An Innovative Development Framework for the Long Term Roadway Network Planning in Rocky View County, Alberta

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ABSTRACT

Alberta's rapid growth in recent years has created problems in planning and integration of the roadway network systems connecting neighboring urban and rural communities. This has resulted in a need for new approaches to address network interface issues. Rocky View County in collaboration with its transportation consultant team of iTRANS Consulting Inc. has charted a new innovative framework (this may be new innovative to us but not to the urban work) for a sustainable road network coupled to intensify, and plan, municipal development.
This paper will summarize main points of the process and explain the benefits of the transportation planning tools and process used to develop a sustainable and cohesive transportation network throughout the region.

Transportation planning plays an important role in the formulation of the overall strategy; extensive public consultation results in early buy-in of the development plan from the community, the municipal council and development industry. Innovative methods of analysis and provisions of creative solutions from "outside the box" thinking all contribute to the successful completion of a planning process that integrates a transportation network connecting communities.

The new approach uses results of the developed traffic model and culminates in the development of a long-term transportation network that recognizes all modes of transportation including walking, bicycling, and the transition to a transit supportable system. For the future highways, a flexible cross-section system is used permitting necessary growth and integration and inclusion of mutli - modal transportation options. The subsequent developed network addresses the local and regional needs. It reflects a context sensitive design approach generated from use of the state-of-the-art techniques and practice tools. The adopted design approach addresses different needs of two distinctly different municipal environments, urban and rural, and enables each to operate satisfactorily in their respective jurisdiction. The developed plan forms a skeleton framework supporting the development expectations of the region.

The functional transportation plan takes into consideration; land use planning, community heritage, residential development, business development, agriculture, natural environment, open space, river sub-basin management and utilities. It provides for inter-municipal and regional traffic access through the County into the City of Calgary via the Provincial Highway System and inter-municipal boundary and grid roads.

The transportation network study completed for the area identifies a modified standards classification for the future interconnected roadway systems.

Rural counties do not typically develop functional transportation studies that reflect a growth expectation and regional road network connections. Traditional approaches gave way to contemporary thinking for providing a more sustainable development over a 50 year growth forecast. This planning for the long-term connectivity of roadway networks in the County is considered a successful innovation from past practices.

INTRODUCTION

The Rocky View County (the County) is located in Southern Alberta. It is a rural municipality (**Figure 1**) bordering the City of Calgary (Calgary) on the West, North and East. It encompasses an area of approximately 404,000 hectares (1,000,000 acres). Within its boundaries the County also surrounds 5 urban communities and borders on 4 other rural municipalities. The existing road system has developed over the years and represents a basic western Canada 2 x1 mile grid road formation. In some areas the traditional grid system has been modified to account for specific development or natural geographic obstacles.

The predominant development is agricultural land uses with the addition of many country residential acreage communities located primarily around the City of Calgary. The typical densities in many of those communities are 0.25 upa (unit per acre). Historically development applications within the County included areas up to 60 ha (160 acres) areas. These were reviewed on one by one basis when submitted, to obtain development approvals.

CURRENT ISSUES

Intensification of development

The last 10 years have seen new development trends emerging within the County. Rapid economic development has resulted in the introduction of several urban style developments reflecting urban size and intensity. Several areas started transitioning from rural development to intensified urban development predicated by their proximity to the City of Calgary. Projected growth nodes identified in a Municipal Growth Management Strategy envision a more urban style of developments. The best example of this new intensified development was a proposal for a Balzac retail/entertainment complex including a retail mall and race track and entertainment centre covering approximately 5 quarter sections (800 acres/300 ha) with 190,000 m^2 (1,900,000 sq ft.) of developed building space projected to generate approximately 6950 trips/pm peak/h. Envisioned for the development are transit connections into neighbouring urban municipalities.

The intensity of residential developments has also increased; new concepts of rural development started emerging with intensities increased to four units per acre. Newly proposed developments outlined subdivision housing clusters including employment nodes and community business centres (**Figure 2**).

Network changes

The existing County grid network has been impacted by construction of the Calgary Ring Road, which acts as a buffer between the City and the County. The Ring Road construction has led to reduction in the number of the direct road connections to the City network and subsequent changes in the regional traffic patterns. This created a need for the County to establish Transportation Corridors that meet transportation requirements in the County while planning for emerging regional needs connecting to the City and Provincial existing and ultimate networks. In addition to the above comment, the County also began balancing the desired future multi-

modal transportation systems recommended by functional studies connecting to the same ultimate City and Provincial road networks.

Challenges were encountered in providing the education, understanding and resources for planning and forecasting future transportation corridors that will ultimately support forecast development and regional traffic flows. Inherent in the planning was the attempt to create parallel transportation corridors that supplement the Alberta Transportation highway system and the City of Calgary transportation corridors. These challenges were multiplied by the fact that in some areas the existing land use and natural obstacles have handicapped the ability to generate appropriate routes.
To address above issues the County adopted its own comprehensive planning process which evaluates development issues in a proactive, rather than reactive, fashion. The adopted process addresses not only land use and transportation planning but treats future development within the County in a comprehensive and holistic approach. It uses elements traditionally used by urban municipalities and implements the best planning practices and tools to establish forecast needs. It is worth noting that County is the first rural municipality in Alberta that adopted and implemented this process in its entirety.

A NEW APPROACH TO RURAL NETWORKS

Historically, development applications within the County area were reviewed on a one by one basis as submitted. TIA's associated with the development were limited in scope and reflected the impact of the single development on the surrounding grid road system. They seldom accounted for cumulative impact of progressing development on, or impacts to, the regional network. These documents could not be tested against anticipated future needs.

With the rising cost of fossil fuel, concerns over green house emissions, and public awareness of environment protection, traditional methods of transportation planning in rural areas that focus on the primary dependency on private vehicular travel were no longer considered adequate, satisfactory or desirable. Alternative methods of travel that include non-motorized modes of traveling, such as walking and bicycling within or to "complete" communities, and the wider use of rapid transit systems, had to be explored and incorporated into the planning processes. Also, typical cross sections of rural highways created interface problems as urban traffic flows spread into rural communities. It has become necessary to adopt a different design approach. This approach resulted in a planned transportation system which addresses the different needs of the two distinctly different municipal environments while enabling each to operate satisfactorily in their respective jurisdiction.

The County approach to development planning has been modified from a reactive decision making process to a holistic comprehensive process that is better described below. Although this process includes assessment of land use, transportation and utility planning, this paper concentrates on integration of the land use and transportation planning as the two key elements.

The change in the intensity of the development showed clearly that a much more comprehensive approach was required and that integration of the land use and network/transportation planning is a must. Consequently the County embarked on a two stage approach:

1. It developed a long term development growth plan for the entire County. This long term growth strategy has been developed based on the current information about existing and anticipated development and established long term development patterns within the County boundaries in collaboration with its many neighbours. It also included identification of future densities and location of development clusters as well as identification of the expected land uses in the fringe areas located along the urban municipal boundaries (**Figure 3**).
2. It adopted a process that included modeling (and the ability to test multiple options in its model) of future land use scenarios and the identification and assessment of the transportation network options including the identification of the required rights-of-way, location of multimodal corridors, future regional transit link alignments and even capacity analysis of key selected intersections. The process identified the key skeletal network including right-of-way requirements and expected number of lanes.

Results of the network analysis were used as feedback to the subsequent stage of the land use concept plan reviews. Within the last two years a number of different detailed development scenarios were analyzed to verify key network components in seven (7) key development areas. The analysis also provided the opportunity to test recommended County transportation corridors and effectively communicate network connection with the City of Calgary and the Provincial highway system.

Development of the Growth Strategy

The County has developed a long term strategy which focuses on implementation of a "Live, Work and Play" community environment to the maximum development potential (economically, environmentally, and socially) while minimizing impacts to the transportation network efficiencies. This strategy addresses on one hand the existing development and its needs while supporting development plans in the specific areas promoting intense business/commercial development and large residential pods. Some of the challenges of this new growth strategy have been linked to provision of trying to link heavy employment areas to residential areas while minimizing cross County trips. Another challenge has been the proposed location of the growth areas and their interconnectivity. Detailed development plans had to reinforce the philosophy of connecting communities while building suitable, basic transportation corridors to sustain growth that has occurred on all sides of the City of Calgary.

Transportation Planning - Development of the Future Transportation Network

The County intended to develop a long term plan for its transportation network to ensure that it is:

- feasible
- safe
- affordable
- efficient
- sustainable
- beneficial (addresses regional needs)

- has limited environmental impact
- supports the existing and planned developments
- addresses multimodal components through transitional stages
- minimizes infill scenarios

According to County growth objectives the long term network should:

- Provide for a transportation systems that offers choices while not affecting social factors
- Introduce a transportation hierarchy that is supported and vetted by the development communities and affected stakeholders.
- Create enhanced infrastructure corridors, supported by effective land uses that will draw or attract alternative transportation modes (walking and cycling).
- Provide connection of communities that promote "Live, Work and Play" and inspire opportunities for various bus transit methods, rail transit, High Occupancy Vehicle lanes and pedestrians while minimizing use of conventional transportation modes.
- Develop transportation corridors that incorporate future regional transit plans.
- Develop a clear understanding of Regional Transportation Plans to ensure connections to other urban communities are not affected.
- Locate transit services that are reachable and desirable while still having the ability to provide effective and efficient transportation means.
- Locate development areas or buffer such areas away from Regional Goods routes.
- Provide separate transportation linkages to ensure services levels are not compromised.

Modification of the Design Guidelines

The original County design guidelines included only a rural road classification system and supporting cross-sections. With the development of functional classifications, appropriate cross-sections for existing links have been established based on the environmental capacity. Use of the rural classification system would have proven woefully inadequate and would result in excessive rights-of-way requirements. Consequently, the County Design Guidelines were modified and an urban design chapter was added introducing a modified urban street classification system. The County adopted, (and slightly modified), the City of Calgary functional urban classification system and street cross-section system to provide for proper transitions and account for drivers expectations at interface points.

Development of Traffic Model

The County has employed iTRANS Consulting Inc. to provide assistance in establishing the long term development strategy for its transportation network as well as technical expertise in addressing other emerging transportation issues. Development of a traffic model was initiated that would provide traffic forecasting that supports the County's short and long term goals and the development of policies and objectives for the management of land uses and related transportation network issues.

It is worth noting that County is the first rural municipality in Alberta which has an operational traffic model.

The City of Calgary has an operational regional traffic EMME/2 model which includes some of the County area. However, although consideration has been given to the use of the City of Calgary Regional Traffic Model, a more detailed analysis determined that this model would not fully meet the County requirements. The County created a model that would permit the exchange of information and provide for possible complementary analysis by both the City and the County. Consequently, the County adopted the same EMME/2 software platform as the existing City model. The existing Regional Model information with respect to zoning, land use assumptions and traffic distribution were obtained from the City and incorporated as base information in the County model.

Both basic City and County models are multimodal transportation demand forecasting models and were established to model PM peak hour. The County model is applicable to large scale inter-municipal and municipal development plans and area structure or redevelopment plans. It is not designed to be applicable to street or block layout plans, subdivision plans or zoning type projects. The model can perform sensitivity testing of road networks, land use and modal split scenarios. The original County model consisted of the County's 2007 road network, featuring 76 traffic zones and 76 centroids (**Figure 4**). This system has been disaggregated to 265 zones to better reflect the current County land use plans (**Figure 5**).

Traffic Analysis and Functional Planning

Results generated by the model were subsequently translated into daily link volumes and used to establish functional designations, cross-section and right-of-way requirements for each section of the future network. Network concepts were reviewed by County staff and then presented to adjacent municipalities (urban and rural) and Provincial transportation planning staff for information and comments. The sharing of information would ensure smoother transitions Municipalities and Provincial entities. This approach permitted development of the parallel and continuous spine road concept within the County while addressing any possible discontinuities within the transition zones.
In addition, capacity analysis of the identified key intersections was carried out using Synchro software to establish if additional right-of-way would be required in the vicinity of those intersections.
In consideration of facilitating Mutli Modal styles of transportation, the County has begun outlining transitional lanes and rights of ways that could be created while not affecting the overarching need of commuter traffic. In time and when the ridership is supported, transit will be adopted and lanes will be protected for the use of transit and, potentially, High Occupancy Vehicles and car pooling.

Transportation Planning

Upon completion of the traffic analysis, functional planning drawings were prepared. The drawings documented the results of the analysis and including an access management strategy identifying future access locations.

A presentation to the County Council summarized the modeling exercise, traffic analysis and functional planning. The adopted information is now used by County staff and developers as guidance for access points and access control for development. The documents are viewed as "live" documents which will be reviewed periodically and modified as development progresses or should growth strategies changed. This information ultimately provides County administration and the development industry consistent growth forecasts within the County boundaries. It further identifies the uniform base information and maintains the consistency of approach and integrity of the planning process.

CONCLUSIONS

The innovative planning approach for the long term roadway network in the County is considered a success. Traditional approaches gave way to contemporary thinking that provides a more sustainable network in conjunction with planned development into a 50 year future. Transportation planning plays an important role in the formulation of the overall growth strategy. Including a proactive public consultation process results in an early buy-in of the ultimate development plans. Innovative methods of analysis and provisions of creative solutions from "outside the box" thinking all contribute to the successful completion of a planning process that integrates land use planning with a transportation network connecting urban and rural communities.

References:

City of Calgary Traffic Model – November 2005
COUNTY of Rocky View Traffic Model - June 1, 2007
Functional Planning Study of East Balzac Area – March 20, 2008
Springbank Functional Study – May 26, 2008
Plan 8 Functional Study – June 1, 2008
SE Industrial Corridor Area Structure Plan – April 2009 (draft)
North Balzac/East Airdrie Area Transportation Planning Study – July 2008

Figure 1: Key Map

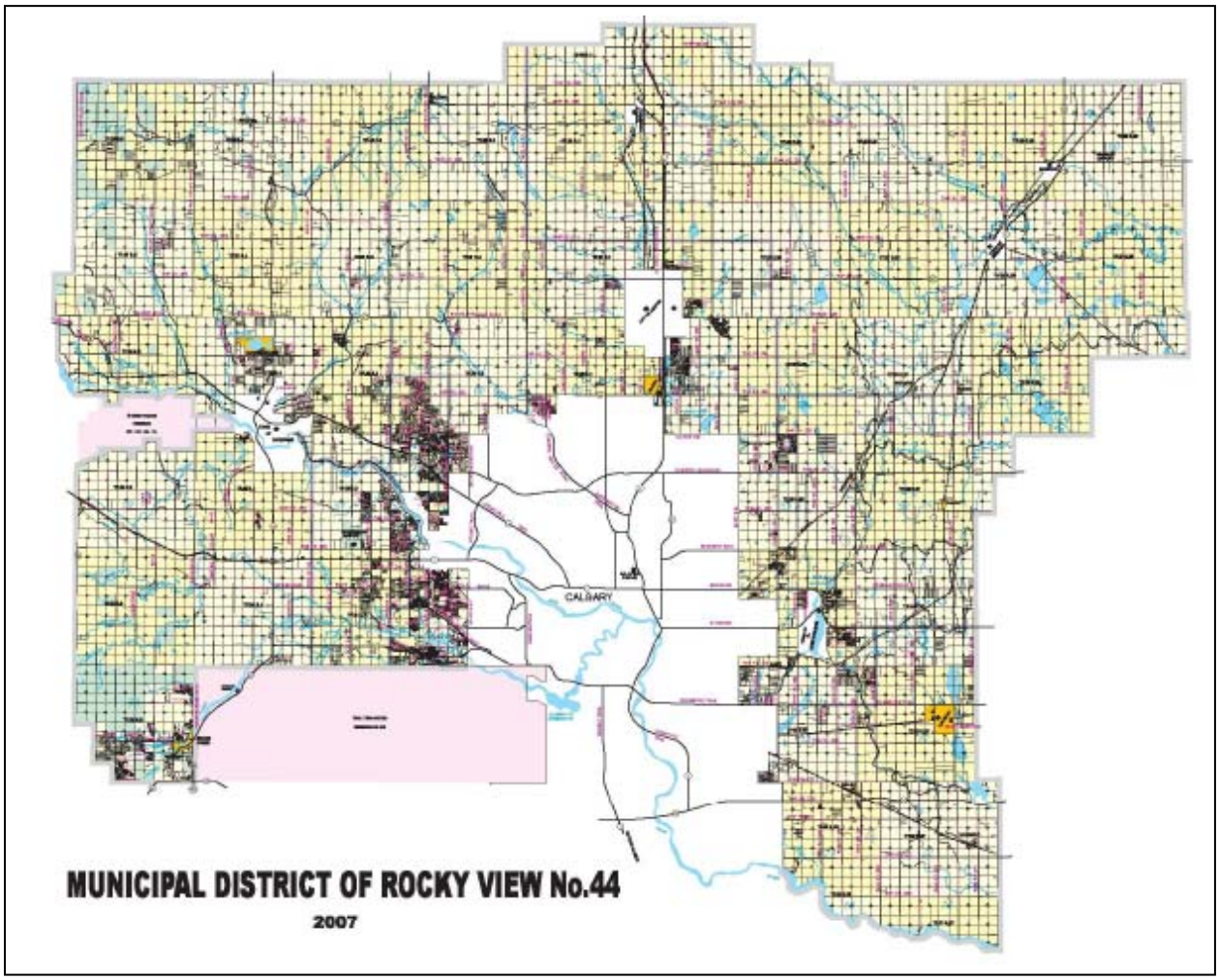


Figure 2: **COUNTY current development model (showing number of lots and green space on ¼ Section.**

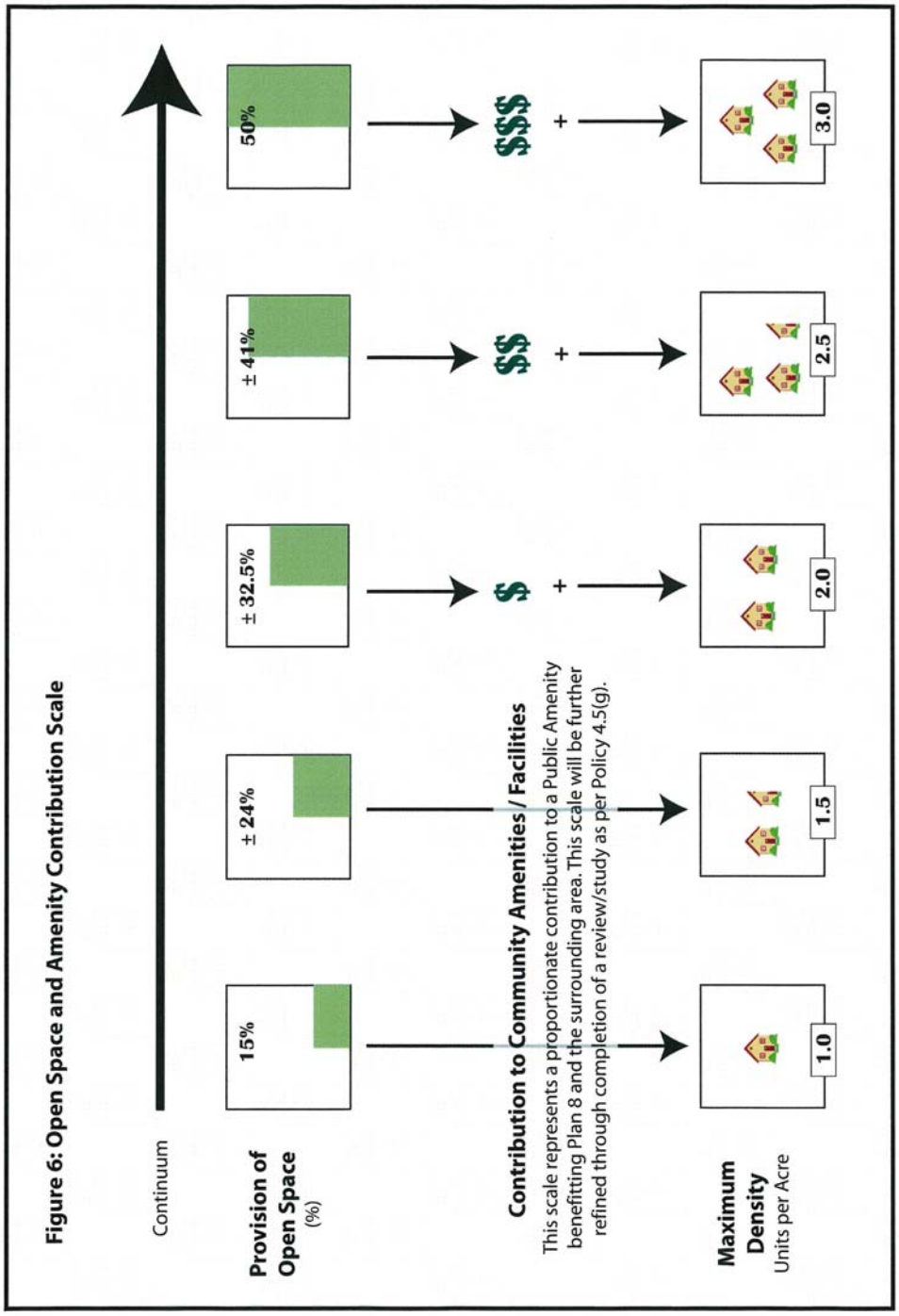


Figure 3: Land use map

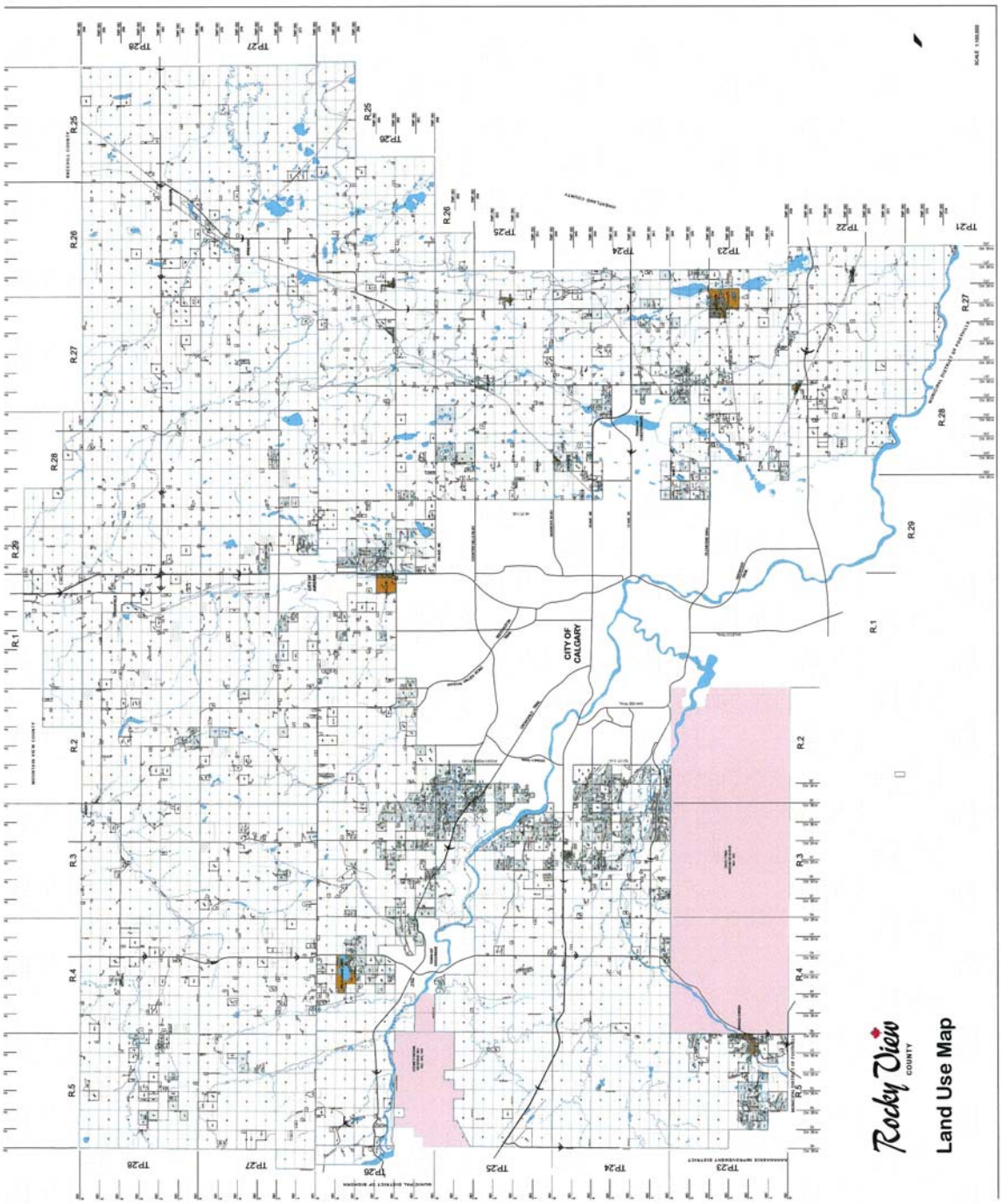


Figure 4: Original zone system

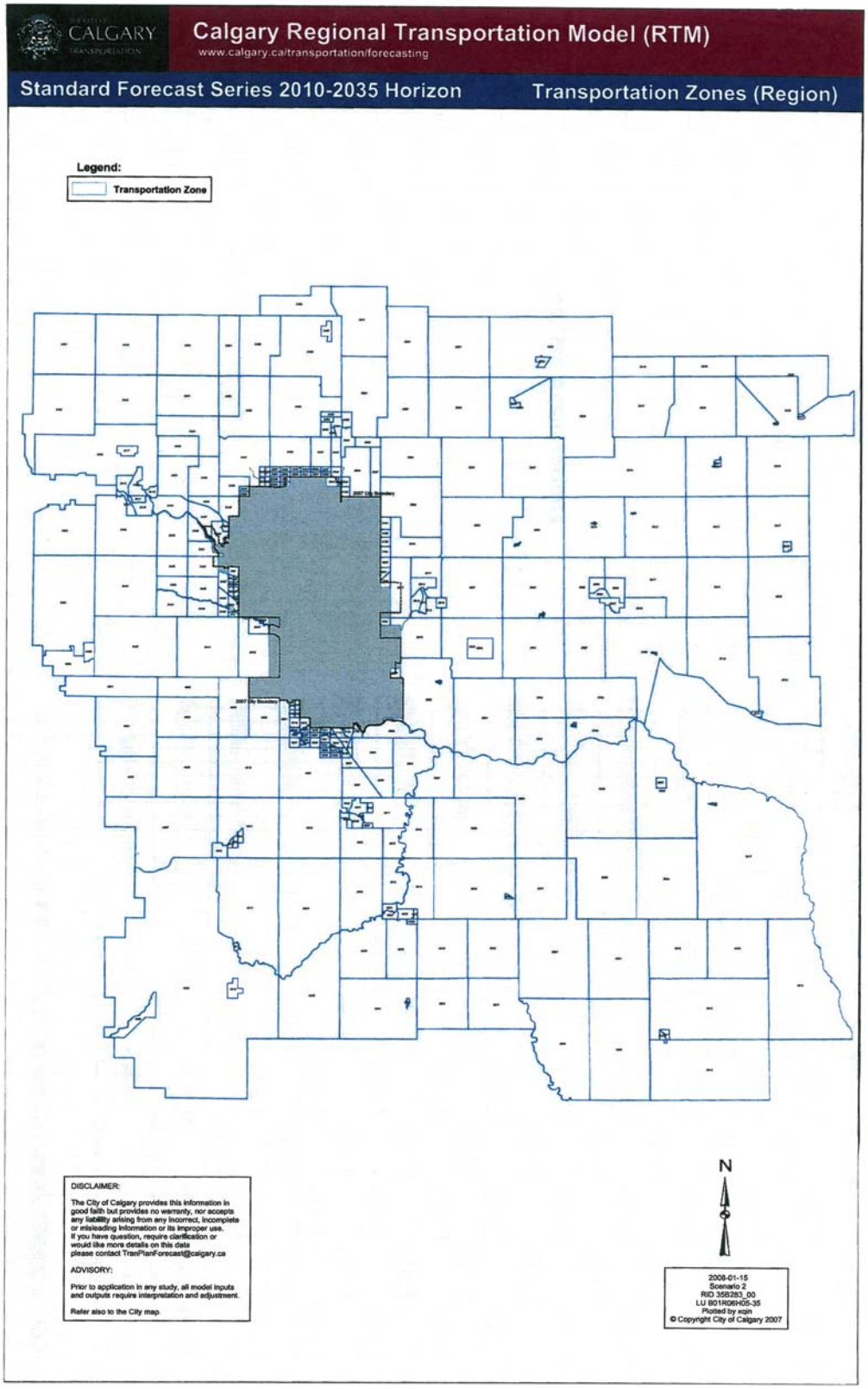


Figure 5: Current zone system

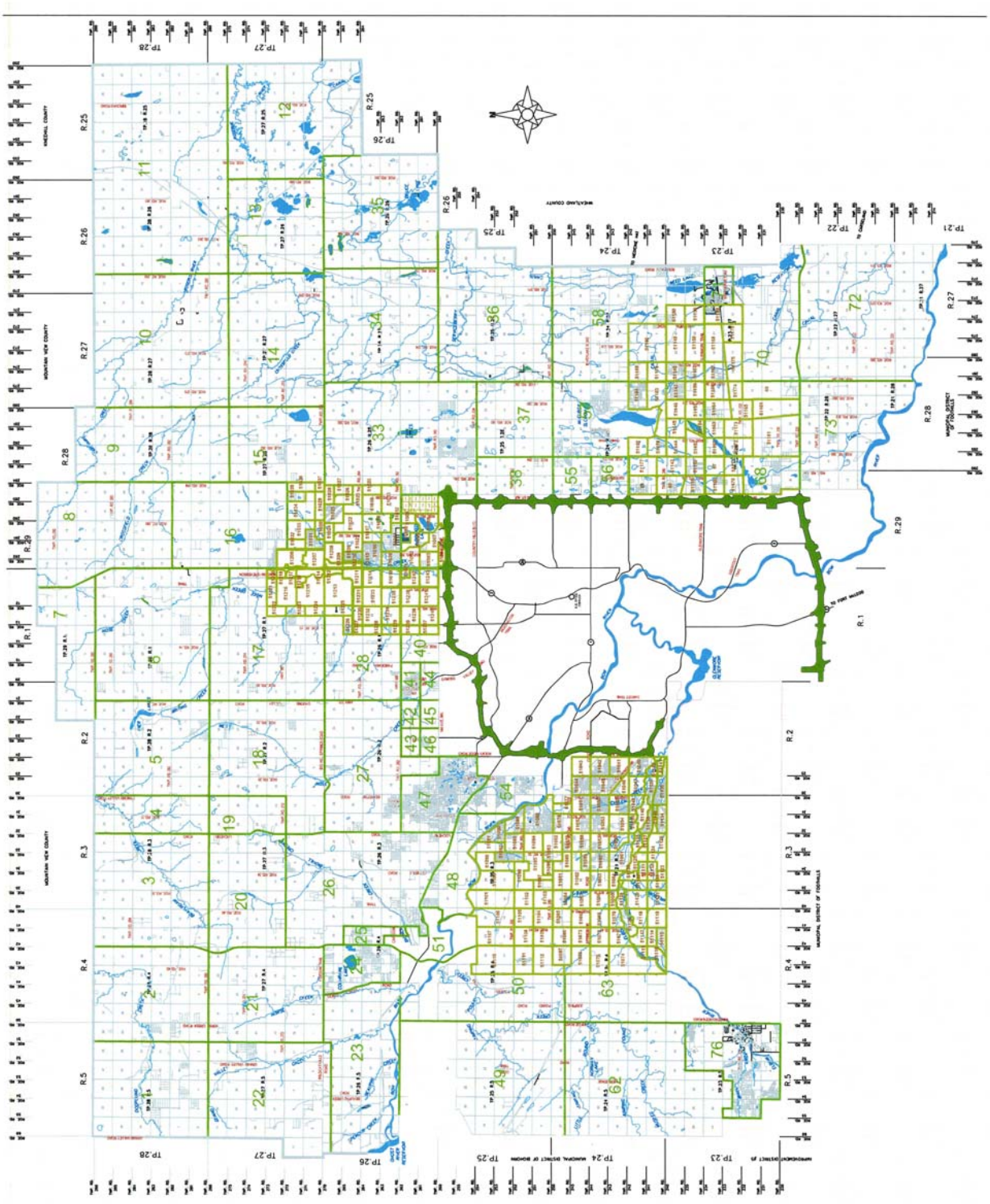


Figure 6: Original Network

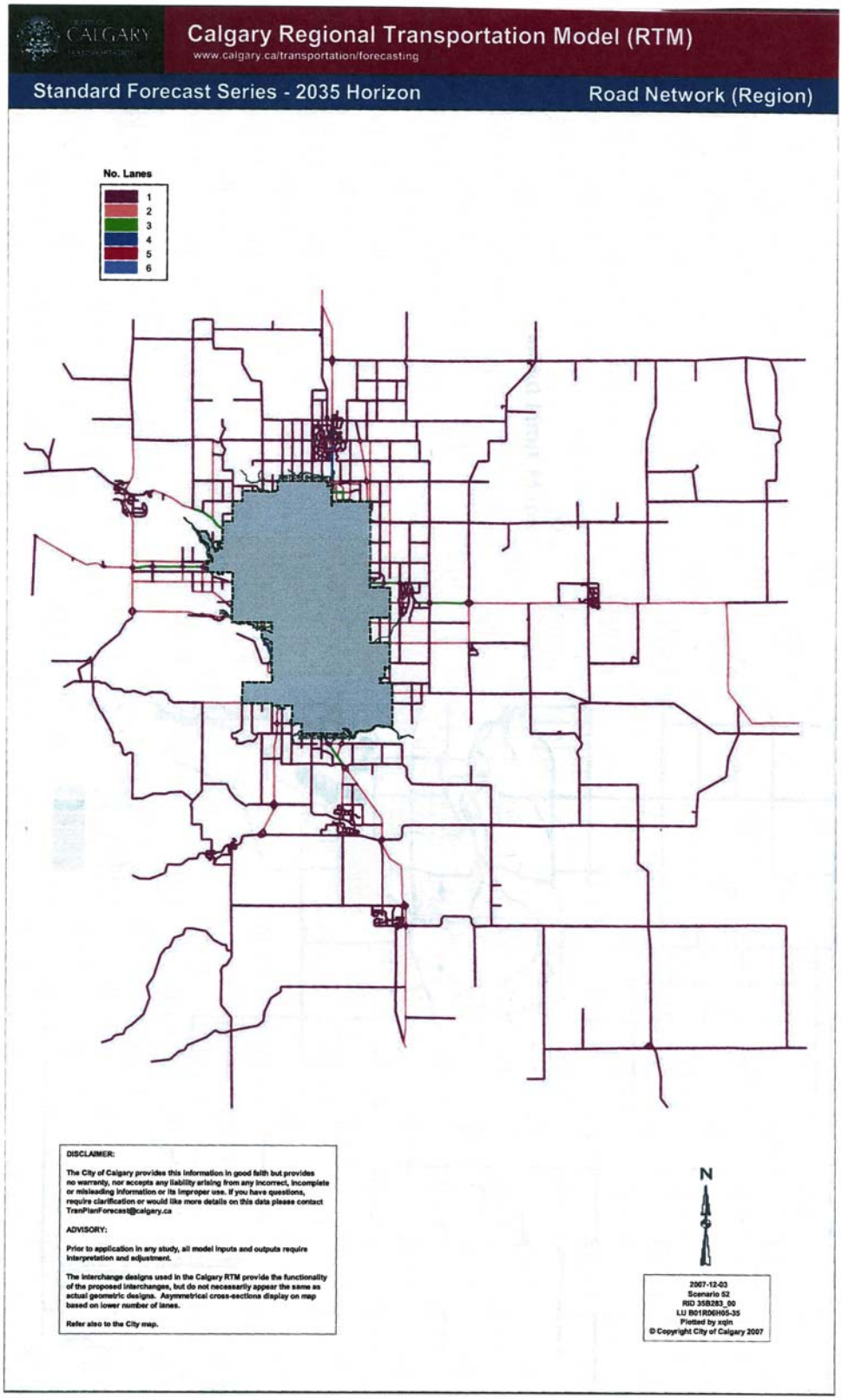
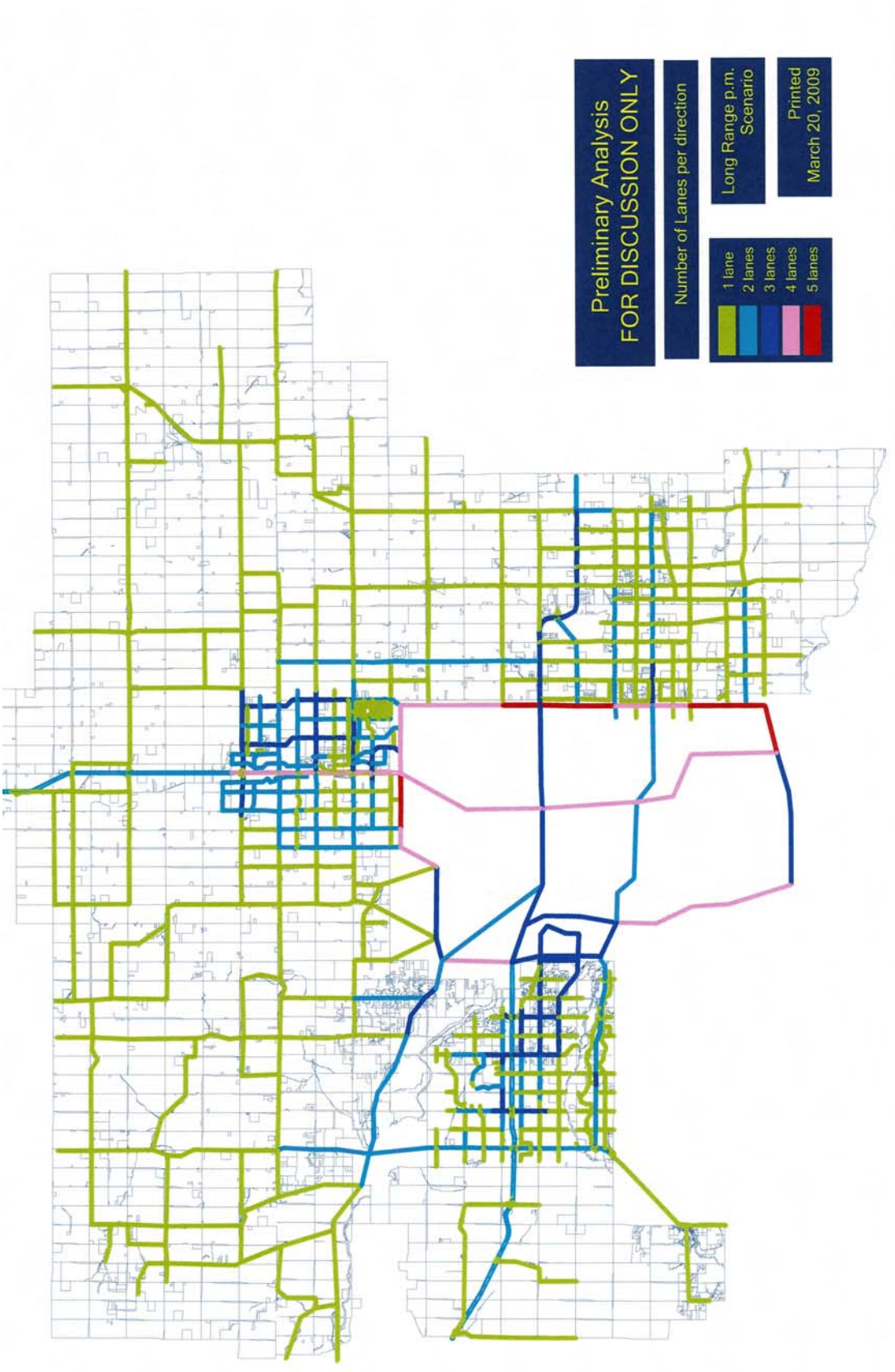


Figure 7: Current Network


Preliminary Analysis
FOR DISCUSSION ONLY
Number of Lanes per direction
1 lane
2 lanes
3 lanes
4 lanes
5 lanes
Long Range p.m. Scenario
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