Scona Road Case Study: Challenges and Opportunities for the Widening of an Existing Major Arterial Into the City of Edmonton's Downtown Core

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ABSTRACT

Scona Road is a major urban arterial roadway which leads to one of six river crossings into Edmonton's downtown core. In 2011, the roadway underwent a full reconstruction as well as the addition of a new lane to address the existing congestion levels and safety issues which occurred as a result of vehicles attempting a merge onto Scona Road from a major arterial. A new lane was required to provide a free-flow movement for vehicles leaving the downtown.

This paper discusses the City of Edmonton's experience with the design and construction to accommodate the new alignment. A major challenge the design encountered was fully accommodating all existing adjacent property users. The west side of the roadway is adjacent to Edmonton's environmentally sensitive river valley. A detailed review was undertaken in an effort to best balance out the needs of pedestrians, cyclists, river valley users, commuters and the adjacent community. The conflicting requirements of the numerous stakeholders could not all be met within the restrictive right of way.

The intent of the report is to provide readers with an insight to an urban widening project and discuss not only the challenges but possible solutions to a topic which numerous Canadian municipalities face: What are the options and implications for widening a roadway in a fully developed and environmentally sensitive area?

1.0 BACKGROUND

The City of Edmonton is Alberta's capital with a population of approximately 800,000, as of 2009 (City of Edmonton, *Population History*). Edmonton's downtown, is located in the center of the City on the north side of the North Saskatchewan River. The river runs adjacent to the south side of downtown as illustrated in Figure 1: Overall Map of Edmoton's Downtown Area. Edmonton's downtown is connected to the south side of the City by six different river crossings within the area of approximately 97 to 104 Avenue; and 82 to 124 Street. Two of these bridges are one-way only, with one river crossing leading vehicles into and the other out of downtown.

The Low Level Bridge is one of the most central bridges and carries approximately 39,000 vehicles per day (City of Edmonton*, Traffic Volumes Average Annual Weekday Monitoring 2002 – 2007*). One of the two roads leading directly into the Low Level Bridge, is Scona Road. The other is Connors Road which brings in traffic from further east. A second river crossing connecting commuters to downtown also leads commuters onto Scona Road. The James MacDonald Bridge has a ramp which allows southbound commuters direct access onto Scona Road. Scona Road is a major arterial which in 2010 was estimated to carry an average annual weekday traffic count of 47,000 (*2010 Traffic Flow Map*, 2011). This arterial roadway plays a major role into leading traffic into Edmonton's downtown core.

Scona Road was a four lane urban arterial roadway, connecting commuters to the downtown via the Low Level Bridge on its north side and 99 Street on its south side.

In 2006, the City of Edmonton identified Scona Road to be one of its top priorites for rehabilitation. Rehabilitation plans for the repairs of the existing roadway were prepared but were deferred as the Transportation Services Department recognized Scona Road required adjustments to improve traffic flow and safety. A concept plan, report and conceptual cost estimate of the Scona Road widening was completed by the City of Edmonton's Strategic Planning Section in 2008. At this time, the pavement structure repairs for the roadway identified a full reconstruction for the northbound lanes, and a grind and overlay for the southbound lanes. Further analysis of the operation of the roadway found that numerous improvements to the carriageway were required. These improvements included the addition of a southbound lane connecting the James MacDonald off-ramp onto Scona Road, an investigation of the noise levels with respect to the adjacent residential properties, rehabilitation of an existing retaining wall, improvements to the pedestrian and cyclist infrastructure as well as improved pedestrian and vehicular access to and from the adjacent Communities.

Due to the significant and numerous improvements required, the estimated cost of the project was significantly higher than the original budget of the rehabilitation. Lack of funds postponed the widening for a number of years until 2010, at which point funding was approved for the design. The City retained ISL Engineering and Land Services to complete the preliminary and detailed design. Construction funding was secured in late 2010 for construction to take place in 2011.

2.0 ROADWAY GEOMETRIC ALIGNMENT IMPROVEMENTS

One of the major findings of the 2008 concept report, was the identification of a high number of collisions for vehicles at three problem spots (Scona Road Concept Plan, 2008). Two of the major collision locations were immediately south of the Low Level Bridge, with the higher collision location being for northbound traffic, and the second for southbound traffic. The southbound lane is also adjacent to a major bus drop off. The overwhelming cause of the collisions, specifically for the southbound traffic, was “ran off road”. The existing conditions of the roadway at this section included a tight horizontal curve which was constrained by the requirement of matching the road onto the Low Level Bridge on the one side and leading the roadway under the existing James MacDonald Bridge overpass. The option of shifting either of the structures would have immense costs and impacts which would make this solution not feasible. To correct this problem, Scona Road would have to be realigned to improve the radii within the set restrictions. The curve of the northbound and southbound roadway was increased to a radius of 140 and 135 meters respectively, just meeting the TAC requirements for the minimum radii at the specified design speed of 60 kilometers per hour. This improvement required the purchase of property on the west side of the roadway but was deemed necessary in an effort to reduce the collisions. The improvement in the roadyway alignment is illustrated in Figure 2: Radius Improvements at South End of Low Level Bridge (ISL Land and Engineering Services, 2011)

The third highest collision location following the two aforementioned areas, was for traffic coming off the James MacDonald Bridge off-ramp, onto Scona Road. Both the James MacDonald Bridge off-ramp traffic and the southbound traffic on Scona Road coming off the Low Level Bridge, which the James MacDonald Bridge traffic was merging into, had high traffic volumes, specifically in the afternoon peak hour. The merge onto Scona Road was located at a curve on the main line of the roadway, had poor sightlines and provided drivers with only approximately 130 meters to merge into the Scona Road traffic. The heavy traffic off the James MacDonald off-ramp made it a common occurrence to see vehicles queued up all the way onto the James MacDonald bridge itself. The traffic delays made drivers impatient and oftentimes drivers made aggressive merges into the heavy Scona Road traffic, conclusively causing fifteen collisions over a four year

period as well as significant back ups in rush hour traffic. To alleviate this issue, the conceptual report recommended extending the James MacDonald Bridge off-ramp into a new southbound lane which was to extend through to the intersection of Scona Road and Saskatchewan Drive, approximately 800 meters south of the ramp entry.

3.0 STRUCTURAL CONSIDERATIONS

To accommodate the new lane, two new retaining walls would be required. The selection and design of the retaining walls were significantly impacted by the tight road right of way constraints.

3.1 Retaining Wall Adjacent to Historical Building (Old Timer's Cabin)

The first retaining wall was on the west side of Scona Road, south of the 95A Avenue intersection. The new lane was constructed in a four to one grassed slope which separated the roadway from the Old Timers Cabin. The Old Timers Cabin is a historical cabin overlooking the North Saskatchewan River which is used as an important gathering place for numerous events throughout the year. Although the Cabin is built on property owned by the City of Edmonton, it is governed and managed by the Northern Alberta Pioneers and Descendants Association. The Cabin is a historical structure and any impacts to the structure needed to be mitigated. The design also had to keep in mind and aim to reduce impacts to the existing trees in this grassed boulevard. Four different retaining wall options were considered in the preliminary design, each with its own sets of benefits and restraints to the restrictive boulevard width. Due to the change in grades and requirement of matching into residential roads on either side, the roadway alignment had to stay mainly as per the existing alignment, with the new lane being put in the west boulevard. The restrictive right of way forced the installation of the wall to be near the roadway at a nine meter offset, and become a significant visual component of the roadway. With Scona Road being one of the major entryways into the City's core, and because the retaining wall could not be situated from the view of the commuters, attention had to be paid to the visual appeal of the structure.

The geometric restrictions and aesthetic possibilities ended up being the deciding factors in deciding the wall type. East of an alleyway immediately adjacent to the Old Timers Cabin, were tall wooden poles which carried overhead power lines that crossed the North Saskatchewan River and continued further east. The wooden poles were stabilized by guy wires which ran across the alley and down to an area in the grassed boulevard which was only a few meters from the edge of where the new roadway curb face was designed. Utility requirements dictated

that the poles could not be removed. The guy wires would have to be relocated to an already narrow boulevard which would now become even smaller due to the addition of a lane. The major challenge this issue posed was that the guy wires had to maintain an approximately equivalent existing angle from the top of the pole to the ground to provide sufficient clearance from the wires to the alleyway underneath them. Geometric constraints of the addition of the lane and the resulting need of the retaining wall along this section of land, did not allow for the wires to maintain this angle and not conflict with the retaining wall to reach the ground. The constraint caused by the confining geometric elements was able to be resolved through a creative and unique idea by Epcor, the utility owner. A solution to this problem involving the construction of a structure strictly for the purpose of supporting the guy wires at the required height was proposed. The guy wire structure was constructed approximately four meters behind the new retaining wall at a height that provided the required vertical clearance of the wires to the alleyway. The guy wire structure and associated relocation of the wires had to be completed before the construction of the noisewall. With the guy wire structure now situated four meters away from the retaining wall location, construction methods of the retaining wall had to be considered in respect to the new structure. The retaining wall which was ultimately selected for construction at this location was a cast in place, retaining wall on piles. Although taking a significant amount of time to construct, this wall provided small impact to the adjacent area as well as provided numerous possibilities for aesthetic finishes. The 165 meter wall ended up requiring 66 concrete piles, with each pile diameter approximately 90 centimeters. To obtain an aesthetic finish, the retaining wall included a rundle stone finish in an effort to maintain a ‘natural’ theme through the River Valley area. The two structures and their rundle stone finishings are shown in Figure 3: Retaining Wall 1 and Guy Wire Structure.

3.2 Retaining Wall Adjacent to River Valley at Southern Limits of Project

To accommodate the new lane, a new retaining wall was also at the southern limits of the project, along the west side of the Road. The design of this wall required thought and detail to accommodate vehicular, pedestrian and cyclist traffic, as well as close attention to the natural environment of Edmonton’s North Saskatchewan River Valley.

There exists a steep drop-off covered by trees and natural brush where the new lane was to match into an existing turn bay for cars to turn onto Saskatchewan Drive. Just south of this location, at the start of Saskatchewan Drive, the City of Edmonton was required to construct a separate retaining wall in 1995 in response to slope instability of the area. A geotechnical analysis and report was carried out which led to the recommendation of the installation of a concrete, cast in place pile wall. Any significant impacts to the River Valley were to be minimized. This area was in one of the narrowest spots of Scona Road. The east

side of the roadway consisted of private residential properties whose frontages faced towards the roadway. The houses had an existing two meter monowalk, which survey had determined had to be constructed on private property. Realigning the roadway eastwards away from the River Valley area to avoid or minimize the need for a retaining wall to encroach onto a natural area could not be accommodated as this solution would provide a further conflict with the residential properties. Residences a block north, with back yards facing the roadway, were to have a noise wall constructed to mitigate the traffic noise. Any attempt to move the roadway even closer to the homes in the south, which could not have a noise wall constructed along it due to the frontage of the homes being cut off from the right of way, was unacceptable. The City was able to negotiate and acquire the land which had an existing encroachment. In order to accommodate the new lane widening, the new retaining wall would be required to be installed at a cost of impacting the natural area.

The new retaining wall was designed to accommodate the new roadway lane as well as to replace a shared use pathway running along the roadway which tied into the River Valley trail system, south of the Old Timers Cabin. The retaining wall design took careful consideration of the inclusion of the shared use path. The shared use path was to match the width of its adjoining three meter path in the river valley. Ideal conditions would call for a three meter boulevard width to separate the path from the edge of roadway. Any space offsets in this area would provide a greater impact to the River Valley, which would call for the requirement of removing trees. Both the path and the roadway experienced heavy traffic and a separation of the different modes was required to provide a sense of safety. As a compromise, to separate the cyclists and pedestrians using the pathway from the heavy vehicular traffic, a jersey barrier with a handrail was installed until the geometrics allowed for the pathway to be shifted away from the roadway. The jersey barrier provided a complementary benefit of shielding vehicles from the natural slope into the River Valley. In an effort to mitigate the negative effect of creating a vertical obstruction which pedestrians and cyclists would tend to shy away from, an additional sixty centimeters was added to the path width, which the City felt was an acceptable compromise between providing pathway users with an acceptable walking/cycling surface, versus mitigating the impact to the natural area. This retaining wall design resulted in a seventy eight meter long retaining wall on 1.2 meter wide piles, nine meters deep.Construction of this retaining wall is shown in Figure 4: Retaining Wall 2 Construction Adjacent to River Valley.

The face of the wall faces the River Valley and for the most part is covered behind the natural growth of the natural area and is not visible to passerbys. This allowed for little attention to be paid to the aesthetic finishing of the wall, which was left in plain concrete.

3.3 Retaining Wall under James MacDonald Bridge

A third new retaining wall was added at the northern end of the project adjacent to the northbound lanes, under the James MacDonald overpass. The unique item about this retaining wall, was that it was not installed with vehicular traffic accommodation being its main purpose. Rather, it was installed to accommodate pedestrian traffic. A curbline walk along Connors Road and a second walk from the Parks area, ties into an existing one and a half meter curbline walk along Scona Road, adjacent to the northbound lanes. The back of the walk is restricted by the end of slope protection treatment coming off the James MacDonald overpass. This particular walk experiences a high volume of foot and bicycle traffic due to its connectivity to the Low Level Bridge which provides pedestrians the most direct route from the south east to the center of the city. Although this walk is substandard to accommodate cyclists, the route is actually designated as a “shared use path”. Due to its high demand in usage the City of Edmonton looked at this area and proposed to increase the walk width from its existing one and a half meter width to three and a half meters. To do this, the existing slope protection from the James MacDonald overpass would have to be cut back and replaced by a retaining wall at the back of walk. The structural engineers reviewed this option and advised that if the walk width was reduced from three and a half to three meters, significant cost reductions would be possible. An analysis of cost versus benefit was completed and ISL was directed to proceed with the structural design for a three meter wide pathway. The less desirable width of three meters was minimized for a very short distance (approximately one hundred fourteen meters), and cautionary signs would be posted to warn oncoming cyclists of the upcoming pathway width.

The construction of this retaining wall was one of the defining aspects of the project. It reflected the City of Edmonton’s effort at putting its goals from two of the City’s Visions- The Way We Green and the Way We Move into practice by ensuring that City projects not only take a look and focus mainly on vehicular improvements, but spend resources and make significant improvements to improve the City’s walkable environment. The main purpose of this retaining wall is to enhance walkability, not vehicular traffic. The geometric restrictions, in this case being the alignment of the roadway on the one side of the walk and the slope protection on the other, had the designers evaluate and aim to improve the walkability of the sidewalk. Oftentimes, when ideal solutions such as making the curbline walk wider cannot be reached, it is imperative that project managers weigh the pros and cons of various options and their associated costs so they are left with confidence that their design not only meets the original project scope, but has also met and followed the overall Vision and Strategic Plan from their City or governing body on all aspects.

4.0 ADJACENT RESIDENTIAL PROPERTIES

One of the unique properties of Scona Road is that even though it is major arterial leading into the City's core, as well as a twenty four hour truck route, the roadway is a divider of the Strathcona community and is immediately flanked by residential properties. As the traffic along Scona Road grew over the years, the negative effect of the increased vehicular traffic, especially to homes immediately adjacent to the roadway, became more noticeable. The increased traffic and truck noise was identified by the City of Edmonton as a significant issue and discussions of construction of a noise wall to protect adjacent homes took place as far back as 1992.

The City of Edmonton has an Urban Noise Policy which dictates that if the City is to build or upgrade a transportation facility adjacent to a developed residential area, the City must achieve a set noise level standard at the building face, and if the noise level is above the set level of 65 decibals, the City is to provide noise attenuation at the projects cost. Along Scona Road, traffic noise complaints had been existent for a number of years. The project scope included a noise level study and found that even though the new lane would very minutely increase the noise levels from where they were presently, the existing noise levels had already exceeded the acceptable noise levels in the City's policy and noise attenuation was required. As mentioned earlier in the report, only one block along the area on the east side of the road was qualified for the noise attenuation in the form of a noise wall, as the remaining houses had their frontages facing the roadway and could not be blocked off.

Once again, geometric constraints caused unfavourable condtions to the design of the wall. The land separating the property line from the edge of roadway was on a steep untraversable slope, covered in brush. The wall had to be placed immediately adjacent to the edge of roadway to avoid conflicting with existing sloped ground conditions towards the private homes. The alignment of the roadway on the opposite side of this project area was flanked by the river valley which needed to be avoided.

The existing edge of the roadway adjacent to the proposed noise wall had a one and a half meter curbline sidewalk running along the edge of the road. The sidewalk was a substandard width due to slope restrictions to the east. The design originally identified in the 2008 concept plan placed the noise wall at the location of the existing east side curbline walk, and had removed the east sidewalk altogether. The sidewalk removal was acceptable at this location as a direct pedestrian connection between where the walk lay adjacent to was not necessary as it only led to backs of houses. The intent for pedestrians seeking to travel to north or south, was to use the three meter shared use path on the west side of the road. There was already an existing signal facilitating safe pedestrian

crossing at the southern limits of the project at 92 Avenue. A new signal was being installed at 94 Avenue as well.

The approximately 2.4 meter high and 180 meter long wall was built using thirty eight piles, six hundred and nine millimeters in diameter. The alignment of the wall running parallel to the edge to the roadway required a barrier to ensure that the wall would not be damaged by vehicles running into it. A reinforced barrier was constructed in front of the wall, at a 1.4 meter shy line offset to the edge of travel lane, as specified to be required in the TAC standards for a roadway with a design speed of 60 kilometers per hour. The barrier was reinforced by anchoring it to its own set of piles. By structurally separating the barrier from the wall, any vehicular impacts would be isolated to the barrier, and in most cases, should not have a negative effect on the noise wall itself. The barrier was anchored to thirty nine 760 millimeter diameter piles, spaced out between the piles for the noise wall. The noise wall was the third new structure being constructed at a location which was visually prevalent to the corridor. The noise wall aesthetics were coordinated with those of the other two new retaining walls, as well as a third retaining wall which was being rehabilitated at the James MacDonald off-ramp. Each wall was covered with a rundle stone veneer selected by architects with the intent to blend into the natural visuals of the adjacent river valley. The rundle stone was also an ideal option from a maintenance perspective. As the walls were positioned so closely to the roadway, it is inevitable that the walls would sustain splashing from the roadways. Any splashes of mud, gravel, sand or other roadside grime would be camouflaged into the natural and varying coloring of the rundle stone.

Impacts of construction immediately adjacent to the property lines had to be considered. The close proximity of the wall and road construction required significant compaction to the reconstructed roadway base. This work would have to be done at close proximity to the frontage of the private property buildings. This work brought forward some concerns regarding the possibility of future claims against the City as a result of the vibratory construction methods, potentially causing structural and aesthetic damage to the adjacent houses. To be proactive in defending potential claims, high level condition assessments of the homes were completed at the start of construction with the permission of the homeowners. The assessments involved inspecting both the exteriors and interiors of the home and collecting pictures of existing damage and areas of the house susceptible to vibration damage (foundation, door and window frames). The majority of homeowners were receptive to the idea and allowed the inspectors access onto their property. The assessments were described and explained to the homeowners as beneficial to both the owners as well as the City. If damage due to the roadway construction did occur due to the need of the construction so close to the structures, the pictures would be used as evidence of progress of damage. With the permission of one of the homeowners adjacent to the noise wall construction, vibration monitors were installed. Throughout the noise wall construction period, these vibration montiors recorded levels of

vibration for major activities, providing the contractor with a warning when levels reached any damage thresholds. Prior to the start of construction, the City had invited all property owners adjacent to the proposed noise wall to provide their input on the aesthetic finishing of the wall as well as to provide them with an opportunity to vote on whether they supported the idea of a noise wall altogether. Endorsment of 60% or more of the homeowners was required by the City of Edmonton to proceed with construction of the noise wall. The early start of communication with affected stakeholders provided a positive foundation for garnering support of the homeowners for the project and made requests to the homewoners to proceed much more smoothly.

5.0 CONSTRUCTION

5.1 Construction Staging

Construction staging of the 1.3 kilometer roadway was a major consideration of the project. The narrow right of way along the project, with the adjacent river valley, as well as steep slopes along either side of the project edges left little room for construction workspace. The new pavement design of the roadway called for .75 meter deep roadway structure: 150millimeter cement stabilized subgrade, 350 millimeter granular base, 200 millimeter asphalt base and 50 millimeter asphalt overlay. At the best cases- where the roadway grades were not being lowered, the excavations for the roadway would have to be almost a meter deep. Construction staging options were evaluated with a high level of detail. Although it was concluded that construction could be staged to allow for traffic movements through the site during the construction, it would require a high level of coordination between them and as a result, restrictions would be put on the contractor that would push the project into a two year construction time-frame, if not more. City administration pushed toward a total closure of the roadway to minimize the disruptive length of construction. Initially the idea was reacted to in a hugely negative way- How could the main artery carrying such a significant portion of daily traffic into Edmonton's downtown be completely shut down? The City completed a traffic simulation exercise, and although finding the alternate routes into the Downtown would become more congested, they would be able to manage the required capacity. If the road closure did not proceed, the resultant traffic disruption to the vehicles using the roadway would last two years or longer. It was recommended that a one year closure had less negative impact over a two year construction period.

The closure would have a negative effect on the properties north of the project whose access onto their properties would be cut off from the south side of the City. If the residents were attempting to commute to the south side of the City, they would have to first cross the River onto the north side and then once again find their way to a river crossing back to the south side. Opposite restrictions

were placed on the residents immediately south of the project. This was recognized as a major impact to the community and the City aimed to minimize the impacts as much as possible. The City and ISL Land and Engineering Services put together a major Communications plan which involved having an open house at the completion of preliminary design, approximately six months ahead of construction, detailing the design aspects and impacts of the project. Two additional open houses were held in April, approximately one month ahead of the total closure to bring it to the public's attention. The open houses provided the public with detour routes and available accesses to their community and most importantly created a direct contact between the residents and the project managers assigned to the project. The initial reaction of the residents finding out about the closure was instinctively negative. However, once discussed directly with the project team members regarding the reasoning and providing more details on the construction restrictions and the logic of the closure, most residents agreed that they would rather have the inconvenience of a slightly longer commute for one construction season as compared to delays to construction in their neighbourhood for at least two years.

By putting the effort into additional public consultation, the City was able to hear citizenss concerns and solve some of the associated concerns the residents brought up, creating a positive relationship with the public. An example of this was when residents brought up concerns that the local roads that they would be restricted to take to enter their properties were in need of repair. Prior to the construction of Scona Road, the City went into the neighbourhood areas which were identified to be a concern and provided a 50mm overlay to the roadways. This was in addition to the scope and cost of work but deemed worthwhile in improving and strengthening the positive relationship between the Community and the City. Transit was also impacted. Numerous bus routes use Scona Road and would now have to be detoured. The project absorbed the cost of the detours, provided information to the public and identified estimated additional route times as a result of the detours. A new shuttle bus route was also added for the course of construction which circled around the neighbourhood, south of the road closure, on a twenty minute cycle in peak week day hours and transported passengers directly to the nearest major Transit Hub at the University.

The Old Timers Cabin, situated in the middle of the project limits had only Scona Road as its main entrance point due to the River Valley being directly adjacent to the building. The only alternate access was from an alleyway which was accessible from the northern residential roads. Realizing that the Scona Road closure would have a major impact to the organization's business operations, the Project Team had arranged for a personal, one-on-one meeting with the Old timers organizational committee- the Northern Alberta Pioneers Association. The Project Team personally introduced themselves to the Committee and offered to assist the organization to minimize the impacts. The Project offered to rehabilitate the alleyways leading up to the Old Timers Cabin that was to be used as a detour. Detour maps were printed out and provided to the Committee to

send out to the facility's customers. A direct contact for the City Construction Manager of the Project was given to the Facility manager, whom he could call if there were any issues related to construction. The Cabin had planned a rehabilitation of the building the same year as the road construction, which would require large material and construction equipment to be brought to the site. The Scona Road construction project manager coordinated with the Cabin rehabilitation and ensured detour routes were available to facilitate the size of construction equipment required at the times the Cabin requested. The outgoing and friendly attitude of the Scona Road project team in regards to facilitating the needs of the Old Timers Cabin greatly strengthened the relationship between the Old Timers Cabin Committee, the Construction team and the Community, and ended up bringing major benefits to the construction itself. The manager of the Old Timers Cabin offered to host weekly construction meetings at the Facility and even provided coffee and snacks.

5.2 Utility Coordination

Significant coordination throughout construction had also been required between the numerous utility companies. Some of the required utility work included: replacement of a water main, relocation of telecommunications ductlines; relocation of overhead power lines; relocation of streetlights; and installation of new signals. An example illustrating the constraints the utility companies faced on the project was the relocation of the telecommunications line. The existing line was placed in a location that would not allow for retaining wall excavation at the southern limits of the project without the ductline being either removed, or having a structure supporting it. The project team assigned a separate project member to coordinate the timing of the utilities and ensure that each agency had scheduled the work for appropriate times and to monitor for any cause of delays. Any timing delay of the utility work had a direct impact to the roadway construction completion date. The high level of coordination and attention paid to this portion of the project ensured the utility companies were aware how changes to their work could negatively impact the ultimate opening of the roadway. The utility companies were very supportive of the timelines set out and caused no significant delays to the construction timeline.

5.3 Contractor

In an effort to ensure the successful Contractor would meet the deadline for completion of the required roadwork in order to reopen the road on time, the City took a number of steps. The City construction tenders are typically awarded to the lowest bidder, with exceptions related to safety and environmental standard requirements. The City underwent a prequalification exercise in selecting the Contractors. This was a safeguard to ensure the bidding contractors were capable and experienced in doing similiar complex work and could demonstrate their ability to deliver on schedule. The prequalification resulted in three

successful contractors which were able to advance to the next stage of the procurements process.The contract included a clause that if the the roadway was reopened early, a bonus payment to the Contractor would be made. However any delays past the set contract date would lead to daily penalty payments by the Contractor. For the major portion of the roadway, both the bonus and penalty were identified at $9,000 a day up to a maximum of $252,000 (positive or negative). The additional financial incentive was deemed as an appropriate measure to increase the chances of the work being completed on time.

6.0 CONCLUSION

Scona Road construction started in April 2011 at which time lanes were reduced to one lane in each direction. The full road closure began in May. The Road reopened ahead of schedule in September 2011. Outstanding work to be completed in 2012 includes landscaping, completion of the rundle stone veneer along the noise wall and retaining wall as well as construction of the retaining wall under the James MacDonald overpass off the roadway. All remaining work will only require partial lane closures and will continue to allow traffic flow in both directions. The resultant roadway improvements will benefit not only vehicular commuters, but pedestrians and cyclists as well. To allow shared improvements between the various modes of transportation in a narrow road right of way not every mode could reach its ideal design standards. Analysis and creative thinking from the project designers was required to come up with innovative and affordable compromises to overcome these obstacles.

The successes of Scona Road are widely contributed to the cooperation and support of stakeholders including the community, utility companies and various City Departments such as Transit, which were affected by the construction. By being proactive and initiating contact with those affected early on in the project, the Project Team was able to hear concerns and requirements of the stakeholders and incorporate them, if possible into the design. The restrictive geometrics made any changes to one aspect of design inadvertantly impact various other aspects of the project. Sufficient time for consideration of the design change and incorporation with all other aspects of the roadway design was required. The project did receive criticism from the public that little consultation was done prior to the announcement of the work going ahead and that more involvement should have been done in the conceptual design stage. Although the work being completed was mainly to improve safety and operations, the public would have liked to contribute their input in the earlier stages of design and discuss the impacts to their community.

Sufficient preparation and proactive action on behalf of the City, Project Design Team and utility companies resulted in construction that met the set out schedule as well as maximized the benefits for the roadways various users in the limited right of way.

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FIGURES

Figure 1: Overall Map of Edmonton's Downtown Area

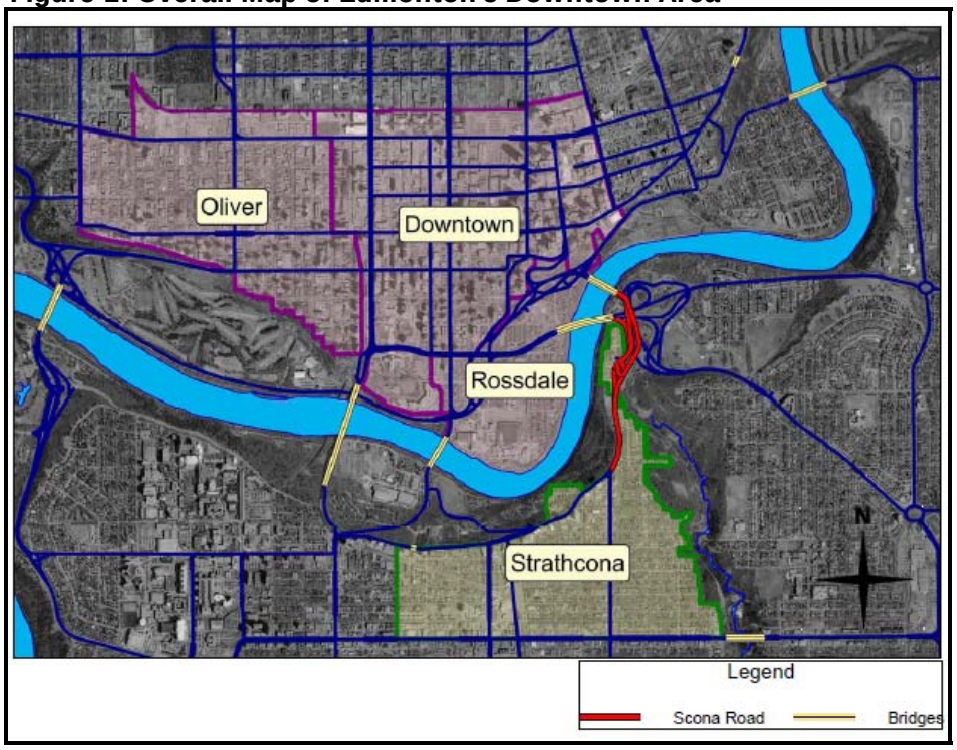

Figure 2: Radius Improvements at South End of Low Level Bridge (ISL Land and Engineering Services, 2011)

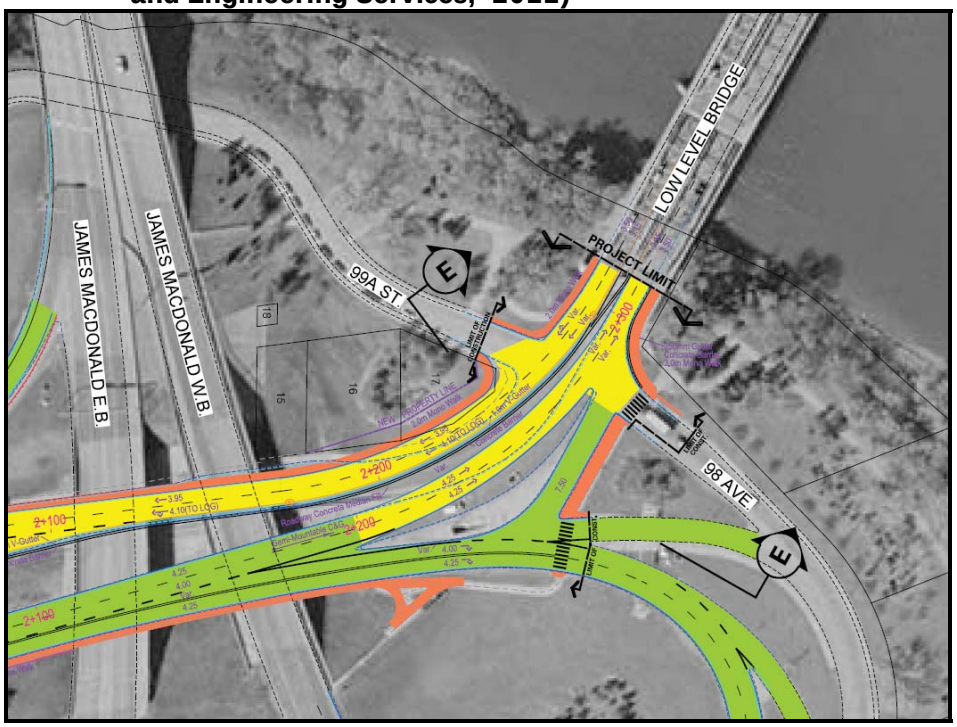

Figure 3: Retaining Wall 1 and Guy Wire Structure

Figure 4: Retaining Wall 2 Construction Adjacent to River Valley