



Municipal Development Plan / Calgary Transportation Plan  
**2022 Monitoring Progress Report**

# MDP/CTP Core Indicators

The Calgary Municipal Development Plan and Calgary Transportation Plan are The City’s key strategic policy documents that guide growth, mobility and city building.

Together, these Plans aim to develop the kind of city that Calgarians have asked for – a great city that attracts investment, jobs and business opportunities, grows in an environmentally sound and affordable manner, and provides more choices in how to travel and where to live. To evaluate the progress being made towards the objectives of the Municipal Development Plan and Calgary Transportation Plan goals, 14 Core Indicators measuring a broad spectrum of urban analytics were first developed in 2009 along with the approval of the plans.

## How are we doing?

Individual indicators demonstrate that we are succeeding in certain areas but need to work harder to achieve our targets in other areas.

### Trend Description



**Improvement:** The past trend indicates that indicator is on track to achieve the target as desired, or the target has already been achieved.



**Behind Trend for Goal:** The indicator is trending in the right direction, but not at a pace fast enough to achieve the target as intended.



**No Improvement:** The indicator is neither trending positively or negatively and has not changed significantly since the last reporting period. With no change, the indicator will not achieve the desired target.



**Decline:** The indicator has moved further from the target since the last reporting period.

Improvement	Improvement (Behind Trend for Goal)	No Improvement	Decline
Density	Urban Expansion	Land Use Mix	Access to Primary Transit Network
Residential Land Use Mix	Population to Job Balance	Urban Forest	Transit Service
Access to Daily Needs	Transportation Mode Split		Watershed Health
Road and Street Infrastructure			
Goods Access			
District Energy			

## Data

Results are reported with the most current data available. Due to the cancellation of the Civic Census, certain indicators provide both historical Civic Census data as well as an updated data from an alternate data source.

## Trend Summary



Behind Trend for Goal

60-70 Year Target:

50%

Latest Data (2006-2021):

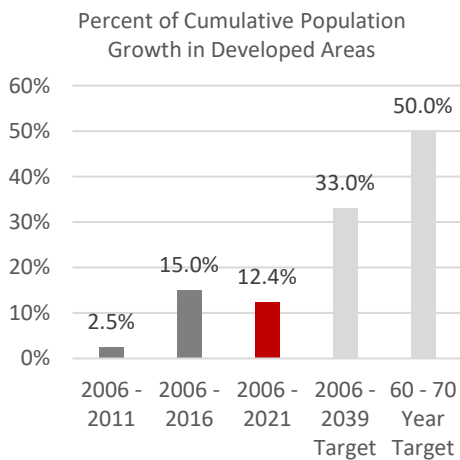
12.4%

Baseline (2006-2011):

2.5%

## Data Sources

- 2021 Statistics Canada



# Urban Expansion

*Note the data source for this indicator has been changed from the Civic Census to the Federal Census. Therefore, results from this report should not be directly compared to previously reported data.*

This indicator shows the outward expansion of the city by measuring the population growth accommodated within the Developed Area since 2006 as a percent of total city-wide population growth. Over the next 60 to 70 years, 50 per cent of the population growth is targeted to occur in Developed Areas. Developed Area correspond to approximately communities built before the mid 2000s and is shown by the Balanced Growth Boundary on Map 1 of the MDP.

## Benefit

Encouraging balanced growth between Developing and Developed Area of the city makes the best use of our existing land, reduces the cost of City services, locates residents closer to where they work, shop and play, and makes walking, cycling and transit more attractive as a mode of transportation, reducing the need to drive to meet daily needs.

## How are we doing?

Most population growth is still occurring in Developing Areas. Overall, the indicator continues to show that The City is slowly moving in the right direction, however, progress towards the target slowed between 2016 and 2021. Between 2006 and 2011, only 2.5% of the cumulative population growth occurred in the Developed Areas of the City. By 2016, this had increased to 15%, but declined to 12.4% by 2021. In years of strong growth, developed areas tend to attract a greater share of residents than lower growth years, while developing areas tend to see more relatively consistent growth. Consequently, with relatively steady suburban growth and moderate forecasted population growth, this target may become increasingly difficult to achieve. For progress to move forward, it will be important to continue to add population in the Activity Centres and Main Streets identified in the Plans. Although the monitoring review shows that we are behind on this target, progress has been made with nearly 40,000 residents added to Developed Areas since 2006. This is more than the population of Cochrane. However, during the same time, the Developed Areas grew by 280,000 residents. Growth is not evenly distributed through the Developed Areas. Centre City and the Inner City is capturing the majority this growth. Many Developed Areas communities, particularly those ones built between 1970 and 2000, are losing population, largely due to natural population lifecycles experienced by communities and lack of redevelopment occurring. Although the Developed Areas have only captured 12.4% of the population growth from 2006 to 2021, they have captured 29% of net new dwelling unit growth. Dwelling units in the Developed areas tend to have a lower occupancy rate compared to Developing Areas.

# Density

Density is measured by taking the total number of people and jobs, and dividing by the total built-up area for a given year, providing a per-hectare city-wide density measure. The 60-year target is to have 27 people per hectare and 18 jobs per hectare citywide.

## Trend Summary



Improvement (population)



No Improvement (jobs)

## 60 Year Target

27 people / ha

18 jobs / ha

## Latest Data (2021, 2016)

25.3 people / ha (2021)

13.5 jobs / ha (2016)

## Baseline (2005)

22.3 people / ha

13.7 jobs / ha

## Data Sources

- 2016 Place of Work Survey, Civic Census
- 2021 Statistics Canada

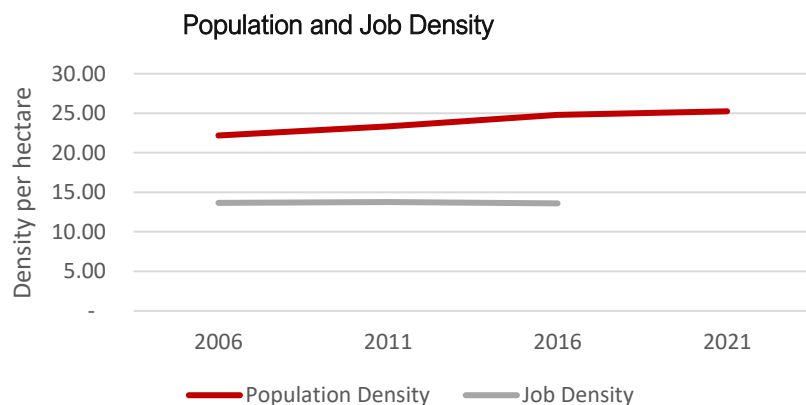
## Benefit

Directing future urban growth in a way that fosters more compact and complete neighbourhoods has benefits for communities, and for Calgary as a whole. Areas with higher densities offer more housing and mobility options, and have a population that supports amenities and infrastructure. At a city-wide level a more compact urban form reduces the cost of service provision (including roads, water, and waste management), and requires less revenue in the form of taxes to provide the quality of life that Calgarians enjoy. From 2006 to 2021 there was a City-wide increase in population density of about 14%.

## How are we doing?

The population density indicator continues to show positive performance. As Calgary continues to grow, it is anticipated that increased housing opportunities will be strategically located within focal areas for growth – primarily in Activity Centres and along Main Streets. Increasing residential development throughout the city will give Calgarians a more livable, vibrant and resilient city. However, population density is not increasing uniformly across the city. Although inner city areas and greenfield areas are seeing increase in density, many established communities are losing population.

Job density remains stable around 13 jobs per hectare, and needs to increase to reach the target of 18 jobs per hectare.



# Population and Job Balance

*Note custom Federal Census employment data has not yet been released. The most current job figures are from 2016.*

## Trend Summary



Behind Trend for Goal

## 60 Year Target

### Pop:Job Ratio

NW - 3:1  
NE -1.4:1  
SW – 1.5:1  
SE – 1.5:1

## Latest Data (2016)

### Pop:Job Ratio

NW - 3:1  
NE -1.7:1  
SW – 1.4:1  
SE – 1.5:1

## Baseline (2006)

### Pop:Job Ratio

NW - 3:1  
NE -1.7:1  
SW – 1.3:1  
SE – 1.2:1

## Data Sources

- 2016 Civic Census
- 2016 Place of Work

Population and Job Balance measures the ratio between population and jobs within each quadrant of the city. A higher ratio indicates fewer jobs are available relative to the population of the quadrant.

## Benefit

How jobs are distributed throughout the city and where people live directly influences the choice of travel mode. The strategy of balancing housing and job growth can reduce the need for long commutes and keep residential and employment communities easily accessible to each other, and provide more transportation options for people who may not drive a car. All quadrants are at or near the 60-year target.

## How are we doing?

All quadrants are at or moving towards the 60-year target. This trend reveals the population to job balance ratio is moving in the right direction in all quadrants except the northeast. Strong population growth in the northeast has increased the ratio of population to jobs. Increased industrial development in the northeast sector in the future should help bring the ratio in better alignment with the target. An increasingly unbalanced population to jobs ratio can lead to an increase in congestion of roads and transit. A decreasing share in the number of jobs in the northwest has resulted in a higher number of people commuting from the northwest to other quadrants for work. The key factor to achieving the target in the northwest is through the development of Activity Centres and Main Streets. That being said, this quadrant is expected to continue to have a much higher residential population than number of jobs, which increases commute lengths. Maintaining a sustainable balance of population and jobs in the northwest will largely depend on the development of complete communities that provide both housing and employment choices for people in this quadrant. Job growth in areas such as the University District will improve the northwest's ratio.

Population to Job Ratios

	SW	SE	NW	NE
60 Year Target	1.5	1.5	3	1.4
2016	1.4	1.5	3.2	1.7
2011	1.4	1.2	3.3	1.6
2006	1.3	1.2	3	1.7

# Mix of Land Use

## Trend Summary

➔ No Improvement

## 60 Year Target

0.7

## Latest Data (2021)

0.56

## Baseline (2008)

0.53

## Data Sources

- 2022 Land Uses

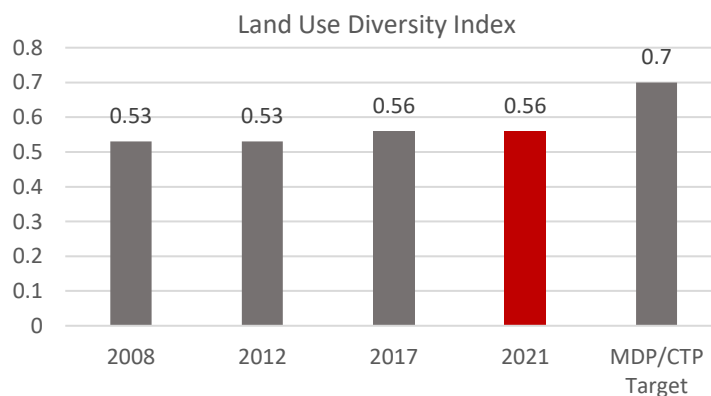
The Land Use Diversity Index measures the variety of Land Use Districts within the city's built area (excluding Centre City) and the share of land within each district. The city-wide index is the average of all community indices. Using a method called the Simpson's Diversity Index, total area of land uses is measured by community. A score higher to 1 means all land uses have the same share of land. A score close to 0 indicates the area of land uses is not evenly balanced. Therefore, a community with a mixture of uses would score high, while a community with one predominant land use district would score low. The 60-year target is 0.7.

## Benefit

Communities that are diverse, or have a greater mix of uses, tend to have more destinations and therefore more complete. Mixed land uses in communities plays a strong role in creating equity amongst citizens. Residents can access more services, products and amenities that they need within the neighbourhood. By growing in a way that brings together places where you live, work, and play, daily trips become more convenient and result in shorter travel times. This improves the quality of your experience living in the city and fosters a sense of community.

## How are we doing?

There has been improvement in Land Use Diversity since 2012, however, in the past 5 years, the indicator has not increased. Generally, the biggest change in land use diversity is in new communities where more complete, mixed neighbourhoods are being built compared to older communities with which have less diverse land uses. In established communities, land uses do not change as often, and when they do, much smaller areas are changed. While there is improvement occurring in the Developed Areas, the changes are slower and more incremental. From 2012 to 2021 there was a 15% increase in land Use Diversity.



# Mix of Residential Land Use

## Trend Summary



Improvement

## 60 Year Target

0.4

## Latest Data (2021)

0.23

## Baseline (2008)

0.19

## Data Sources

- 2022 Land Uses

Residential Land Use Mix measures the diversity of housing forms and types within a community. This indicator describes the housing mix expressed in terms of the number of residential land use districts. It is calculated using the same methodology as the Mix of Land Use category, but only includes residential land uses in the calculation. The 60-year target is 0.4.

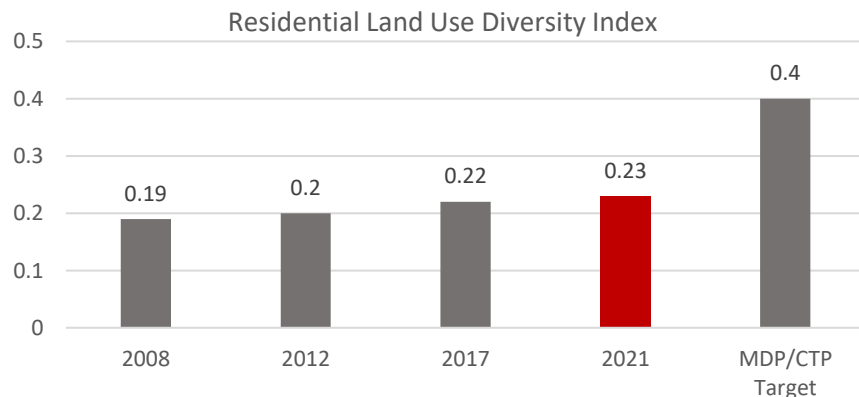
## Benefit

Communities with a more diverse range of housing are often less affected by community demographic lifecycles and provide local level economic resilience. A socio-economically and age diverse mix of residents supports local retail and commercial services and uses community amenities like parks and transit most efficiently. A range of housing choice and opportunity can foster the building of complete communities, with more opportunities for affordability for all Calgarians.

## How are we doing?

Our Plans establish a residential housing diversity target of 0.4. A number closer to 1.0 indicates a more diverse range of residential land use types permitted. A number close to zero means that only one land use type dominates. Communities with high residential diversity will have more housing options available. A score closer to 1.0 indicates there is more potential for housing diversity.

This indicator will change slowly city-wide. In 2021, the Residential Diversity Index was 0.23, a 21 per cent increase in housing diversity since 2008. Development in new communities where a greater range of residential uses are now required has helped to move this indicator. In established areas, residential uses do not change as much or in terms of the volume of land area re-designated as in Developing Areas, but this will become increasingly important as Main Streets and Activity Centres continue to redevelop. The proposed Land Use Bylaw renewal project will aim to improve this score.



# Road and Street Infrastructure

## Trend Summary



Improvement

## 60 Year Target

0.57

## Latest Data (2022)

0.47

## Baseline (2008)

0.72

## Data Sources

- 2022 Road data

This metric measures the roads to streets ratio, which is a proportion of skeletal roads used for high-speed, long-distance travel such as freeways and expressways to streets used for local residents, businesses and services. The 60-year target it is have 0.57 km of skeletal roads for every 1 km of arterial streets.

## Benefit

Calgary needs to have efficient transportation to be competitive, but requires streets to provides a high-quality environment for all modes of transportation to sustain vibrant communities, provide safe travel, enable diverse forms of mobility for all people, and support local business. Skeletal roadways are the major transportation connections that carry cars and trucks long distances at high speeds while arterial streets provide access to homes, businesses, and local services. While both types of infrastructure are required, a smaller ratio of roads to streets means there is more accessible transportation infrastructure that could accommodate multi-modal transportation, resulting in a greater share for transit, bike and pedestrian trips.

## How are we doing?

In 2005, Calgary had a road to street ratio of 0.72, meaning there was 1 km of Arterial Streets for every 0.72 km of Skeletal Roads, whereas the CTP target is 1km for every 0.57km. When the Calgary Transportation Plan was implemented, roadways across the city were reclassified to a new system. This reclassification shifted the ratio to 0.49, exceeding the plan target. In 2017, this shifted significantly again to 0.61 after the construction of the Stoney Trail ring road, returning to behind our target for this indicator. By 2022, Calgary surpassed its target by having a road to street ratio of 1 km of Skeletal Roads for every 0.47 km of Arterial Street.

The ratio is lower now because we have built more or improved more arterial roads than skeletal roads. Although parts of the Southwest Ring Road were opened in 2020, we have added more arterials and that is moving the ratio closer to the target. Over the next few years as portions of the Southwest and West Ring Roads are complete, this ratio will likely change.



Road to Street Ratio

2005	2012	2017	2022	Target
0.72	0.49	0.61	0.47	0.57



## Trend Summary



Decline

### 60 Year Target

Percent of population within 400m of a Primary Transit Network: **45%**

Percent of jobs within 400m of a Primary Transit Network: **67%**

### Latest Data (2019, 2016)

Percent of population within 400m of a Primary Transit Network: **0%**

Percent of jobs within 400m of a Primary Transit Network: **0%**

### Baseline (2008)

Percent of population within 400m of a Primary Transit Network: **0%**

Percent of jobs within 400m of a Primary Transit Network: **0%**

### Data Sources

- 2022 PTN
- 2019 Civic Census
- 2016 Place of Work

# Accessibility to Primary Transit Network

*Note population and job data previously acquired are no longer available to inform this indicator. Building Permits offer a temporary proxy measure.*

Accessibility to the Primary Transit Network (PTN) is measured by the percent of population and jobs that are located within 400 meters of the PTN.

## Benefit

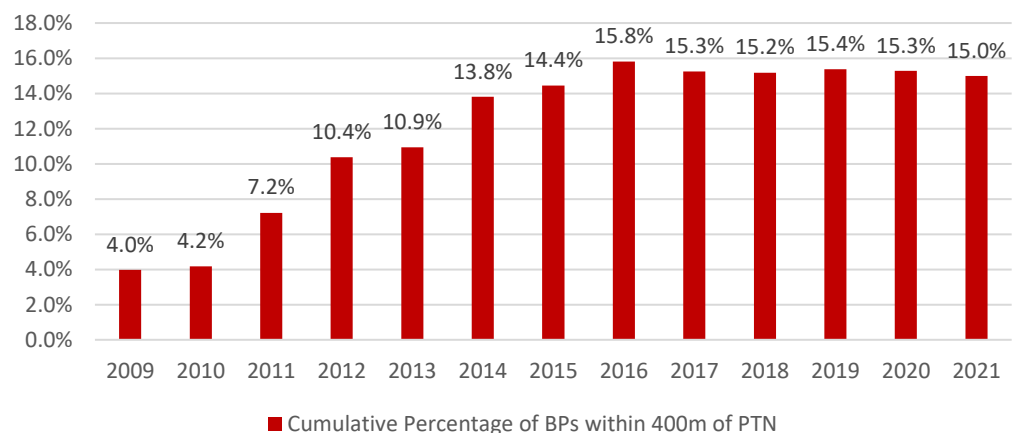
The Primary Transit Network is a system of interconnected routes that are fast, convenient, and easy to use. Primary transit routes run every ten minutes, 15 hours a day, seven days a week. Having access to this level of service is key to making travel equitable, affordable and easy throughout Calgary. Accessible transit provides an affordable option to people who may not drive, such as youth, seniors, and people with disabilities.

## How are we doing?

In 2005, there were no areas in Calgary that had Primary Transit Network levels of transit service. By 2016, service levels on Route 3 and both CTrain lines had increased to a PTN level of service and 37 per cent of jobs and 14 per cent of the population were in the Primary Transit Network area. By 2022, the level of service has decreased and no routes operate at a PTN level of service due to service reductions initially attributed to the economic recession and exacerbated by the COVID-19 pandemic.

With no Civic Census data available, Building Permits (BP) can be used as a proxy measure. The share of BPs near the hypothetical PTN increased from 2009 to 2016, but has since levelled off. The following chart shows BPs within a hypothetical PTN, including both LRT lines and Bus Route 3.

Cumulative Percentage of Issued Building Permits (Units) within 400 m of the Primary Transit Network



## Trend Summary



## 60 Year Target

Transit Service Hours Per Capita: **3.70**

## Latest Data (2021)

Transit Service Hours Per Capita: **1.77**

## Baseline (2005)

Transit Service Hours Per Capita: **2.22**

## Data Sources

- Calgary Transit

# Transit Service

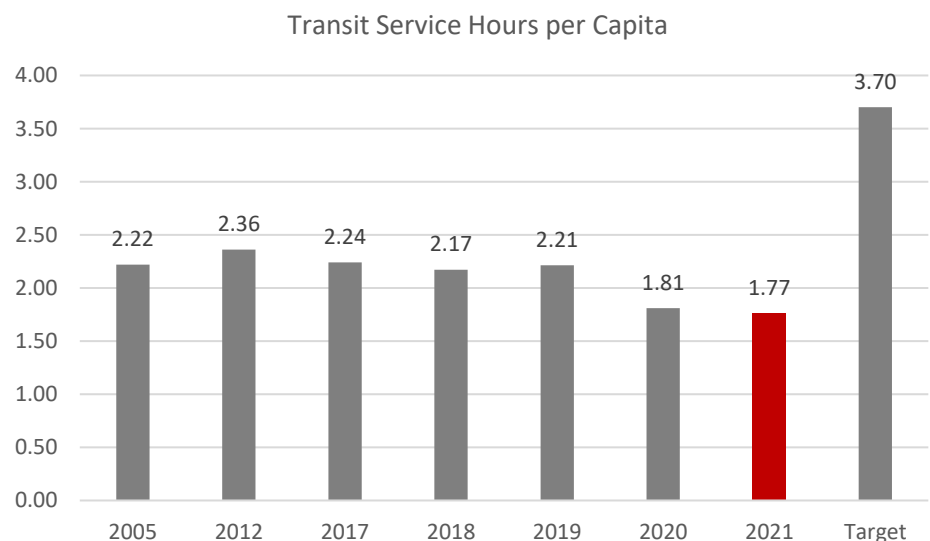
Transit Service is measured by annual transit service hours divided by total population for a given year and is measured in service hours per capita. In a growing city, more service is required each year to maintain a baseline level.

## Benefit

Transit service needs to be safe, frequent and reliable to attract a high level of ridership. People begin to rely on transit as a preferred mode when they are able to walk a short distance to service and can expect a bus or train to arrive with minimal and predictable wait time. Improving transit service improves equity amongst Calgarians.

## How are we doing?

Investments in service improved between 2005 and 2012, when the city was experiencing economic growth. During the recent economic downturn, fewer transit riders resulted in decreased service. COVID-19 has significantly affected transit service; however, this is likely a short-term decrease and expected to rise after the pandemic as work from home orders end. The extent to which it will rise is unclear. Calgary Transit strategically adjusted schedules, however, considerable effort will be needed to reverse this decrease and move towards the Plans' target.



## Trend Summary



Improvement

### 60 Year Target

Per cent of intermodal and warehousing facilities within 1600 m (actual) of Primary Goods Movement Network:  
**95%**

### Latest Data (2022)

Per cent of intermodal and warehousing facilities within 1600 m (actual) of Primary Goods Movement Network:  
**98%**

### Baseline (2008)

Per cent of intermodal and warehousing facilities within 1600 m (actual) of Primary Goods Movement Network:  
**73%**

### Data Sources

A new data source is required for this indicator.

- Logistics Council

# Goods Access

*A new consistent data source is required for this indicator.*

Goods Access measures the percentage of intermodal and warehousing facilities in close proximity (1600 metres) to the Primary Goods Movement network.

## Benefit

Locating intermodal and warehousing facilities close to the Primary Goods Movement Network contributes to transportation efficiency and supports the city and regional economy. Smaller distances between these facilities and the network decreases trip length and reduces greenhouse gas emissions.

## How are we doing?

Currently 98 per cent of Calgary's intermodal and warehousing facilities are within 1600m of the Primary Goods Movement Network, above the target of 95 per cent throughout reporting periods. New intermodal and warehousing facilities have been successful in locating near the Goods Movement Network, and adjustments have been made to the Primary Goods Movement Network. Success can also be attributed to the Industrial Strategy and Goods Movement Strategy.

### Percent of Intermodal Facilities within 1600m of Goods Movement Network

2005	2012	2022	Target
0.73	0.73	0.98	0.95

# Transportation Mode Split

Percentage of all-purpose, city-wide trips made by walking, cycling, transit and car within a 24-hour period. This includes trips for work, school, leisure or other.

## Trend Summary



Behind trend for goal

## 60 Year Target

Per cent split (all purpose trips, 24 hours, city-wide)

Walking and cycling: 20% - 25%  
 Transit: 15% - 20%  
 Auto: 65% - 55%

## Latest Data (2022)

Per cent split (all purpose trips, 24 hours, city-wide)

Walking and cycling: 22%  
 Transit: 3%  
 Auto: 75%

## Baseline (2008)

Per cent split (all purpose trips, 24 hours, city-wide)

Walking and cycling: 14%  
 Transit: 9%  
 Auto: 77%

## Data Sources

- Transportation Data

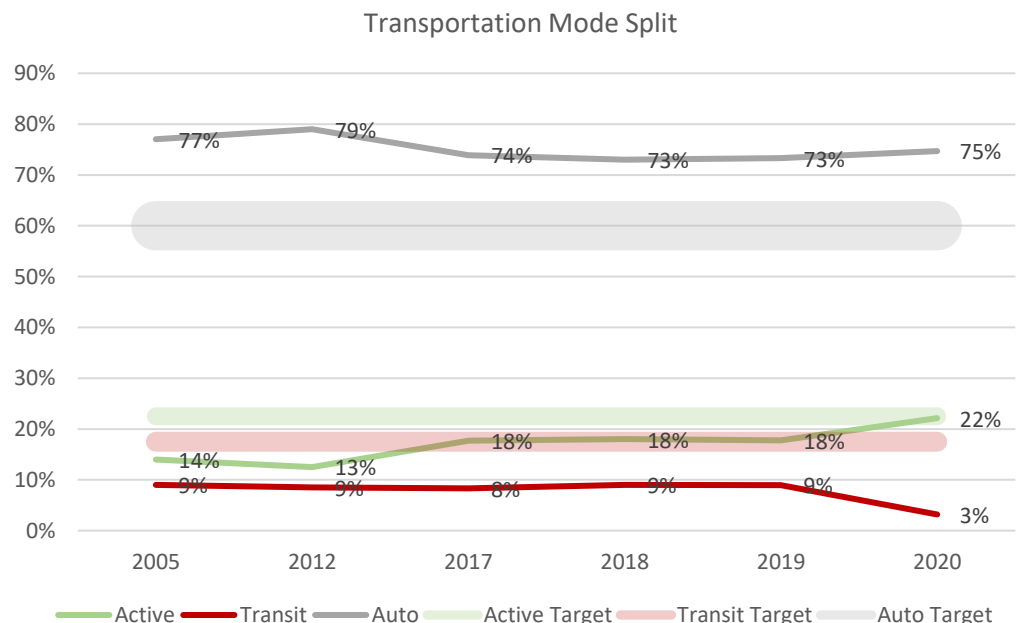
ISC: UNRESTRICTED

## Benefit

Most people have access to a variety of travel modes, but will only choose a mode if it is safe, affordable and easy to use. The way Calgarians move around the city is reflective of the urban form, urban design, transit services, and street connectivity. Reducing vehicle dependence improves equity amongst Calgarians. More Calgarians using transit and active forms of transportation reduces GHG emissions and promotes health. Less reliance on personal vehicles also strengthens equity amongst Calgarians.

## How are we doing?

The COVID-19 pandemic has significantly affected transportation mode split, particularly in terms of active transportation and transit usage. Reductions in service prompted by COVID-19 as well as the economic downturn impacted the ability of transit to recover in mode share. During the pandemic, workers were more likely to have worked from home, a situation which especially affected downtown workers who may have previously taken transit. Automobile travel has remained the primary transportation option for Calgarians. Active modes of transportation have increased significantly during the pandemic, with increasing options, such as bike lanes and the scooter-share program proliferating, as well as street closures for active transportation. Long term remote and hybrid work scenarios could result in latent capacity in the transportation system at traditional peak times. This may enable utilizing more road space to enable dedicated transit, walking/wheeling space to aid in shifting mode share over time.



## Trend Summary



Improvement

## 60 Year Target

Per cent of population within Major and Community Activity Centres, and 600 m of Urban and Neighbourhood Corridors: **30%**

## Latest Data (2019)

Per cent of population within Major and Community Activity Centres, and 600 m of Urban and Neighbourhood Corridors: **22% (2019)**

## Baseline (2008)

Per cent of population within Major and Community Activity Centres, and 600 m of Urban and Neighbourhood Corridors: **18%**

## Data Sources

- Civic Census
- Building Permits

# Accessibility to Daily Needs

*Note population and job data previously acquired are no longer available. Additional reporting using Building Permits offers a temporary proxy measurement.*

Accessibility to daily needs is measured by the percentage of Calgarians living within Activity Centres, or within 600 metres of Main Streets.

## Benefit

Encouraging new development and redevelopment that focuses on intensifying and diversifying housing and urban activities within community hubs (Activity Centres and Main Streets) around transit stations and premium transit routes encourages more walking, cycling and transit use. Destination within a community make for efficient use of public investment and infrastructure, and creates less of a need for personal vehicles, increasing equity amongst Calgarians by making services readily available in close proximity, and reducing greenhouse gas emissions. This also strengthens our business and commercial districts.

## How are we doing?

In 2019, 22 per cent of Calgary's population was located within Activity Centres and Main Streets. These strategically important areas have added over 48,000 people since 2006. This share of growth is consistent with long term objectives.

Household level Civic Census data is required to monitor this indicator. In the absence of a Civic Census, Building Permit data has been analysed to determine if residential unit construction is occurring within proximity to daily needs. This data shows that an increasing share of dwelling unit growth is occurring in these strategic growth areas.

Cumulative % of Issued Building Permits within Activity Centres or 600m of Main Streets (2009 - 2021)



## Trend Summary



Decline

## 60 Year Target

Per cent of impervious surfaces: **10% - 20%**

## Latest Data (2018)

Per cent of impervious surfaces: **45%**

## Baseline (1998)

Per cent of impervious surfaces: **33%**

## Data Sources

- Calgary Impervious Surface

# Watershed Health

Watershed Health measures the amount of impervious surface area (land area covered by buildings, roadways, and parking lots) within the urban area. As imperviousness increases there is a degradation in river and creek channel stability, water quality, and aquatic biodiversity. As land is developed, impervious surfaces can have a significant impact on the quantity and quality of rainfall run-off that flows to the river. The amount of imperviousness rises in the city as more area is developed with buildings, roads, and parking lots. There is a direct correlation between the increase in impervious surfaces and an increase in stormwater runoff to the rivers which affects water quality and quantity.


## Benefit

Protecting the watershed by decreasing impervious surfaces is necessary to sustain and enhance river and creek channel stability, water quality, and aquatic biodiversity. Limiting impervious surface area can lower the stress load on stormwater systems, mitigate surface and bank erosion, and avoid damaging run-off.

## How are we doing?

Calgary's impervious surface cover has been increasing since 1998. Compared to baseline data, imperviousness has increased by 12 per cent. As urban development continues, less area remains green and permeable.

## Trend Summary

 No Improvement

## 60 Year Target

Per cent of tree cover: **14% - 20%**

## Latest Data (2020)

Per cent of tree cover: **8.25%**

## Baseline (1998)

Per cent of tree cover: **7%**

## Data Sources

- Calgary Tree Cover, City of Calgary

# Urban Forest

Urban Forest measures the percentage of area covered by tree canopy in Calgary's urbanized area. It is an important indicator of the health of forests throughout the city.

## Benefit

Trees provide many ecological services, including cleaning the air, reducing erosion and creating wildlife habitats. In general, trees contribute to the quality of life, providing shade to residents and adding a sense of serenity and character to the neighbourhoods. In 1998, a baseline of 7% was established for tree canopy cover. Our Plans set a target of 14% to 20% tree canopy coverage.

## How are we doing?

This was a slight drop in canopy since 2017, however, the minor decrease of a land area of almost 85,000 ha is likely not of statistical significance. The trend is that our canopy is remained stable since the 2014 storm despite having planted approximately 39,000 trees since 2014. Regrowth and steady increases of tree canopy city-wide are a result of Calgary Parks' strategies and actions.

1998	2012	2013	2015	2017	2020	Target
<b>7.0%</b>	<b>8.5%</b>	<b>8.4%</b>	<b>8.2%</b>	<b>8.3%</b>	<b>8.2%</b>	<b>14-20%</b>

# District Energy

*Note population and job data previously acquired from the Civic Census are no longer available.*

District Energy measures the percentage of Calgary's land area with enough population and job density to potentially support a district energy system.

## Trend Summary



Improvement

## 60 Year Target

6.5%

## Latest Data (2016)

Per cent of land area with densities supportive of district energy systems: **2.6%**

## Baseline (1998)

Per cent of land area with densities supportive of district energy systems: **1.8%**

## Data Sources

- Civic Census

## Benefit

District energy systems are communal heating, cooling and power networks that can reduce the demand for non-renewable energy resources. The increased efficiency of supplying energy in this form reduces overall energy consumption and greenhouse gas emissions.

## How are we doing?

District energy systems rely on a dense network of uses to enable cost effective management and distribution of heating, cooling and electricity efficiently. While the number of district energy facilities has not increased in Calgary since the last reporting period, a greater percent of the city now has a sufficient density to support these systems. However, only 2.6% of urban area in Calgary in 2016 was dense enough to support district energy.



