Bicycle Transportation Plan – City of Edmonton

Claire Ellick, E.I.T., Transportation Engineer Sustainable Transportation The City of Edmonton

Based upon the 2009 City of Edmonton Bicycle Transportation Plan as prepared by Stantec Consulting

Paper prepared for presentation

at the Road Safety Session

of the 2009 Annual Conference of the Transportation Association of Canada Vancouver, British Columbia

## 2. Abstract

"Communities that are bicycle friendly are seen as places with a high quality of life. This often translates into increased property values, business growth, and increased tourism. Bicycle friendly communities are places where people feel safe and comfortable riding their bikes for fun, fitness, and transportation. More bicycling in communities results in reduced traffic demands, better air quality, and improved public health."

– Your Guide to Becoming a Bicycle Friendly Community, The League of American Bicyclists.

Similar to other major Canadian cities, Edmonton is experiencing strong growth with a trend towards further suburbanization, which has an effect on travel patterns across the City by increasing both car usage and trip distance. Edmonton is the fifth largest municipality in Canada with a population of approximately 750,000 people and is part of the Capital Region encompassing a population of 1 million (2006 Census Metropolitan Area). Over the next 30 years, the population is expected to exceed 1 million people, while the Capital Region is expected to exceed 1.6 million people (Census Metropolitan Area).

In many ways, Edmonton is a bicycle friendly city offering many of the key elements that support this perception among residents and visitors alike. However, some existing bicycle supportive elements are not as visible or well understood as they could be. As with many young cities built during an era heavily influenced by the automobile, Edmonton has significant room for improvement in order to be broadly and consistently experienced as bicycle friendly. An overarching vision for Edmonton and the region is a bicycle friendly city where more people cycle more often.

Edmonton's previous Bicycle Transportation Plan was created in 1992. Its Planning, Engineering, Education, Encouragement, and Enforcement goals have helped create a city that supports cyclists better than it did 20 years ago. Building on the success of the 1992 Plan, further examination of cycling practice and infrastructure was required to support the growing numbers of commuter and recreational cyclists in Edmonton.

In the 17 years since the previous Bicycle Transportation Plan was adopted, the field of bicycle transportation planning and engineering has advanced significantly. A key reason for updating the Bicycle Transportation Plan is to consolidate the gains benefiting experienced cyclists while appealing to an additional broader demographic of potential cyclists who are open to considering the bicycle as an alternative mode of transportation.

#### 3. Text

#### INTRODUCTION

Similar to other major Canadian cities, Edmonton is experiencing strong growth with trends towards further suburbanization, which have an effect on travel patterns across the City by increasing both car usage and trip distance. Edmonton is the fifth largest municipality in Canada with a population of approximately 750,000 people and is part of the Capital Region encompassing a population of 1 million (2006 Census Metropolitan Area). Over the next 30 years, the population is expected to exceed 1 million people, while the Capital Region is expected to exceed 1.6 million people (Census Metropolitan Area).

The City of Edmonton has recently prepared a set of strategic plans to address this rapid growth and the challenges it will bring on the City's transportation system in future years. Through these plans, the City of Edmonton will continue to provide leadership in sustainable transportation practices to reflect its commitment to environmental, economic, and social sustainability. In 2009, new integrated land use and transportation master plans will be reviewed by Edmonton City Council to guide the City's development to the year 2040. A number of more specialized subsidiary plans will be implemented to address walkability, cycling and support Transportation Demand Management.

The Transportation Master Plan/Moving Edmonton is currently being updated and identifies a transportation system that supports healthy, active lifestyles as an important priority. It also highlights the need for a shift away from transportation primarily through means of private automobiles and a shift towards public transport and active transportation. The Bicycle Transportation Plan will play a key role in creating a "cycle-friendly city" as outlined in the Transportation Master Plan.

The Bicycle Transportation Plan, which was last updated in 1992, underwent a review and update through the course of 2007 and 2008, and was recently adopted by the City of Edmonton in March 2009. Stantec Consulting was retained by the City of Edmonton in 2007 to conduct this update and the paper presented herein gives a summary of the 2009 Bicycle Transportation Plan.

Edmonton has great potential to improve as a bicycle-friendly city and has an excellent foundation for doing so. Substantial context and policy support exist for bicycle transportation including an established bicycle transportation plan and many bicycle-supportive facilities, programs, and initiatives.

#### CYCLING IN EDMONTON

The 2005 Household Travel Survey was conducted to inform the City of Edmonton Transportation Department of citizens' travel patterns and behaviours. The survey was distributed randomly in the Edmonton region between

September 2005 and December 2006, gathering data from approximately 6,600 households. As of 2005, cycling comprises about 1% of Edmonton's modal split, which is a 150% increase from the 1994 Household Travel Survey.

The survey identified that Edmonton's population increased by 13% in the eleven years since the last survey, with the 25-64 age group making the most significant increase in biking and walking trips. The survey reported an incidence of car trips at 77% of total trips, as well as a decrease in car passengers and higher numbers of vehicle kilometres traveled. The latter is likely due to lower average household size, higher incidence of vehicle ownership, and suburban areas expanding further from the downtown. These factors can lead to higher numbers of single occupancy vehicle trips.

Relating to bicycle transportation, the survey reports that bicycle trips account for about 1% of the mode share in Edmonton. Approximately 27% of cyclists are reported to be traveling to work or school, 20% of bicycle trips were made for social or recreational reasons, 17% of bicycle trips were made to shop, and 36% of bicycle trips were made for other reasons. 63% of bicycle trips were made by males whereas 49% of all trips by all modes were made by males. The average bicycle trip distance reported from the Household Travel Survey was 4.5 km with a standard deviation of 5.3 km. The Household Travel Survey also showed that two thirds of bicycle trips are in the range of 2 km to 10 km.

# CYCLING FACILITIES IN EDMONTON

Edmonton is home to an extensive network of on-street and separated bicycle facilities. However, some of these facilities are not as visible or well-understood as they could be. Since the adoption of the 1992 Bicycle Transportation Plan, the City has constructed wide curb lanes along all new or rehabilitated arterial roadways throughout the City. To date there are over 200km of wide curb lanes throughout Edmonton to accommodate cyclists sharing the lane side by side with motorists.

Edmonton is also home to 6km of on-street contra-flow bicycle lanes and 6km of bus/taxi/bicycle lanes, as well as 105 km of signed on-street bicycle routes and more than 100 km of shared-use sidewalks (or multi-use trail) along road right-of-way.

Edmonton is the site of both the largest urban parkland in North America (the North Saskatchewan River Valley) as well as an extensive network of rail and utility corridors which provide long stretches of uninterrupted greenway, well-suited to major active transportation corridors. Off road cycling facilities in Edmonton consist of more than 135 km of multi-use trail in the river valley (55 km paved, 80 km granular), 460 km of single track/unimproved trails within the river valley (0.5 m width or greater) open to mountain biking, 30 km+ of multi-use trail along pipeline/utility rights-of-way and 10 km of granular trails along

pipeline/utility rights-of-way. These facilities serve a diversity of cyclists throughout the year, and all paved multi-use trail facilities are snow-cleared for year-round use by pedestrians and cyclists.

### **1992 BICYCLE TRANSPORTATION PLAN**

The current state of cycling in Edmonton owes much of its success to the achievement of the broad goals of the *1992 Bicycle Transportation Plan*. Its section on awareness and education for cycling safety and efficiency has helped to create a diverse and well-established cycling community.

The education and encouragement goals of the *1992 Bicycle Transportation Plan* encompass a broad range of community and municipal level cycling advocacy. Partnerships with the Edmonton Police Service, Safety Councils, Alberta Education, Alberta Transportation, the Solicitor General, City Council, and internal City of Edmonton departments such as Transportation, and Parks and Recreation were referenced for cross promotion in bicycle advocacy.

Educational programs for safety, awareness, and promotion of cycling were recommended for specific user groups, such as new motorists and transit operators, as well as the general public. The 1992 Bicycle Transportation Plan also made recommendations to establish end-of-trip facilities both as a requirement of new developments and to accommodate bicycles on light rail transit (LRT) vehicles.

Design standards for infrastructure affecting cyclists were also reviewed and recommendations were made for the design and placement of drainage grates, curb and gutter width, pavement marking types as well as bicycle parking guidelines. Maintenance practices such as snow clearing and spring street sweeping were also emphasized for their importance in supporting year-round cycling.

## MOVING FORWARD – THE 2009 BICYCLE TRANSPORTATION PLAN

Stantec Consulting was hired in early 2007 to lead the review and update of the Bicycle Transportation Plan. Significant public involvement occurred as part of the review process, and a number of open houses and workshops were held on a variety of topics including bicycles and transit, end-of-trip facilities, education and promotion, as well as the City-wide bicycle route network. Hundreds of local cyclists and members of the public turned out to share their voices and shape the plan's direction.

### NETWORK PHILOSOPHY AND PRINCIPLES

Providing a range of facility types appealing to a variety of skill levels creates a functional, comprehensive network for cyclists. From multi-use trails or shared lanes on quiet streets for novice cyclists and bicycle lanes on collector and arterial roads for moderately skilled cyclists, to wide curb lanes on arterials for experienced cyclists, the bicycle network, customized to the constraints and opportunities in a wide range of contexts and locations, can address the needs of a range of users.

Using a philosophy of progressive levels of skill and experience, novice cyclists will gain the skill and confidence they need from off-road or low traffic-volume routes, and can gradually make the transition to on-road facilities. Over time, cyclists may become confident enough to ride on any road, fully integrated with vehicular traffic, including on busy roads with wide curb lanes or without designated cycling facilities.

#### **BROADENING THE EXISTING NETWORK**

The practice of implementing wide curb lanes and multi-use trails (on one side) will be continued for arterial roads that are not part of the designated bike route network. This practice has been very successful in improving the conditions and status for bicycle transportation in Edmonton, particularly for confident, experienced riders; however there is a need to provide a wider range of facility types and more visible facilities in order to accommodate a wider range of cyclists and potential cyclists.

An essential element of the Bicycle Transportation Plan is the implementation of a cycling network to provide year-round functional bicycle facilities appealing to a broad range of users possessing a variety of skill levels.

The City of Edmonton has grown substantially since the implementation of the 1992 Bicycle Transportation Plan and the 2001 Multi-use Trail Corridor Study (separated bicycle facilities through a city-wide network of rail and utility corridors). There is significant need to provide linkages to new areas of the city, and to better support existing areas for cycling. Data from both the 2005 Household Travel Survey and 2005/6 Bicycle User Survey indicated trip patters that occur in a relatively dispersed pattern of origins and destinations throughout the city. This supports the creation of a grid-based network of bicycle routes as opposed to a radial system focused towards a singular central hub of education and employment.

The foundation of the proposed cycling network will be provided through a City-Wide System that will allow cyclists to move throughout the city along a grid of direct corridors with access to major destinations including transit hubs. Typically located along minor arterial and collector roads, this network will consist of routes spaced approximately 3 kilometres apart that will be maintained for year-round use. The City-Wide System will be supplemented by a Neighbourhood Connector System to provide access to neighbourhood and recreational destinations, and points of interest along collector and local roads. The network features a higher density of routes in central areas with increased population and employment densities and higher number of destinations.

The cycling network will consist of a broad range of facilities to include multi-use trails or shared lanes on quiet roads for novice cyclists, bicycle lanes on collector and arterial roads for moderately-skilled cyclists, and wide curb lanes along arterial roads for experienced cyclists. Though there will be some flexibility of facility type depending on context (based upon the roadway system, width, speed limits, parking, etc.) the typical facility for the City-wide network of bicycle routes will consist of a marked bicycle lane. The figure below illustrates the range of route treatments to be considered for the City-Wide and Connector networks, and a City-wide network map is shown as Figure 5.1 at the end of the report.





## WAYFINDING SIGNAGE

Though Edmonton has used directional signage over the past 17 years to demarcate on-street bicycle routes, the new City-wide network will be implemented with updated wayfinding signage to assist cyclists in their navigation of the City. A review of best-practices is currently underway to establish new bicycle route signage, which may feature helpful information including distances to major destinations, route names, etc.

#### MAINTENANCE

Edmonton is a four-season city, which experiences a major winter season with a significant amount of snowfall. All of Edmonton's paved multi-use trails are currently snow-cleared both alongside roadways, rail and utility corridors as well as in the North Saskatchewan River Valley. Winter cycling is a common trend in Edmonton, which will continue to grow in years to come. Snow-clearing and storage for both on-street and off-road facilities will be critical to ensure that the network remains safe and accessible throughout the winter.

The City of Edmonton also operates a 24 hour roadway maintenance hotline, which is advertised to cycling groups and citizens as a means of reporting

potholes, gravel and glass along their bike routes. Maintenance crews are very responsive to reported issues and this provides citizens with a direct means of reporting locations that require immediate attention.

# PUBLIC TRANSIT

Bicycles and transit provide an excellent opportunity for efficient, long-distance travel that provides a good level of service to users of the system. In addition to increasing catchment areas and ridership from a transit perspective, having access to transit, both for travel or connectivity allow cyclists the assurance they need to make longer trips, have a back-up plan in case of inclement weather or mechanical failure, and make it easier to cross some of the larger barriers to cycling within a city. Particularly with the expansion of fixed route transit, such as light rail transit (LRT) in Edmonton, bicycles provide an excellent opportunity for an expanded catchment basin of users to access high quality, time efficient transport. As a city with a relatively low population density in suburban areas, these opportunities to reach more potential riders provide a strong case for accommodating cyclists both at stations and on transit vehicles.

Currently in Edmonton, there are three bus routes that are equipped with bicycle racks. Cyclists can travel on LRT in both directions outside of morning and evening peak hours. The Bicycle Transportation Plan recommends expansion of bicycle racks to all buses, as well as providing a means for accommodating cyclists on LRT vehicles without bans in peak periods of travel. In 2009, 120 new buses have been purchased with bicycle racks; which is more than double the current number, and all new buses come equipped with a rack. As vehicles with racks are added to the fleet, they will be assigned to cross-town and express routes to provide the maximum convenience for cyclists wishing to cover a large distance or cross barriers such as a steep river valley or freeway system.

Supporting elements such as secure parking facilities at transit stations are also being reviewed and as Edmonton's light rail transit (LRT) network expands, new opportunities arise for the provision of class 1 bicycle parking facilities. Edmonton is currently in the process of reviewing class 1 facility types to establish a consistent format for longer-term bike storage at transit centres.

## BICYCLE PARKING

The provision of bicycle parking is an important component in the general encouragement of cycling. Data from Edmonton's 2005/2006 Bicycle User Survey indicates a slightly longer average trip length where secure bicycle parking is provided and approximately a third of respondents indicated that the provision of more secure bike parking would encourage them to cycle more. Recognizing the importance of bicycle parking, Edmonton's current Zoning Bylaw includes requirements for the number, location, and design of bicycle parking stalls for new developments. The City of Edmonton has also implemented a

program to install post-and-ring style bike racks throughout the city. The process for placing the new bike racks will include placing the racks in areas of known demand as well as responding to requests for bike racks and evaluating the requested location for suitability.

### EDMONTON ZONING BYLAW

Edmonton's Zoning Bylaw currently includes requirements for bicycle end-of-trip facilities as a condition for new developments. Requirements for the number, design and location of bicycle parking stalls is shown in Table 2.2.

### Table 3.1 - Edmonton Zoning Bylaw 12800 - Bicycle Parking Requirements

Use of Building or Site	Minimum Number of Bicycle Parking Spaces
1. All Residential and Residential-Related Use	5% of the number of vehicular parking spaces
Classes of 20 Dwellings or more, and all Non-	required under Schedule 1 to a maximum of 50
residential Use Classes outside the boundaries of	Bicycle Parking spaces with 5 Bicycle Parking
the Downtown Area Redevelopment Plan.	spaces being the minimum to be provided.
2. Administration Use and Educational Facilities	10% of the number of vehicular parking spaces required under Schedule 1, with 5 Bicycle Parking spaces being the minimum number of spaces to be provided.
3. All Residential and Residential-Related Use	20% of the number of vehicular parking spaces
Classes of 20 Dwellings or more, and all Non-	required under Schedule 1 to a maximum of 50
residential Use Classes within the boundaries of	Bicycle Parking spaces, with 5 Bicycle Parking
the Downtown Area Redevelopment Plan	spaces being the minimum to be provided.

The current Zoning Bylaw will be updated to include a broader array of end-of-trip facilities including showers, lockers and changerooms in places of employment, as well as specific detail about design standards for appropriate facilities.

## ACCOMMODATING BICYCLES IN CONSTRUCTION ZONES

Road construction can prohibit continuous cyclist movement, and although measures may be taken to preserve pedestrian safety and accessibility, coordinated planning is needed to maintain cyclist traffic flow. Often, grade separation, debris, stairs, or a complete absence of bicycle facilities impedes cyclists' travel and can compromise safety. These accommodations are especially important near major destinations or barriers. Hard surfaced detours are generally provided where there is interruption to a bicycle route or trail, in addition to signage and contact information. In some cases, as in bridge rehabilitation, it may be necessary to provide a shuttle service for pedestrians and cyclists if the work cannot be phased in a manner that will allow for a multiuse facility to remain open for the project's duration.

# BICYCLE EDUCATION AND SAFETY

### **Cyclist Education**

An important component of promoting safe and conscientious cycling is to provide education to cyclists regarding their responsibilities in cyclist-motorist, cyclist-pedestrian, and cyclist-cyclist interactions. Education regarding operating rules for cyclists on the road and in shared facilities like multi-use trails and contra-flow bike lanes is currently provided by programs which are sponsored by bicycle user groups (BUGs) and retailers. This will be particularly important as Edmonton embarks on the provision of new cycling treatments (bike lanes, sharrows) that many drivers and cyclists have not previously seen in Edmonton.

The City of Edmonton could further the effectiveness of these cycling education initiatives by supporting the creation of a Bicycle Ambassador Program similar to the one in Toronto. The Toronto Ambassador program is comprised of trained individuals that reach out to communities with programs and campaigns to deliver safety messages and safe riding practices as well as encourage cycling. A program is currently being developed in Edmonton for launch in 2010 and 2011, pending the approval of funding for the Bicycle Transportation Plan in late 2009.

Edmonton currently offers how-to-ride seminars each spring for children aged 5 through 12, and Can-Bike Training is offered through the local Edmonton Bicycle Commuters society. Beyond this, there is the need to reach a broader audience of school-aged children who may not otherwise sign up for a course. Efforts will be made to partner with the Edmonton Public and Catholic School Boards, as well as Alberta Education to encourage them to formally incorporate cycling education and training into school curriculums.

## **Cyclist-motorist Interaction**

In addition to educating cyclists, educating automobile drivers of their responsibilities in terms of motorist-cyclist interaction is also important for providing a safe cycling network. The curriculum included in the Alberta Transportation's 2006 Basic License Driver Handbook details several helpful tips to facilitate cyclist and motorist safety. Conversely, the Alberta Motor Association (AMA) is lacking in resources for drivers regarding interaction with cyclists and currently does not include any road-sharing safety information on its website.

The City of Edmonton will be partnering with the Alberta Motor Association as well as the Edmonton Police Service and Office of Traffic Safety to work on specific targeted campaigns to address cycling safety, and sharing the roadway in a safe manner. The City's existing "Be Courteous Share the Road" signage program will continue and expand to new areas and routes in the City.

### Understanding Bicycle Collisions

Safety is a continuous concern in transportation, specifically in the interaction of motorized and non-motorized modes. While separated bicycle facilities also require safety precautions, on-road cycling requires strategic planning along with effective education for all road users.

The City of Edmonton's Office of Traffic Safety publishes an annual Motor Vehicle Collisions Monitoring report. The report details some bicycle collision data and presents vehicle/bicycle collisions resulting in minor (bruising or scraping) and major (requiring hospital care) injuries as well as fatalities. Data sampled from 2006 statistics shows that bicycle collisions were most prominent on Mondays, Thursdays, and Fridays at 9:00 AM, 4:00 PM, and 6:00 PM, occurring most often in May.

It is important to note that these are only a fraction of the actual total bicycle collisions in Edmonton on an annual basis, as many collisions go unreported and the current system for data collection is not comprehensive. Details of bicyclebicycle or bicycle-pedestrian collisions are not accounted for, making it difficult to interpret exactly how many collisions there are in Edmonton. Although there is information on roadway location (mid-block, intersection, etc.) for collisions, there is no data available on exact locations. A lack of comprehensive and representative data makes it difficult to accurately identify appropriate collision prevention improvements. Changes to the collision recording and analysis process are needed with the end goal of collecting more statistically significant The City of Edmonton will move forward with promoting increased data. reporting of bicycle-bicycle, bicycle-pedestrian and bicycle-automobile collisions by cyclists and the general public. Options may include information and marketing campaigns, information on the City of Edmonton website, at schools, and at other relevant events.

## CYCLING PROMOTION

There are several notable programs in place in Edmonton aimed at educating current and potential cyclists of all types. Bikeology, a seven year old festival, is one of a series of events geared at bringing together various types of cyclists in Edmonton each June. The festival celebrates a one-day gathering along with several bike-related events throughout Bike Month, and promotes cycling safety education, encouragement and culture. Events include bike-to-work breakfasts, bicycle related film screenings, and educational sessions on topics such as winter cycling and bicycle maintenance. Bike Month is facilitated by interest groups, community-level advocates, local retailers, and the City of Edmonton.

Edmonton is also home to a strong community of cycling advocates. The Edmonton Bicycle Commuters are a not-for-profit society that was established in the early 1980s to provide support, education and advocacy for bicycle

commuters in Edmonton. They currently operate a repair shop where members of the public can go to learn how to repair their own bicycles, as well as offering educational opportunities such as Can-Bike courses, winter biking seminars and other support.

### MONITORING

An organized and consistent effort by the City of Edmonton will be made to ensure that accurate and representative cycling data is collected. Gathering meaningful data will help to advance the state of cycling in Edmonton and its progress in terms of practice, policy, and infrastructure. The monitoring program may include regular status reports outlining remaining implementation work, updated costs and goals, and project implementation sensitivities for coordinated planning with major initiatives such as LRT expansion.

The regular collection of cycling traffic data, with a focus on high traffic locations and important screenlines – such as bridges and important intersections – can inform cycling planning and policy decisions. Continuation of the Household Travel Survey and in particular, including cycling data as part of the Household Travel Survey, is important to assist bicycle transportation planning. The Bicycle Users Survey currently provides data that can provide some indications of trends and bicycle users' opinions.

Working with Edmonton Police Service and Capital Health to report bicycle collisions in a manner such that they can be of most use to the Transportation Department to effect change will require coordination and communication with all parties but will result in a safer overall transportation system. Specific focus on high-volume bicycle areas such as bridges and major intersections is necessary to record and prevent collisions and to target safe cycling initiatives in appropriate areas. By maintaining the roadway maintenance hotline and responding to cycling inquiries, and also by maintaining communication with the stakeholders identified throughout the Bicycle Transportation Plan Update, the City of Edmonton can collect feedback on the network and the needs and desires of the recreational and utilitarian cycling communities.

# CONCLUSION

The updated Bicycle Transportation Plan was adopted by the City of Edmonton in March of 2009, and City Administration is currently in the process of preparing concept plans for on-street bicycle lanes, expanded educational programs, connections to transit and a variety of other initiatives.

Towards the end of 2009, the plan will be written into policy format and Edmonton City Council will allocate budget for its implementation over a 10 year timeframe. As Edmonton continues to grow and expand, the provision of a well-supported cycling system will prove to be critical to health, environment, economy, transportation and quality of life in our city.

#### 4. References

Paper based upon the City of Edmonton's 2009 Bicycle Transportation Plan, as prepared by Stantec Consulting in 2007-2008.

### 5. Figures



Figure 5.1 Edmonton's Bicycle Route Network

# Figure 5.2 Facility Types for Edmonton's Bicycle Route Network

Figure 1: Range of Proposed Bicycle Facilities



### **SPEAKER'S BIOGRAPHICAL NOTES**

2009 TAC Annual Conference October 18-21 Vancouver, British Columbia

The information you provide on this form will be used by your session chair to introduce you before your presentation. Please outline your education, current position and responsibilities, and any special awards or recognition received.

Return this form **by April 30** to Sylvie Rozon, Communications and Member Services Assistant, TAC, 2323 St. Laurent Blvd., Ottawa K1G 4J8; email srozon@tac-atc.ca; fax (613) 736-1395.

Name (no initials please): Claire Ellick

Paper Title: Bicycle Transportation Plan – The City of Edmonton

Session: Road Safety

Biographical Notes:

Claire Ellick, E.I.T.

Transportation Engineer – Sustainable Transportation

Claire Ellick graduated from the University of Alberta in 2004 with a Bachelor of Science Degree in Civil Engineering, Co-op. As an avid cyclist, Claire has worked with the City of Edmonton in Sustainable Transportation since 2005 providing support for the City of Edmonton's cycling programs and initiatives.