Woodcroft Neighborhood Reconstruction

Some Details about the Roadwork

Queries:

Neighbors had noticed that the side streets of Woodcroft, the ones that are not bus routes or collector roads, were getting what appeared to be a lot of work done (looked like full depth reclamation with new asphalt on top). So, when they heard that the collector roads/bus routes were getting grinding and paving (milling existing 50mm of asphalt and repaving), it was natural to ask if that was "enough".

Also, there were some questions about the design life of the roadways, and what growth factors were used in predicting future traffic volumes.

Answers:

Hugh Donovan, P. Eng., Construction Services Engineer, Transportation Services, City of Edmonton

provided the following information in response to our queries:

"In detail design calculations we design a residential/residential collector using the design lane concept. This concept takes into account the traffic loading on the design lane, which in our case is taken to be the curb lane as trucks, buses and other vehicles travel in the curb lane of these types of roadways. When we design multi lane roadways such as arterial roads we need to split up the traffic volume into the individual lanes. In the case of 139 Street, we determine the traffic volume in one direction for our design calculations. To do this we calculate the bus traffic in one direction either northbound or southbound, in this case we choose northbound due to the slightly higher bus count. We then adjust the bus count by a factor of 20% due to the presence of a school. The 20% factor was chosen as it is difficult to get an accurate school bus count for the various schools. It should also be noted that a loaded school bus imparts about ½ of the load that an Edmonton Transit bus imparts due to their Tandem Axles.

With respect to the truck traffic volume, for a residential/residential collector we use a truck factor that would allow for 16 heavy trucks per day total, 365 days per year. For modeling passenger car and passenger truck type vehicles we use a design factor of 0.0001 which indicates that regardless of the number of passenger cars and passenger trucks that use the roadway their effect is so small that it does not affect the design calculations.

After all this we then add in an annual growth factor of 1.0%.

All of the roadways in Woodcroft have been structurally tested and have been designed to a 20 year design life. The original neighborhood roadways would have been designed to a 20 year design life when the initial designs were completed prior to initial construction.

In evaluating a neighborhood rehabilitation project, the Engineering Services Section gathers the following information on each roadway segment within the neighborhood:

· Existing material structural information through a Coring and Ground Penetrating Radar program;

· Roadway structural load carrying capacity of the existing structure through Dynaflect deflection testing.

Once Engineering Services get the existing pavement information we then undertake a structural design of each roadway segment within the neighborhood. From this evaluation we determine the amount of structural asphalt (amount of asphalt necessary as an overlay) to give us our 20 year design life for each roadway segment. From there we determine the most cost effective process for achieving the structural requirement for each segment.

Our standard three options in the order of cost effectiveness are:

1. Remove a portion of the existing asphalt through milling and place back a new wearing surface incorporating the structural component if there is one. (i.e. milling off 50 mm of existing asphalt material and placing 75 mm of new asphalt). This option can only be done on roadways where the existing asphalt exceeds a thickness of 100 mm and the grade requirements are such that the new asphalt wearing surface can be placed;

2. Full Depth Reclamation and overlay, where we pulverize the existing roadway into a granular material add a foamed asphalt stabilizer for a predetermined depth of stabilized layer, mix in the stabilizer, compact the stabilized base material and place 75 mm of new asphalt. (i.e. FDR 175 mm with foamed asphalt and place 75 mm of new asphalt). This option is chosen if the combined asphalt/granular base component consists of 225 mm or more and the grade requirements are such that the new asphalt wearing surface can be placed;

3. Complete reconstruction of the existing structure which incorporates removal of all existing materials to the clay subgrade, cement stabilization of the clay subgrade, placement of 300 mm of 3-20 mm or 3-63 mm granular base, followed by the placement of 100 mm of new asphalt for a Residential roadway and 120 mm of new asphalt for a Residential Collector roadway. This option is chosen if the existing structure is too thin to successfully FDR or the structural requirement is such that it is impossible to construct given grading considerations.

139 Street, 114 to 118 Avenues currently consists of 120 to 295 mm of asphalt over 55 to 230 mm of granular base, with the thinnest granular section corresponding to the thickest asphalt sections. Our structural analysis of the existing 139 Street indicates that for the 20 year design life the roadway does not need a structural overlay, thus the option chosen was to mill 50 mm place 50 mm of a new asphalt wearing surface."

We thank Mr. Donovan for his reply to our queries, especially for the level of detail that he provided in such a way that is easy enough for non-engineers to understand.

Mr. Donovan has graciously allowed us to post his reply on the Woodcroft Community League website, so that we can better understand the processes by which City engineers decide how to rebuild our roadways.