

Executive Summary

Highway 19 and 60 is designated as the southwest truck bypass of Edmonton metropolitan area and carries traffic volumes between 9,500 average annual daily traffic (AADT) (Highway 19) and 13,840 AADT (Highway 60). The vehicle classification breakdown for these highways is generally 82 percent passenger, 15 – 16 percent commercial and the remaining recreational and buses. Alberta Infrastructure and Transportation (INFTRA) initiated a functional planning study to identify the improvements required to meet free flow traffic operations. A technical review committee comprised of INFTRA (regional staff and planning branch), the Town of Devon and Leduc County reviewed potential improvement options based on a defined set of criteria.

STUDY AREA CHARACTERISTICS

Two main water features are located within the study area, an unnamed creek that is tributary to the river, and a wetland complex. The unnamed watercourse crosses the intersection of Highways 60 and 19 and flows northward to the North Saskatchewan River. A brief field inspection and discussions with federal and provincial experts suggest that the apex of Unnamed Creek is unlikely to constitute fish habitat. The wetlands outlet to the east and eventually flow into the North Saskatchewan River. The wetlands are fed by runoff from surrounding agricultural land and the existing highway ditches.

Agricultural land is dominant within the study area, while the predominant soil types consist of water-laid sandy loams to loams and silty clay loams. Upland areas are well to moderately well drained and sometimes have imperfect to poorly drained, low-lying areas. Natural vegetation comprises less than 10 percent of the local area. Rare plants were not found along the alignment alternatives during a rare plant survey in June 2004.

RECOMMENDED IMPROVEMENT STRATEGY

Two alternative alignment concepts for the 8 km improvement of Highways 19 and 60 in the Devon area were investigated in this study. Alternative A focused on maximizing usage of the existing infrastructure within the existing highway corridor whereas Alternative B proposed development a new route concept that corresponded to existing traffic desire lines. Both concepts included two interchange facilities, but only Alternative B provided two opportunities for the town residents to access the provincial road network. Based on comments received from the general public, support from the local municipal councils and analysis of the Technical Review committee, Alternative B1 (Figure E.1) was unanimously chosen as the recommended improvement strategy.

GEOTECHNICAL REVIEW

Due to the high groundwater table in the Devon area, some of the cut sections below the groundwater table are expected to encounter minimal seepage. Where possible, the gradeline should be raised to avoid cuts below the expected groundwater table. In general, seepage rates from the clay are expected to be relatively low, and should not be a significant long-term drainage problem. Where sand is encountered below the groundwater table, greater seepage flow rates may be encountered and slope erosion could be a long-term problem. In such areas, a granular drainage blanket may be required. If necessary, subdrains may also be provided on each side of the roadway near the toe of the cut slopes, where cuts extend below the groundwater table in sand deposits.

It is expected that most of the alignment will be located on a shallow embankment fill. The foundation soils under the embankments fills are typically expected to vary from compact to wet loose sand and sand & clay to very soft to firm clay. To bridge over wet areas and reduce the potential for long-term soaking of the subgrade, a minimum embankment fill height of 1m above original ground is recommended. However, where possible the embankment fill height should be maintained below 2 m to avoid settlement and stability problems.

Highway 19 will be constructed under the existing Highway 60, with cuts of 8 metres expected. Drilled test holes indicate that the cut slopes will be mainly through clay, clay till and interlayered clay shale and sandstone bedrock. Permanent slopes of 3H:1V, or flatter, are recommended for the proposed cut slopes at the interchange location. This would also apply to the headslopes under the overpass bridge. A significant amount of muskeg is expected in the low-lying wet area west of the existing Hwy 60 from south of Miquelon Avenue to north of St. Lawrence Avenue. Special measures, consisting of the installation of wick drains and/or staged fill construction, will likely be required. In addition, wick drains will likely need to be installed. Ideally, the approach fills should be constructed well in advanced (about 1 year) prior to bridge construction to reduce the amount of settlement remaining after bridge construction.

Based on the above previous analyses and favourable performance to date of the existing south valley backslope of the North Saskatchewan River, it is recommended that an inclination of 4H:1V be used for the preliminary design of the proposed cut slopes in the south valley section of the highway realignment. For purposes of this study, the planning concept includes a multiple 'stepped' with 5 m wide benches. In addition, a catch water ditch at the top of the slope is recommended.

Based on test hole results, cast-in-place concrete end bearing piles and driven steel piles are considered feasible foundation types for the interchange bridge at the future Highway 60 / 19 bridge. Driven steel piles are recommended for the bridge foundations at the Miquelon Avenue interchange. Drilled cast-in-place concrete piles are not recommended due to the significant depth of soft clay and wet sand which could cause sloughing, squeezing and seepage problems during installation.

ENVIRONMENTAL MITIGATION

Hydrologic concerns/issues associated with the improvement of Highway 19 and 60 in the Devon area includes drainage alteration, a reduction in water quality resulting from sedimentation, potential input of deleterious substances, and a change in water flow in the creeks resulting from culvert installation, and increased road surface runoff. Mitigation measures include maintenance of drainage patterns in the vicinity of an unnamed creek and the wetland complex, use of a stormwater retention pond(s) for contaminated highway runoff, sediment and erosion control structures during construction, and measures to reduce the input of deleterious substances into the creek and river, as well as plans for containment and clean-up of potential spills.

Potential impacts to vegetation and wetlands include loss or alteration of native terrestrial and wetland communities through clearing, draining/infilling, altered drainage patterns, sedimentation and erosion, as well as weed invasion and spread, or effects of deleterious substances. No impacts to rare plants are expected as a result of the proposed project. Alternative B will impact the wetland area just west of Devon. Mitigation measures include minimizing vegetation/wetland loss by limiting the construction footprint within the wetland area, proper maintenance/cleaning of equipment during construction, re-vegetation of exposed soil surfaces and use of sediment control techniques, compensation for lost habitat through reclamation utilizing native seed mixes and wetland restoration/creation initiatives.

The proposed project has the potential to impact the fish populations / habitat in the North Saskatchewan River or lower portions of the existing creeks through the introduction sediments and deleterious substances (e.g., accidental spills, contaminated runoff). In order to mitigate these impacts, appropriate sedimentation, contaminated runoff, and spill control measures should be implemented. Two sedimentation ponds are proposed. If the recommended mitigation measures are implemented, the residual impacts of the proposed upgrading project on fish and fish habitat are expected to be insignificant.

The project was forwarded to Alberta Sustainable Resource Development, Alberta Environment and Alberta Community Development for comment. Only Alberta Environment responded with specific comments, including:

- Highway 19/60 interchange must have storm water management;
- Preliminary design should be forwarded for comment; and
- Cod of Practice application for watercourse crossings may be required.

HISTORICAL MITIGATION

Moderate to high potential for encountering intact archaeological deposits exists only for the following locations within the study area:

- those portions of Sections 28 and 33 that fall within the uncultivated terrain surrounding the drainage channels, sloughs and marsh areas, and areas (intact and cultivated) within the sand hills complex identified in LSDs 14 and 15-28-50-26 W4M;

- the approximately 80 m-wide strip of undisturbed land along the perimeter of the ravine in Sections 23, 24 and 26-51-26 W4M; and
- any undisturbed locations outside of the existing graded right-of-way for Highway 60 in the N ½ of Section 33-50-26 W4M, and in Sections 3 and 4-51-26 W4M at the crossing of the North Saskatchewan River.

It is recommended that a Historical Resources Impact Assessment (HRIA) be conducted on the above portions of the development. This assessment should include surficial inspection, shovel testing and, where necessary, deep testing by backhoe.

Leduc Number 1 Discovery Well, falls within the southern most portion of the study. Ministerial approval will be required before any work can be carried out at this location (LSD 5-22-50-26-4). The recommended highway improvement plan closes the current access to the tourist site and requires the construction of a parallel service road. The historic Atlantic-3 site (Lot 2, NW 23-50-26-4) is also located within the study area. Soils contaminated with hydrocarbons are known to exist at this location. The recommended highway improvement plan has a small impact on the northwest corner of the parcel. Additional review of this impact at the design stage is required.

An unrecorded Historic Period farmyard site was noted during the field inspection in LSD 4-28-50-26-4. The farmyard appears to date to the early 1900s and should be subject to a Historical Resources Impact Assessment (HRIA). The site of Halicz School, constructed in 1902, also falls within LSD 4-28-50-26 W4M. The school has since been levelled, with no structural remains left to be identified so no additional assessment is recommended. The recommended highway improvement plan significantly impacts this area.

STAGING

It is envisioned that this project could be constructed in stages, as required by traffic volumes and operational characteristics. The first stage is expected to occur with the twinning of Highway 19 between Highway 2 and 60. The alignment would be deflected south of the existing route and would be constructed coincidentally with the future interchange ramps east of Highway 60. The second stage of the project would include construction of the Highway 19 / 60 interchange and the remainder of the highway route west of the existing development is Devon (including reconstruction along the south bank of the North Saskatchewan River). Construction of the Miquelon Avenue interchange will be the final stage of the project.

OPINION OF PROBABLE COST

The following table summarizes an opinion of probable cost for the recommended improvements on the provincial highway network for the entire project.

Table E.1

Highway 19 / 60 – Town of Devon

Opinion on Probable Cost of Construction – Ultimate Stage

CATEGORY	Opinion of Probable Cost of Construction (\$M)
Highway Construction	\$25.6
North Saskatchewan River Bank Excavation	\$5.0
Local Road Network	\$3.8
Utility Impacts/Protection	\$2.7
Drainage Improvements	\$0.5
Hwy 60 & Miquelon Ave. Interchange	\$16.6
Hwy 60 & 19 Interchange	\$19.4
SUBTOTAL	\$73.6
(10%) Contingency	\$7.4
(25%) Engineering	\$20.2
Right-of-Way / Development Impacts	\$2.1
TOTAL	\$103.2

Note: Contingency includes miscellaneous items such as minor intersection treatments, guardrail, pavement markings, culverts, lighting modifications etc.

Table E.2 provides opinion of probable cost for the initial stage development.

Table E.2

Highway 19 / 60 – Town of Devon

Opinion on Probable Cost of Construction – Initial Stage

CATEGORY	Opinion of Probable Cost of Construction (\$M)
Highway Construction	\$9.8
Local Road Network	\$3.8
Utility Impacts/Protection	\$1.1
Drainage Improvements	\$0.2
Intersection Improvements	\$0.4
SUBTOTAL	\$15.3
(10%) Contingency	\$1.5
(25%) Engineering	\$4.2
Right-of-Way / Development Impacts	\$0.6
TOTAL	\$21.6

Note: Contingency includes miscellaneous items such as minor intersection treatments, guardrail, pavement markings, culverts, lighting modifications etc.