

This section covers the design of the transportation system including but not limited to roadways, lanes, sidewalks and pathways located within road right of way.

6.0.1 GENERAL

Current practice is to use a system of arterial roadways, collector roadways, local roadways, lanes, sidewalks, and pathways to move people and goods.

The overall design principles described in the introduction to these standards are the basis on which all construction is undertaken in the City. Often, a combination of principles will come into play when designing a particular component of the system.

The designer must consider safety in the design of transportation facilities. At a minimum, the following safety factors shall be considered in the design of the transportation system:

- i. Number and types of vehicles using the roadway;
- ii. Accessibility of an area to emergency services;
- iii. Spacing, type, intersecting angle, and location of intersections and crosswalks;
- iv. Sight distance (decision, stopping, intersection, etc.);
- v. Level of access from adjacent properties;
- vi. Traffic calming requirements;
- vii. Playground and school zone locations;
- viii. Pedestrian facilities;
- ix. Cycling facilities;
- x. Intersection offsets;
- xi. Intersection control (Yield, Stop, roundabout or traffic signal);
- xii. Median treatment;
- xiii. Traffic control device warrants; and
- xiv. Requirements identified by the Alberta Building Code.

Designers shall consider how the transportation system interacts with other components of the City's infrastructure. In particular, this applies to major overland flow routes forming part of the Storm Water Management System (See Chapter 3).



6.0.2 LEVEL OF SERVICE OBJECTIVES

The objective of the transportation system is to allow movement of people and goods into, out of, and within the city while maintaining quality of life.

In considering the layout of streets, safety and convenience are overarching principles. Design of local roadways shall focus on providing safe access to adjacent properties, while minimizing speed and potential for transient traffic use.

When considering the impact of development of adjacent areas on existing arterial and collector roadways, more traditional definitions of level of service will be used. The City, in these cases, considers level of service “D” and a “Volume to Capacity” ratio of 0.80 to be acceptable operating conditions during peak traffic periods. Improvements are identified / required when the level of service reaches the “D/E” transition.

In addition to providing a minimum level of service for traffic flow, roadways and other surface improvements in the road right of way shall be designed to provide a useful life of 20 years with a minimal maintenance program.

6.0.3 APPLICABLE REGULATIONS, GUIDELINES AND RESOURCES

The following legislation provides information related to the design of transportation systems:

- 1) *Traffic Safety Act*

The following guidelines provide information on the design of transportation systems:

- 1) *Geometric Design Guide for Canadian Roads* Transportation Association of Canada, current edition.
- 2) *Manual of Uniform Traffic Control Devices for Canada* Transportation Association of Canada, current edition.
- 3) *Canadian Traffic Signal Warrant Matrix Procedure* Transportation Association of Canada, current edition.
- 4) *Pedestrian Crossing Control Guide* Transportation Association of Canada, current edition.

Designers of transportation systems are also referred to the following useful resources for additional information on Transportation Systems:

- 1) *Transportation Association of Canada*, <http://tac-atc.ca/>
- 2) *Alberta Transportation*, www.transportation.alberta.ca
- 3) *Institute of Transportation Engineers*, <http://www.ite.org/>



6.1 TRANSPORTATION REQUIREMENTS

6.1.1 TRAFFIC IMPACT ASSESSMENTS

A Traffic Impact Assessment (TIA) shall be completed for all new development or redevelopment that generates 100 additional trips during a peak hour period and/or is expected to create operational difficulties associated with the safe and efficient movement of traffic, pedestrians, bicycles, and transit vehicles.

A traffic impact assessment shall be required even if there are less than 100 peak hour trips when one or more of the following conditions are anticipated or present:

- The development/redevelopment is located in an area of high roadway congestion and/or a high expected rate of population or employment growth;
- The development is located within or adjacent to a residential community that has over-spill of parking issues and may have a residential parking permit program in place;
- The development is located in an area with existing parking issues;
- The development, its access or type of operation is not envisaged by local land-use or transportation plans;
- The development or redevelopment proposal requires amendment of the applicable official plan(s);
- As part of the proposed development, a new traffic signal is proposed to be installed on the arterial road network; or,
- If the development/redevelopment has the potential to create unacceptable adverse operational and safety impacts on the road network. Examples include the following:
 - Inadequate horizontal or vertical sight distances at access points;
 - The proximity of the proposed access points to other existing driveways or intersections;
 - Lack of existing left or right turn lane(s) on the adjacent roadway at the proposed access point(s);
 - The vehicular traffic generated by the development/redevelopment would result in volume/capacity ratios at an adjacent intersection becoming critical (i.e. greater than 0.80 overall or Level of Service D).

The onus is on the proponent/consultant to demonstrate that a traffic impact assessment is not required.

Qualifications to conduct a Traffic Impact Assessment



- When the scale of the development/redevelopment warrants a traffic impact assessment, it is the proponent's responsibility to retain a qualified transportation engineering consultant experienced in transportation planning and traffic engineering.
- The consultant's representative, the engineer responsible for the traffic impact assessment, shall be a member of the Institute of Transportation Engineers and registered as a Professional Engineer in the Province of Alberta. The report must be dated and signed accordingly. The signing Engineer is verifying that appropriate assumptions, procedures, and calculations have been undertaken during the process of completing the traffic impact assessment and that they are the individual who is taking corporate/professional responsibility for the work.

A Traffic Impact Assessment Guideline is available from the Transportation Business Unit for use by transportation consultants. The following guidelines provide additional information on traffic impact assessments:

- 1) *Transportation Impact Analysis for Site Development, Institute of Transportation Engineers*
- 2) *Transportation and Land Development, Institute of Transportation Engineers*
- 3) *Access Management Manual, Transportation Research Board*
- 4) *Trip Generation, Institute of Transportation Engineers*
- 5) *Traffic Impact Assessment Guideline, Alberta Transportation*

Specific requirements for the completion of a TIA are provided by the Transportation Business Unit on a case by case basis and generally include, but are not limited to:

- Identification of intersections to be included in the TIA;
- Proposed development layout;
- Development horizons (existing, interim, 10 year, 30 year, full build out, etc – horizons to be determined based on development size, complexity, and proposed staging);
- Confirmation of trip generation rates prior to analysis;
- Review of trip distribution assumptions prior to analysis (internal and external to site);
- Review of trip assignment prior to analysis (internal and external to site);
- On site circulation;
- On site parking layout;
- Access;
- Pedestrian requirements;
- Cycling requirements;
- Adjacent on-street parking;
- Transit requirements;



- Safety review;
- Traffic Signal Warrants (most recent available from TAC); and
- Synchro and/or Sidra analysis of intersections (City of Lethbridge factors).

Results of the TIA shall identify improvements in the transportation network required to support the proposed development. When considering the results of an Area Structure Plan or Outline Plan TIA, the developer shall be responsible for all improvements identified until the full build out of the development area, in a manner agreed upon with the City.

Traffic Impact Assessments can be separated into three categories:

- TIAs for Urbanization Plans and Area Structure Plans. These TIAs focus on the impact the new development area will have on the existing transportation network and the connection points to the existing/future external transportation network.
- TIAs for Outline Plans. At this level, the TIA will review the internal road network of the proposed development area and also refine the requirements for the access points.
- TIAs for specific development projects. These TIAs look specifically at an individual development site or sites that may be associated with rezoning or development permit applications.

Further information on the three types of Traffic Impact Assessments is available within the Traffic Impact Assessment Guideline.

Additional information is provided in Section 2 General Considerations for Planning Requirements.

6.1.2 ENVIRONMENTAL CONSIDERATIONS & BEST MANAGEMENT PRACTICES

As stewards of the environment, charged with creating a healthy city and protecting the natural endowments within our jurisdiction, the City promotes any design measures which reduce or mitigate the impacts of development.

In particular, design features and construction methods which contribute to improved storm water and air quality are strongly encouraged. Specifically related to transportation design and planning are measures which promote pedestrian and bicycle traffic and encourage the use of public transit.

Designers are referred to [STANDARDS AND GUIDELINES FOR MUNICIPAL WATERWORKS, WASTEWATER AND STORM DRAINAGE SYSTEMS](#) and [STORMWATER MANAGEMENT GUIDELINES FOR THE PROVINCE OF ALBERTA](#) both published by Alberta Environmental Protection for a list of Best Management Practices, which can be designed into the transportation system to reduce the environmental impacts of urbanization.



6.2 TRANSIT REQUIREMENTS

The City of Lethbridge is committed to transit orientated developments (TOD). To accomplish this goal, all developments shall locate moderate to higher density developments within an easy walk of a major transit stop, generally with a mix of residential, employment, and shopping opportunities designed for pedestrians without excluding vehicles. Major senior facilities shall be located adjacent to roadways with transit routes.

6.2.1 GENERAL

Transit routes shall not be located on Local roadways. They should be located on any of the following:

- Arterial (accommodated with pull outs),
- Super Collector,
- Community Entrance Roads,
- Major Collector,
- Minor Collector, or
- Industrial Collector roadways.

6.2.2 WALK DISTANCES

Transit services shall be considered where the location exceeds the following distance from a transit route:

- 400 metres walking distance for residential areas (an area may be excluded from consideration if 90% of all residences in the built up area are currently served);
- 250 metres walking distance to all medium and high density residential buildings;
- 250 metres walking distance to institutional facilities including major educational, medical and recreational services;
- 200 metres walking distance to major seniors' residences and seniors activity centres; and
- 750 metres to industrial land uses.

6.2.3 BUS STOPS

Bus stops shall not be located less than 250 metres apart (multiple stops at a single location may be considered), are to be spaced to achieve the walking distance standards, and their location selected to maximize safety considerations.



Stops and the area around them shall be accessible to people with disabilities, including wheelchairs and other mobility aids. Pads shall be installed at all stops and curb cuts at each corner. In general bus stops should be located downstream of intersections.



6.3 ARTERIAL

6.3.1 ARTERIAL

Design

TRAFFIC VOLUME (vehicles per day)	NUMBER OF LANES	RIGHT-OF-WAY REQUIREMENT	MINIMUM INTERSECTION SPACING (Property Lines)
Over 15,000	2 to 6	45.0 m to 75.0 m	400 m
FUNCTION			
<ul style="list-style-type: none"> To allow movement between sections and subdivisions within the City of Lethbridge Arterial roadways are generally laid out on 1.6 km intervals along the boundaries of neighbourhoods To function as part of the Truck Route system 			
CONDITIONS			
<ul style="list-style-type: none"> Intersections may be grade separated when warranted An ultimate arterial is a divided roadway with full access control Arterials may intersect with Arterial, Super Collector, or Community Entrance roadways Right in right out access to adjacent property will be considered by the Transportation Business Unit pending completion of a Traffic Impact Assessment by the applicant No direct vehicular access is allowed to adjacent residential property Intersection spacing on an Arterial shall be no closer than 400 m property line to property line unless agreed to in writing by the Transportation Business Unit. The minimum acceptable distance between the termination of an interchange ramp and the centreline of the first intersection is 400 m Where intersections are at grade, channelization may be required to control turning movements All transit stops shall be accommodated in pull outs WB-20 design vehicle with 1.0 m buffer for all arterial access points to commercial land uses 			
FEATURES		NOTES	
Posted Speed (kph)	50 to 80	<ol style="list-style-type: none"> Basic right of way requirement is 45.0 m. An additional 15.0 m shall be added to each side adjacent to residential development Design and construction shall be undertaken by the City of Lethbridge when necessary and as funding becomes available ROW shall be purchased from the developer by the City at the time of subdivision at the current market rate for raw land Developers adjacent to Arterial roadways shall make provision for storm water management for the Arterial road adjacent to their development 	
Parking	No		
Sidewalk	Regional pathway on one side or, if warranted, both sides		
Traffic Signals	As Warranted		



Pedestrian Crossing	At Grade Ramps required	5. Subdivision design shall aim for back of lot grades to be 600mm above the shoulder curb elevation of the arterial road 6. All intersections shall be as near as possible to 90 degrees 7. Modification of the Arterial roadway standard will be considered by the Transportation Business Unit on a case-by-case basis 8. Arterial roadway construction may be staged to meet traffic volume requirements 9. Play grounds shall be placed a sufficient distance from an arterial roadway to eliminate the need for a playground zone 10. Manholes shall not be placed in pathways	
Bikeway	Regional Pathway		
Transit Route	Yes		
Truck Route	Yes		
Sound Attenuation	15 m in ROW adjacent to residential areas		
Pavement Markings	Yes	Reference Drawings	SLA_06

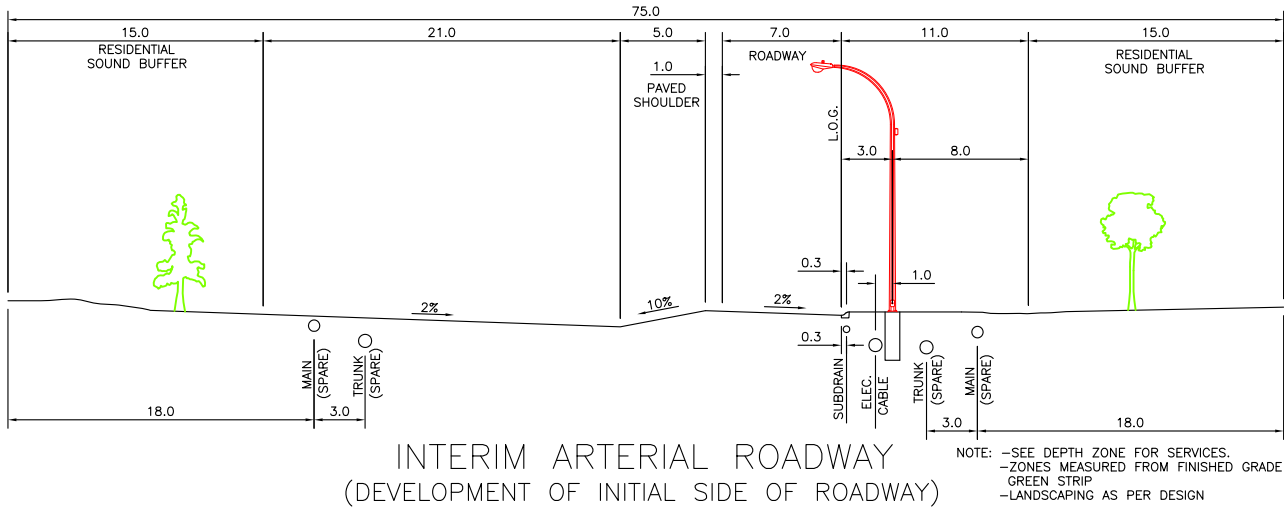
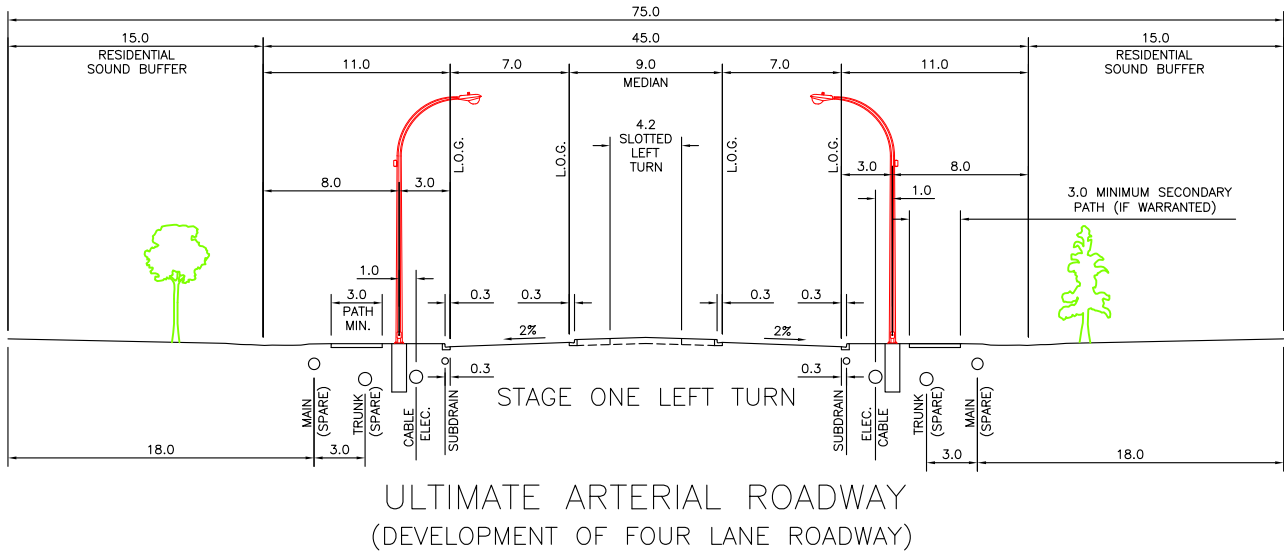
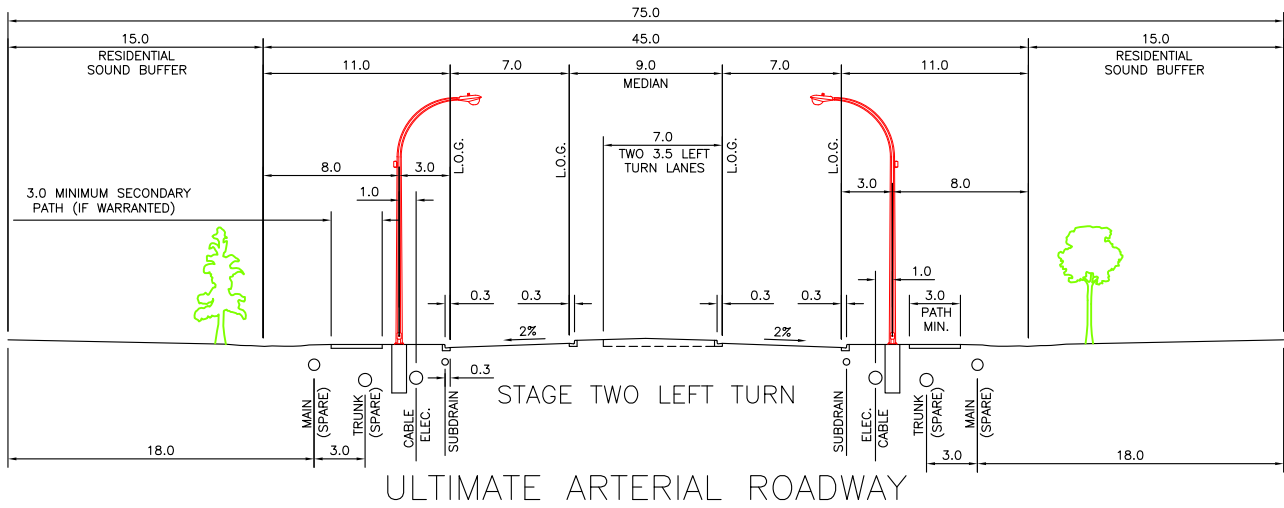
6.3.2 ARTERIAL

Geometric

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Urban Arterial Divided (UAD 60)	60-90 kph	WB-20
Urban Arterial Divided (UAD 70)		
Urban Arterial Divided (UAD 80)		(1.0 m buffer with a minimum of 0.3 m each side of vehicle)
Urban Arterial Divided (UAD 90)		
HORIZONTAL ALIGNMENT		
Minimum Stopping Sight Distance		Minimum Radius of Curvature
(As per current TAC GDGCR)		(As per current TAC GDGCR)
Median Left Turn Bay		
All arterial intersections to allow: <ul style="list-style-type: none"> • Stage 1 – single slotted left turn bays with opposing left turns capable of operating simultaneously • Stage 2 – dual parallel left turn bays with opposing left turns capable of operating simultaneously • Left turn bay storage lengths as per 6.12.1 Intersection Design • (As per current TAC GDGCR) 		
VERTICAL ALIGNMENT		
Maximum & Minimum Grades		



<ul style="list-style-type: none">• Max 6%, Min 0.6%	
Grade at Intersections	
<ul style="list-style-type: none">• (As per current TAC GDGCR)	
Vertical Curves & Super Elevation	
<ul style="list-style-type: none">• Vertical curve lengths in meters should not be less than speed in kilometers per hour• Use 0.04 or 0.06 superelevation tables	
PAVEMENT STRUCTURE	REFERENCE DRAWINGS
STR 18a	City of Lethbridge Engineering Standards;



INTERIM ARTERIAL ROADWAY
(DEVELOPMENT OF INITIAL SIDE OF ROADWAY)

DATE	REVISION	BY
11/06	BUFFERED UTILITIES	R.J.K.
01/13	PATHWAYS ADDED	R.J.K.
02/16	TREES ADDED	R.J.K.
FILE:	TRAN_6.3.dwg	



CITY OF
Lethbridge

INFRASTRUCTURE SERVICES

75m ARTERIAL ROAD

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	10/05/1999
DWG NO:	TRAN_6.3



6.4 SUPER COLLECTOR

6.4.1 SUPER COLLECTOR

Design

TRAFFIC VOLUME (vehicles per day)	NUMBER OF LANES	RIGHT-OF-WAY REQUIREMENT	MINIMUM INTERSECTION SPACING (Property Lines)
2,000 to 15,000	2 to 4 (see Geometric note)	<i>See Note 1</i>	200 m

FUNCTION

- To distribute traffic in commercial areas, between residential communities, and as community entry roadways
- To serve secondary traffic generators such as commercial centres, recreational facilities, schools, and traffic from neighbourhood to neighbourhood within the community
- To connect commercial areas and residential communities to arterials
- May be used as a transit route

CONDITIONS

- Direct access to abutting commercial properties shall be based on intersection spacing requirements
- Residential frontage is not permitted on a Super Collector
- Super Collectors may intersect with Local roadways, Minor Collectors, Major Collectors, Community Entrance Roads, other Super Collectors, or Arterial roadways
- Developers shall complete a Traffic Impact Assessment prior to approval of commercial driveway access to a Super Collector.
- When a Super Collector intersects with an Arterial, all turns driveway access from adjacent properties shall not be allowed within a minimum distance of 200 m from the edge of the Arterial right of way
- Right in right out driveway access to adjacent property will be considered by the Transportation Business Unit pending completion of a Traffic Impact Assessment by the applicant
- Intersection spacing on Super Collectors shall not be less than 200 m property line to property line unless agreed to in writing by the Transportation Business Unit.

FEATURES		NOTES
Posted Speed (kph)	50	1. Basic right of way requirement is 30.0 m. Additional right of way shall be required for trees in boulevard and/or median 2. Divided roadway 3. All intersections shall be as near as possible to 90 degrees 4. Super Collector roadways shall not end in a cul-de-sac
Parking	No	
Sidewalk	Yes (<i>see Note 8</i>)	
Traffic Signals	As Warranted	



Pedestrian Crossing	At Grade Ramps required	5. Super Collector roadways shall be configured in loops and/or intersect with other Collector or Arterial roadways at a minimum of two locations 6. Modification of the Super Collector standard will be considered by the Transportation Business Unit on a case-by-case basis 7. If the roadway is adjacent to low density residential development, one storey single family residential dwellings must back onto the Super Collector unless sufficient noise attenuation is provided by the developer 8. Separate sidewalk, curb and gutter shall be provided on one side and regional pathway on one side 9. Play grounds shall be placed a sufficient distance from a super collector to eliminate the need for a playground zone 10. If left turn bays will not be developed at the intersection the median width must be reduced if not being used for landscaping. 11. Manholes shall not be placed in pathways	
Bikeway	TBD		
Transit Route	Yes		
Truck Route	No		
Sound Attenuation	As warranted		
Pavement Markings	Yes	Reference Drawings	SLA_07

6.4.2 SUPER COLLECTOR

Geometric

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Urban Collector Divided (UCD 60)	60	Residential - WB-17 Commercial - WB-20 (1.0 m buffer with a minimum of 0.3 m each side of vehicle))
HORIZONTAL ALIGNMENT		
Minimum Stopping Sight Distance		Minimum Radius of Curvature
(As per current TAC GDGCR)		(As per current TAC GDGCR)
Median Left Turn Bay		
<ul style="list-style-type: none"> Left turn bay storage lengths as per 6.12.1 Intersection Design (As per current TAC GDGCR) 		
VERTICAL ALIGNMENT		
Maximum & Minimum Grades		
<ul style="list-style-type: none"> Max 6%, Min 0.6% 		



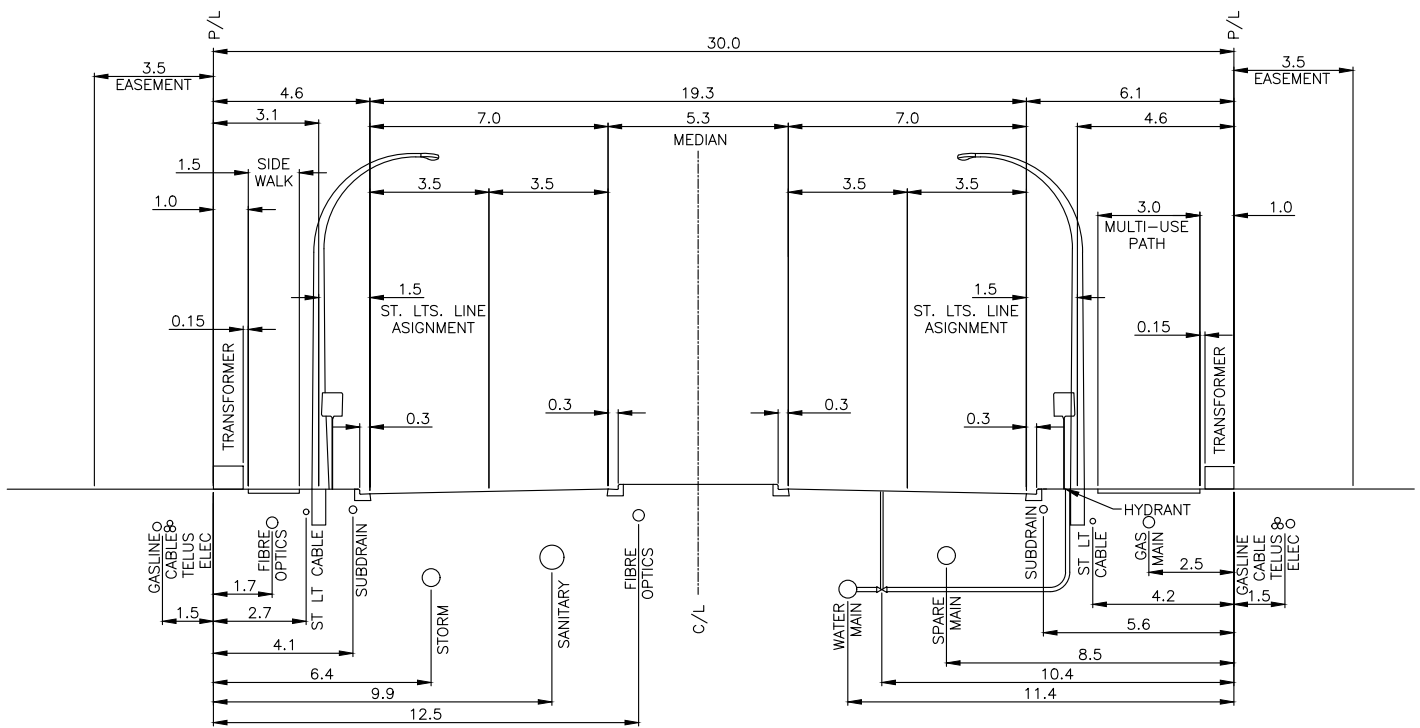
Grade at Intersections	
<ul style="list-style-type: none">• (As per current TAC GDGCR)	
Vertical Curves & Super Elevation	
<ul style="list-style-type: none">• Vertical curve lengths in meters should not be less than speed in kilometers per hour• Use 0.04 or 0.06 superelevation tables	
PAVEMENT STRUCTURE	REFERENCE DRAWINGS
STR 18a	City of Lethbridge Engineering Standards;

NOTES

Super Collectors are required in commercial and high volume residential areas. The number of lanes is dependent on future traffic volume and intersection control. Design of the appropriate super collector cross-section requires careful consideration. The following list identifies several of the alternate super collector concepts.

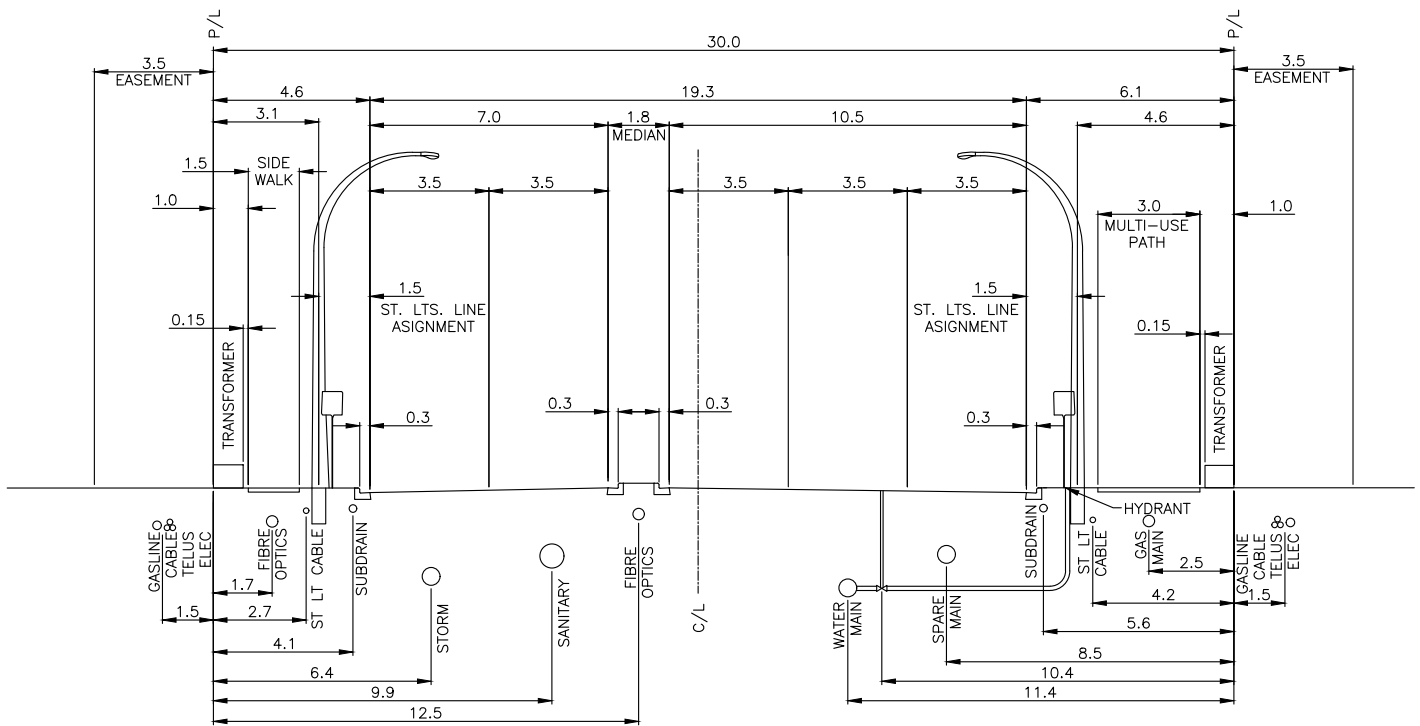
- Two lane, no parking, conventional intersection
- Two lane, parking, conventional intersection
- Two lane, no parking, roundabout intersection
- Two lane, parking, roundabout intersection
- Four lane, no parking, conventional intersection
- Four lane, no parking, roundabout intersection

Cross-sections approaching roundabout intersections or conventional intersections that do not require development of a left turn bay may require a reduction in the median width if not being used for landscaping. The median width in these cases shall be based on engineering requirements including, but not limited to, safety, sight distance, access control, adjacent parking, and maintenance.



TYPICAL SECTION

NOTE: SHALLOW UTILITY EASEMENT:
 -3.5m 4 PARTY TRENCHING (RESIDENTIAL)
 -ADDITIONAL RIGHT OF WAY WILL BE REQUIRED TO PROVIDE TREES IN BOULEVARD AND/OR MEDIAN



LEFT TURN SECTION

DATE	REVISION	BY
02/05	REVISED	W.G.C.
02/07	REVISED	R.J.K.
12/07	REVISED	R.J.K.
01/11	SHALLOW UTILITIES	R.J.K.
04/16	1.5m SIDEWALKS	R.J.K.
FILE:	TRAN_6.4.dwg	

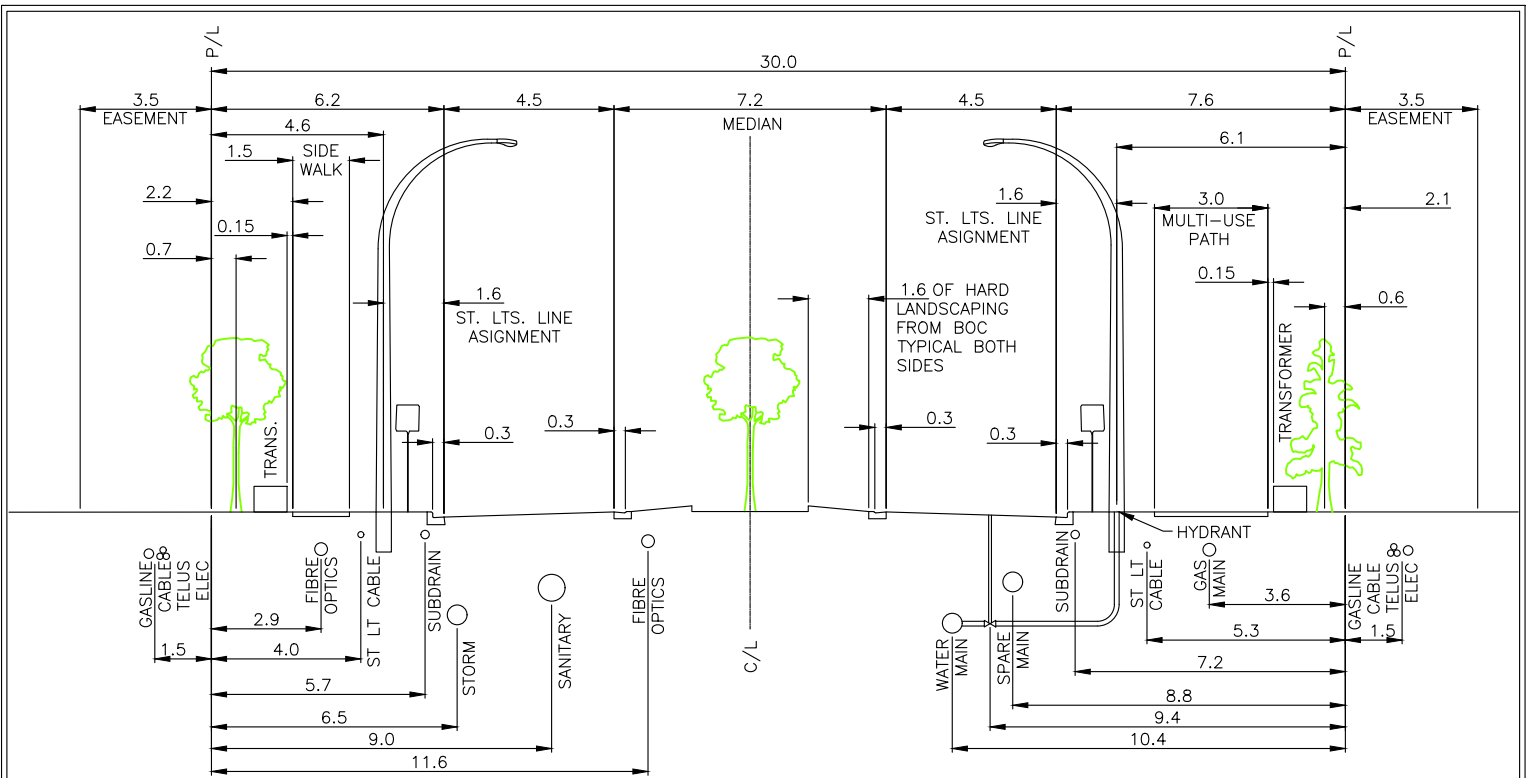


CITY OF
Lethbridge

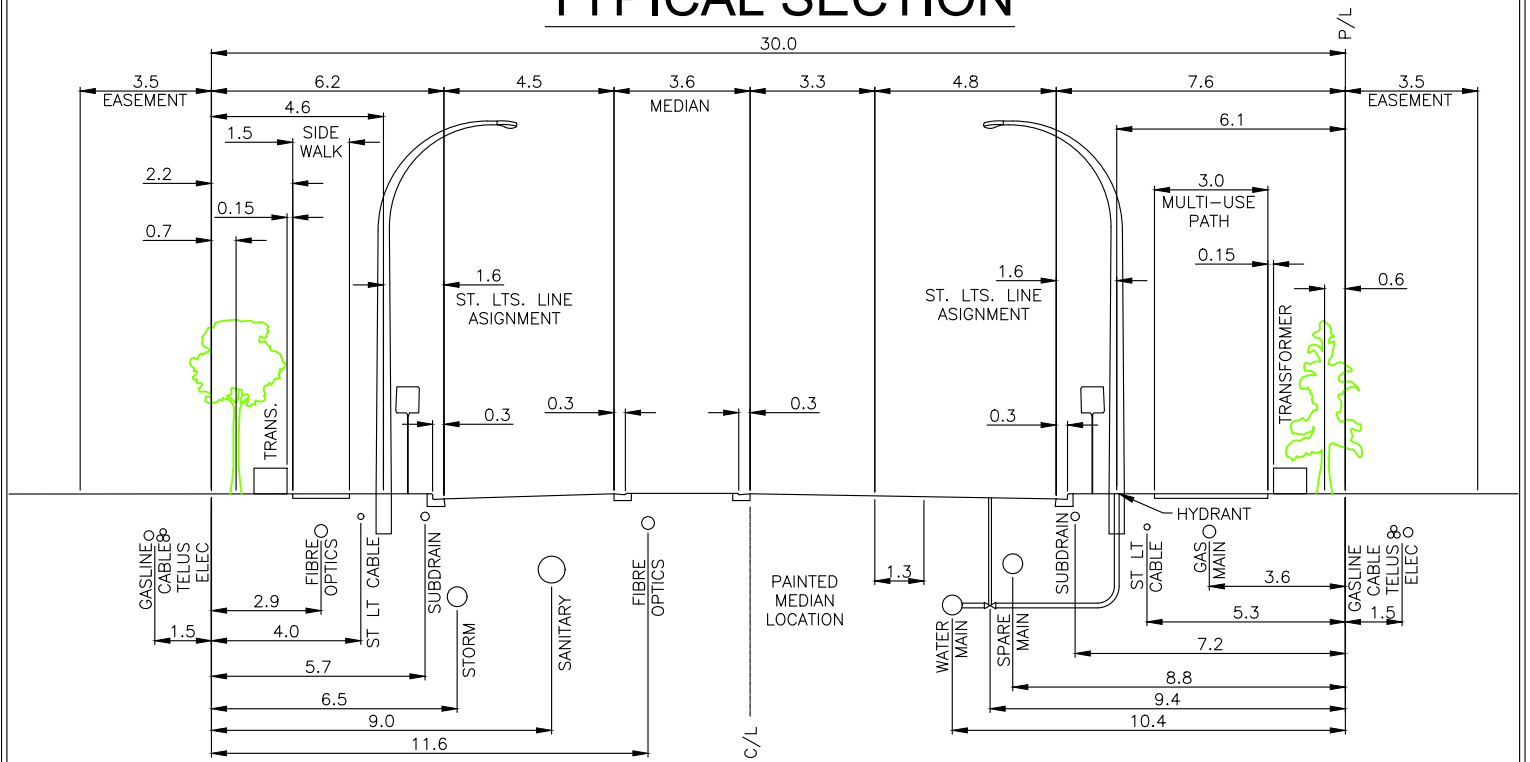
INFRASTRUCTURE SERVICES

30m SUPER COLLECTOR
 (4 LANES)
 WITH CONVENTIONAL INTERSECTION

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	04/02/2004
DWG NO:	TRAN_6.4



TYPICAL SECTION



LEFT TURN SECTION

DATE	REVISION	BY
02/11	SHALLOW UTILITIES	R.J.K.
04/16	1.5m SIDEWALKS	R.J.K.
FILE:	TRAN_6.4a.dwg	



CITY OF
Lethbridge

INFRASTRUCTURE SERVICES

30m SUPER COLLECTOR
(2 LANES)
WITH CONVENTIONAL INTERSECTION

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	15/11/2006
DWG NO:	TRAN_6.4a



6.5 COMMUNITY ENTRANCE ROAD

6.5.1 COMMUNITY ENTRANCE ROAD

Design

TRAFFIC VOLUME (vehicles per day)	NUMBER OF LANES	RIGHT-OF-WAY REQUIREMENT	MINIMUM INTERSECTION SPACING (Property Lines)
2,000 to 8,000	2	28.0 m	120 m
FUNCTION			
<ul style="list-style-type: none"> To distribute traffic between residential communities and as community access points from Arterial roadways To serve secondary traffic generators such as neighbourhood commercial centres, recreational facilities, schools and traffic from neighbourhood to neighbourhood within the community To serve as a transit route 			
CONDITIONS			
<ul style="list-style-type: none"> Direct access shall be permitted to abutting commercial properties Residential frontage shall not be permitted on a Community Entrance Road Community Entrance Road shall intersect with Local roadways, Minor Collectors, Major Collectors, other Community Entrance Roads, Super Collectors or Arterial roadways Developers shall complete a Traffic Impact Assessment prior to approval of commercial driveway access to a Community Entrance Road. When a Community Entrance Road intersects with an Arterial, driveway access from adjacent properties shall not be allowed within a minimum distance of 60 m from the edge of the Arterial right of way Intersection spacing on Community Entrance Roads shall not be less than 120 m property line to property line unless agreed to in writing by the Transportation Business Unit. Right in right out access to adjacent commercial property shall be considered by the Transportation Business Unit on a case-by-case basis. 			
FEATURES		NOTES	
Posted Speed (kph)	50	<ol style="list-style-type: none"> Divided roadway All intersections shall be as near as possible to 90 degrees The cross section shall increase to four lanes at intersections if additional capacity is required for turning movements Intersection control by yield signs, stop signs or traffic signal as warranted No residential access permitted Sufficient carriageway is required to permit two way traffic on either side of the median if a road closure is in effect on the other side of the median 	
Parking	No		
Sidewalk	Yes (<i>see Note 8</i>)		
Traffic Signals	As Warranted		
Pedestrian Crossing	At Grade Ramps required		
Bikeway	TBD		

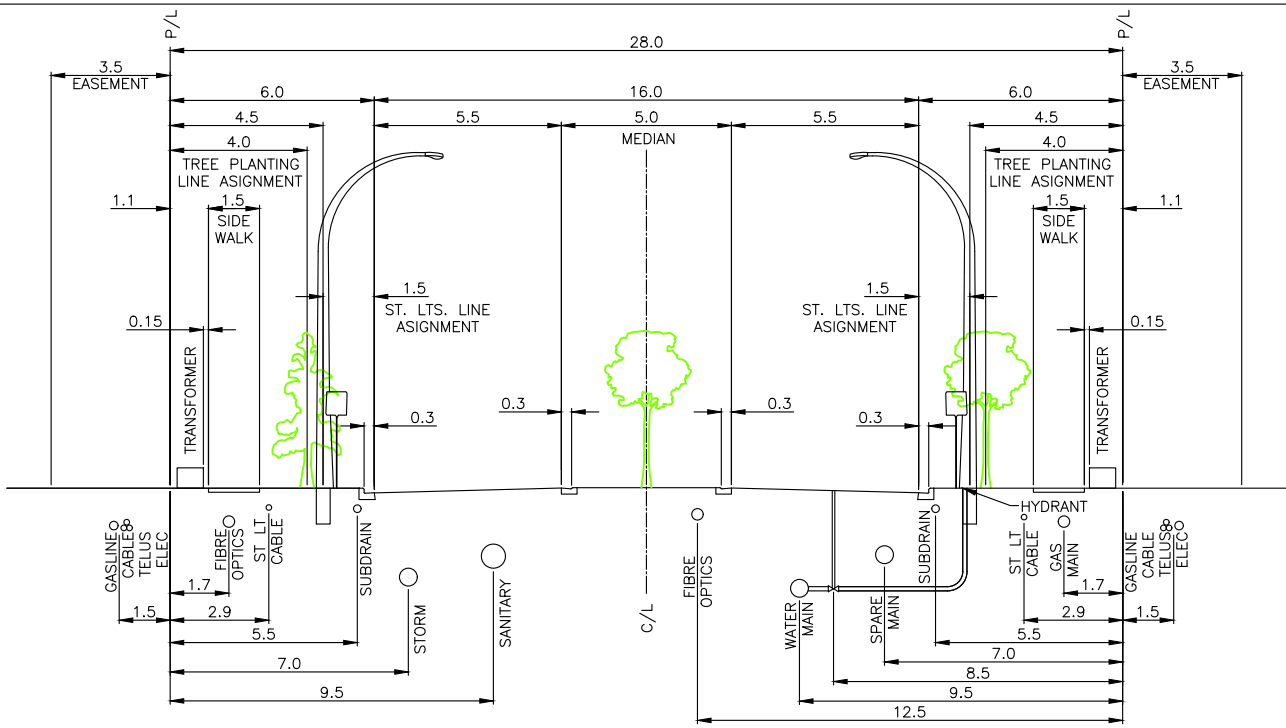


Transit Route	Yes	7. Modification of the Community Entrance Road standard will be considered by the Transportation Business Unit on a case-by-case basis
Truck Route	No	
Sound Attenuation	As warranted	
Pavement Markings	Yes	8. Separate sidewalk, curb, and gutter on both sides 9. Play grounds must be placed a sufficient distance from a community entrance road to eliminate the need for a playground zone
		Reference Drawings

6.5.2 COMMUNITY ENTRANCE ROAD

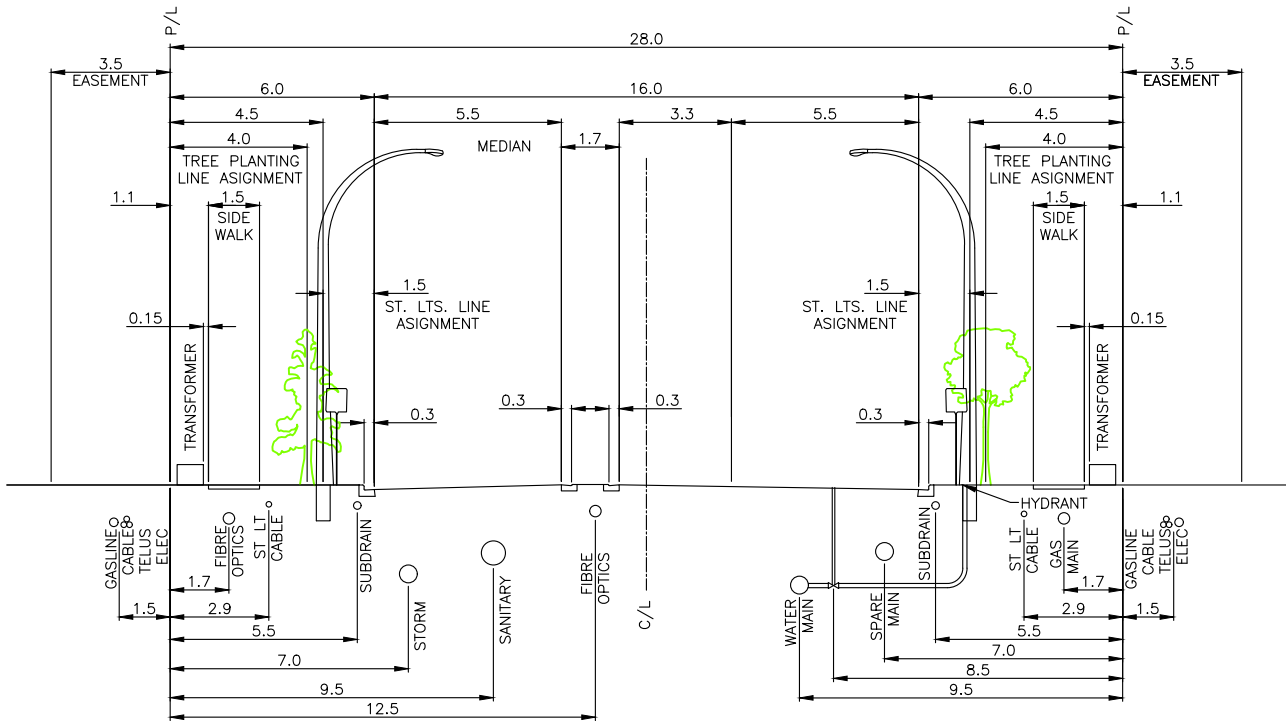
Geometric

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Urban Collector Divided (UCD 60)	60 kph	Residential - WB-17 Commercial - WB-20 (1.0 m buffer with a minimum of 0.3 m each side of vehicle)
HORIZONTAL ALIGNMENT		
Minimum Stopping Sight Distance		Minimum Radius of Curvature
As per current TAC GDGCR		As per current TAC GDGCR
Median Left Turn Bay		
<ul style="list-style-type: none"> Left turn bay storage lengths as per 6.12.1 Intersection Design As per current TAC GDGCR 		
VERTICAL ALIGNMENT		
Maximum & Minimum Grades		
<ul style="list-style-type: none"> Max 6%, Min 0.6% 		
Grade at Intersections		
<ul style="list-style-type: none"> As per current TAC GDGSCR 		
Vertical Curves & Super Elevation		
<ul style="list-style-type: none"> Vertical curve lengths in meters should not be less than speed in kilometers per hour Use 0.04 or 0.06 superelevation tables 		
PAVEMENT STRUCTURE		REFERENCE DRAWINGS
STR 18a		City of Lethbridge Engineering Standards;



TYPICAL SECTION

NOTE: SHALLOW UTILITY EASEMENT:
-3.5m 4 PARTY TRENCHING



LEFT TURN SECTION

DATE	REVISION	BY
01/11	SHALLOW UTILITIES	R.J.K.
04/16	1.5m SIDEWALKS	R.J.K.



CITY OF
Lethbridge

INFRASTRUCTURE SERVICES

28m COMMUNITY ENTRANCE
COLLECTOR ROAD

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	26/02/2004
DWG NO:	TRAN_6.5

FILE: TRAN_6.5.dwg



6.6 MAJOR COLLECTOR

6.6.1 MAJOR COLLECTOR

Design

TRAFFIC VOLUME (vehicles per day)	NUMBER OF LANES	RIGHT-OF-WAY REQUIREMENT	MINIMUM INTERSECTION SPACING (Property Lines)
2,000 to 8,000	2	25.0 m	120 m
FUNCTION			
<ul style="list-style-type: none"> To collect and distribute traffic within residential communities To provide access to the adjacent residential lots within the subdivision To serve secondary traffic generators such as neighbourhood commercial centres, recreational facilities, schools, and traffic from neighbourhood to neighbourhood within the community To serve as a transit route 			
CONDITIONS			
<ul style="list-style-type: none"> Direct access shall be permitted to abutting residential and commercial properties Major Collectors shall intersect with Local roadways, Minor Collectors, other Major Collectors, Community Entrance Roads, or Super Collectors Lane intersections with Major Collector roadways are not preferred. (All efforts should be taken to eliminate the intersection) Adequate emergency services access shall be provided to all abutting properties Lane connections to Major Collector roadways will be treated as driveways until the lane generates more than 250 vehicles per day. (No less than 30m from the nearest intersection measured from property line to property line) Intersection spacing on Major Collector roadways shall not be less than 120 m property line to property line unless agreed to in writing by the Transportation Business Unit 			
FEATURES		NOTES	
Posted Speed (kph)	50	<ol style="list-style-type: none"> Undivided roadway All intersections shall be as near as possible to 90 degrees Intersection control by yield signs, stop signs, or a roundabout as warranted Parking permitted on both sides of roadway, but may be restricted on higher volume sections by the Transportation Business Unit on a case by case basis Major Collector roadways shall not end in a cul-de-sac 	
Parking	Yes (see Note 4)		
Sidewalk	Separate sidewalk, curb and gutter on both sides		
Traffic Signals	As Warranted		



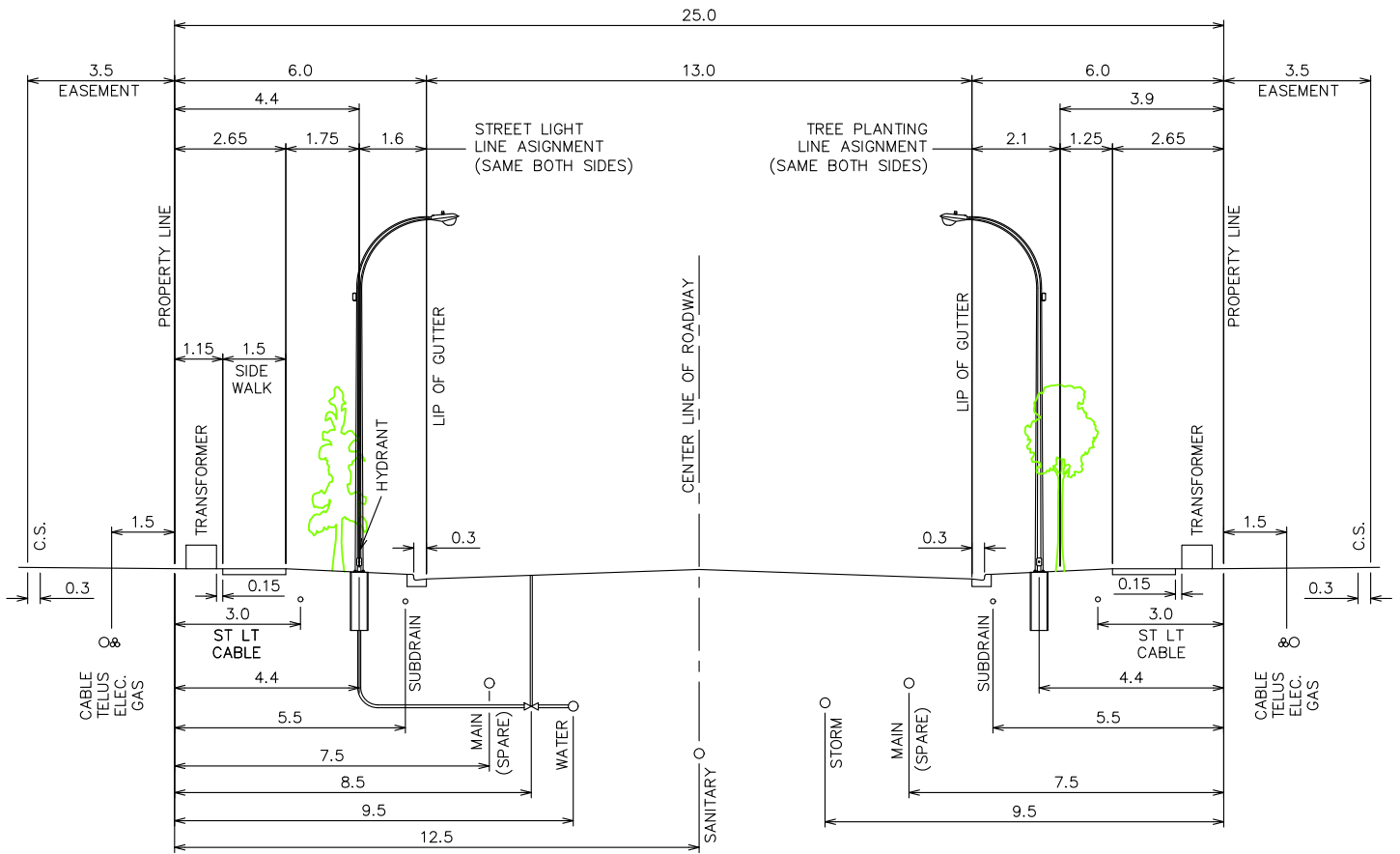
Pedestrian Crossing	At Grade Ramps required	6. Major Collector roadways shall be configured in loops and/or intersect with other Collector or Arterial roadways at a minimum of two locations	
Bikeway	TBD	7. All Major Collector roadways shall have yellow centerline pavement markings.	
Transit Route	Yes	8. No front residential driveway access on Major Collectors with projected volumes exceeding 7000 vehicles per day	
Truck Route	No	9. Major Collector roadways shall be configured to discourage transient traffic through residential neighbourhoods	
Sound Attenuation	No	10. Modification of the Major Collector standard shall be considered by the Transportation Business Unit on a case-by-case basis	
		11. Playground and School zones shall be minimized on Major Collector roadways	
		12. Traffic calming shall be considered on Major Collectors with potential for transient traffic	
Pavement Markings	Yes	Reference Drawings	SLA_05



6.6.2 MAJOR COLLECTOR

Geometric

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Urban Collector Undivided (UCU 50) Urban Collector Undivided (UCU 60)	50 - 60 kph	Residential - WB-17 Commercial - WB-20 (1.0 m buffer with a minimum of 0.3 m each side of vehicle)
HORIZONTAL ALIGNMENT		
Minimum Stopping Sight Distance		Minimum Radius of Curvature
(As per current TAC GDGCR)		(As per current TAC GDGCR)
VERTICAL ALIGNMENT		
Maximum & Minimum Grades		
<ul style="list-style-type: none"> Max 6%, Min 0.6% 		
Grade at Intersections		
<ul style="list-style-type: none"> (As per current TAC GDGCR) 		
Vertical Curves & Super Elevation		
<ul style="list-style-type: none"> Vertical curve lengths in meters should not be less than speed in kilometers per hour Use 0.04 or 0.06 superelevation tables 		
PAVEMENT STRUCTURE		REFERENCE DRAWINGS
STR 18a		City of Lethbridge Engineering Standards;



NOTE: -SEE DEPTH ZONES OF SERVICES. HYDRANT, TRANSFORMERS AND STREET LIGHTS ARE CENTERED ON LOT LINE EXTENSIONS

-WIRE FOR ELECTRIC/TELUSS/SHAW AND GAS CABLE 1.5m BACK FROM PROPERTY LINE

-TRANSFORMERS & PEDESTALS 0.15m BACK OF SIDEWALK

-SHALLOW UTILITY EASEMENT 3.5m 4 PARTY TRENCHING (RESIDENTIAL)

DATE	REVISION	BY
01/01	REVISED	A.D.
01/04	REVISED	W.G.C.
02/04	REVISED	W.G.C.
11/06	UPDATE	R.J.K.
11/07	UPDATE	R.J.K.
03/14	UTIL. SPACING	R.J.K.
04/16	1.5m SIDEWALK	R.J.K.
FILE:	TRAN_6.6b.dwg	



CITY OF
Lethbridge

INFRASTRUCTURE SERVICES

25m MAJOR COLLECTOR

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	30/01/1997
DWG NO:	TRAN_6.6b



6.7 MINOR COLLECTOR

6.7.1 MINOR COLLECTOR

Design

TRAFFIC VOLUME (vehicles per day)	NUMBER OF LANES	RIGHT-OF-WAY REQUIREMENT	MINIMUM INTERSECTION SPACING (Property Lines)
up to 4000	2	21 or 23 m	60 m
FUNCTION			
<ul style="list-style-type: none"> To collect and distribute traffic within residential communities To provide access to the adjacent residential lots within the subdivision To serve secondary traffic generators such as recreational facilities and schools To serve as a transit route 			
CONDITIONS			
<ul style="list-style-type: none"> Direct access shall be permitted to abutting residential properties, schools, and recreational facilities Minor Collectors shall intersect with Lanes, Local roadways, other Minor Collectors, Major Collectors, Community Entrance Roads, or Super Collectors Adequate emergency services access shall be provided to all abutting properties Intersection spacing on Minor Collector roadways shall not be less than 60 m unless agreed to in writing by the Transportation Business Unit Lane connections to Minor Collector roadways will be treated as driveways until the lane generates more than 250 vehicles per day. (No less than 30 m from the nearest intersection measured from property line to property line) 			
FEATURES		NOTES	
Posted Speed (kph)	50	<ol style="list-style-type: none"> Undivided roadway All intersections shall be as near as possible to 90 degrees Intersection control by yield signs or stop signs as warranted Parking permitted on both sides of roadway, but may be restricted under special circumstances Minor Collector roadways shall not end in a cul-de-sac Minor Collector roadways shall be configured in loops and/or intersect with other Collector roadways at a minimum of two locations Minor Collector roadways shall be configured to discourage transient traffic through residential neighbourhoods Modification of the Minor Collector standard shall be considered by the Transportation Business Unit on a case-by-case basis 	
Parking	Yes (Both Sides)		
Sidewalk	Combined or separate sidewalk, curb and gutter on both sides		
Traffic Signals	As Warranted		
Pedestrian Crossing	At Grade Ramps required		
Bikeway	TBD		

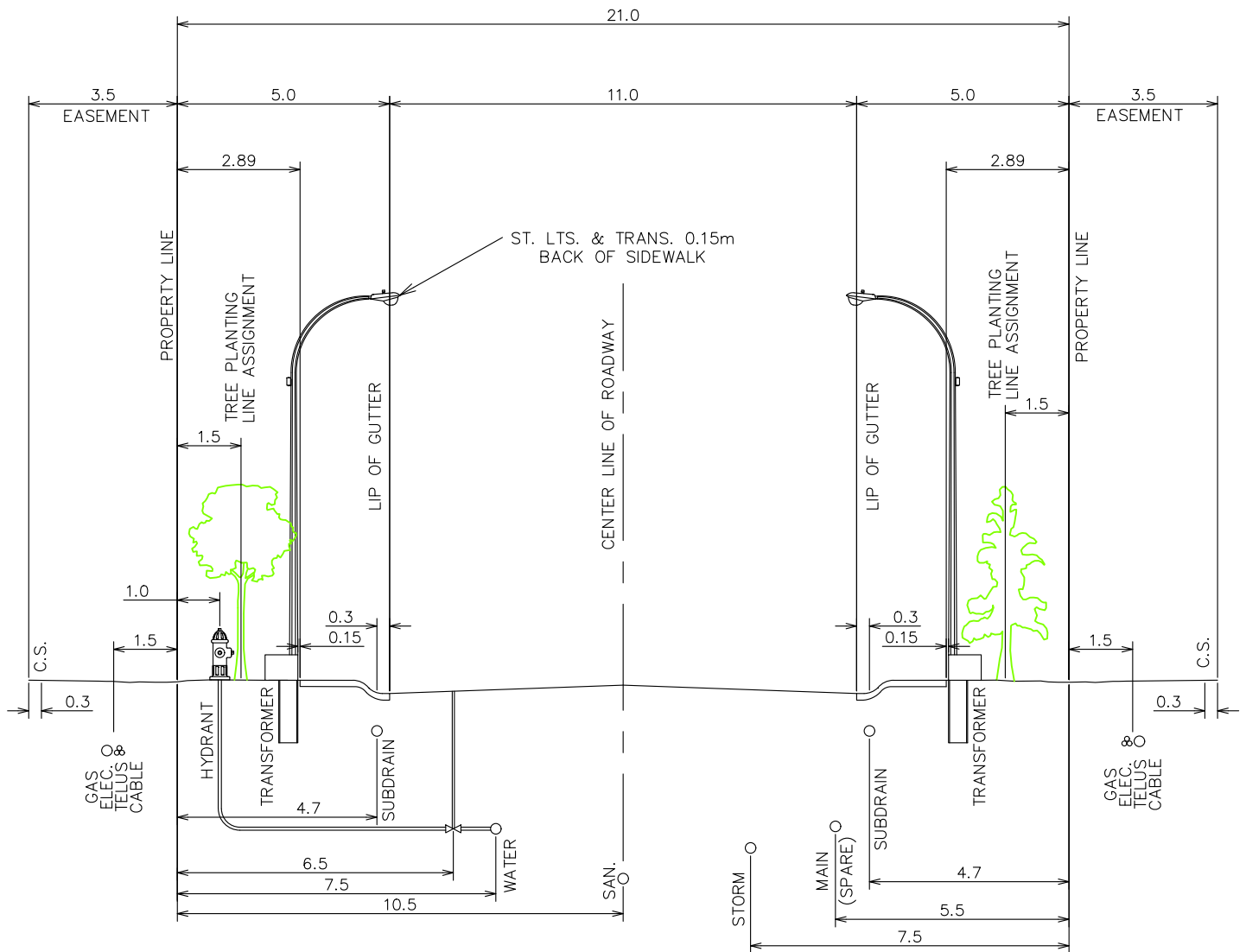


Transit Route	Yes	9. Use of a Minor Collector requires written approval of the Transportation Business Unit 10. Traffic calming shall be considered on Minor Collectors with potential for transient traffic	
Truck Route	No		
Sound Attenuation	No		
Pavement Markings	No	Reference Drawings	SLA_04

6.7.2 MINOR COLLECTOR

Geometric

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Urban Collector Undivided (UAU 50)	50 kph	WB-17 (1.0 m buffer with a minimum of 0.3 m each side of vehicle)
HORIZONTAL ALIGNMENT		
Minimum Stopping Sight Distance		Minimum Radius of Curvature
(As per current TAC GDGCR)		(As per current TAC GDGCR)
VERTICAL ALIGNMENT		
Maximum & Minimum Grades		
<ul style="list-style-type: none"> Max 6%, Min 0.6% 		
Grade at Intersections		
<ul style="list-style-type: none"> (As per current TAC GDGCR) 		
Vertical Curves & Super Elevation		
<ul style="list-style-type: none"> Vertical curve lengths in meters should not be less than speed in kilometers per hour Use 0.04 or 0.06 superelevation tables 		
PAVEMENT STRUCTURE	REFERENCE DRAWINGS	
STR 18a	City of Lethbridge Engineering Standards;	



NOTE: -SEE DEPTH ZONES OF SERVICES. HYDRANT, TRANSFORMERS AND STREET LIGHTS ARE CENTERED ON LOT LINE EXTENSIONS

-TRANSFORMERS & PEDESTALS 0.15m BACK OF SIDEWALK,

-WIRE FOR ELECTRIC/TELUS/SHAW AND GAS CABLE 1.50m BACK FROM PROPERTY LINE

-SHALLOW UTILITY EASEMENT 3.5m 4 PARTY TRENCHING (RESIDENTIAL)



CITY OF
Lethbridge

INFRASTRUCTURE SERVICES

21m R.O.W. MINOR COLLECTOR
(MONO SIDEWALK WITH TREES)

DRAWN: R.J.K.

DESIGN: R.J.K.

CHECKED: R.A.B.

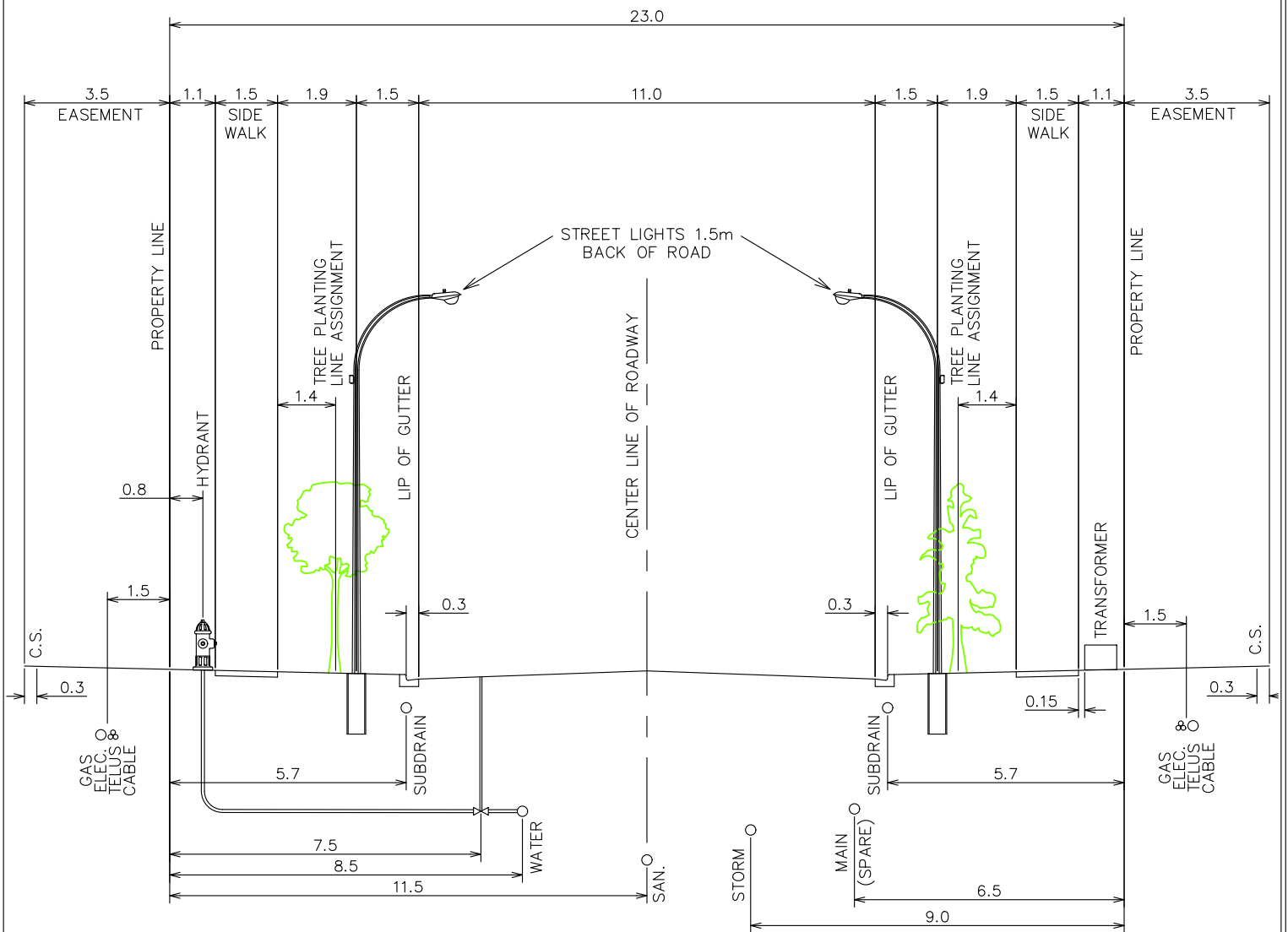
APPROVED: D.L.J.

SCALE: N.T.S.

DATE: 30/01/1997

DWG NO:
TRAN_6.7

DATE	REVISION	BY
01/00	REVISED	K.A.
01/01	REVISED	A.D.
01/05	REVISED	W.G.C.
11/06	UPDATE	R.J.K.
01/11	R.O.W. WIDTH	R.J.K.
03/14	UTIL. SPACING	R.J.K.
04/16	1.5m SIDEWALK	R.J.K.
FILE: TRAN_6.7.dwg		



NOTE: -SEE DEPTH ZONES OF SERVICES. HYDRANT, TRANSFORMERS AND STREET LIGHTS ARE CENTERED ON LOT LINE EXTENSIONS

-WIRE FOR ELECTRIC/TELUS/SHAW AND GAS CABLE 1.50m BACK FROM PROPERTY LINE

-SHALLOW UTILITY EASEMENT 3.5m 4 PARTY TRENCHING (RESIDENTIAL)

DATE	REVISION	BY
04/16	1.5m SIDEWALK	BY
FILE:	TRAN_6.7a.dwg	



CITY OF
Lethbridge

INFRASTRUCTURE SERVICES

23m R.O.W. MINOR COLLECTOR
SEPARATE SIDEWALK WITH TREES

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	14/02/2011
DWG NO:	TRAN_6.7a



6.8 INDUSTRIAL COLLECTOR

6.8.1 INDUSTRIAL COLLECTOR

Design

TRAFFIC VOLUME (vehicles per day)	NUMBER OF LANES	RIGHT-OF-WAY REQUIREMENT	MINIMUM INTERSECTION SPACING (Property Lines)
NA	2 to 4	20.0 m	120 m
FUNCTION			
<ul style="list-style-type: none"> To collect and distribute traffic within industrial areas To serve as a transit route 			
CONDITIONS			
<ul style="list-style-type: none"> Direct access shall be permitted to abutting commercial and industrial properties Industrial Collectors shall intersect with Lanes, other Industrial Collectors, Community Entrance Roads, Super Collectors, or Arterial roadways Adequate emergency services access shall be provided to all abutting properties When an Industrial Collector intersects with an Arterial, driveway access from adjacent properties shall not be allowed within a minimum distance of 60 m from the edge of the Arterial right of way Intersection spacing on Industrial Collector roadways shall not be less than 120 m unless agreed to in writing by the Transportation Business Unit Parking may be restricted to accommodate turning requirements for larger vehicles Parking may be restricted on higher volume Industrial Collectors 			
FEATURES		NOTES	
Posted Speed (kph)	50	<ol style="list-style-type: none"> Undivided roadway All intersections shall be as near as possible to 90 degrees Intersection control by yield signs or stop signs as warranted All Industrial Collector roadways shall have yellow centerline pavement markings. Parking permitted on both sides of roadway, but may be restricted under special circumstances Industrial Collector roadways shall not end in a cul-de-sac Industrial Collector roadways shall be configured in loops and/or intersect with other Industrial Collector or Arterial roadways at a minimum of two locations 	
Parking	Yes (see Note 4)		
Sidewalk	Both Sides		
Traffic Signals	As Warranted		
Pedestrian Crossing	At Grade Ramps required		
Bikeway	TBD		
Transit Route	Yes		
Truck Route	Yes		

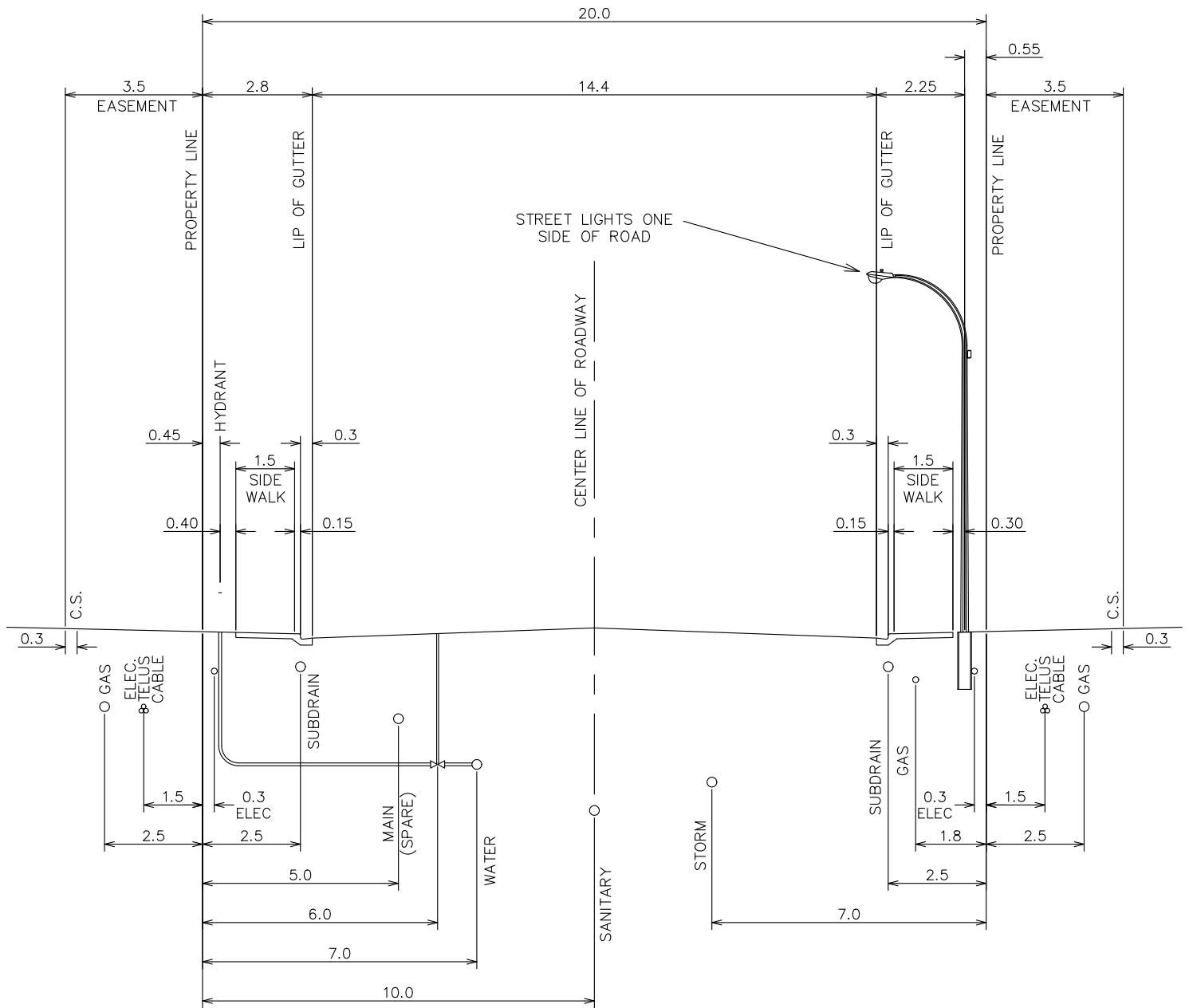


Sound Attenuation	No	8. Modification of the Industrial Collector standard shall be considered by the Transportation Business Unit on a case-by-case basis	
Pavement Markings	At signalized intersections	Reference Drawings	SLA_09

6.8.2 INDUSTRIAL COLLECTOR

Geometric

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Urban Collector Undivided (UCU-60)	60	WB-20 or larger dependent on projected land use (1.0 m buffer with a minimum of 0.3 m each side of vehicle)
HORIZONTAL ALIGNMENT		
Minimum Stopping Sight Distance		Minimum Radius of Curvature
(As per current TAC GDGCR)		(As per current TAC GDGCR)
VERTICAL ALIGNMENT		
Maximum & Minimum Grades		
<ul style="list-style-type: none"> Max 6%, Min 0.6% 		
Grade at Intersections		
<ul style="list-style-type: none"> (As per current TAC GDGCR) 		
Vertical Curves & Super Elevation		
<ul style="list-style-type: none"> Vertical curve lengths in meters should not be less than speed in kilometers per hour Use 0.04 or 0.06 superelevation tables 		
PAVEMENT STRUCTURE		REFERENCE DRAWINGS
STR 18b		City of Lethbridge Engineering Standards;



NOTE: -SEE DEPTH ZONES OF SERVICES.
 -HYDRANT CENTERED ON LOT LINE EXTENSION
 -TRANSFORMER UTILITY EASEMENT 2m x 2m ON PRIVATE PROPERTY
 -MAINS GAS ON ONE SIDE ELECTRIC ON THE OTHER

DATE	REVISION	BY
30/01	REVISED	A.D.
11/06	REVISED	R.J.K.
12/07	REVISED	R.J.K.
03/13	REVISED	R.J.K.
04/16	1.5m SIDEWALK	R.J.K.



CITY OF
Lethbridge

INFRASTRUCTURE SERVICES

20m R.O.W. INDUSTRIAL COLLECTOR

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	15/11/2006
DWG NO:	TRAN_6.8

FILE: TRAN_6.8.dwg



6.9 LOCAL

6.9.1 LOCAL

Design

TRAFFIC VOLUME (vehicles per day)	NUMBER OF LANES	RIGHT-OF-WAY REQUIREMENT	MINIMUM INTERSECTION SPACING (Property Lines)
< 2000	1 to 2	16.5 m or 18.5 m	30 m
FUNCTION			
<ul style="list-style-type: none"> To provide access to adjacent residential lots To convey local residential traffic to Collector roadways Local roadways include cul-de-sacs and P loops To serve as part of the Fire & Emergency Services access route 			
CONDITIONS			
<ul style="list-style-type: none"> Direct access shall be permitted to abutting residential properties Access shall not be permitted to commercial properties from Local roadways Local roadways shall intersect with Lanes, other Local roadways, Minor Collectors, Major Collectors, Community Entrance Roads, or Super Collectors Access shall be designed to the requirements of the Alberta Building Code (ABC) Part 3 No dwelling shall be located more than 200 m as measured along the centreline of the roadway from a roadway intersection that provides the only access to the dwelling. This includes cul-de-sacs and multiple branch cul-de-sacs The length of road making up a P loop as measured along the centreline of the roadway shall not exceed 350 m P loop links shall be no shorter than 60 m as measured along the property line of the adjacent lots Additional secondary access roads are required as the number of households increase above 100 (one more) and above 600 require two more. Secondary access route is to be installed as remotely from the primary access as possible and cannot be used as part of the primary access. 			
FEATURES		NOTES	
Posted Speed (kph)	50	<ol style="list-style-type: none"> Undivided roadway All intersections shall be as near as possible to 90 degrees Intersection control by right-of-way rule, yield signs or stop signs Parking permitted on both sides of roadway, but may be restricted under special circumstances 	
Parking	Yes (see note 4)		
Sidewalk	Both sides		
Traffic Signals	No		

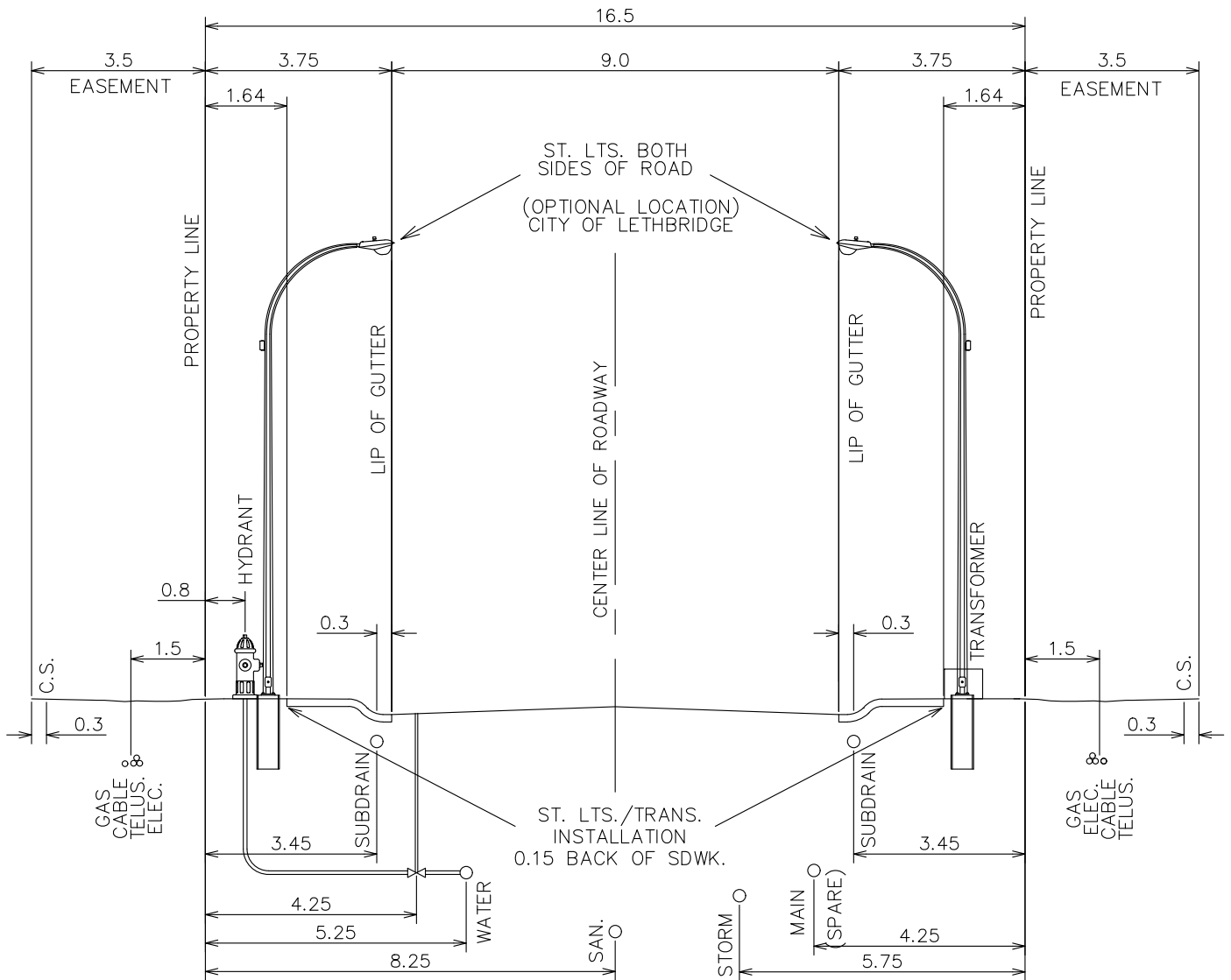


Pedestrian Crossing	At Grade Ramps required	<p>5. Parking in cul-de-sacs will be restricted for Emergency vehicle and solid waste vehicle access. No parking signs posted according to Alberta Fire Code.</p> <p>6. A Local roadway with traffic volumes in excess of 1000 vehicles per day or servicing more than 100 dwelling units shall have the asphalt surface widened to 11 m (18.5m R.O.W.) as measured from lip of gutter to lip of gutter. Transitions will occur at intersections.</p> <p>7. Traffic calming shall be considered on Local roadways with potential for transient traffic</p> <p>8. Modification of the Local standard shall be considered by the Transportation Business Unit on a case-by-case basis</p>	
Bikeway	TBD		
Transit Route	No		
Truck Route	No		
Sound Attenuation	No		
Pavement Markings	No	Reference Drawings	<p>SLA_02</p> <p>SLA_03</p>

6.9.2 LOCAL

Geometric

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Urban Local Undivided (ULU-50)	50 kph	WB-17 (1.0 m buffer may be required with a minimum of 0.3 m each side of vehicle)
HORIZONTAL ALIGNMENT		
Minimum Stopping Sight Distance		Minimum Radius of Curvature
(As per current TAC GDGCR)		(As per current TAC GDGCR)
VERTICAL ALIGNMENT		
Maximum & Minimum Grades		
<ul style="list-style-type: none"> Max 6%, Min 0.6% 		
Grade at Intersections		
<ul style="list-style-type: none"> (As per current TAC GDGCR) 		
Vertical Curves & Super Elevation		
<ul style="list-style-type: none"> (As per current TAC GDGCR) 		
PAVEMENT STRUCTURE		REFERENCE DRAWINGS
STR 18b		City of Lethbridge Engineering Standards;



NOTE: -SEE DEPTH ZONES OF SERVICES. HYDRANT, TRANSFORMERS AND STREET LIGHTS ARE CENTERED ON LOT LINE EXTENSION

-TRANSFORMERS AND STREET LIGHTS 0.15m BACK OF SIDEWALK

-WIRE FOR ELECTRIC/TELUS AND SHAW CABLE 1.5m BACK FROM PROPERTY LINE

-SHALLOW UTILITY EASEMENT IS 3.5m 4 PARTY TRENCHING (RESIDENTIAL)

DATE	REVISION	BY
01/01	REVISED	A.D.
01/05	REVISED	W.G.C.
11/06	TO SCALE	R.J.K.
04/16	1.5m SIDEWALK	R.J.K.
FILE:	TRAN_6.9.dwg	

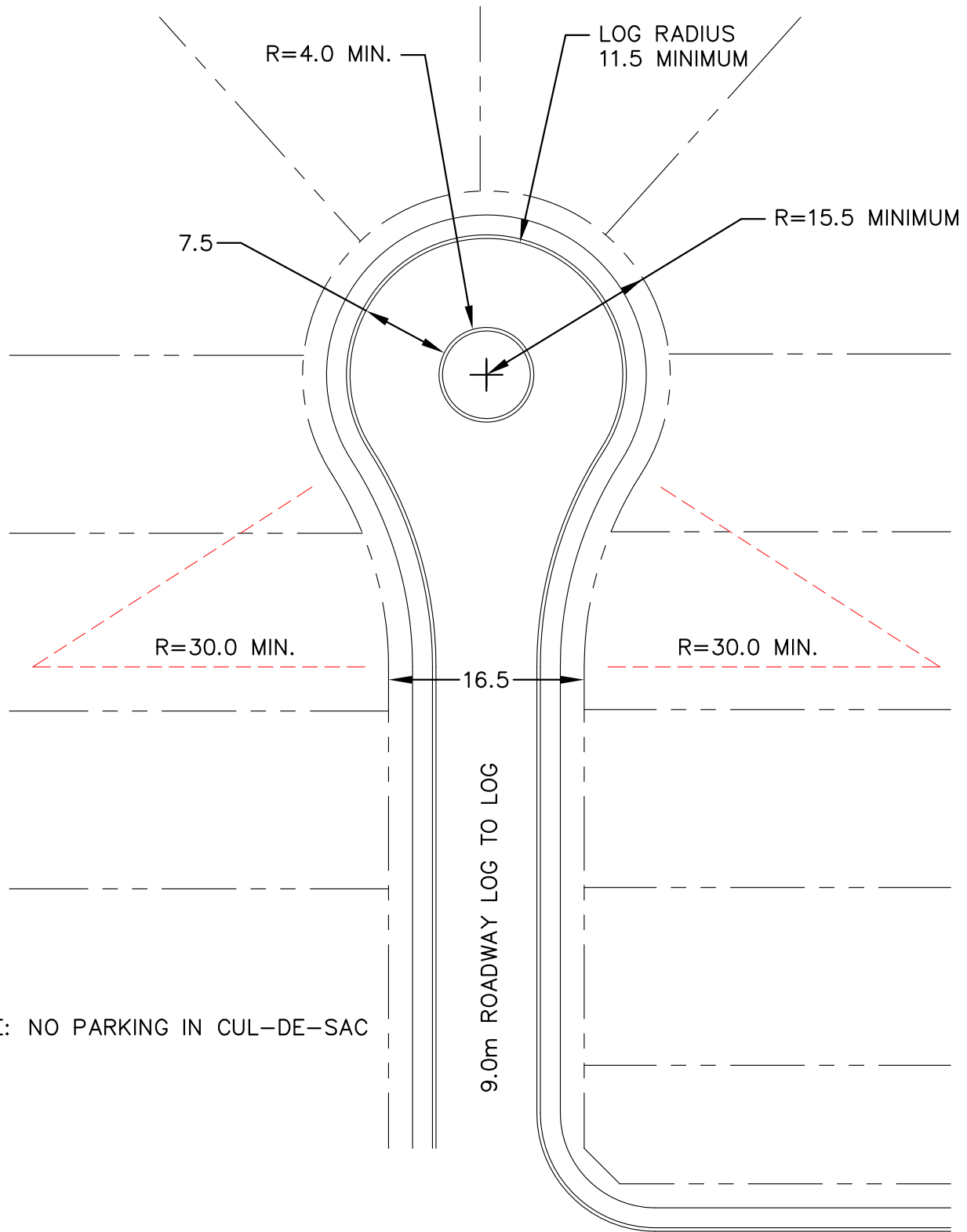


CITY OF
Lethbridge

INFRASTRUCTURE SERVICES

16.5m R.O.W. LOCAL ROAD

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	30/01/1997
DWG NO:	TRAN_6.9



NOTE: NO PARKING IN CUL-DE-SAC



CITY OF
Lethbridge

INFRASTRUCTURE SERVICES

TYPICAL CUL-DE-SAC DESIGN
MINIMUM REQUIREMENTS

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	05/03/1999
DWG NO:	TRAN_6.11

DATE	REVISION	BY
11/06	REVISION	R.J.K.
16/02	ISLAND ADDITION	R.J.K.
FILE:	TRAN_6.11.dwg	



6.10 LANES

6.10.1 LANES

Design

TRAFFIC VOLUME (vehicles per day)	NUMBER OF LANES	RIGHT-OF-WAY REQUIREMENT	MINIMUM INTERSECTION SPACING (Property Lines)
NA	NA	7.0 m	30 m
FUNCTION			
<ul style="list-style-type: none"> To provide rear access to the adjacent lots within the subdivision To provide opportunity for loading and unloading in commercial districts 			
CONDITIONS			
<ul style="list-style-type: none"> Direct access is permitted to abutting properties Lanes shall intersect with other Lanes, Local roadways, Industrial Collectors, and Minor Collectors Lane intersections with Major Collector roadways are not preferred. (All efforts should be taken to eliminate the intersection) Lane design shall accommodate emergency services access to abutting properties The distance along the centreline of a lane from a property to the nearest roadway shall not exceed 300 m Intersection spacing on Lanes shall not be less than 30 m unless agreed to in writing by the Transportation Business Unit Lane connections to higher classification roadways will be treated as driveways until the traffic generates more than 250 vehicles per day. (No less than 30 m from the nearest intersection measured from property line to property line.) Lane intersections with higher classification roadways shall meet the intersection spacing requirements of the higher classification roadway. Accommodation of pedestrian facilities in a Lane require additional Lane width and permanent delineation of the pedestrian facility Pedestrian crossing points in Lanes shall include an offset pedestrian gate Dead end lanes shall provide a turnaround sufficient to accommodate emergency services vehicles and garbage trucks 			
FEATURES		NOTES	
Posted Speed (kph)	20	<ol style="list-style-type: none"> All intersections shall be as near as possible to 90 degrees Only T intersections are permitted in lanes Intersection control between two lanes is by right-of-way rule Where lanes intersect one another a sufficient fillet shall be provided to allow fire trucks and garbage trucks to turn in a single operation (contact Fire for appropriate vehicle size) 	
Parking	No		
Sidewalk	No		
Traffic Signals	No		
Pedestrian Crossing	At Grade		



Bikeway	No	5. Lane design shall minimize opportunity for transient vehicle use (shortcutting) 6. All new Lanes shall be paved in accordance with the standard for paved lanes in the current version of the Engineering Standards	
Transit Route	No		
Truck Route	No		
Sound Attenuation	No		
Pavement Markings	No		
		Reference Drawings	SLA_01

6.10.2 LANE

Geometric

CONSTRUCTION TYPE	
HORIZONTAL ALIGNMENT	
Radius of Curvature	
<ul style="list-style-type: none"> Based on design vehicle 	
RIGHT-OF-WAY	
LENGTH	
GRADE	
<ul style="list-style-type: none"> Max 6%, Min 1.0% (or additional storm drainage considerations) Last 5 m of lane at 1.5% 	
PAVEMENT STRUCTURE	REFERENCE DRAWING
STR_26	City of Lethbridge Engineering Standards;



6.11 RAIL SPUR LINES

6.11.1 RAIL SPUR LINES

Design

TRAFFIC VOLUME (vehicles per day)	NUMBER OF LANES	RIGHT-OF-WAY REQUIREMENT	MINIMUM INTERSECTION SPACING (Property Lines)
NA	NA	15.0 m	NA
FUNCTION			
<ul style="list-style-type: none"> To provide rail access from CP Rail to properties within industrial areas. 			
CONDITIONS			
<ul style="list-style-type: none"> Direct access shall be permitted to abutting properties via sidings within easement or at termination of a Rail Spur Line. Rail Spur Lines intersect with other Rail Spur Lines, Lanes, Local roadways, Minor Collectors, Major Collectors, Industrial Collectors, Community Entrance Roads, Super Collectors or Arterial roadways. All Rail Spur Line intersections with public roadways shall be as near as possible to 90 degrees Driveways shall be located a minimum of 8.0m from the intersection of the closest rail of the Rail Spur Line with a Local or Collector roadway. Driveway flare and/or radius connection to adjacent roadway must be a minimum of 5.0m from the intersection of the closest rail of the Rail Spur Line with a Local or Collector roadway. 			
FEATURES		NOTES	
Posted Speed (kph)	Less than 15	1. Pavement markings to meet TAC MUTCD 2. Signage to meet TAC MUTCD 3. Signals to meet TAC MUTCD	
Parking	No		
Sidewalk	No		
Traffic Signals	As warranted		
Pedestrian Crossing	At Grade		
Bikeway	No		
Transit Route	No		
Truck Route	No		
Sound Attenuation	No		
Pavement Markings	At intersection		
		Reference Drawings	



6.11.2 RAIL SPUR LINES

Geometric

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Rail Spur Line	(CPR design guidelines)	(CPR design guidelines)
HORIZONTAL ALIGNMENT		
Minimum Stopping Sight Distance	Minimum Radius of Curvature	
(CPR design guidelines)	(CPR design guidelines)	
VERTICAL ALIGNMENT		
Maximum & Minimum Grades		
<ul style="list-style-type: none"> (CPR design guidelines) 		
Grade at Intersections		
<ul style="list-style-type: none"> (CPR design guidelines) 		
Vertical Curves & Super Elevation		
<ul style="list-style-type: none"> (CPR design guidelines) 		
RAIL STRUCTURE	REFERENCE DRAWINGS	
(CPR design guidelines)	City of Lethbridge Engineering Standards;	



6.12 INTERSECTION

6.12.1 INTERSECTION

Design

DESCRIPTION

An intersection is formed when two or more roadway segments converge at a point. Intersection design is a complex engineering function which considers multimodal use of the road right of way, safety considerations, sight distances, traffic control devices, channelization, pavement markings, turning movement capacity/demand, drainage, etc.

FUNCTION

- Intersection requirements are design dependent based on classification of intersecting roadways and traffic demand.

CONDITIONS

- Left turn bay storage length shall be a minimum of 60m and right turn bay shall be a minimum of 30m on Super Collector and Arterial roadways
- Storage bay length shall be determined from Trafficware Synchro analysis of 95% queue length for a future 10 year horizon Synchro analysis when storage bay is defined by pavement markings
- Storage bay length shall be determined from Trafficware Synchro analysis of 95% queue length for a future 30 year horizon Synchro analysis when storage bay is defined by permanent curbing
- Intersection designs shall consider the appropriate design vehicles for the roadway classification and the accessible land uses
- For residential approaches the design vehicle shall be a WB-17
- For commercial/industrial approaches, the design vehicle shall be a WB-20
- Alternate design vehicles shall be considered by the Transportation Business Unit on a case by case basis
- A 1.0 m buffer, with a minimum of 0.3 m each side of vehicle, shall be provided for the wheel path of the design vehicle relative to the edge of asphalt for all turning movements unless agreed to in writing by the Transportation Business Unit
- A 1.0 m buffer, with a minimum of 0.3 m each side of vehicle, shall be provided for the swept path of the design vehicle relative to signs, poles, etc. placed on islands, medians and boulevards, for all turning movements unless agreed to in writing by the Transportation Business Unit

FEATURES

NOTES

Posted Speed (kph)	Based on approach classification	1. The design of intersections shall include an evaluation of sight distance on all approaches for all relevant vehicle types expected to use the intersection 2. Sight lines shall be identified prior to landscape design
Parking	No	
Sidewalk	Match Roadway	
Traffic Signals	As Warranted	



Pedestrian Crossing	Yes	<p>3. Opposing and alternating intersection approaches may have different design speeds and posted speed limits based on the approach classification</p> <p>4. Additional travel lanes should be initiated or terminated at an intersection</p> <p>5. Minimum intersection spacing identified in the design standards is relative to the property lines at the edge of the right of way. The centerline spacing is greater than the identified minimum intersection spacing</p> <p>6. “T” intersections shall have a minimum of 3 pedestrian crossing ramps. Full intersections shall have a minimum of 4 pedestrian crossing ramps.</p> <p>7. All intersections shall be as near as possible to 90 degrees</p> <p>8. Intersection control type shall follow the following hierarchy:</p> <ul style="list-style-type: none"> • Yield • One- or Two-Way stop control • Three- or Four-Way stop control when used as an interim step subject to further improvements • Roundabout • Traffic Signal 	
Bikeway	TBD		
Transit Route	Match Roadway		
Truck Route	Match Roadway		
Sound Attenuation	No		
Pavement Markings	Based on approach classification	Reference Drawings	

6.12.2 INTERSECTION

Geometric

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Adjoining Road Classification		Residential - WB-17 Commercial - WB-20 (1.0 m buffer required with a minimum of 0.3 m each side of vehicle)
HORIZONTAL ALIGNMENT		
Minimum Stopping Sight Distance	Minimum Radius of Curvature	
(As per current TAC GDGCR)	(As per current TAC GDGCR)	
Median Left Turn Bay		



- Arterial, Super Collector and Community Entrance Road
- (As per current TAC GDGCR)

VERTICAL ALIGNMENT

Maximum & Minimum Grades

Grade at Intersections

- (As per current TAC GDGCR)

Vertical Curves & Super Elevation

- Vertical curve lengths in meters should not be less than speed in kilometers per hour
- $e_{max} = 0.04$ or less

MINIMUM PROPERTY LINE CORNER CUTS (m)

	Arterial	Super	Community	Major	Minor	Industrial	Local	Lane
Arterial	City	15	15	NA	NA	10	NA	NA
Super Collector	15	15	10	10	10	10	NA	NA
Community Entrance	15	10	10	10	10	10	8	NA
Major Collector	NA	10	10	5	5	5	5	*
Minor Collector	NA	10	10	5	5	5	5	*
Industrial Collector	10	10	10	5	5	5	5	*
Local	NA	NA	8	5	5	5	5	*
Lane	NA	NA	NA	<i>Evaluate to provide sight distance*</i>				5

* Sight distance shall be considered for vehicle-vehicle and vehicle-pedestrian interaction.

PAVEMENT STRUCTURE

REFERENCE DRAWINGS

City of Lethbridge Engineering Standards;



6.13 ROUNDABOUT

6.13.1 ROUNDABOUT

Design

DESCRIPTION

An intersection with three or more approach legs in which the traffic streams merge and then diverge on a one-way roadway surrounding a central island. Traffic on this roadway travels counter-clockwise, and has the right-of-way over traffic entering the circulatory roadway.

Roundabout design is an iterative process that requires achieving an optimal balance between capacity and safety. The process of optimization is iterative and requires a thorough knowledge of site constraints and operating criteria. Even a minor change in geometry can have a substantial impact on safety and operational performance. In addition, designers should keep firmly in mind that the geometric elements are not independent of one another. How all the geometric elements of a roundabout interact is clearly more important than their individual impacts.

GUIDELINES

- Robinson, Bruce et al. “Roundabouts: An Informational Guide.” NCHRP Report FHWA-RD-00-67 1-277, Federal Highway Administration, McLean, VA: 2000 as the reference of choice for roundabout design in Lethbridge
- Projection of the centre line of each approach shall be to the left of the centre of the roundabout. Projection to the right of centre is NOT acceptable
- Approach legs should be evenly spaced around the Roundabout
- The speed differential between entering and circulating movements shall be less than 20 kph
- Manholes located within the landscaped portion of the Roundabout shall be accessible
- The curb height for a mountable truck apron shall be 75 mm
- Single lane entry and exit widths to include sufficient width for design vehicles plus 1.0 m buffer. To reduce speed the design should consider mountable areas for larger design vehicles

FEATURES

NOTES

Posted Speed (kph)	Advisory speed may be posted	<ol style="list-style-type: none"> 1. No raised landscaping planters 2. The slope of the central island should not exceed 6:1 3. Stopping sight distance and intersection sight distance must be established prior to landscape design 4. Landscape should block sight lines through the centre of the roundabout 5. Zebra striped crosswalks to be placed 6.0 m in advance of the yield line for single lane approaches 6. Bicycle traffic may access pedestrian crossing via up-ramps in advance of roundabout and multi-use path 7. Continuous involvement of the Transportation Business Unit is required during Roundabout design
Parking	No	
Sidewalk	Match Roadway	
Traffic Signals	No	
Pedestrian Crossing	(see Note 5)	
Bikeway	(see Note 6)	
Transit Route	Match Roadway	



Truck Route	Match Roadway	8. Right turn bypass lanes should be used to increase capacity where high right turn volumes occur. Design shall consider safety requirements for pedestrians and bicyclists 9. The Transportation Business Unit may require a peer review of roundabout designs
Sound Attenuation	No	
Pavement Markings	Yes	Reference Drawings

6.13.2 ROUNDABOUT

Geometric

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Adjoining Road Classification		Residential - WB-17 Commercial - WB-20 (1.0 m buffer required with a minimum of 0.3 m each side of vehicle) SU-9 & Bus to circulate without apron
HORIZONTAL ALIGNMENT		
Minimum Stopping Sight Distance		Minimum Radius of Curvature
(As per current TAC GDGCR & Reference)		(see Reference)
Note		
<ul style="list-style-type: none"> Reference: Robinson, Bruce et al. "Roundabouts: An Informational Guide." NCHRP Report FHWA-RD-00-67 1-277, Federal Highway Administration, McLean, VA: 2000. 		
VERTICAL ALIGNMENT		
Vertical design should indicate the maximum longitudinal grades at the circle (<4%), crossfall and the need for pavement elevation plans in X and Y coordinates.		
PAVEMENT STRUCTURE		REFERENCE DRAWINGS
		City of Lethbridge Engineering Standards;



6.14 RIGHT IN RIGHT OUT

6.14.1 RIGHT IN RIGHT OUT

Design

DESCRIPTION

A right in right out intersection provides vehicle access to and from one direction of travel on the adjacent roadway. Delineation at the right in right out and, in some, cases a median in the centre of the adjacent roadway, prevent left turns and through movements.

Right in right out intersections may be permitted as secondary access points to commercial developments; however, they may also be used to connect two public roadways when the roadway classification restricts full access due to intersection spacing constraints and/or safety issues.

GUIDELINES

- Right in right out designs shall consider the appropriate design vehicles for the roadway classification and the accessible land uses
- The intersection spacing for a Right in right out access shall be 50% of the corresponding roadway classifications intersection spacing. (e.g. Arterial RI/RO spacing of 200 m)
- A traffic impact assessment addressing safety and operational considerations shall be required for a commercial right in right out access to an Arterial, Super Collector or Community Entrance Road unless this condition is waived in writing by the Transportation Business Unit

FEATURES

NOTES

Posted Speed (kph)	NA	1. Geometric design to meet or exceed minimum requirements of adjacent roadway classification 2. Pathway / pedestrian facility crossings at right in right out accesses shall be delineated such that it is clearly apparent to drivers that they are crossing a pathway / pedestrian facility where the pathway user / pedestrian has the right of way. The pathway / pedestrian facility crossing shall be provided as (a) a concrete sidewalk (b) a raised asphalt crossing (c) permanent pavement markings in a zebra stripe pattern. Signage identifying the location of the pathway / pedestrian facility shall be provided. 3. Sight lines shall be identified prior to landscape design
Parking	No	
Sidewalk	(See Note 2)	
Traffic Signals	No	
Pedestrian Crossing	(See Note 2)	
Bikeway	NA	
Transit Route	Yes	
Truck Route	Yes	
Sound Attenuation	No	
Pavement Markings	Yes	Reference Drawings



6.14.2 RIGHT IN RIGHT OUT

Geometric

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Adjoining Road Classification		Residential - WB-17 Commercial - WB-20 (1.0 m buffer required with a minimum of 0.3 m each side of vehicle)
HORIZONTAL ALIGNMENT		
Minimum Stopping Sight Distance		Minimum Radius of Curvature
(As per current TAC GDGCR)		(As per current TAC GDGCR)
VERTICAL ALIGNMENT		
Maximum & Minimum Grades		
<ul style="list-style-type: none"> Max 6%, Min 0.6% 		
Grade at Intersections		
<ul style="list-style-type: none"> (As per current TAC GDGCR) 		
Vertical Curves & Super Elevation		
<ul style="list-style-type: none"> Vertical curve lengths in meters should not be less than speed in kilometers per hour $e_{max} = 0.04$ or less 		
PAVEMENT STRUCTURE		REFERENCE DRAWINGS
		City of Lethbridge Engineering Standards;



6.15 PAVEMENT MARKINGS

6.15.1 PAVEMENT MARKINGS

Design

DESCRIPTION

Pavement markings include longitudinal, transverse, symbol, and word pavement markings.

Pavement markings provide information to drivers. There are, however, limitations to the use of pavement markings including obstruction by snow cover, limited visibility when wet, and reduced visibility with wear.

The design of pavement markings must conform to the Manual of Uniform Traffic Control Devices for Canada.

The following table identifies marking material for all pavement markings on all roadway classification. Roadway design and engineering judgment will determine actual use of pavement markings and/or marking materials.

MATERIAL

Line Type	Pavement Marking Type
Lane Lines	Inlaid
Edge Lines	Inlaid
Centre Lines	Inlaid
Crosswalks	Inlaid
Stop Bars	Inlaid
Continuity Lines	Inlaid
Guide Lines	Inlaid
Arrows	Inlaid

NOTES

Surface applied pavement markings include plastic (hot or cold applied), epoxy, Methyl Methacrylate (MMA), and hot tape.

All approaches of Collector roadways to Arterials, Super Collectors and Community Entrance Roads will be treated with the same level of pavement marking as the higher classification roadway.

Roadway design and engineering judgment will determine length of pavement markings required.



6.16 MINIMUM ROADWAY PAVEMENT REQUIREMENTS

The following table outlines the minimum materials required for the pavement structures of roadways for the City of Lethbridge:

Table 6.16.1 MINIMUM REQUIREMENTS FOR ROADWAY PAVEMENT STRUCTURES (mm)

Material	Maximum Aggregate Size (mm)	Arterial	Super Collector	Major & Minor Collector	Local	Industrial	Lane	Local Industrial*
Type I Asphalt Surface	16	60	60	60		60		50
Type II Asphalt Base Course	25	100	80	60		100		50
Type III Asphalt Surface	16				90		80	
Granular Base Course	25	100	100	100	250	100	200	250
Granular Subbase	75	350	350	150		250		
Subgrade		300	300	300	300	300	300	

* Use of the Local Industrial road structure requires approval by the Transportation business unit on a case-by-case basis.

Specific roadway pavement structures require review by the Transportation Business Unit based on roadway use, traffic volumes, heavy vehicles, and equivalent single axle loads.

6.17 ENTRYWAYS, BOULEVARD, AND MEDIAN LANDSCAPING

- i. Landscaping of boulevards and road rights of way shall be done in compliance with the Parks and Open Space Chapter of this standard, the latest version of the City Engineering Standards, and the latest version of the Arterial Roadway Landscaping Standard. Landscaping plans will be subject to the approval of the City Engineer.
- ii. Landscaping features shall be low maintenance and cost effective to maintain with existing city maintenance equipment and personal.
- iii. Trees planted in boulevards adjacent to collector roads shall be of a species with an elevated canopy to reduce line of sight conflicts and of a species approved by the City Engineer.



6.18 SIDEWALKS, PATHWAYS, AND CROSSWALKS

- i. Subdivisions shall be incorporated into the City's regional pathway and park system by providing adequate pedestrian linkages internally and to adjacent neighborhoods.
- ii. Innovative community planning which promotes pedestrian traffic for both work and pleasure is encouraged. Some characteristics which promote pedestrian traffic include short trip distances, wide well lit pathways, and safe road crossings.
- iii. Crosswalks shall be located at intersections only. Pathways and park entrances intersecting roads at mid-block shall require approval in writing from the Transportation Business Unit and Community Services.
- iv. A minimum of 100mm of gravel shall be provided under all side walks where medium to high plastic soils are present as per the City's existing standard. The Transportation Business Unit will, on a case by case basis, consider not having gravel if a detailed geotechnical report indicates;
 - i. soils are not medium to high plastic, and
 - ii. not having high swelling properties, and
 - iii. no long term performance issues without gravel for each specific location.
- v. Install white inlaid pavement markings at all Pathway crossing locations. Mid-block crossing locations and locations serviced by Rectangular Rapid Flashing Beacons shall consist of white zebra stripe pavement markings and intersection crossing locations shall consist of parallel white lines. Where the crossing is not subject to other traffic control signs, Pedestrian Crossing signs shall be installed.

6.19 STREET AND TRAFFIC CONTROL SIGNS

- i. The Municipal naming committee names streets according to prevailing city conventions when the lands are subdivided and titles created.
- ii. Costs of preparing and installing street and traffic control signs are included in the charges calculated and paid as part of the Service Agreement. The Transportation Business Unit determines the requirement for traffic control devices and street name signs during the construction drawing review.
- iii. Any other Identifying Signage must comply with the Corporate Identity Guidelines



6.20 MISCELLANEOUS

6.20.1 MISCELLANEOUS

Design

DESCRIPTION

The Miscellaneous page presently identifies items identified by the Transportation Business Unit that have not found a permanent location elsewhere in the Design Standards document

Miscellaneous

1. Adequate clear zone distance shall be provided between the edge of travel lanes and roadside obstructions. This includes separation for light standards, signs, landscaping, fences, etc
2. Stopping sight distance, decision sight distance and intersection sight distance shall be considered in all designs
3. Driveway locations shall meet City of Lethbridge design standards and bylaw requirements
4. Throat lengths for Arterial and Collector roadways shall meet or exceed the throat lengths identified for specific land uses in the TAC Geometric Design Guide for Canadian Roads unless this condition is waived in writing by the Transportation Business Unit
5. Roadways shall terminate in a temporary or permanent cul-de-sac. If a temporary cul-de-sac is provided until such time that the roadway is completed, it shall be maintained by the developer to a level suitable for public use
6. Temporary construction access shall not attract shortcutting traffic to the construction access. Signage is required for all temporary construction access and the developer is responsible for construction and maintenance
7. As built drawings are required prior to Final Acceptance Certificate
8. Coordinate tree locations with street lights to minimize future tree trimming requirements. Mid-block lights should be spaced 4m from full tree canopy. At intersections, no trees shall be planted between positive contrast street lights for crosswalks and the crosswalks themselves.
9. Sidewalk and pathway grades should not exceed a maximum of 5%.
10. A portion of roadway shall not have a change of gradient more than 1 in 12.5 over a maximum distance of 15 m
11. Handicap accessible ramps shall be provided for each individual crossing and shall be directed into the crosswalk location. The ramps shall not be located such that pedestrians are directed into the middle of the intersection
12. A 5m throwaway section of pavement shall be installed beyond the end of all roads that are to be extended at a future development phase
13. Stepped pavement tie in shall be completed at all road extensions between phases as per STR_30
14. Access shall be designed to the requirements of the Alberta Building Code (ABC) Part 3
15. Access shall be designed to support the minimum load of 38,600 Kg