

Transforming a Downtown Roadway into a Green and Walkable Street

Principal Author: Subbu Gopalakrishnan, M.A.Sc., P.Eng.
Senior Transportation Engineer
Associated Engineering Alberta Ltd., Edmonton

Co-Author: Claire Stock, P.Eng.
Senior Transportation Engineer
The City of Edmonton

Paper for presentation at the “Geometric Design – Transit/Transportation Corridors
without Boundaries” Session

of the 2006 Annual Conference of the Transportation Association of Canada
Charlottetown, Prince Edward Island

ACKNOWLEDGMENTS

The authors are thankful to the project steering committee members from the City of Edmonton, the project team members and the Stakeholder Advisory Group members for their valuable contributions to this project.

ABSTRACT

This case study of 105 Avenue in Edmonton overviews the strategic planning and engineering design that will redefine an urban roadway into a multi-use trail corridor. 105 Avenue is a central component of Edmonton's citywide 62 kilometre multi-use trail corridor network. Situated along the northern edge of Downtown Edmonton, the 2.6 kilometre long corridor travels through a mixed-use area of residential, educational, commercial and light industrial sites. In addition to innovative design work, it was necessary to balance the needs and visions of residents, trail users, motorists and adjacent property owners while promoting walkability and non-motorized transportation.

Starting in 2004 the City of Edmonton began a strategic development plan for the Downtown North Edge area to provide a framework to transition the area to a mixed-use community. Working with a consultant team in late 2005, the strategy progressed to develop preliminary engineering designs, cost estimates and financing mechanisms to complete the 105 Avenue Corridor.

New Urbanism and Context Sensitive Street Design philosophies were applied to create and assess design options. The result is a unique treatment for the entire road right-of-way that prioritizes travel by pedestrians, cyclists, and skaters, while maintaining and managing vehicular access along 105 Avenue.

This paper highlights the tasks undertaken to advance the strategic direction for 105 Avenue from several City of Edmonton plans and policies. These tasks included developing preliminary engineering design options, extensive stakeholder consultation to communicate project information, and exploring funding mechanisms for corridor development.

INTRODUCTION

Starting in 2004, the City of Edmonton prepared a strategic development plan for the Downtown North Edge area (1). 105 Avenue is aligned through this area and currently supports light industrial, commercial and some residential uses. The roadway is also the northern boundary of a major tertiary education institution, MacEwan College.

The strategic development plan provided a framework for the transition of the area to a mixed-use community. Redevelopment of the area is expected to accommodate an additional 7000 residents. 105 Avenue was identified as a pedestrian and cycling corridor, with important connections to Downtown.

Working with a consultant team in late 2005, this study involved strategic planning, public consultation and engineering design to redefine this urban roadway into a multi-use trail corridor. The purpose of this project was to develop preliminary engineering designs, cost estimates and financing mechanisms to complete the 105 Avenue corridor from 97 Street in the east to 119 Street in the west. The study also included considerations for improvements for streets connecting to 105 Avenue within the study area. Figure 1 shows the limits of the 105 Avenue corridor study.

SUPPORTING POLICIES & PRINCIPLES

The 105 Avenue corridor preliminary engineering design study relates to a number of studies including the City of Edmonton's Transportation Master Plan (TMP), the Downtown North Edge Planning Study (2005), the North High Speed Transit Planning Study (2005), Multi-use Trail Corridor Study (2001), Smart Choices for Developing Our Community (2003) and the Project Charter: Walkable Edmonton Strategy (2003) among others. In approving these reports, City Council has directed the Administration to proceed with preliminary engineering design work for the corridor.

New Urbanism and Context Sensitive Street Design philosophies were also applied to create and assess design options. The result is a unique treatment for the entire road right-of-way that prioritizes travel by pedestrians, cyclists, and inline skaters, while maintaining and managing vehicular access along 105 Avenue.

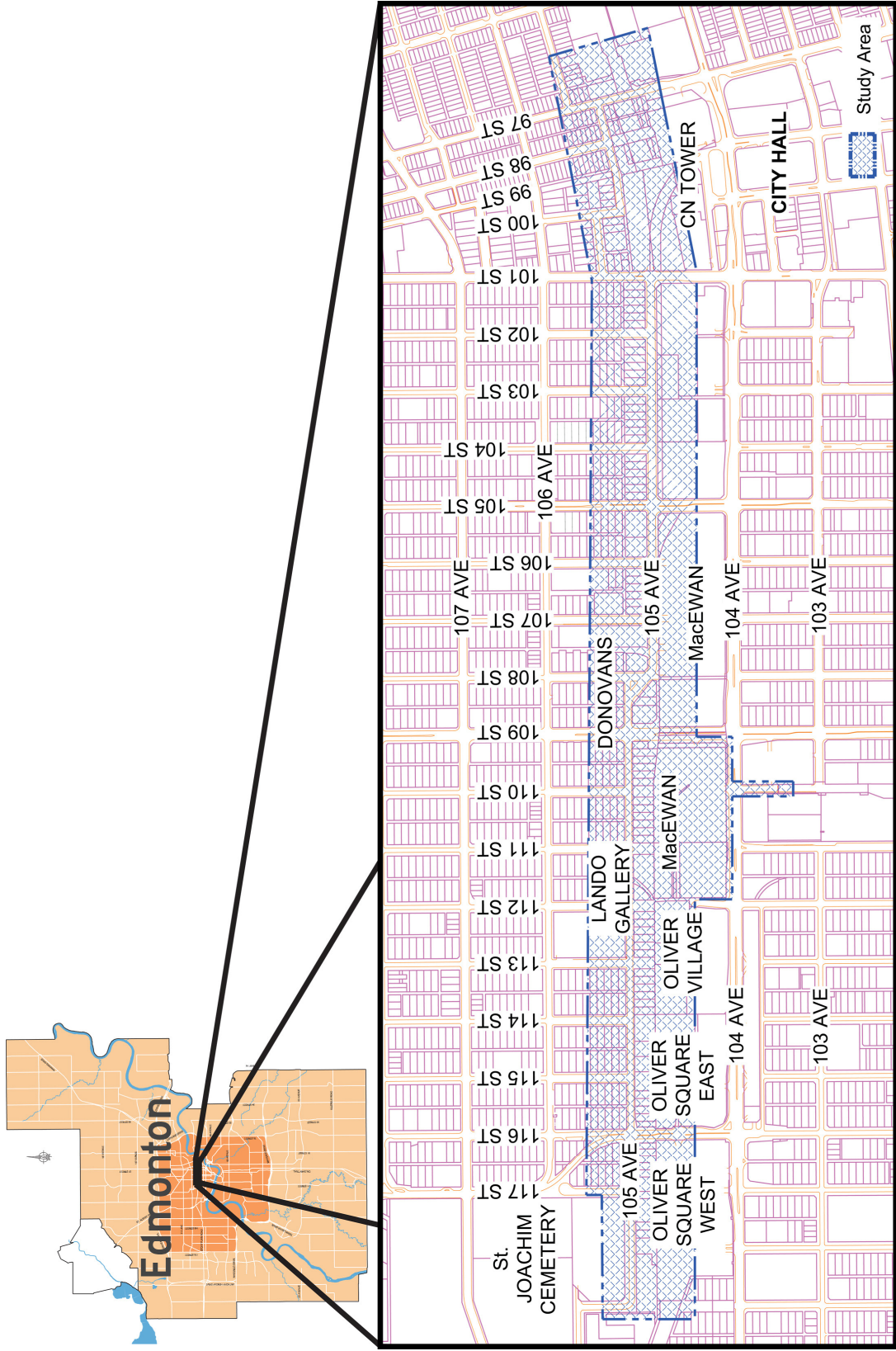


Figure 1 – Study Area

STUDY PROGRAM & PURPOSE

Strategic direction for this project was established by the Downtown North Edge Development Study, approved in 2005 by City Council (2). This paper overviews results from the preliminary design study commenced late 2005 to develop engineering drawings and costing. The next phase of detailed design will continue throughout 2006.

The purposes of the study are as follows:

- Advance strategic directions for 105 Avenue from the City of Edmonton plans and policies;
- Develop an integrated urban design;
- Provide the necessary links to existing multi-use trail corridors;
- Support the City of Edmonton's "Smart Choices" catalogue of ideas for developing our community; and,
- Produce a preliminary engineering design package for the 105 Avenue corridor for City Council review and approval.

The deliverables from this study will lead to the detailed design of the 105 Avenue corridor, which will begin the implementation of a more urban, community friendly street environment.

PROJECT TEAM

This preliminary engineering design project was sponsored by the City of Edmonton and was a collaborative effort by the project team comprising of Associated Engineering, Gibbs Brown Johansson Landscape Architects Ltd., Armin A. Preiksaitis & Associates Ltd., and Gray Scott Consulting Inc.

DEFINING THE PROJECT STRATEGY

The initial task for the project team was to research relevant documents, best practices and innovative design principles to establish the overall approach for the study.

An important feature of this project is the incorporation of design elements that facilitate walkability and the use of non-motorized transport modes throughout the corridor. City Council and administration have strongly endorsed the concept of making Edmonton a more walkable city through several corporate priorities, including the Walkable Edmonton Strategy. 105 Avenue was identified in the Multi-use Trail Corridor Network as the central east-west trail connection, described later in the paper. In March 2004, City Council also approved the report 'Smart Choices for Developing our Community', which included a recommendation to "make walkability a prime consideration in infrastructure and development decisions."

Roadway planning has often been shaped predominantly by the imperatives of traffic engineering, where focus is placed on providing for efficient car access. As a result, many streets have been developed in isolation from their surrounding neighbourhood contexts, without much serious consideration given to planning for other types of users or functions.

As part of this project, the project team researched best practices and relevant examples of walkable/livable communities. The research summarized findings on principles and approaches applicable to the strategic direction for the 105 Avenue corridor. The recommendations pointed to roadway and corridor design that accommodates a variety of motorized and non-motorized users.

Context Sensitive Street Design considers different modes of transport and the provision of scenic, historic, and community based street design. The key is to consider the influences and land use patterns within the local neighbourhood and surrounding areas before designing road facilities. New urbanism strives to create environments that are easily accessible by foot, bike, transit, car, and other non-motorized forms of transportation. The Complete Street philosophy avoids separating different user groups along different transportation corridors, instead making streets accessible to all users. The latter is taken one step further with Universal Design, which expands the philosophy to also include the requirements of special needs citizens.

The strategic direction developed for the 105 Avenue corridor includes the following:

- Foster the mutually beneficial integration of land uses with transportation needs along the 105 Avenue Corridor
- Support Transit-Oriented Development (TOD)
- Improve connections / linkages / walkability
- Promote multi-modal transport
- Create memorable places / promote place-making
- Foster diversity by catering to the needs of different user groups
- Encourage public safety and security
- Encourage year-round use / programming
- Improve wayfinding
- Encourage the development of active streetfronts
- Manage parking
- Manage access and circulation

PUBLIC CONSULTATION PROCESS

Public consultation is critically important to the success of sustainable transportation studies like this project. A comprehensive public and stakeholder consultation program was formulated and completed throughout this project. Table 1 summarizes the public consultation process for this study.

Phase	Description
Phase One – Profiling Interviews	Arrange and conduct profiling interviews with representatives of key stakeholder groups, companies and associations within the study area to get a sense of their project understanding, what they see as the issues and their thoughts on the planned public involvement process.
Phase Two – Establishment of Stakeholder Advisory Group (SAG)	<p>To act as a representative voice of the public and as a sounding board for the work being done by the project team.</p> <p>SAG members communicated within their respective stakeholder groups regarding the project concepts and recommendations.</p> <p>The SAG met throughout the study process and had the opportunity to review and provide comments to the draft study report. SAG will continue to operate until the final study report is presented to City Council.</p>
Phase Three – Neighbourhood Meetings	<p>Meetings with members of the groups that represent the stakeholders for this study - smaller groups of no more than 5 or 6 people that would represent the groups in the study area.</p> <p>Introduce some of the concepts and ideas the project team have developed and to seek input and feedback prior to the Open House event.</p>
Phase Four – Open House Event	The purpose is to provide the opportunity for the general public to view the concepts and draft recommendations of the Study prior to completion.

Table 1 – Public Consultation Process

105 AVENUE MULTI-USE TRAIL CORRIDOR

105 Avenue is a central component of Edmonton’s citywide 62 km Multi-use Trail Corridor (MUTC) network (3). This network of trail corridors is being developed along rail, utility, and road rights-of-way to supplement more than 700 km of trails and cycling routes already developed throughout the city. 105 Avenue connects to existing trail corridors at either end, and provides several north-south linkages to the Downtown core. Figure 2 shows the City of Edmonton’s MUTC network.

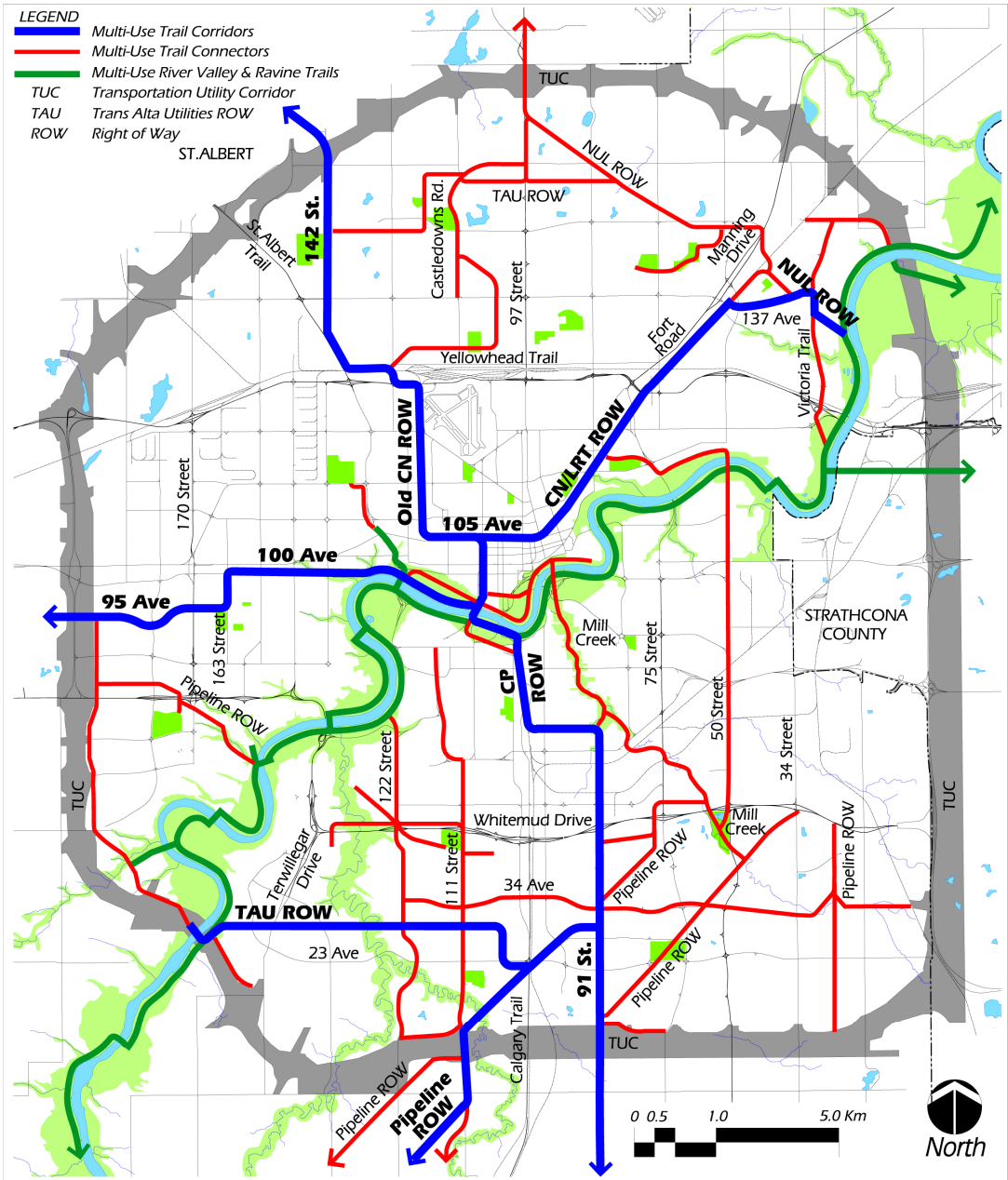


Figure 2 – Multi-Use Trail Corridor Network

105 AVENUE ROADWAY

At present, the 2.6 km long 105 Avenue corridor is typically an 11.5m wide collector roadway with intermittent sidewalks. There are currently traffic signals at the intersections of 105 Street, 109 Street, and 116 Street providing access to the arterial road system. The annual average daily traffic (AADT) on 105 Avenue varies between 1700 to 5000 vehicles per day. The available right-of-way varies between 18.2m and 24.4m.

The future function and role of 105 Avenue corridor within the City of Edmonton road network was arrived at based on the literature search carried out by the project team, the vision for the “Downtown North Edge” outlined in the City Council approved Downtown North Edge Development Study, and the input received from various stakeholders during the profiling interviews and the first SAG meeting. It is also consistent with the strategic direction developed for the 105 Avenue corridor.

“Local road with two-way traffic (with a lane width of 3.3 m each), posted speed of 30 kph, no on-street parking and priority to non-motorized users by providing multi-use trails, dedicated bikeway lanes, landscaped sidewalks and traffic calming features like curb extensions etc.”

The project team investigated various multi-use trail corridor options for 105 Avenue taking into account the following key challenges:

Limited right-of-way: Project team has to work with the available right-of-way along 105 Avenue in the study area. There will be no land acquisition along 105 Avenue except for connections to existing multi-use trails to the south, east and west of 105 Avenue.

Variable right-of-way: Right-of-way varies within the 2.6 km study corridor. The available right-of-way varies between 18.2m and 24.4m.

Land use: Options developed should be consistent with the existing and future land use proposals along the 105 Avenue study corridor. Of note, the City of Edmonton is planning a Light Rail Transit service along a section of 105 Avenue between 101 Street and 105 Street.

MULTI-USE TRAIL CORRIDOR OPTIONS

Definition of Terms

Multi Use Trail: A trail which can accommodate a variety of non-motorized users (pedestrians, joggers, cyclists, inline skaters, dog walkers etc.) and wheelchairs/ scooters for assisted travel.

Bike Lane: A portion of the roadway designated by striping, signing and/or pavement markings for preferential or exclusive use of bicycles.

Bikeway: Dedicated lanes on the curb for use by cyclists and inline skaters.

Sidewalk: A pedestrian facility, usually concrete, located within the road right-of-way.



Multi-use Trail



Bike Lane



Bikeway



Sidewalk

Figure 3 – Definition of Terms

The project team arrived at the preferred options for different sections of the 105 Avenue corridor based on the advantages and disadvantages for each option. The preferred options were discussed with the stakeholders during the stakeholder advisory group meetings and neighbourhood meetings, and have been selected based on the following criteria for each different section of the 105 Avenue corridor:

- No on-street parking;
- Opportunities to create extra wide multi-use trails;
- Preserving the existing boulevard walkway north of MacEwan College between 105 Street and 109 Street;
- Bikeways as opposed to bike lanes.

Table 2 shows the preferred options for the 105 Avenue multi-use trail corridor.

Section of 105 Avenue Corridor	Multi-use Trail Corridor Options
Between 119 Street and 116 Street	2 vehicle lanes, multi-use trail on north side, one bikeway lane on the south side curb, & sidewalk on south side
Between 116 Street and 109 Street	2 vehicle lanes, 2 bikeway lanes on the curb, & sidewalk on both sides
Between 109 Street and 105 Street	2 vehicle lanes, 2 bikeway lanes on the curb, & sidewalk on both sides
Between 105 Street and 101 Street	2 vehicle lanes, multi-use trail on north side, & sidewalk on south side
Between 101 Street and 97 Street	2 vehicle lanes, multi-use trail on south side, & sidewalk on north side

Table 2 – Preferred Options for 105 Avenue Multi-use Trail Corridor

The typical cross-sections of the preferred options are shown in Figures 4a through 4e.



Figure 4a – Proposed Roadway Cross-Section 116 Street to 119 Street

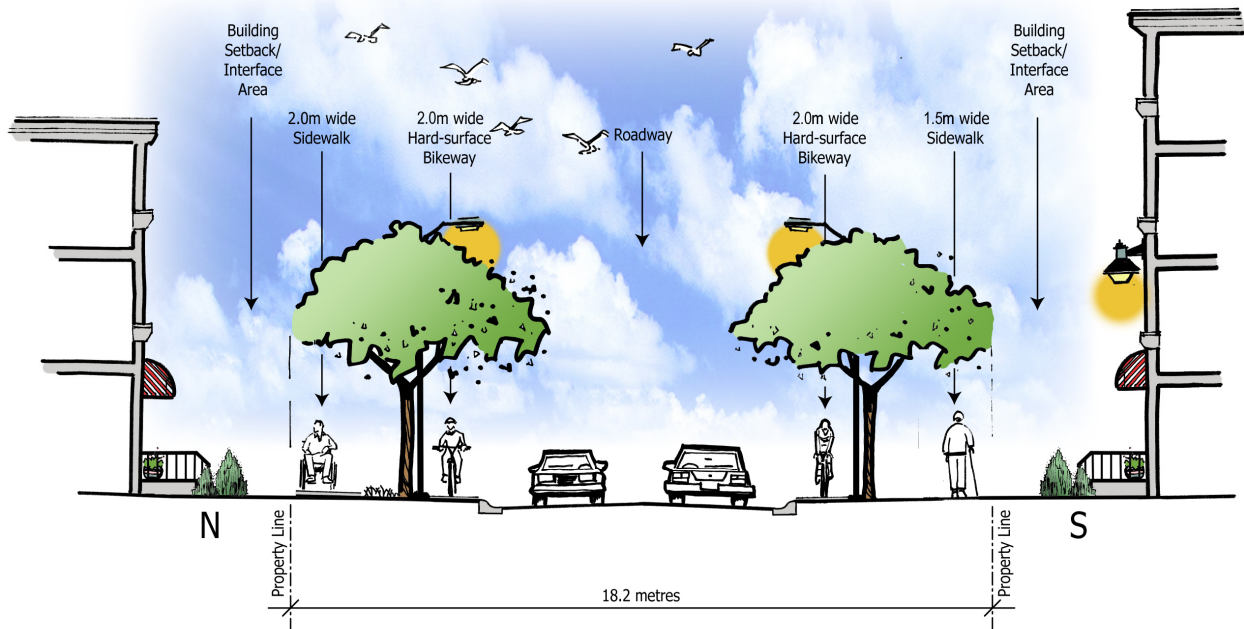


Figure 4b – Proposed Roadway Cross-Section 109 Street to 116 Street

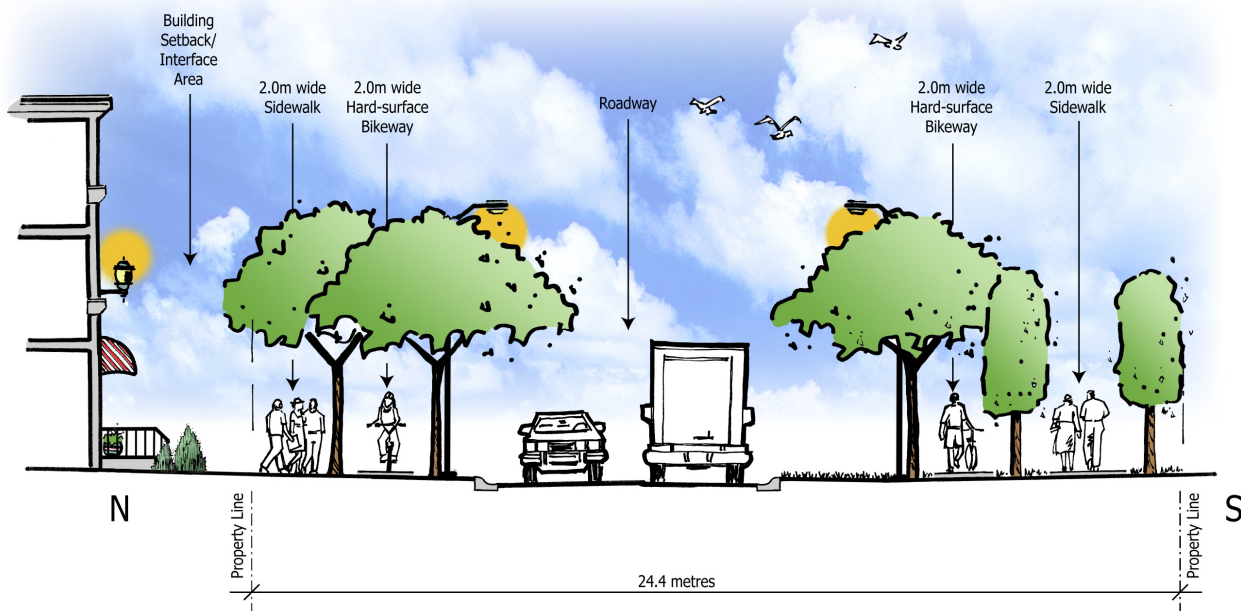


Figure 4c – Proposed Roadway Cross-Section 105 Street to 109 Street

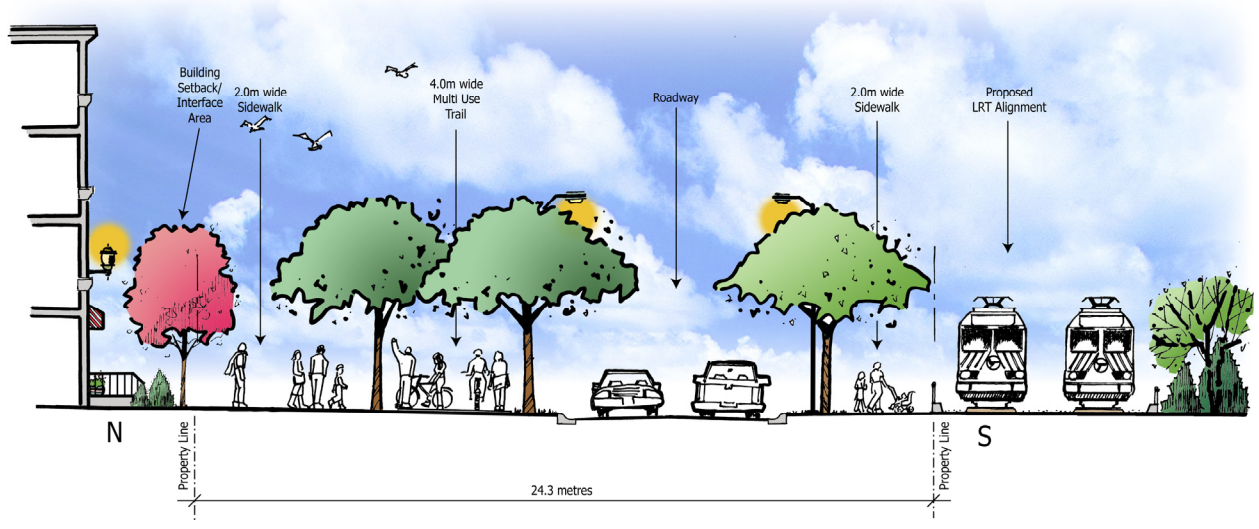


Figure 4d – Proposed Roadway Cross-Section 101 Street to 105 Street

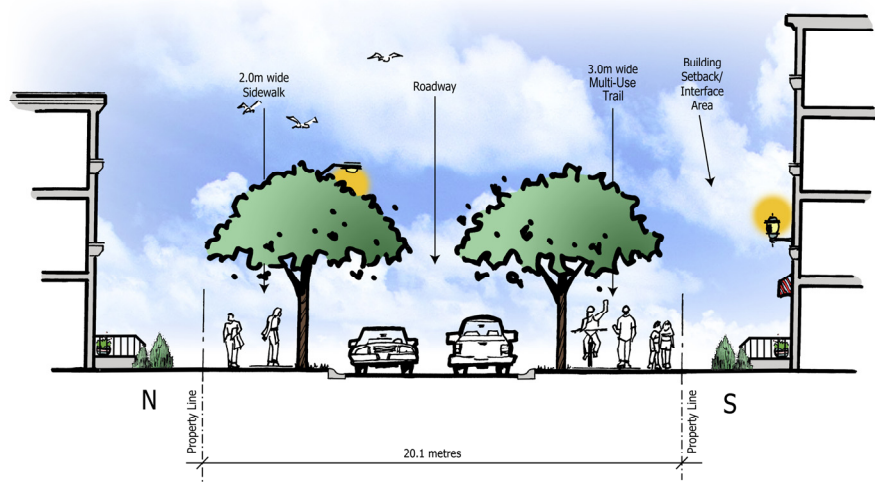


Figure 4e – Proposed Roadway Cross-Section 97 Street to 101 Street

Figure 5 shows the proposed transformation of 105 Avenue into a multi-use trail corridor and redeveloped roadway.



1. Existing Conditions



2. Relocate Power Lines & Other Utilities



3. New Sidewalks, Curbs and Light Standards



4. Add Streetscape Elements



5. Infill Residential/Commercial Development

Figure 5 – Transformation of the 105 Avenue Corridor

ROADWAY PLAN DEVELOPMENT

The project team researched available guidelines and design standards to arrive at the design criteria for lane widths, curb extensions, horizontal, and vertical alignment. 1:500 scale preliminary engineering design drawings for the 105 Avenue corridor.

105 Avenue is not a continuous east-west roadway within the City of Edmonton's network. 105 Avenue terminates at 119 Street in the west and 97 Street in the east. These characteristics allowed the project team to identify potential half-block road closures along 105 Avenue to create opportunities for green/open spaces. The road closures are designed to avoid compromising existing direct access points to businesses located along the 105 Avenue corridor, and are proposed to proceed with redevelopment of the area. Therefore, the project team has recommended staged road closures for the sections between 109 Street and 116 Street, and between 101 Street and 105 Street. Road closures are not possible for the section between 105 Street and 109 Street due to the direct access to loading bays and underground parking lots of MacEwan College.

Figure 6 shows the plan view of a typical treatment for a road closure along 105 Avenue.

The study team concluded that the remaining portions of 105 Avenue would continue to function as a roadway for two-way traffic, keeping with the current trend of municipalities in North America converting their existing one-way streets to two-way streets. Converting 105 Avenue to a one-way street would also violate the principles outlined for Crime Prevention Through Environmental Design (CPTED). In the future, the 105 Avenue corridor would function as a low volume local road providing local access and circulation to community traffic with origins and/or destinations within the area.

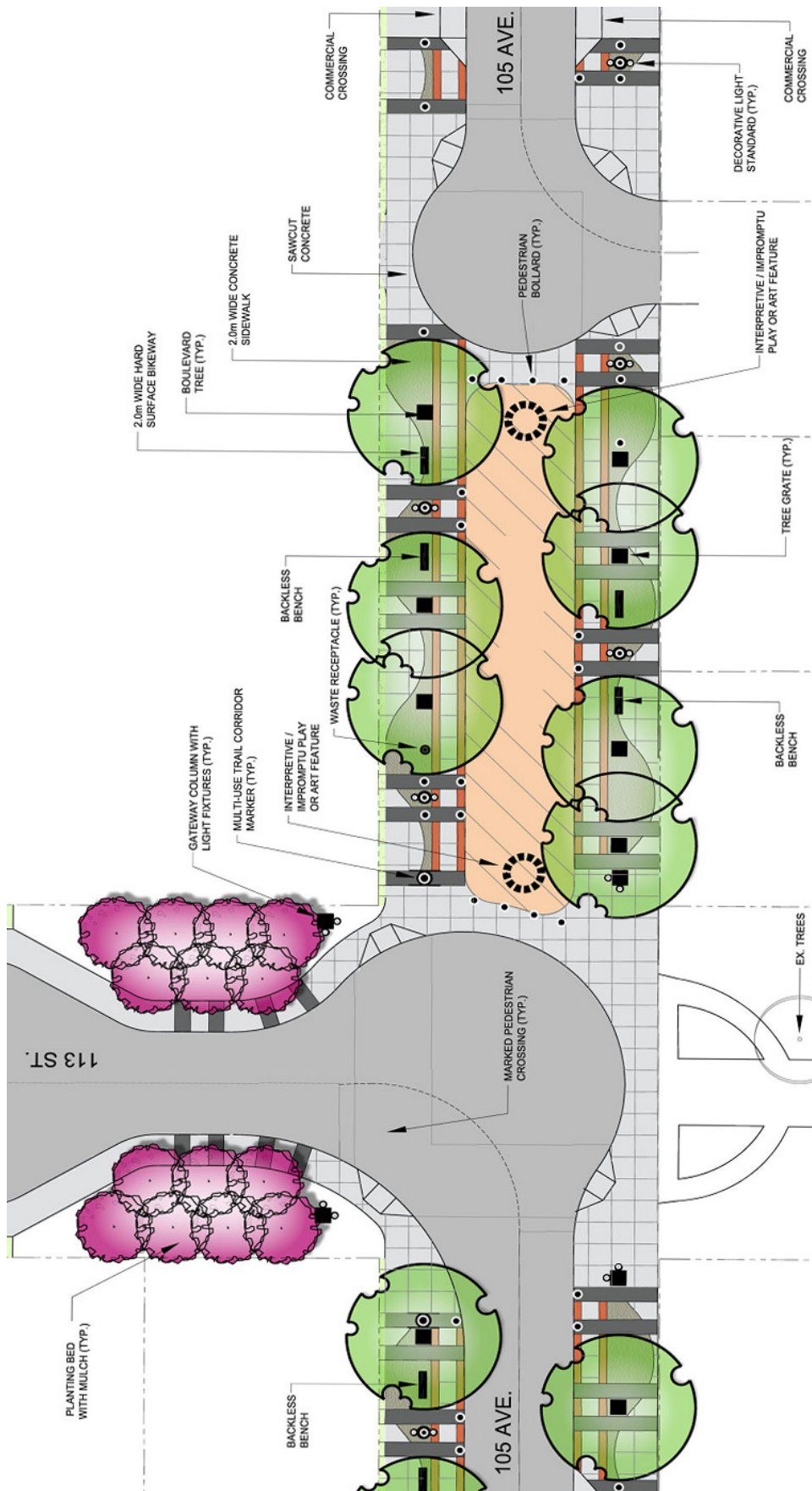


Figure 6 – Typical Road Closure

STREETSCAPE PLANS

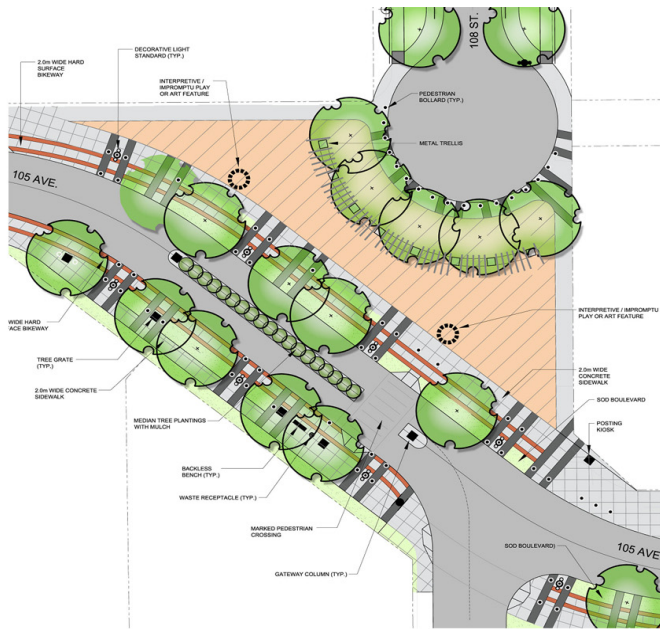
The redevelopment of 105 Avenue is a planning initiative that will lay the foundations for a northern edge to the City of Edmonton's Downtown Core. Vision is rooted in the best current thinking on urban design and landscape architecture. The proposed streetscape improvements and infill redevelopments along 105 Avenue will help shape the physical, economic and cultural character for the Downtown and both of the adjacent neighbourhoods, Queen Mary Park and Central McDougall, so as to better relate to current community needs and future planning aspirations.

The overriding design goal for 105 Avenue was to create a memorable downtown destination and a welcoming symbol of the spirit of communities in the Downtown North Edge area. The project team recognizes that 105 Avenue has its own unique geographic setting, historic patterns of development, landmarks, and architectural heritage. With this in mind, the street's physical setting and the relationship between elements of its built environment will establish the district's "special quality" as a downtown destination. Water, vegetation, and open spaces will be the primary elements used to help form the character of the streetscape. To a lesser degree, the character of 105 Avenue will also be influenced by a myriad of secondary elements such as: surface treatments, architectonic forms, site furniture, public art, and public gathering spaces that will overlay its basic form and structure.

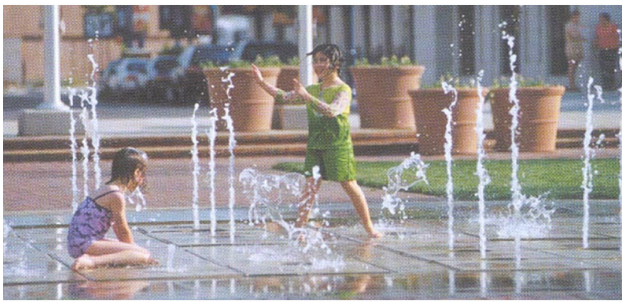
The project team has attempted to create a coordinated and well balanced landscape in which a number of social and cultural themes have been integrated into a vibrant urban fabric. Those social and cultural themes include the following:

- Central McDougall Community;
- Queen Mary Park Community;
- Canadian National Railway;
- MacEwan College – Walk of the Humanities;
- Aboriginal Culture; and,
- Chinese Culture.

Typical streetscape elements that may be used on 105 Avenue are shown in Figure 7.



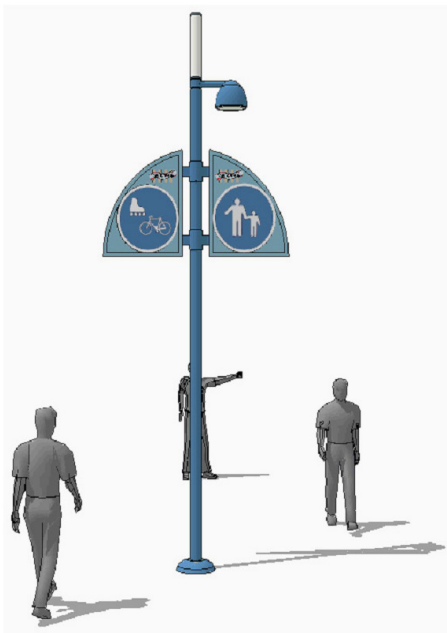
Potential Open Space Treatment



Open Space



Pavement Treatments & Planting Beds



Pedestrian-scaled Lighting



Street Tree Plantings

Figure 7 – Proposed Streetscape Elements

COST ESTIMATES

The project team generated preliminary engineering estimates for the recommended improvements. The total preliminary engineering cost estimates (in 2006 dollars) for developing the 105 Avenue corridor would be approximately \$30 Million. This includes roadway reconstruction, streetscaping, lighting, landscaping, and burying power lines underground. These costs will be further reviewed as detailed design continues.

IMPLEMENTATION

The 105 Avenue corridor preliminary engineering study report will be submitted to City Council for approval during May/June 2006. The City administration will then proceed with producing detailed design plans and drawings. Budget approval and mechanisms to fund construction of the 105 Avenue multi-use trail corridor will be sought during the detailed design process.

The project team recommended that the City administration construct the 105 Avenue multi-use trail for the entire study area from 97 Street to 119 Street under one construction contract. The reasons are as follows:

- Development driven upgrading would result in a fragmented implementation;
- A corridor long upgrading plan would set the stage for a comprehensive development strategy based on the strategic principles of new urbanism;
- A higher quality end product;
- Overall lower cost of upgrades;
- Best overall value.

FUNDING PROGRAM OPTIONS

Successful implementation of the \$30 Million 105 Avenue multi-use trail corridor from 97 Street to 119 Street will require utilizing a number of public and private funding sources.

The City administration will be responsible for funding the construction of multi-use trail. The incremental cost of the streetscape improvements over and above the City's standard infrastructure will be the responsibility of the property owner/developer.

Potential funding options analyzed for implementing this project included the following:

- **City Council approved funding strategies:** Development Agreements and Redevelopment Levy;
- **Debt Financing:** Community Revitalization Zone levy and Local Improvement Assessment Tax;
- **Grant Programs:** City Transportation Fund, Alberta Municipal Infrastructure Fund, Federal Gas Tax Funding and Green Municipal Funds;
- **Foundations:** Alberta Lottery Fund and Private Foundations;
- **Fund Raising:** Corporate Fund Raising and Community Fund Raising.

Local Improvement Assessment Tax for financing the 105 Avenue streetscape improvements over and above development agreements at the time of redevelopment could be a potential funding mechanism. This tool could be attractive for the developers as it amortizes the costs of these improvements over a longer period of time.

CONCLUSIONS

The design principles and philosophies behind the successful implementation of 105 Avenue Multi-use Corridor could form the basis for similar projects for promoting walkability and the use of non-motorized modes in a busy urban setting.

REFERENCES

1. Downtown North Edge Development Study (2005) – The City of Edmonton
2. Central McDougall/Queen Mary Park Area Redevelopment Plan (2005) – The City of Edmonton.
3. Multi-use Trail Corridor Study (2001) – The City of Edmonton.